ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

INFORMATION TECHNOLOGY

B. TECH FOUR YEAR UG COURSE

(Applicable for the batches admitted from 2022-2023)

REGULATION: R22
(I, II, III & IV Year Syllabus)

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)
Bhaskar Nagar, Yenkapally (V), Moinabad (M), Hyderabad – 500075, Telangana, India

INSTITUTE-VISION AND MISSION

VISION:

To be a Centre of Excellence in Engineering and Management Education, Research and Application of Knowledge to benefit Society with blend of Ethical Values and Global Perception.

MISSION:

M1: To provide world class engineering education, encourage research and development.

M2: To evolve innovative applications of technology and develop entrepreneurship.

M3: To mould the students into socially responsible and capable leaders.

DEPARTMENT-VISION AND MISSION

VISION:

To become a centre of excellence in Information Technology and prepare students as professionals, by carrying high end research to meet the emerging trends to benefit the society.

MISSION:

M1: To impart quality education with multidisciplinary applications to solve complex problems concerning the industry.

M2: To create a research environment in Information Technology and prepare students to accept futuristic global challenges by encouraging continuous learning.

M3: To encourage entrepreneurship for innovation, inculcate sense of social responsibility and ethical values.

Program Educational Objectives (PEOs)

PEO1

Be a competent software engineer/developer either as an individual or as a team player in IT industry and allied branches providing viable solutions.

PEO2

Initiate life-long learning to acquire new technologies and adapt to the changing needs of IT industry through self-learning for professional development.

PEO3

Exhibit professional excellence through ethics, soft skills and leadership qualities as a responsible citizen with societal interest.

Program Outcomes(POs)

and

Program Specific Outcomes of IT Department (PSOs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO4: Conduct investigations of complex problems: using research- based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9: Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change. Any signatory needs to provide an overview of its learning outcomes and confirm that compliance of programs.

PSO1

Design, Develop, Test and Manage reliable and efficient application software systems as per user requirements.

PSO2

Acquaint with the contemporary trends and issues in industry or research settings by giving innovative novel solutions to existing problems.

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JBIET Academic Regulations - R22

Applicable to

B.Tech Regular Four Year Degree Programme

(For the Batches admitted from the Academic Year 2022- 2023) &

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2023- 2024)

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC Autonomous)

JBIET Academic Regulations - R22

Applicable to

B.Tech Regular Four Year Degree Programme

(For the Batches admitted from the Academic Year 2022- 2023)

&

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2023- 2024) Offered under **Choice Based Credit System (CBCS)**

JB Institute of Engineering and Technology (hereinafter referred to as JBIET) academic regulations **JBIET - R22** are given here under. These regulations approved by the Academic Council shall be in force and applicable from the academic year 2022- 23 onwards.

1.0 Under-Graduate Degree Programme in Engineering & Technology

J. B. Institute of Engineering and Technology (JBIET) offers a 4-Year (8 Semesters) Bachelor of Technology (B. Tech) Degree Programme for regular students under Choice Based Credit System (CBCS) in the following branches of Engineering with effect from the academic year 2022-23.

S. No.	Branch Code	Branch Name
1	**01**	Civil Engineering (CE)
2	**02**	Electrical and Electronics Engineering (EEE)
3	**03**	Mechanical Engineering (ME)
4	**04**	Electronics and Communication Engineering (ECE)
5	**05**	Computer Science and Engineering (CSE)
6	**12**	Information Technology (IT)
7	**19**	Electronics and Computer Engineering (ECM)
8	**25**	Mining Engineering (MIE)
9	**66**	Computer Science and Engineering (Artificial Intelligence and Machine Learning)-CSE(AI&ML)
10	**67**	Computer Science and Engineering (Data Science)-CSE(DS)
11	**72**	Artificial Intelligence and Data Science(AI&DS)
12	**73**	Artificial Intelligence and Machine Learning(AI&ML)

2.0 Eligibility for Admission

2.1. Admission to the undergraduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET) or the University or on the basis of any other order of merit approved by the College, subject to reservations as prescribed by the government from time to time.

2.2. The medium of instructions for the entire Undergraduate Programme in Engineering &Technology is English only.

3.0 Duration of the UG Program

Each Under Graduate (**UG**) Programme is of 4 Academic Years (8 Semesters) with the Academic Year divided into two Semesters of 22 weeks (≥90 instructional days) each. Each Semester is having "**Continuous Internal Evaluation (CIE)**" and "**Semester End Examination (SEE)**" under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC. The guidelines issued by JNTUH, AICTE and NEP-2020 are followed while designing curriculum / course structure.

3.1 ***Minimum Duration***: The minimum (normal) duration of the B. Tech. Programme for the student securing admission under Regular mode is *Four Academic Years (8 Semesters)* and for the student admitted under Lateral Entry Scheme is *Three Academic Years (6 Semesters)* starting from the commencement of the First Year First Semester.

3.2 ***Maximum Duration:*** A student admitted under Regular mode shall complete the B. Tech Programme in a maximum period of Eight Academic Years (16 Semesters) and the student admitted under Lateral Entry Scheme shall complete the
B. Tech Programme in a maximum period of Six Academic Years (12 Semesters) starting from the date of commencement of First Year First Semester.

3.3 However, student is permitted to appear in the supplementary examinations for ***two* more** academic years after the Maximum Duration of course work as mentioned in **3.2** to complete backlog subjects for fulfilling the academic requirements for the completion of the programme, failing which he/she shall forfeit his / her seat in B.Tech course.

4.0 B. Tech Programme Structure

The curriculum B. Tech Programme includes various curricular components like Foundation Courses (BS, HS and ES), Core Courses (PC, PW), Elective Courses (PE & OE), Audit Courses (AC), Mandatory Courses (MC) etc. The details of these courses and typical breakup of credits for each category is mentioned in the tables given below.

4.1 Subject/ Course Classification

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES- Engg. Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to Humanities, Social sciences and Management
4	Core Courses (CoC)	PC– Professional Core	Includes core subjects related to the parent Discipline/ department/ branch of Engineering.
5		PW- Project Work	B. Tech project or UG project or UG major project or Project Stage I & II
6		Industrial training / Mini- project	Industrial training/ Summer Internship/ Industry Oriented Mini-project/Mini-project
7	Elective Courses (ElC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
8		OE – Open Electives	Elective subjects which include inter- disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
9	Seminar	Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Audit courses (AC)	-	Value Added Course / Audit Courses (Non- Credit)
11	Mandatory Courses(MC)	-	Mandatory Courses (Non-credit)

4.2 Typical Breakup of Credits for each Category:

S.No	Category	Breakup of Credits
1	Humanities and Social Sciences (HS)- including Management.	**10**
2	Basic Sciences (BS)- Courses including Mathematics, Physics and Chemistry.	**23**
3	Engineering Sciences (ES)-Courses including Workshop, Drawing, Basics of Electrical / Electronics /Mechanical / Computer Engineering.	**22**
4	Professional Core (PC)-Courses relevant to the chosen specialization / branch.	**57**
5	Professional Electives (PE)-Courses relevant to the chosen specialization / branch.	**18**
6	Open Elective (OE) - Courses from other technical and / or emerging subject areas.	**15**
7	Mini-project / Project Work / Internship / Industrial training / Seminar	**15**
8	Mandatory Courses / Audit Courses.	**Non-Credit**
TOTAL		**160**

5.0 Credit System: The student has to register for all the courses offered in a Semester. The credits assigned for each course are indicated in an L: T: P/D: C (Lecture periods: Tutorial periods: Practical/Drawing periods: Credits) pattern as follows:

- Theory Courses: One Lecture Hour (L) per week in a semester: 01 Credit
- Practical Courses: One Practical Hour (P) Per week in a semester: 0.5 Credit
- Tutorial: One Tutorial Hour (T) Per week in a semester: 01 Credit
- Mandatory Courses: No CREDIT is awarded.
- Audit Courses: No CREDIT is awarded.

For Internship and Project Work credits are assigned based on the complexity of the work to be carried out.

The four-year curriculum of any B. Tech Program of study shall have a total of 160 credits. However, the curriculum for students admitted under lateral entry shall have a total of 122 credits.

6.0 Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:

- Student centred learning
- Students to learn courses of their choice
- Interdisciplinary learning

A Student has a choice of registering for courses comprising program core, professional electives, open electives, value added, Skill oriented courses etc. Besides, choice is also offered to students for registering courses to earn Minor in Engineering / Honours degree.

7.0 Course Registration

7.1. A faculty advisor or mentor shall be assigned to a group of 20 students, who can advise the students about the Programme, it's course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre- requisites and interest.

7.2 Before the commencement of every semester, all the students shall register for the courses offered in that semester through online registration process

7.3 A student can apply for registration, only after obtaining the 'written approval' from faculty advisor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor and the student.

7.4 If any student fails to register courses in a semester, he/she shall undergo the courses as per the course structure decided by the Head of the Department.

7.5 If any student submits ambiguous choices or multiple options or erroneous entries during registration for the subject(s) / course(s) under a given / specified course group / category as listed in the course structure, the subject / courses decided by the Head of the Department will be final.

7.6 After registering for a course, a student shall attend the classes, to satisfy the attendance requirements, earn Continuous Internal Evaluation (CIE) Marks and appear in Semester End Examinations (SEE).

7.7 Subject / course options exercised while registration is final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject / course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the first week after the commencement of class-work for that semester.

7.8 Open Electives: The students have to choose requisite number of open electives (as prescribed in the course structure) from the list of open electives. However, the student cannot opt for an open elective subject offered by his own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

7.9 Professional Electives: The students have to choose requisite number of professional electives (as prescribed in the course structure) from the list of professional electives.

7.10 Elective Courses (Professional Electives and Open Electives) shall be offered by a Department if a minimum of 30 students register for that course.

8.0. Academic Requirements

8.1 Attendance Requirements

8.1.1 A student shall be eligible to appear for the Semester End Examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (excluding attendance in Mandatory Courses and Audit Courses) for that semester. The attendance of Mandatory and Audit Non-Credit Courses should be maintained separately. Two periods of attendance for each theory subject shall be considered if the student appears for the mid-term examination of that subject.

8.1.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the College Academic Committee (CAC) on genuine and valid grounds, based on the student's representation with supporting evidence.

8.1.3 Shortage of attendance below 65% in aggregate **shall in no case be condoned**.

8.1.4 A stipulated condonation fee as decided by the CAC is payable for condoning shortage of attendance.

8.1.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester.

8.1.6 Students will not be promoted to the next semester and no grade allotments or SGPA / CGPA calculations will be done for such students for the entire semester in which they have been detained.

8.1.7 A student detained in a semester due to shortage of attendance may be readmitted in the same semester as and when offered in the forthcoming academic years for fulfilment of academic requirements. The academic regulations under which a student has been readmitted shall be applicable.

8.1.8 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

8.2 Credit Requirements

8.2.1. A student should earn credits allotted for each of the course by securing minimum marks designated as passing standard for that course.

8.2.2. A student shall be admitted under regular scheme, register for all 160 credits offered and has to earn all the credits (A student admitted under Lateral entry scheme shall register for all 122 credits offered and all the credits). However the student shall be eligible to avail the benefits that the JNTUH University announces such as exemption of subjects and grace marks for batches admitted during the academic years same as these students.

8.2.3. A student shall register for all mandatory courses mentioned in the curriculum and get minimum pass marks (i.e., 40% of total marks) to get the degree. Grade points obtained in these courses will not be considered for awarding class.

9.0 Break of Study from a Program (Gap Year)

9.1 A student is permitted to go on break of study for a maximum period of two years either as *two breaks of one year* each or a *single break of two years after completion of II year II semester*.

9.2 In case, a student wishes to extend the gap year for one more consecutive year, he shall be permitted with the prior approval of the Principal on the recommendations of the Head of the Department prior to the beginning of the semester in which he has taken break of study.

9.3 The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The gap year concept is introduced *for start-up (or) incubation of an idea, National/International Internships*, and *professional Volunteering*. Student taking break of study shall submit an application to the Principal through the Head of the department. A committee shall be appointed by the Principal in this regard. Based on the recommendations of the committee, Principal shall decide whether to permit the student to avail the gap year or not.

9.4 The students permitted to rejoin the program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining. The students rejoining in new regulations shall apply to the Principal in the prescribed format through Head of the Department, at the beginning of the readmitted semester for registering additional / equivalent courses to comply with the curriculum in-force.

9.5 The period of break of study *shall be counted in the maximum* Period of graduation (i.e the maximum period of graduation is 8 years for Regular admitted students and 6 years for Lateral Entry admitted students availing Gap Year).

9.6 If a student has not reported to the college after completion of the approved period of break of study he is deemed to be detained in that semester. Such students are eligible for readmission into the semester when offered next.

10.0. Evaluation-Distribution and Weightage of marks

10.1 The performance of a student in all theory and Laboratory courses shall be evaluated for 100 marks each, with **40 marks** allotted for **Continuous Internal Evaluation (CIE)** and **60 marks** for **Semester End-Examination (SEE).**The details of course-wise allotment of marks are given below.

S. No.	Course	Marks	
		CIE	SEE
1	Theory courses	40	**60**
2	Laboratory courses	40	**60**
3	Mandatory courses	100	--
4	Audit Courses	--	--
5	Internship- I	50	--
6	Internship- II	50	--
7	Mini Project	50	--
8	Project Stage - I	100	--
9	Seminar	50	--
10	**Project Stage - II**	**40**	**60**

10.2. Continuous Internal Evaluation (CIE)

10.2.1 ***Theory Courses:*** For theory courses, during the semester there shall be 2 **mid-term examinations** (***internal exams of 20 marks each***), **2 quizzes *of 5 marks each***), ***4 Unit tests of 10 marks each*** and ***2 assignments carrying 5 marks each***.

S. No	Component	Frequency of Evaluation	Marks for Each test	Final Marks (Average)
1	Mid Examinations	2	20	
2	Quiz Test	2	5	
3	Unit Tests	4	10	
4	Assignments	2	5	
Total			40	40

(a) Quiz Examinations (5 marks):

Each quiz examination will be of 20 minutes duration consisting of objective questions for 5 marks. The objective question paper is set with 20 questions of multiple choice, fill-in the blanks and matching type of questions. The Quiz examination shall be conducted after each spell of instructions.

(b) Mid-term Examinations (20 marks):

Each mid-term examination will be of 1 hour 20 minutes consisting of descriptive questions (long answer) for 20 marks. The descriptive paper is four questions of 5 marks each with either / or choice. The Mid-I shall be conducted after first spell of instructions covering the syllabus of Modules I and II. The Mid-II shall be conducted after second spell of instructions covering the syllabus of Modules III, IV and V.

(c) Unit Tests (10 Marks):

The Unit Tests shall be conducted by the faculty member handling the subject. The duration of Unit Test shall be 1 hour. The question paper of Unit Test shall be of descriptive type with 3 questions each of 5 marks out of which student shall answer any two. Unit Test-1 and 2 shall be conducted before I Mid Term Examination covering the syllabus of Module-1, Module-2 respectively. Unit Test-3 and 4 shall be before II Mid Term Examination covering the syllabus of Module-3, Module-4 and Module-5 respectively. The average of marks obtained from Unit Test 1,2 and the average of marks obtained Unit Test 3,4 is to be considered for CIE-I and CIE-II respectively.

(d) Assignments (5 marks):

There shall be two assignments for 5 marks each. Assignment-1 shall be submitted before First mid examinations covering the topics from Module-1 and Module-2, and the Assignment-2 shall be submitted before Second mid examinations covering the topics from Module-3, Module-4 and Module-5. The assignments are used to test the student in Bloom's higher order thinking skills.

(e) If a student is absent for any Mid-Term Examinations on medical grounds / due to any emergency / unavoidable circumstances, the student may be permitted to apply for makeup examinations within a week after completion of Mid-Term Examinations. A sub-committee with the following composition will look into such cases. Student shall pay Rs.200 per subject as registration fee in which he/she is appearing for re-examination.

S. No	Faculty Member	Designation
1	Concerned Head of the Department	Chairman
2	Faculty nominated by Principal	Member
3	Senior faculty member of the concerned Department	Member
4	Class Teacher of the class/section	Member

10.2.2 *Laboratory Courses*

Continuous Internal Evaluation (CIE): The continuous internal evaluation for laboratory courses is based on the following parameters:

There shall be Day-to-Day Evaluation for 30 marks which includes day to day Attendance (5 Marks), observation writing(5 Marks), Experimental setup/Program writing(5 Marks), Experiment conduction/Program Execution(5 Marks), Record writing(5 Marks), Viva Voce(5 Marks).

Internal laboratory examination (ILE) for 10 marks shall be conducted by the faculty member handling the laboratory. ILE shall be conducted after Second spell of instructions.

S.No	Component	Marks
1	Day-to-Day Evaluation	30
2	Internal Examination	10
	Total	40

10.3 Semester End Examinations (SEE)

10.3.1 Theory Courses

The semester end examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. **i) Part- A for 10 marks, ii) Part - B for 50 marks.**

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- The duration of Semester End Examination is 3 hours.

10.3.2 Laboratory Courses The performance of the student in laboratory courses shall be evaluated for **60 marks** jointly by Internal and External Examiners for 3 hours duration.

10.4 Internship

The students should undergo two Internships. Internship-I shall be carried out under the guidance of professors from Science, Basic engineering subjects, with topics having some social relevance. The Internship-I is to be taken up during the summer vacation after I Year II Semester Examination and it will be evaluated in II Year I semester for 50 marks. However, the process might be initiated before the end of I Year II Semester by the concerned department. The students admitted under Lateral Entry Scheme (LES) shall carry out internship in the area of their Diploma specialization under the guidance of a faculty member of that Department immediately in the first month, after their joining of the course.

The Internship-II is to be taken up during the summer vacation after II Year II Semester examination and it will be evaluated in III Year I semester for 50 marks. However, the process might be initiated before the end of II Year II Semester by the concerned department.

For both the Internships, the student shall submit a report on the training undergone. The internships shall be evaluated by a three-member committee constituted by the Head of Department to assess the student performance on the following parameters. There shall be no Semester End Examinations for the Internships.

Parameter	Marks
Internship report	15
Quality of work	15
Presentation	15
Viva-Voce	5
Total	50

10.5 Industry Oriented Mini Project

A student is required to undergo a Mini Project of his/her choice during the vacation after III Year II Semester Examination by applying theoretical concepts to develop a practical component /element/system that includes design/ testing/ analysis. The performance of a student in the Mini Project shall be evaluated in IV Year I Semester by a three-member committee constituted by the HoD as per the following parameters:

Parameter	Marks
Mini Project report	15
Quality of work	15
Presentation	15
Viva-Voce	5
Total	50

The performance of a student in Mini Project shall be evaluated based on two reviews, each carrying 50 marks. The average marks of these two reviews will be awarded. **There shall be no Semester End Examination** for the Industry Oriented Mini Project.

10.6 Seminar

There is a Seminar in IV Year II Semester for 50 Marks. The student shall deliver a seminar on any emerging topic of his / her choice from the core technical domain. The student shall submit a duly-certified Seminar report. A three-member committee constituted by the HoD will evaluate the Seminar report submitted by the student. **There shall be no Semester End Examination**.

If a student is absent for seminar on medical grounds / due to any emergency / unavoidable circumstances, the student may be permitted to reappear within a month.

10.7 Project Work

The student is required to undertake a Project Work by using the knowledge acquired by him / her during the course of study. The student is expected to design and build a complete system or subsystem on his / her area of interest. The Project Work consists of two parts namely, Project Stage - I (Project Survey) and Project Stage – II (Project Implementation). Project Stage – I is carried out during IV Year I Semester and the Project Stage – II during IV Year II Semester. A project work shall be taken up by a batch of students not exceeding 4 members under the guidance of a faculty supervisor.

For Project Stage – I, the Project Review Committee (PRC) consisting of Head of the Department, Project Coordinator, Project supervisor and one senior faculty member shall evaluate the Project Work for 50 marks. **There shall be no End Semester Evaluation for Project Phase-I**. The student is deemed to have failed, if he

(i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule

(ii) Secures less than 40% marks in the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he/she fails in such 'one reappearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

For Project Stage – II, Project Review Committee (PRC) consisting of Head of the Department, Project supervisor, Project Coordinator and a senior faculty member **shall evaluate for 40 marks as continuous evaluation**. The External Examiner shall **evaluate the Project work for 60 marks as Semester End Examination.** The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the External Examiner as per schedule, or (ii) Secures less than 40% marks in the sum total of the CIE and SEE taken together. The student is deemed to have failed, if he

(i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule.

(ii) Secures less than 40% marks in the sum total of the CIE and SEE taken together.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

For conducting Viva-Voce of Project Stage – II, Principal selects the External Examiner from the list of experts in the relevant branch of engineering submitted by the concerned Head of Department.

10.8 Mandatory Courses (MC)

Mandatory courses carry "ZERO" credits. There shall be NO Semester-end examination. However, attendance in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The Continuous Internal Evaluation (CIE) shall be conducted and evaluated for 40 marks similar to the Theory courses. In addition to this an internal Examination for 60 marks covering the syllabus from all five modules. The student shall be declared to have passed the mandatory courses only when he/she secures 40% marks in the internal evaluation carried out for 100 marks. If the student fails, a re-examination shall be conducted for such candidates in the following semester before the supplementary examinations. The performance of the student shall be indicated in the grade sheets "PASS" (or) "FAIL" Only. The student should pass all the mandatory courses, for the award of B.Tech degree.

10.9 Audit Courses (AC)

Audit courses carry **zero** credits. There shall be No mid-term and Semester end examination. However, attendance in audit courses shall be considered while calculating aggregate attendance in a semester. The student should study all the audit courses. No credits will be assigned to these courses. A separate certificate will be issued by the Head of the institution on satisfactory completion of Audit Courses.

The student may be permitted to register Mandatory courses and Audit courses as MOOCs offered by SWAYAM / NPTEL / EdX / Coursera / Udacity / Udemy /upgrad/ Khan Academy / Edureka / QEEE etc. The student shall submit weekly assessment report to the faculty coordinator as mentioned in 13.1 and the same shall be considered for internal marks and attendance.

11.0 Passing Standards

11.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each subject/ course/ Laboratories/ Project Stage-II etc. which are having both CIE and SEE, only if he/she secures not less than ***35% of marks (21 out of 60 marks)*** in the semester end examination and a **minimum of 40% of marks (**40 marks out of 100**) in the sum total** of the *continuous internal evaluation (CIE) and semester end examination (SEE)* taken together.

11.2 A student is deemed to have fulfilled the minimum academic requirements and earned the credits allotted to subjects having only internal evaluation (CIE), such as Internships / Industry Oriented Mini Project / Seminar / Project Stage - I if the student secures not less than 40% marks in each of them. However, a student who fails to secure minimum 40% marks or abstains from such subjects, he / she will be permitted to appear in the re-examination which shall be conducted before completion of Semester End Examinations. If the student fails in such re-examination he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

11.3 The student shall deemed to have failed to earn the credits allotted to subjects having only internal evaluation (CIE), if he (i) does not submit a report on Industrial Oriented Mini Project/Summer Internships, Project Stage-I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar or (iii) secures less than 40% marks in Industrial Oriented Mini Project/Summer Internship and seminar evaluations.

11.4 Such failed students may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

11.5 Recounting/Revaluation/Challenging Evaluation: Students shall be permitted to apply for Recounting /Revaluation/ Challenging Evaluation of the Semester-end examination answer scripts within a stipulated period after payment of the prescribed fee. After completion of the process of Recounting /Revaluation/Challenging Evaluation, the records are updated with changes if any, and the student shall be issued a revised grade sheet. If there are no changes, the same will be shown in the student examination portal.

11.6 Supplementary Examinations:

The supplementary examinations Odd semester shall be conducted during even semester regular/supplementary examinations and even semester supplementary examinations during Odd semester regular supplementary examinations.

Advance supplementary examinations shall be conducted to the students failed in the IV B.Tech - II Semester Regular Examinations. A notification Advance supplementary examinations shall be released after the announcement of regular results.

12.0 Promotion Rules

The students shall be deemed to have promoted to higher classes i.e. from I Year to II year , II year to III Year and III year to IV Year only after earning the below mentioned credits from theory and laboratory courses registered by him/her. The tables given in 10.1, 10.2 provide the details of the credits to be earned by the student (admitted under Regular and Laterally Entry Scheme respectively) to get promoted to higher classes.

12.1 Promotion Rules for Regular Students

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 19 credits out of 38 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 40 credits out of 80 credits i.e., 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 61 credits out of 122 credits i.e., 50% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

12.2 Promotion Rules for Lateral Entry Students

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to secondyear second semester	Regular course of study of second year firstsemester.
2	Second year second semester to thirdyear first semester	**(i)** Regular course of study of second yearsecond semester. **(ii)** Must have secured at least 21 credits out of 42 credits i.e., 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third yearsecond semester	Regular course of study of third year firstsemester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third yearsecond semester. (ii) Must have secured at least 42 credits out of 84 credits i.e., 50% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester

13.0 Massive Open Online Courses (MOOCs)

A student shall be permitted to register BOS approved list of online / self-study course in lieu of the Professional Electives; Open Electives from Massive Open Online Courses (MOOCs) offered by SWAYAM / NPTEL / EdX / Coursera / Udacity / Udemy /upgrad/ Khan Academy / Edureka / QEEE etc. However, the syllabus of the MOOC course shall be approved by the concerned BOS. No formal lectures will be delivered for a self- study course.

13.1 One faculty member for each course shall be nominated as coordinator by the Department to monitor the progress made by the student. The coordinator needs to carry out the conversion of grades awarded to the student in internal and external examinations by the MOOCs offering institution into corresponding grades of JBIET. If any student fails in successfully completing the MOOC course in the first attempt, he/she shall successfully complete it in the supplementary examination conducted by the college in the subsequent semesters. The question paper pattern and evaluation process for the examination of such subjects for MOOC courses will be similar to that of any other theory course offered under R22.

13.2 Mandatory Massive Open Online Courses (MOOCs)

A student has to undergo one mandatory MOOC course (Professional Elective- V) of 3 credit from the online MOOC platforms listed in 13.0 during IV-I semester. The department has to finalize the electives offered on MOOC platform at the end of III-I semester and take prior approval from the BOS for the MOOC course (including syllabus) to be registered by the student.

14.0 Awarding Grace Marks

A student who fails in two theory courses falling short of a few marks is eligible for 0.15% of total marks as Grace Marks.

- Grace marks addition is applicable for maximum of 2 subjects.
- Grace marks can be added only for external examinations.
- Among all the external examinations appeared by the student in a specific subject, the highest marks are considered for adding Grace Marks.
- The provision of Grace Marks is also extended for class change.

The Description of class change is given below:

i. Class Change from 49.85 % to 50 % for Pass Class to Second Class
ii. Class Change from 59.85 % to 60 % for Second Class to First Class
iii. Class Change from 69.85 % to 70 % for First Class to First Class with distinction

Note: Grace marks cannot be added to internal marks.

15.0 Internal improvement examination

Student is permitted to appear for improvement of internal marks of all papers of the B. Tech in which the candidate has not passed due to the shortage of Internal Marks. Students who secured internal marks less than specified marks are only eligible to write the Internal Improvement Examination. The specified marks can be computed using the following formula.

- For B. Tech Course: 0.4*Total-marks - 0.35*External-marks

- Students who have completed all semesters of their, B. Tech course work can only avail this option.
- This internal improvement option is extended up to double the duration of the course work.
- In case of Students who secure less marks in internal improvement examination than his/her previous internal marks or if the student is has registered for Internal Improvement but has not appeared / absent, the old marks will be retained.
- A separate notification shall be released by the JBIET examination branch for conduction of this examination and the students shall register for this option at the time of this notification.

16.0 Award of Degree

A student is declared to have 'qualified' for the award of B. Tech. degree by JNTUH, in the chosen branch of Engineering selected at the time of admission, if he/she fulfills the following conditions.

16.1 The student shall pursue a program of study for not less than four academic years and not more than eight academic years. In case of lateral entry students, student shall pursue a program of study for not less than three academic years and not more than six academic years.

16.2 The student shall register for 160 credits and has to secure all 160 credits (122 credits in case of lateral entry students). Marks obtained in all 160 credits shall be considered for the award of the class based on aggregate of grades. Also, the student should appear and complete all mandatory courses prescribed.

16.3 However, the students are eligible to avail the benefits such as exemption of credits that degree awarding University (JNTUH) announces to the students admitted during this period

16.4 Award of 2-Year B.Tech. Diploma Certificate

A student is declared to have ‘qualified’ for the award of **2-Year B.Tech. Diploma Certificate** by JNTUH, in the chosen branch of Engineering selected at the time of admission if he/she fulfils the following conditions.

1. When a student wants to exit from 4-Year B. Tech. program, He/she has to fulfil all the academic requirements and earn all the registered 80 credits (within 4 years from the date of admission) up to B. Tech. – II Year – II Semester to be eligible for **2-Year UG Diploma Certificate**.
2. The student once opted and awarded for 2-Year UG Diploma Certificate will not be permitted to Re-join in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.

16.5 Award of Class

A student who qualifies for the award of the degree as is placed in the following classes.

i. Students with final CGPA (at the end of the under graduate programme) ≥ 7.50 shall be placed in ‘**first class with distinction’**.

ii. Students with final CGPA (at the end of the under graduate program me) ≥ 6.50 but < 7.50, shall be placed in ‘**first class’**.

iii. Students with final CGPA (at the end of the under graduate program me) ≥ 5.50 but < 6.50, shall be placed in ‘**second class’**.

iv. All other students who qualify for the award of the degree, with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 5.50, shall be placed in ‘**pass class**’.

A student with final CGPA (at the end of the undergraduate programme) < 5.00 will not be eligible for the award of the degree.

17.0 Transitory Regulations:

The transitory guidelines are applicable to the students

17.1 Who have been detained due to lack of attendance in any semester, shall be permitted the join the corresponding semester.

17.2 Students detained due to shortage of credits, shall be promoted to the next semester only after acquiring the required credits as per the corresponding regulations of his / her admission

17.3 Students who have discontinued and wish to continue the Program, are eligible for admission into the unfinished semester.

Students readmitted under conditions mentioned 16.1, 16.2 and 16.3 shall satisfy all the eligibility requirements as mentioned in 3.0

If a student readmitted to R22 Regulations, has already studied any subject with 80% of syllabus common in his / her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the BOS concerned. If the readmitted student has not studied the pre-requisite subjects for any subject offered in R22 regulations, remedial classes shall be arranged by the concerned HoD.

18.0. Grading Procedure

18.1 Grades will be awarded to indicate the performance of students in each Theory subject, Laboratory / Practical, Seminar, Industry Oriented Mini Project, and Project Stage - I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade is given.

18.2 As a measure of the performance of a student, a 10-point Absolute Grading System using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks is followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

Credit Points (CP) = Grade Point (GP) x Credits …. For a course

A student passes the subject/ course only when GP ≥ 5 ('C' grade or above).

18.3 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of Credit Points ($\sum$ CP) secured from all subjects/ courses registered in a semester, by the total number of Credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as given below:

$$SGPA = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{i=1}^{N} Ci} \text{ for each Semester}$$

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects 'registered' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

18.4 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I Year II Semester onwards at the end of each semester as per the formula.

$$CGPA = \frac{\sum_{j=1}^{M} C_j G_j}{\sum_{j=1}^{M} C_j}$$ for all S number of semesters registered

(i.e., up to and inclusive of S semesters, S ≥ 2),

where 'M' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I Year I Semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

$$SGPA = \frac{152}{21} = 7.24$$

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point(GP)	Credit Points(CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

$$CGPA = \frac{518}{69} = 7.51$$

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

18.5 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used.

18.6 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA is mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, Mandatory Courses will not be taken into consideration.

19. 0 Transfer Of Students From Other Colleges / Universities

Transfer of students from other Colleges or Universities are permitted subject to the rules and regulations of Telangana State Council for Higher Education (Technical Education Department) and JNTUH in vogue.

20.0 Malpractices Rules

Disciplinary Action For / Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	**Punishment**
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.

2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year.
3.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
4.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
5.	Refuses to obey the orders of the chief superintendent/ assistant superintendent / any officer on duty or misbehaves or creates disturbance	In case of students of the college, they is expelled from examination halls and cancellation of their performance in that subject and all

	of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination	other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a Police case is registered against them.
6.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The student is also debarred for two consecutive semesters from class work and all End examinations. The

		continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
7.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
8.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
9.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be

		permitted for the remaining examinations of the subjects of that semester/year
10.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.

- *If any malpractice is detected which is not covered in the above clauses 1 to 10 shall be referred to the Malpractice Committee for further action and to award suitable punishment.*

ANNEXURE-I

J.B.INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC Autonomous)

Accredited by NBA & NAAC, Approved by AICTE & Permanently affiliated to JNTUH

Yenkapally(V), Moinabad(M), P.O. Himayat Nagar, R.R. District, Hyderabad-500075

Academic Regulations for *B. Tech. with Honours program*

1. Objectives

The key objectives of offering B. Tech. with Honours program are:

- To expand the domain knowledge of the students laterally and vertically to cope up with Education 4.0.
- To enhance the employability of undergraduate students as per Industry 4.0 standards.
- To provide an opportunity to students to pursue their higher studies in wider range ofspecializations.

2. Academic Regulations for B. Tech. Honours degree

1) The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4-Years B. Tech. program.
2) For B. Tech with Honours program, a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). The broad guidelines for the courses of Honours program, their respective credits weightage and semester-wise break-up of the course are enclosed as Annexure. **All these 20 credits need to be completed in III year I Semester to IV year I Semester only.**
3) After registering for the Honours programme, **if a student is unable to pass all courses in first attempt and earn the required 20 credits, he/she shall not be awarded Honours degree**. However, if the student earns all the required 160 credits of B. Tech., he/she will be awarded only B. Tech degree in the concerned branch.
4) There is no transfer of credits from courses of Honours program to regular B. Tech. degreecourse & vice versa.

5) These 20 credits are to be earned from the additional courses offered by the host department in the college or from a closely related department in the college as well as from the MOOCS platform.

6) **Guidelines for courses selected under MOOCs platform :**

   a) Prior to registration of MOOCS courses, formal approval of the courses, by the Head of the Department is essential. Head of the Department before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

   b) Department wise MOOCs finalized are to be consolidated and needs to be approved by BOS before commencement of the semester.

   c) Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Honours course structure provided by the JBIET.

   d) Only Pass-grade/marks or above shall be considered for inclusion of grades in the Honours grade memo.

   e) Any expenses incurred for the MOOCS courses are to be met by the students only.

7) The **choice to opt/take the Honours program is purely on the choice of the students**.

8) The student shall be given a **choice of withdrawing all the courses registered and/or the credits earned for Honours program at any time**; and in that case the student will be awarded only B. Tech. degree in the concerned branch on earning the required credits of 160.

9) The students of every branch can choose Honours program in their respective branches if they are eligible for the Honours program**. A student who chooses an Honours program is not eligible to choose a Minor program and vice-versa.**

10) Students can register for the Honours program only if they fulfill the **eligibility criteria.**

11) A student can graduate with Honours if he/she fulfils the requirements for his/her regular B. Tech. program as well as fulfils the requirements for Honours program.

12) The record of students registered and pursuing their Honours programs branch-wise is sent to JNTUH once the enrolment process is complete.

13) The department shall prepare the time-tables for each Honours program offered at their respective departments without any overlap/clash with other courses of study in therespective semesters.

3. Eligibility conditions of the students for the Honours degree

a) A student can opt for B.Tech. degree with Honours, if she/he passed all subjects in first attempt in all the semesters till the results announced and **maintaining 7.5 or moreCGPA.**

b) **If a student fails in any registered course of either B. Tech. or Honours in any semester of four years program, he/she will not be eligible for obtaining Honours degree**. He will be eligible for only B. Tech. degree

c) **Prior approval of mentor and Head of the Department for the enrolment into Honours program, before commencement of III year I Semester (V Semester), is mandatory.**

d) If more than 30% of the students in a branch fulfil the eligibility criteria (as stated above), the number of students given eligibility is limited to 30%. The criteria to be followed for choosing 30% candidates in a branch may be the **CGPA secured bythe students till II year I semester.**

e) Successful completion of 20 credits earmarked for honours program with at least 7.5 CGPA along with successful completion of 160 credits earmarked for regular B. Tech. Program with at least 7.5 CGPA and passing all subjects in first attempt gives the eligibility for the award of B. Tech. (Honours) degree.

f) For CGPA calculation of B. Tech. course, the 20 credits of Honours program will not beconsidered.

4. Registration for the course in Honours program

a) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

b) The students should choose a course from the list against each semester (from Honours course structure) other than the courses they have studied/registered for regular B.Tech programme. No course should be identical to that of the regular B. Tech. course. The students should take the advice of faculty mentors while registering for a course at the beginning of semester.

c) The maximum No. of courses for the Honours is limited to two in a semester along with regular semester courses.

d) The students need to register the Honours degree by paying an registration fee of Rs. 1000/- per one credit.

e) A fee for late registration will be imposed as per the norms of JNTUH.

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Academic Regulations for Honours degree in B. Tech. programs

S. No.	Year / Semester	Course to be chosen from/studied	Mode of Learning	No. of Credits
1	III-I	PE-1	Blended/Conventional	4
2	III-I	PE-2	Blended/Conventional	4
3	III-II	PE-3	Blended/Conventional	4
4	III-II	MOOC Platform (PE-4 or an Inter disciplinary subject)	MOOCS	2
5	IV-I	PE-5	Blended/Conventional	4
6	IV-I	MOOC Platform (PE-6 or an Inter disciplinary subject)	MOOCS	2
	Total Credits			**20**

Note:

- The attendance and evaluation scheme for Honours degree courses will be same as the regular B. Tech. courses.

- If the blended course option is chosen, for the subjects in any semester, the learning should be partially in online mode and partially in offline mode. The Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) shall be carried out by JBIET.

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Yenkapally(V), Moinabad(M), P.O. Himayat Nagar, R.R. District, Hyderabad-500075

Academic Regulations for *B. Tech. with Minors program*

5. Objectives

The key objectives of offering B. Tech. with Minor program are:

- To expand the domain knowledge of the students in one of the other branches ofengineering.
- To increase the employability of undergraduate students keeping in view of better opportunity in interdisciplinary areas of engineering & technology.
- To provide an opportunity to students to pursue their higher studies in the inter-disciplinaryareas in addition to their own branch of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrustareas of Engineering.

6. Academic Regulations for B. Tech. Minors degree

14) The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4-Years B. Tech. program.

15) For B. Tech with Minors program, a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). The broad guidelines for the courses of Minors program, their respective credits weightage and semester-wise break-up of the course are enclosed as Annexure. **All these 20 credits need to be completed in III year I Semester to IV year I Semester only.**

16) After registering for the Minors programme, **if a student is unable to pass all courses in first attempt and earn the required 20 credits, he/she shall not be awarded Minors degree**. However, if the student earns all the required 160 credits of B. Tech., he/she will be awarded only B. Tech degree in the concerned branch.

17) There is no transfer of credits from courses of Minors program to regular

B. Tech. degreecourse & vice versa.

18) These 20 credits are to be earned from the additional courses offered by the host department in the college or from a closely related department in the college as well as from the MOOCS platform.

19) Guidelines for courses selected under MOOCs platform :

a) Prior to registration of MOOCS courses, formal approval of the courses, by the Head of the Department is essential. Head of the Department before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

b) Department wise MOOCs finalized are to be consolidated and needs to be approved by BOS before commencement of the semester.

c) Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Minors course structure provided by the JBIET.

d) Only Pass-grade/marks or above shall be considered for inclusion of grades in the Minors grade memo.

e) Any expenses incurred for the MOOCS courses are to be met by the students only.

20) The **choice to opt/take the Minors program is purely on the choice of the students**.

21) The student shall be given a **choice of withdrawing all the courses registered and/or the credits earned for Minors program at any time**; and in that case the student will be awarded only B. Tech. degree in the concerned branch on earning the required credits of 160.

22) The students of every branch can choose Minors program in their respective branches if they are eligible for the Minors program**. A student who chooses an Minors program is not eligible to choose a Minor program and vice-versa.**

23) Students can register for the Minors program only if they fulfill the **eligibility criteria.**

24) A student can graduate with Minors if he/she fulfils the requirements for his/her regular B. Tech. program as well as fulfils the requirements for Minors program.

25) The record of students registered and pursuing their Minors programs

branch-wise is sent to JNTUH once the enrolment process is complete.

26) The department shall prepare the time-tables for each Minors program offered at their respective departments without any overlap/clash with other courses of study in therespective semesters.

7. Eligibility conditions of the students for the Minors degree

g) A student can opt for B.Tech. degree with Minors, if she/he passed all subjects in first attempt in all the semesters till the results announced and **maintaining 7.5 or moreCGPA.**

h) **If a student fails in any registered course of either B. Tech. or Minors in any semester of four years program, he/she will not be eligible for obtaining Minors degree**. He will be eligible for only B. Tech. degree

i) **Prior approval of mentor and Head of the Department for the enrolment into Minorsprogram, before commencement of III year I Semester (V Semester), is mandatory.**

j) If more than 30% of the students in a branch fulfil the eligibility criteria (as stated above), the number of students given eligibility is limited to 30%. The criteria to be followed for choosing 30% candidates in a branch may be the **CGPA secured bythe students till II year I semester.**

k) Successful completion of 20 credits earmarked for Minors program with at least 7.5 CGPA along with successful completion of 160 credits earmarked for regular B. Tech. Program with at least 7.5 CGPA and passing all subjects in first attempt gives the eligibility for the award of B. Tech. (Minors) degree.

l) For CGPA calculation of B. Tech. course, the 20 credits of Minors program will not beconsidered.

8. Registration for the course in Minors program

f) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

g) The students should choose a course from the list against each semester (from Minors course structure) other than the courses they have studied/registered for regular B.Tech programme. No course should be identical to that of the regular B. Tech. course. The students should take the advice of faculty mentors while registering for a course at the beginning of semester.

h) The maximum No. of courses for the Minors is limited to two in a semester along with regular semester courses.

i) The students need to register the Minors degree by paying an registration fee of Rs. 1000/- per one credit.

j) A fee for late registration will be imposed as per the norms of JNTUH.

-oOo-

Academic Regulations for Minors degree in B. Tech. programs

S. No.	Year / Semester	Course to be chosen from/studied	Mode of Learning	No. of Credits
1	III-I	PE-1	Blended/Conventional	4
2	III-I	PE-2	Blended/Conventional	4
3	III-II	PE-3	Blended/Conventional	4
4	III-II	MOOC Platform (PE-4 or an Inter disciplinary subject)	MOOCS	2
5	IV-I	PE-5	Blended/Conventional	4
6	IV-I	MOOC Platform (PE-6 or an Inter disciplinary subject)	MOOCS	2
	Total Credits			**20**

Note:

- The attendance and evaluation scheme for Minors degree courses will be same as the regular B. Tech. courses.

- If the blended course option is chosen, for the subjects in any semester, the learning should be partially in online mode and partially in offline mode. The Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) shall be carried out by JBIET.

****

I Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P/D**	**Credits**
1	L110B	English	3	0	0	3
2	L110A	Differential Equations and Calculus	3	1	0	4
3	L110C	Applied Physics	3	0	0	3
4	L115A	Programming for Problem Solving	3	1	0	4
5	L1102	Physics Lab	0	0	2	1
6	L1101	English Language and Communication Skills Lab	0	0	2	1
7	L1151	Programming for Problem Solving Lab	0	0	4	2
8	L11M2	Audit course – I (Human Values and Professional Ethics)	2	0	0	0
		Total	14	2	8	18

I Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P/D**	**Credits**
1	L120D	Engineering Chemistry	3	0	0	3
2	L120A	Linear Algebra and Advanced Calculus	3	1	0	4
3	L112A	Basic Electrical and Electronics Engineering	3	1	0	4
4	L1232	Engineering and IT Workshop	1	0	4	3
5	L1231	Engineering Drawing	1	0	4	3
6	L1203	Chemistry Lab	0	0	2	1
7	L1221	Basic Electrical and Electronics Engineering Lab	0	0	4	2
8	L12M1	Audit course – II (Functional English)	2	0	0	0
		Total	13	2	14	20

II Year I Semester						
S. No	Code	Course Title	L	T	P/D	Credits
1	L210C	Mathematical Foundations of Computer Science	3	0	0	3
2	L210A	Probability and Statistics	3	1	0	4
3	L216A	Data Structures using C	3	0	0	3
4	L215E	Operating Systems	3	0	0	3
5	L215C	Computer Networks	3	0	0	3
6	L2161	Data Structures lab	0	0	3	1.5
7	L2154	Operating Systems and Computer Networks Lab	0	0	3	1.5
8	L2163	Internship-I	0	0	2	1
9	L21M2	Mandatory Course -I (Environmental Science)	2	0	0	0
		Total	17	1	8	20

II Year II Semester						
S. No	Code	Course Title	L	T	P/D	Credits
1	L225E	Software Engineering	3	0	0	3
2	L224F	Digital Logic Design and Computer Organization	3	1	0	4
3	L225F	Python Programming	3	0	0	3
4	L225C	Design and Analysis of Algorithms	3	0	0	3
5	L226B	Database Management System	3	0	0	3
6	L226C	Automata and Compiler Design	3	0	0	3
7	L2252	Python Programming Lab	0	0	3	1.5
8	L2261	Database Management System Lab	0	0	3	1.5
9	L22M1	Mandatory Course – II (Gender Sensitization)	2	0	0	0
		Total	20	1	6	22

III Year I Semester						
S. No	Code	Course Title	L	T	P/ D	Credits
1	L31EA	Business Economics And Financial Analysis	3	1	0	4
2	L316A	Object Oriented Programming through Java	3	0	0	3
3	L316B	Data science through Python	3	0	0	3
4	BTITE1	Professional Elective-I	3	0	0	3
5	BTITO1	Open Elective-I	3	0	0	3
6	L3161	OOP through Java lab	0	0	2	1
7	L3162	Data science through Python Lab	0	0	3	1.5
8	L3163	Internship-II	0	0	2	1
9	L31M2	Mandatory Course-III (Cyber Security)	2	0	0	0
10	L31T2	Audit Course-III (Foundations of Entrepreneurship)	2	0	0	0
		Total	19	1	7	19.5

III Year II Semester						
S. No	Code	Course Title	L	T	P	Credits
1	L325B	Web Technologies	3	0	0	3
2	L326A	Linux Programming	3	0	0	3
3	BTITE2	Professional Elective -II	3	0	0	3
4	BTITE3	Professional Elective -III	3	0	0	3
5	BTITO2	Open Elective -II	3	0	0	3
	BTITO3	Open Elective -III	3	0	0	3
6	L3252	Web Technologies Lab	0	0	3	1.5
7	L3261	Linux Programming Lab	0	0	2	1
8	L3201	Life Skills and Professional Skills Lab	0	0	4	2
9	L32M1	Mandatory Course-III (Artificial Intelligence)	2	0	0	0
10	L32T1	Audit Course-III (Employability Skills)	2	0	0	0
		Total	22	0	9	22.5

IV Year I Semester						
S. No	Code	Course Title	L	T	P	Credits
1	L416A	Data Analytics Using R	3	1	0	4
2	L416B	Data Warehousing and Data Mining	3	0	0	3
3	BTITE4	Professional Elective -IV	3	0	0	3
4	BTITE5	Professional Elective -V	3	0	0	3
5	BTITO4	Open Elective -IV	3	0	0	3
6	L4161	Data Analytics Using R Lab	0	0	3	1.5
7	L4162	Data Mining Lab	0	0	3	1.5
8	L4163	Mini Project	0	0	4	2
9	L4164	Major Project Phase-I	0	0	4	2
10	L41M6	Mandatory Course-IV Unified Modelling Language	2	0	0	0
		Total	17	1	14	23

IV Year II Semester						
S. No	Code	Course Title	L	T	P	Credits
1	BTITE6	Professional Elective -VI	3	0	0	3
2	BTITO5	Open Elective -V	3	0	0	3
3	L4262	Major Project Phase-II	0	0	16	8
4	L4261	Seminar	0	0	2	1
		Total	6	0	18	15

Professional Elective-I

S. No	Code	Course Title	L	T	P	D	Credits
1	L315E	Cloud Computing	3	0	0	0	3
2	L316F	Information Retrieval Systems	3	0	0	0	3
3	L316G	Principles of Programming Language	3	0	0	0	3

Professional Elective-II

S. No	Code	Course Title	L	T	P	D	Credits
1	L325E	Software Testing Methodologies	3	0	0	0	3
2	L325F	Software Project Management	3	0	0	0	3
3	L326E	Software Architecture and Design Pattern	3	0	0	0	3

Professional Elective-III

S. No	Code	Course Title	L	T	P	D	Credits
1	L326H	Open Source Software	3	0	0	0	3
2	L326I	Object Oriented Analysis and Design	3	0	0	0	3
3	L326J	Object Oriented Software Engineering	3	0	0	0	3

Professional Elective-IV

S. No	Code	Course Title	L	T	P	D	Credits
1	L416E	Adhoc Sensor Networks	3	0	0	0	3
2	L416F	Storage Area Networks	3	0	0	0	3
3	L416G	Wireless Networks and Mobile Computing	3	0	0	0	3

Professional Elective-V(Mandatory MOOC)							
S. No	Code	Course Title	L	T	P	D	Credits
1	L416H	MOOC-1	3	0	0	0	3
2	L416I	MOOC-2	3	0	0	0	3
3	L416J	MOOC-3	3	0	0	0	3

Professional Elective-VI							
S. No	Code	Course Title	L	T	P	D	Credits
1	L42DB	Big Data Analytics	3	0	0	0	3
2	L427E	Internet of Things	3	0	0	0	3
3	L42AC	Machine Learning	3	0	0	0	3

Open Elective-I					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L31OA	Elements of CIVIL Engineering	**3**	**3**	CE
2	L31OB	Introduction to Computer Networks	**3**	**3**	CSE
3	L31OC	Introduction to Machine Learning	**3**	**3**	AI&ML
4	L31OD	Fundamentals Of Data Science	**3**	**3**	AI&DS
5	L31OE	Principles of Communications	**3**	**3**	ECE
6	L31OF	Fundamentals of Digital Logic Design	**3**	**3**	ECM
7	L31OG	Energy Engineering	**3**	**3**	EEE
8	L31OH	Open Source Software's	**3**	**3**	IT
9	L31OI	Automotive Technology	**3**	**3**	MECH
10	L31OJ	Introduction to Mining Technology	**3**	**3**	MINING
11	L31OK	Entrepreneurship for Micro, Small and Medium Enterprises	**3**	**3**	MBA
12	L31OL	Numerical Solution of Ordinary Differential Equations	**3**	**3**	Maths
13	L31OM	Nano materials	**3**	**3**	Physics
14	L31ON	Chemistry of Engineering materials	**3**	**3**	Chemistry
15	L31OO	Technical writing skills	**3**	**3**	English
16	L31OP	Indian Constitution	**3**	**3**	English

Open Elective-II

S. No	Code	Course Title	L	Credits	Approving BOS
1	L32OA	Construction Management, Contracts and valuation	**3**	**3**	CE
2	L32OB	Principles of Operating Systems	**3**	**3**	CSE
3	L32OC	Introduction to Predictive Analytics	**3**	**3**	AI & ML
4	L32OD	Business Data Analytics	**3**	**3**	AI & DS
5	L32OE	Basics of IC Technology	**3**	**3**	ECE
6	L32OF	Introduction to Micro Processor and Micro Controllers	**3**	**3**	ECM
7	L32OG	Hybrid Electric Vehicles	**3**	**3**	EEE
8	L32OH	Distributed Systems	**3**	**3**	IT
9	L32OI	Fundamentals of Operations Research	**3**	**3**	MECH
10	L32OJ	Introduction to Surface Mining	**3**	**3**	MINING
11	L32OK	Intellectual Property Rights	**3**	**3**	MBA
12	L32OL	Numerical Solution of Partial Differential Equations	**3**	**3**	Maths
13	L32OM	Advanced physics for Engineers	**3**	**3**	Physics
14	L32ON	Nano Chemistry	**3**	**3**	Chemistry
15	L32OO	Teamwork and Team Building	**3**	**3**	English
16	L32OP	Essence of Indian Traditional Knowledge	**3**	**3**	English

Open Elective-III					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L32OQ	Road Safety Engineering	**3**	**3**	CE
2	L32OR	Introduction to Java Programming	**3**	**3**	CSE
3	L32OS	Introduction to Neural Networks	**3**	**3**	AI&ML
4	L32OT	Health Care Data Analytics	**3**	**3**	AI&DS
5	L32OU	MATLAB Programming Language	**3**	**3**	ECE
6	L32OV	Introduction to Sensors and Its Applications	**3**	**3**	ECM
7	L32OX	Non-Conventional Energy Sources	**3**	**3**	EEE
8	L32OY	Soft Computing	**3**	**3**	IT
9	L32OZ	Basics of Robotics	**3**	**3**	MECH
10	L32O1	Basic Mining Geology	**3**	**3**	MINING
11	L32O2	Digital Marketing	**3**	**3**	MBA
12	L32O3	Number Theory and Cryptography	**3**	**3**	Maths
13	L32O4	NDT and Vaccum Technology	**3**	**3**	Physics
14	L32O5	Chemistry for Engineers	**3**	**3**	Chemistry
15	L32O6	Technical communication skills	**3**	**3**	English

Open Elective-IV					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L41OA	Environmental Impact Assessment	3	3	CE
2	L41OB	Introduction to Python Programming	3	3	CSE
3	L41OC	Introduction to Deep Learning	3	3	AI&ML
4	L41OD	Fundamentals of Big Data	3	3	AI&DS
5	L41OE	Consumer Electronics	3	3	ECE
6	L41OF	Introduction to Embedded Systems	3	3	ECM
7	L41OG	Special Electrical Machines	3	3	EEE
8	L41OH	Object Oriented Analysis and Design	3	3	IT
9	L41OI	Basics of MINE Environment	3	3	MINING
10	L41OJ	Rural Marketing	3	3	MBA

Open Elective-V					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L42OA	Energy Audit & Green buildings	**3**	**3**	CE
2	L42OB	Introduction to Big Data Analytics	**3**	**3**	CSE
3	L42OC	Introduction to Generative Adversarial Networks	**3**	**3**	AI&ML
4	L42OD	Cloud Computing	**3**	**3**	AI&DS
5	L42OE	Principles of Sensors and their Application	**3**	**3**	ECE
6	L42OF	Introduction to Electronic Instrumentation	**3**	**3**	ECM
7	L42OG	Instrumentation	**3**	**3**	EEE
8	L42OH	Cyber Laws & Ethics	**3**	**3**	IT
9	L42OI	Fundamentals to Rock Mechanics	**3**	**3**	MINING
10	L42OJ	Customer Relationship management	**3**	**3**	MBA

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech IT
I Year-I Sem</td></tr>
<tr><td>Course Code:
L110B</td><td rowspan="2">ENGLISH
(Common to CSE, IT, ECM&AI&DS)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

Module 1: [8L]

The Model Millionaire-Oscar Wilde from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: The Listening Process-Hearing and Listening; Types of Listening.
Speaking: Narrating Personal Experiences, Expressing Opinions.
Reading: Reading for Summarizing and Paraphrasing, Facts versus Opinions.
Writing Skills: Note-making, Summarizing; Writing Formal Letters.
Vocabulary and Grammar: Subject-Verb Agreement, Noun-Pronoun Agreement; Collocations.

Module 2: [8L]

The Lotos-Eaters (extract)-**Alfred Tennyson** from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Listening for Style-Communicative Purpose, Degree of Formality, Choice of Vocabulary Pronunciation and Syntax;Listening for Structure-Introduction, Body and Conclusion.
Speaking: Making Presentation-Preparing a Presentation, Structuring Content, Delivering the Presentation.
Reading: Reading for Meaning;Reading for Pleasure;Making Inferences; Reading Between the Lines.
Writing Skills: Writing an Appreciation of a Poem; Paraphrasing;Note-Taking.
Vocabulary And Grammar: Word Roots and Affixes;Tenses;Correcting Errors in Punctuation.

Module 3: [8L]

Continuous Transformation-Azim Premji from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Listening with a Purpose-Barriers to Listening.
Speaking: Agreeing and Disagreeing with, and Defending Opinions.
Reading: Reading Methods-SQ3R Reading Technique.
Writing Skills: Writing Argumentative Essays.
Vocabulary and Grammar: Active and Passive Voice, Academic Vocabulary.

Module 4: [8L]

Steve Jobs-Steven Paul Jobs from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Effective Listening Strategies-Ten Thumb Rules for Good Listening.
Speaking: What is a Group Discussion? GD Strategies-Type of GDs-Dos and Don'ts.
Reading: Reading Strategies-Scanning and Skimming Skills.
Writing Skills: Writing Job Application Letters and CVs.
Vocabulary and Grammar: Phrasal Verbs, Phrasal Prepositions;Technical Vocabulary.

Module 5: [8L]

How I Became a Public Speaker (extract) – **George Bernard Shaw** from the prescribed textbook ‘Forging Ahead’ published by Orient Black Swan.
Listening: Listening for Explicit and Implicit Information.
Speaking: Making Presentations as a Team.
Reading: Reading Strategies-Extensive and Intensive Reading Skills.
Writing Skills: Report Writing-Formats of Reports, Types of Reports.
Vocabulary and Grammar: Improving Vocabulary-Avoiding Cliches, Redundancies; Correcting Common Errors.

Text Books

1. Chitra. V.B. G.M. Sundaravalli, D.S. Kesava Rao. Ed. *Forging Ahead: A Course Book for B. Tech Students:* Orient Black Swan: Hyderabad, 2022.
2. Ashraf Rizvi. M. *Effective Technical Communication*. McGraw-Hill: New Delhi, 2010.

Reference Books

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

E-Resources

1. https://poemanalysis.com/alfred-tennyson/the-lotos-eaters/
2. https://degmateng.wordpress.com/2019/11/27/ls-6-the-model-millionaire-oscar-wilde-summary/
3. https://www.google.com/search?q=Continuous+Transformation+Azim+Premji+&rlz=1C2CHBD_enIN915IN915&sxsrf=APq-WBs4xyvTdVhFoCE_EIk0ydf4s65pmw%3A1650947439347&ei=b3VnYo7lFJqf4-EP9fqTIA&ved=0ahUKEwjO2Ki98rD3AhWazzgGHXX9BAQQ4dUDCA4&uact=5&oq=Continuous+Transformation+Azim+Premji+&gs_lcp=Cgdnd3Mtd2l6EAMyBQghEKABMgUIIRCgATIFCCEQoAFKBAhBGABKBAhGGABQAFgAYLs1aAFwAXgAgAHyAYgB8gGSAQMyLTGYAQCgAQKgAQHAAQE&sclient=gws-wiz
4. https://www.britannica.com/biography/Steve-Jobs
5. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
6. https://www.learngrammar.net/english-grammar

Course Outcomes

At the end of the course, the student will be able to:
CO1. Use English Language effectively in spoken and written forms.
CO2. Comprehend the given texts and respond appropriately.
CO3. Use the proper vocabulary and grammatically correct sentences.
CO4. Communicate confidently in various contexts and different cultures.
CO5. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PS O2**
CO1								2		3		3		
CO2								2		3		3		
CO3								2		3		3		
CO4								3		3		3		
CO5								2		3		3		
Average								**2.2**		**3.0**		**3.0**		

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-I Sem			
Course Code: L110A	**DIFFERENTIAL EQUATIONS AND CALCULUS** (Common to all Branches)	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1:First Order, First Degree ODE and it Applications [9L]

Differential equations of first order and first degree ,Exact differential equation, Linear and Bernoulli differential equation.
Applications of differential equations of first order and first degree, Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

Module 2: Second and higher order ODE with constant coefficients [10L]

Second order linear differential equations with constant coefficients,Solution of Homogenous, non homogeneous differential equations, non-homogeneous terms of the type e^{ax}, sin (ax), cos (ax), polynomials in x, $e^{ax}V(x)$, xV(x). Method of variation of parameters, Equations reducible to linear ODE with constant Coefficients, Euler- Cauchy equation, Legendre's equation.

Module 3: Sequences and Fourier series [10L]

Definition of a Sequence, limit, Convergent, Divergent and Oscillatory sequences.
Series, Convergent, Divergent and Oscillatory Series, Series of positive terms,P-test, Comparison test, Alternating series, Leibnitz test, Absolute and Conditionally Convergence.
Determination of Fourier coefficients, Fourier series of even and odd functions, Fourier series in an arbitrary interval, even and odd periodic continuation, Half-range Fourier sine and cosine expansions.

Module 4: Calculus and Improper integrals[9L]

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's mean value Theorem, Taylor's Series
Definition of Improper Integrals, Beta functions, Properties of beta functions, Gamma functions, Properties of Gamma functions, Relation between the Gamma and Beta functions, evaluation of improper integrals using Beta and Gamma functions.

Module 5: Functions of Multivariable's [10L]

Limits, Continuity, Partial differentiation, partial derivatives of first and second order,homogeneous function, Euler's theorem, total derivative, Chain rule,Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undeterminedmultipliers.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.

Reference Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11th Reprint, 2010.

E-Resources

https://nptel.ac.in/courses/111106100
https://www.math.ust.hk/~machas/differential-equations.pdf
https://en.wikipedia.org/wiki/Fourier_series
https://www.khanacademy.org/math/ap-calculus-bc/bc-integration-new/bc-6-13/a/improper-integrals-review
https://onlinecourses.nptel.ac.in/noc20_ma15/preview

Course Outcomes

At the end of the course, the student will be able to:

CO1. Solve the First order linear differential equations .

CO2. Apply the concepts of higher order linear differential equations with constant coefficients solving physical problems arising in engineering.

CO3. Determine Fourier series expansion of a given function.

CO4.Analyse the improper integrals.

CO5.Find the maxima and minima of multivariable functions.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	3	2	3								3	3	1
CO2	3	3	2	3								3	3	1
CO3	3	2	3	3								2	2	
CO4	3	3	2	3								2	1	
CO5	3	3	2	2								2	1	2
Average	**3.0**	**2.8**	**2.2**	**2.8**								**2.4**	**2.0**	**1.3**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-I &II Sem			
Course Code: L110C	**APPLIED PHYSICS** (COMMON TO EEE, ECE, CSE, IT, ECM,CSE(AI&ML),CSE(DS), AI&ML&AI&DS)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Physics.

Module-1: Quantum Mechanics **[9L]**

Introduction to Quantum mechanics, Black body radiation, Planck’s law, Compton effect, Photoelectric effect -Einstein's photoelectric equation. de Broglie's concept of matter waves, Davisson and Germer’s experiment, Heisenberg’s Uncertainty Principle, Schrödinger’s Time dependent and Independent Wave Equation; Physical Significance of the Wave Function, Energy of a particle in One Dimensional Infinite Potential well.

Module-2: Band Theory of Solids& Semiconductors **[9L]**

Band Theory of Solids: Free electron theory, Density of energy states, Quantum theory of free electron, Bloch’s theorem, Kronig-Penny model (Qualitative treatment), E-K diagram, Effective mass of electrons, origin of energy bands, Classification of materials on the basis of energy bands.
Semiconductors: Intrinsic and extrinsic semiconductors, Carrier concentration, Dependence of Fermi level on carrier concentration and temperature, Hall effect.

Module–3: Light-Semiconductor Devices **[9L]**

Direct and indirect band gap semiconductors, Carrier generation and Recombination, Drift and Diffusion, P-N junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar Junction Transistor (BJT): Construction and Principle of operation. PIN, Avalanche photodiode, LED – working principle and characteristics, Solar Cell and Photo diode.

Module–4: Lasers & Fiber Optics **[9L]**

Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient of A &B, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.
Fiber Optics: Principle and construction of an optical fiber, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), Losses in optical fibers, Optical fiber communication system with block diagram and Applications of opticalfibers.

Module-5: Electromagnetism & Dielectric Properties **[9L]**

Electromagnetism: Laws of electrostatics, Electric current and the continuity equation, Ampere’s and Faraday’s laws, Maxwell’s equations.
Dielectric Properties: Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic,ionic and orientation polarizations (quantitative treatment), Internal fields in a solid, Clausius-Mossotti equation, Ferro-electricity and Piezo electricity.

Text Books

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2.Physics, Halliday and Resnick, - Wiley.
3. A textbook of Engineering Physics, Dr.TVS Arun Murthy , Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar – Chand.

Reference Books

1. Richard Robinett, Quantum Mechanics.
2. Semiconductor Optoelectronics: Physics and Technology, J.Singh, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL.
4. P.K.Palanisamy, "Engineering Physics", Scitech Publications, Fourth edition.

E-Resources

1. https://www.researchgate.net/publication/259574083 Lecture Notes on Engineering Physics.
2. https://www.researchgate.net/publication/292607115_Applied_Physics.
3. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational +physics/journal/40094
4. http://www.springer.com/physics/journal/340 .
5. http://nptel.ac.in/courses/113104012/
6. https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFCh SiCj7jBidO0.
7. https://www.youtube.com/watch?v=4a0FbQdH3dY.

Course Outcomes

After completion of this course the student is able to

1. Realize the concept of uncertainty principle and to compute quantized energy levels.
2. Analyze the formation the bands thereby classification of materials on the basis of transport properties.
3. Identify the semiconductors for engineering applications.
4. Analyze working principle of lasers and to summarize its applications.
5. Formulate and solve the engineering problems on electromagnetism and dielectrics.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO2	3	2	2									3		
CO3	3	2	2									3		
CO4	3	2	2									2		
CO5	3	2	2									2		
Average	3	2	2									2		

Correlation: 3–Strong; 2–Medium; 1-Weak

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IT I Year – I Sem			
Course Code: L115A	**PROGRAMMING FOR PROBLEM SOLVING** (Common For All Branches)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites:
1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:
The Student will:
1. Learn the fundamentals of computers.
2. Understand the various steps in program development.
3. Understand the syntax and semantics of C programming language.
4. Learn the usage of structured programming approach in solving problems.
5. Gain the knowledge on searching and sorting methods.

Module 1:
INTRODUCTION TO PROGRAMMING:
Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.
Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.
Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments
Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch- case, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Module 2:
ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:
Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.
Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures.
Preprocessor: Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

Module 3:

POINTERS AND FILE HANDLING IN C:

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type.

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Module 4:

FUNCTION AND DYNAMIC MEMORY ALLOCATION:

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

Module 5:

INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques),Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexitythrough the example programs

Text Books:

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3^{rd}Edition).

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16^{th}Impression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4^{th}Edition
5. Byron Gottfried, Schaum'sOutline of Programming with C,McGraw-Hill

E - Resources:

1. https://fresh2refresh.com/c-programming/
2. https://www.studytonight.com/c/
3. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
4. https://www.programiz.com/c-programming
5. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundaments_of_C.pdf
6. http://cs.indstate.edu/~cbasavaraj/cs559/the_c_programming_language_2.pdf

Course outcomes:

The student will be able to:

1. Design the algorithms/flowcharts of C-programs.
2. Write the Code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code.
4. Make Use of arrays, pointers, strings and structures to write C Programs.
5. Apply searching and sorting algorithms.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2							3				3	3
CO2	3	2							3					2
CO3	3	2							3					2
CO4	3	2							2				3	3
CO5	3	2							2					2
Average	**3.0**	**2.0**							**2.6**				**3.0**	**2.4**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-I Sem			
Course Code: L1102	**PHYSICS LAB** (COMMON TO: All branches)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Intermediate basic concepts.

List of Experiments:

1:Energy gap of P-N junction diode

To determine the energy gap of a semiconductor diode.

2. Solar Cell:

To study the V-I Characteristics of solar cell.

3. Light emitting diode and Laser Diode:

Plot V-I characteristics of light emitting diode and Laser diode.

4. Optical fiber:

Determination of Numerical Aperture of an optical fibre.

5. Hall effect:

To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect

To determine work function of a given material.

7. LASER

To study the Wave length of LASER Source.

8. Dielectric Constant

To determine the Dielectric constant of the given material.

9. LCR Circuit

To determine the Quality factor of LCR Circuit (Series & Parallel).

10. R-C Circuit

To determine the time constant of R-C circuit (Growth and Decay).

11. Melde's Experiment

To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

12. Torsional Pendulum

To determine the rigidity modulus of the material of the given wire using torsional pendulum.

13. Newton's Rings

To determine the radius of curvature of the lens by forming Newton's rings.

14. Diffraction Grating

To determine the number of lines per inch of the grating.

15. Sonometer

To determine the frequency of AC Supply sonometer.

Note: Any 10 experiments are to be performed.

Text Books

1. Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4th edition) ,
2. " Engineering Physics Lab Resources" By Department of Physics JBIET.

Course Outcomes

At the end of the course, students will be able to

1. **CO1**. Learn the experimental concepts on in LED, Electric and Electronics materials.
2. **CO2.**Get the knowledge of fundamentals of Semiconductor physics.

3. **CO3**. Design, characterization and study of properties of material help the students to prepare newmaterials for various engineering applications.
4. **CO4.** Be exposed to the phenomena of waves, oscillations and optics.
5. **CO5.** Lasers and fiber optics enable the students to apply to various systems like communications,solar cell, photo cells and so on.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3		2					3					
CO2	3	3		2					3					
CO3	3	2	2	2					3					
CO4	3	2	2	2					3					
CO5	3	2	2	2					3					
Average	**3.0**	**2.4**	**2.0**	**2.0**					**3.0**					

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-I Sem			
Course Code: L1101	**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB** (Common to CSE, IT, ECM & AI&DS)	L	T	P	D
Credits: 1		**0**	**0**	**2**	**0**

Pre-Requisites:

English Language and Communication Sills Lab (ELCS) will have two parts:

a) **Computer Assisted Language Learning (CALL) Lab:**
b) **Interactive Communication Skills (ICS) Lab:**

Module 1: [9L]

CALL Lab:
Common Indian Variants in Pronunciation-Introduction to Phonetics – Speech Sounds – Vowels and Consonants;Minimal Pairs;Pronunciation Patterns.
ICS Lab:
Ice-Breaking Activity and JAM Session- Situational Dialogues -Greetings-Taking Leave - Introducing Oneself and Others.

Module 2: [9L]

CALL Lab:
The Phoneme: The Syllable.
ICS Lab:
Features of Good Conversation - Non-verbal Communication- Telephone Etiquette-Role Plays.

Module 3: [9L]

CALL Lab:
Stress-Word and Sentence Stress- Stress Shift- Strong and Weak Forms.

ICS Lab:
Presentations Skills-Formal Presentations.

Module 4: [9L]

CALL Lab:
Intonation-Errors in Pronunciation-The Influence of Mother Tongue (MTI)-Differences in British and American Pronunciation.
ICS Lab:
Group Discussion Skills- Mock GD.

Module 5: [9L]

CALL Lab:
Listening for Specific Details-Listening Comprehension Tests.
ICS Lab:
Interview Skills-Mock Interviews.

Text Books

1. ELCS Lab Manual: A Workbook for CALL & ICS Lab Activities; Orient Black Swan.

Reference Books

2. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
3. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.
4. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.

E-Resources

7. https://bbamantra.com/listening/
8. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the%20physical%20properties%20of%20speech.
9. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with-your-students
10. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
11. https://www.learngrammar.net/english-grammar

Course Outcomes

At the end of the course, the student will be able to:

CO1. Develop correct pronunciation.

CO2. Use stress and intonation properly while speakng and writing.

CO3. Develop listening skills.

CO4. Acquire public speaking skills and structured talks.

CO5. Acquire debating and oral presntation skills.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO2**
CO1									3	3		3		
CO2									3	3		3		
CO3									3	3		3		
CO4									3	3		3		
CO5									3	3		3		
Average									**3.0**	**3.0**		**3.0**		

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td>AY 2022-23 onwards</td><td colspan="4">J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech IT
I Year – I Sem</td></tr>
<tr><td>Course Code: L1151</td><td colspan="4" rowspan="2">PROGRAMMING FOR PROBLEM SOLVING LAB
(Common For All Branches)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 2</td><td>0</td><td>0</td><td>4</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The student will:

1. Work with an IDE to create, edit, compile, run and debug programs
2. Analyse the various steps in program development.
3. Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. Develop modular, reusable, and readable C Programs using the concepts like functions, arrays etc.
5. Write programs using the Dynamic Memory Allocation concept, files

Lab Experiments:

1. a) Write a program for find the max and min from the three numbers.
   b) Write a program to read marks from keyboard and your program should display equivalent grade according to following table(if else ladder)

Marks	Grade
100 – 80	Distinction
79 – 60	First Class
59 – 40	Second Class
< 40	Fail

2. Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
3. Write a program that finds if a given number is a prime number
4. Write a C program to generate the first n terms of the sequence
5. Write a C program to find the minimum, maximum and average in an array of integers.
6. Write a C program to find Addition of Two Matrices
7. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
8. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
9. a) Write a C program to implement binary search algorithm.
   b) Write a C program to implement linear search algorithm.
10. a) Write a C program that implements the Bubble sort method.
    b) Write a C program that implements the Insertion sort method.

11. Write a C program that implements the Quick sort method.
12. Write a C program that implements the Merge sort method.

Case Studies:

1. Implement Hotel Management system in C with the following requirements.
Requirements:
-Provide the information on reserving rooms, book an event, check the features
- Give the login for both admin and user for proper login validation
-Add/View/Edit/Delete user records
-Calculate the bill after checkout of customers

2. Implement Library management system in C with the following requirements.
Requirements:
-To add Book Information
- Display Book Information
-List all the books of the given author
-List the title of the specified Book
-List the count of books in the library

Course Outcomes:

The student will be able to:

1. Formulate the algorithms for simple problems
2. Examine syntax errors as reported by the compilers
3. Define and manipulate data with arrays, strings, and structures
4. Make use of pointers with different function types
5. Create, read, and write to and from simple text and binary files.

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2							3				3	3
CO2	3	2							3					2
CO3	3	2							3					2
CO4	3	2							2				3	3
CO5	3	2							2					2
Average	3.0	2.0							2.6				3.0	2.4

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT I Year – I Sem			
Course Code: L11M2	Audit Course-I HUMAN VALUES AND PROFESSIONAL ETHICS (Common For All Branches)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course objectives:
The Student will:

1. To know the importance of corporate social responsibility and values.
2. To understand ethics as a professional responsibility.
3. Corporate ethical course and ethical audit.
4. To understand importance of values and ethical living.
5. To ensure safety at work place.

Module 1:
Introduction to Ethics

Corporate Governance – importance of Corporate Governance, Ethics & CSR (Corporate Social Responsibility)
Indian and western thoughts on ethics, value education, dimensions of ethics, goal setting importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories.

Module 2:
Professional and professionalism

Introduction to profession, professional associations, professional's roles and professional risks. Professional accountability, successful professional, ethics and profession, engineering as social experimentation, engineering ethics, roles of engineers, professional responsibilities, professional rights. Professional etiquettes- Dress code, Telephone call, Email writing.

Module 3:
Ethical codes and audits

Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes. Need for Ethical Audit, Sustainability, Ethical standards, Ethical audit.

Module 4:
Human values and ethical living

Introduction, terminology, domains of learning, human values, attitudes, Behaviour values, attitudes and professionals. Needs of life, harmony in life, what is ethical living, case studies.

Module 5:
Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right.

Safety and risk, assessment of risk, risk and cost, engineers responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit,ethical issues of safety.

Text Books:

1. Professional ethics by R. Subramanian, Oxford press.
2. Text book on Professional ethics and human values by R.S.Nagarajan, New age international.

Reference Books:

1. Professional ethics and human value by D.R.Kiran, Tata McGraw Hills education.
2. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford

E-Resources:

1. http://jits.ac.in/humanvalues_professional-ethics/
2. https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_introduction.htm
3. https://www.onlineethics.org/
4. https://onlinecourses.nptel.ac.in/noc19_hs35/preview

Course outcomes:

The student will be able to:

CO1. Use of ethical values and attitudes in their life.
CO2. Practice professional etiquettes in the profession.
CO3. Apply the different types of professional ethical codes in their organization.
CO4. Demonstrate human values,attitude and harmony in life throug ethical living.
CO5. Solve the issues related to various ethics and risks.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1								3				3		
CO2								3				3		
CO3								3				3		
CO4								3				3		
CO5								3				3		
Average								**3.0**				**3.0**		

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-II Sem			
Course Code: L120D	**ENGINEERING CHEMISTRY (**COMMON TO: AIDS, CSE, IT and ECM)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Molecular Structure and Theories of Bonding [9L]

Atomic and Molecular orbitals-Molecular orbital theory-LCAO – bonding in homo and heteronuclear diatomic molecules, molecular orbital energy level diagrams of homo nuclear di atomic molecules(N_2, O_2 and F_2), hetero nuclear di atomic molecules(CO and NO). Crystal Field Theory (CFT), Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral complexes. Magnetic and colour properties of complexes. Band theory of solids – band diagrams for conductors, semiconductors and insulators, effect of doping on conductance.

Module 2: Water and Its Treatment [10L]

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent – units of hardness-numerical problems – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in potable water treatment – Disinfection of water by chlorination and ozonization-Breakpoint chlorination. Boiler feed water- scale and sludge formation--internal treatment of boiler feed water– Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process.Desalination of brackish water – Reverse osmosis.

Module 3: Electrochemistry and Corrosion [12L]

Electrochemistry[7L]
Introduction-electrode potential, standard electrode potential, Electrochemical cell-Galvanic cell – Nernst equation derivation-applications,Numerical problems.Types of electrodes – calomel, Quinhydrone and glass electrode.determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications.Batteries – Primary (Li-MnO_2 cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).
Corrosion[5L]
Causes and effects of corrosion – chemical and electrochemical corrosion – mechanism of electrochemical corrosion, types of corrosion-galvanic, pitting and waterline corrosion-factors influencing rate of corrosion-Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods-Surface coatings-Hot dipping(Galvanizing and Tinning).

Module 4: Chemical Fuels [8L]

Fuels: Definition, classification, characteristics of a good fuel, Calorific value (CV)-HCV and LCV. Calculation of CV using Dulong's formula, numericals.
Soild Fuels: Coal-proximate &ultimate analysis-significance.
Liquid Fuels: Composition and CV of gasoline, cracking: Fixed bed catalytic cracking method. Knocking and its significance, octane number, cetane number.

Module 5: Polymers and Nanomaterials[12L]Polymers [8L]

Definition – Types of polymerization – addition and condensation polymerization with examples. Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC, Nylon-6, 6 and Bakelite.Conducting Polymers-conduction in polyacetylene.

Nanomaterials[4L]

Introduction, Synthesis:Top down and bottom up approaches. Sol-gel and Chemical Vapour Deposition(CVD) methods. Properties and applications of fullerenes, carbon nanotubes.Medical applicationsofnanomaterials.

Text Books

1. Engineering Chemistry: P. C. Jain & M. Jain, DhanpatRai Publications, New Delhi.
2. Engineering Chemistry: ShashiChawla, Dhanapathrai Publications (2019), New Delhi.

Reference Books

1. Engineering Chemistry, M. Thirumalachary and Laxminarayana, Scitech Publications.
2. Text Book of Engineering Chemistry, Cengage Learning, B.Rama Devi, Ch. VenkataRamana Reddy and PrasanthRath.
3. Engineering Chemistry (NPTEL Web-book)by B.L. Tembe, Kamaluddin andM.S.Krishnan

E-Resources

1. https://www.imnh.isu.edu/digitalatlas/hydr/basics/main/chmtxt.
2. https://chem.libretexts.org/Core/.../Electrochemistry/Basics_of_Electrochemistry
3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm
4. https://www.youtube.com/watch?v=W0-CvvAGtEM
5. https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials

Course Outcomes

At the end of the course, the student will be able to:

CO1. Analyze microscopic chemistry in terms of atomic and molecular orbitals.

CO2. Identify the suitability of water for domestic and industrial purposeslearn about the municipal water treatment using various methods.

CO3. Apply the basic principle of electro chemistry. proceduresrelated to corrosion and its control.

CO4. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various pectroscopic techniques.

CO5. Prepare the drug molecules.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3			3										
CO2	3			3		3						2		
CO3	3			3		3						2		
CO4	3			2										
CO5	3			2	2									
Average	**3.0**			**2.6**	**2.0**	**3.0**						**2.0**		

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-II Sem			
Course Code: L120A	Linear Algebra and Advanced Calculus (Common to all Branches)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites:

Module 1:Matrices and system of equations [10L]

Types of Matrices, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form,Gauss elimination,Inverse of non-singular matrices by Gauss-Jordan method.

System of linear equations, solving system of Homogeneous and Non-Homogeneous equations.

Module 2: Eigen values, Eigen Vectors and Quadratic Forms[12L]

Eigen values, Eigen vectors and their properties, Diagonalization, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

Definitions of Linear Transformation and Orthogonal Transformation, Quadratic forms, rank and nature of the quadratic forms ,index and signature, reduction of quadratic forms into canonical form using Linear Transformation and Orthogonal Transformations.

Module 3: Multiple Integrals[10L]

Evaluation of double integrals, change of order of integration, change of variables,evaluation of triple integrals, change of variables.

Applications: Finding areas and volumes, Centre of gravity.

Module 4: vector differential calculus [8L]

Scalar and vector fields, vector differentiation, level surfaces, gradient of a scalar field, directional derivative, divergence and curl of a vector field, Scalar potential energy, Tangent plane and normal line. Vector Identities (without proofs).

Module 5: Vector integral calculus [8L]

Line, surface and volume integrals.

Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem(without proofs).

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.

Reference Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

E-Resources

https://nptel.ac.in/courses/111/108/111108098/
https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
https://nptel.ac.in/courses/111/107/111107108/
https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
https://www.whitman.edu/mathematics/calculus_online/chapter16.html

Course Outcomes

At the end of the course, the student will be able to:

CO1. Solve the consistent system of linear equations.
CO2. Apply orthogonal congruent Transformations to a quadratic form.
CO3.Evaluate multiple integrals in various coordinate system.
CO4. Apply the concept of gradient, divergence and curl to formulate engineering problems.
CO5. Convert line integrals to surface integrals and surface integrals to volume integrals.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	3	3	3								2	3	2
CO2	3	3	3	3								3	3	2
CO3	3	3	3	3								3		
CO4	3	3	3	3								2	3	2
CO5	3	3	3	3								3		
Average	**3.0**	**3.0**	**3.0**	**3.0**								**2.6**	**3.0**	**2.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-II Sem			
Course Code: L122A	Basic Electrical and Electronics Engineering (Common to AIDS, IT, CSE & ECM)	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Physics

Module 1: DC and AC Circuits [10L]

Unit-I: DC Circuits [6L]

Electrical quantities - resistors - inductors - capacitors - Ohm's Law - Kirchhoff's Laws - series and parallel circuits - analysis of DC circuits - mesh, nodal - simple problems.

Unit-II: AC Circuits [4L]

Sinusoidal functions - phasor representation - RMS and Average values - form and peak factors - RLC series circuits - power and power factor-concept of three phase system.

Module 2: DC and AC Electrical Machines [9L]

Unit-I: DC Electrical Machines [5L]

Construction and principle of operation of DC machines – DC generator – EMF equation – Types – DC motor – Types.

Unit-II: AC Electrical Machines [4L]

Single phase transformer – Construction and operation – EMF equation - Three phase induction motor – Construction and operation.

Module 3: Measuring Instruments and Electrical Installation [8L]

Unit-I: Measuring Instruments [4L]

PMMC and MI Instruments - Construction and operation – Torque Equation - advantages and disadvantages.

Unit-II: Electrical Installation [4L]

Electrical Installation: Components of LT Switchgear - Switch Fuse Unit (SFU) –MCB – MCCB – Earthing.

Module 4: DIODES AND APPLICATIONS [12L]

Unit-I: P-N junction diode Principle of operation and characteristics of a P-N junction diode static and dynamic resistance of a diode , ideal diode, Zener Diode, Avalanche and Zener Breakdown mechanisms, V-I characteristics of Zener Diode

Unit-II: Rectifiers & Filters: Diode as a Rectifier Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, rectifier with Capacitor filter and π- Section filter, zener diode as a voltage regulator

Module 5: TRANSISTOR CHARACTERISTICS [12L]

Unit-I: :Bi-Polar Junction Transistor (BJT): Principle of operation of Bi-Polar Junction Transistor (BJT), current components in a junction Transistor, V-I characteristics in CB, CE,CC configurations, determination of " α" and " β " of a transistor from the V-I characteristics,

Unit-II: Field Effect Transistors (FET): Comparison of BJT & JFET, Construction & Operation of JFET, V-I Characteristics of JFET, Determination of FET Parameters from the V-I characteristics. MOSFET Construction & Operation in Enhancement and Depletion modes, V-I Characteristics of MOSFET.

Text Books

1. V.K. Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. A. K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.
4. Electronic Devices & Circuits :Millman & Halkias Mcgraw Hill
5. Integrated Electronics: Millman & Halkias Mcgraw Hill

Reference Books

7. Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand, 2018.

8. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-Resources

1. https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
2. https://nptel.ac.in/courses/108/108/108108076/
3. https://www.electrical4u.com

Reference Books

1. Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand, 2018.
2. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-Resources

1. https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
2. https://nptel.ac.in/courses/108/108/108108076/
3. https://www.electrical4u.com

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Apply the basic laws of electricity in DC and AC circuits.

CO 2. Identify the operation of electrical machines and its construction.

CO 3. Explain the functioning of measuring instruments and components of LT Switchgear.

CO 4. Analyze PN junction diode operation, characteristics and applications.

CO 5. Acquire the Knowledge of characteristics of BJT & FET in various modes of operation

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	3	3											
CO2	3	3	3											
CO3	3	3	3											
CO4	3	3	3											
CO5	2		3											
Average	**2.8**	**3.0**	**3.0**											

<table>
<tr><td>AY 2022-23 Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech IT
I Year – II Sem</td></tr>
<tr><td>Course Code: L1232</td><td rowspan="2" colspan="4">ENGINEERING AND IT WORKSHOP</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits:3</td><td>1</td><td>0</td><td>4</td><td>0</td></tr>
</table>

Pre-Requisites: Basic knowledge about tools and different trades

Course objectives:

The Student will:

1. Develop understanding of various Engineering materials and Manufacturing processes
2. Know different tools used in Carpentry, fitting, tin smithy, house wiring, welding, foundry, machine shop and black smithy.
3. Develop Engineering Skill in making components, system integration and assembly to form a useful product.
4. Study/demonstrate the concepts of computer w.r.t. it's hardware.
5. Install the operating system and perform various tasks.

Trades for Practice (Minimum 1 Exercise from each category)

1. Carpentry
2. Fitting shop
3. Tin Smithy
4. Electrical house wiring
5. Foundry practices – mould preparation
6. Welding (Arc Welding)

Trades for Demonstration

1. Black Smithy
2. Machine shop

IT Workshop

1. a. Computer Hardware: Identification of Peripherals
   b. Study of UPS and SMPS
2. a. Assembling and disassembling of a PC
   b. Simple diagnostic exercises – Related to hardware
3. a. Installation of Windows Operating System
   b. Installation of Linux Operating System
4. a. Basic Windows and Linux Commands
   b. Simple diagnostic exercises –Related to Operating System.

Course outcomes:

The student will be able to:

1. Identify, assemble and dissemble the given configuration of a computer.
2. Install the operating system in the given configuration of a computer
3. Execute commands for LINUX Operating System
4. Develop components using the techniques of carpentry, tin smithy, forging,etc. listed in trades for exercises.
5. Use the given models in machine shop and CNC lathe

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3				2				3			3		
CO2	3				2				3			3		
CO3	3				2				3			3		
CO4	3				2				3					
CO5	3				2				3					
Average	**3.0**				**2.0**				**3.0**			**3.0**		

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B. Tech: IT
I Year – II Sem</td></tr>
<tr><td>Course Code: L1231</td><td rowspan="2">ENGINEERING DRAWING
(Common to ECE, CSE, IT, ECM)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>1</td><td>0</td><td>0</td><td>4</td></tr>
</table>

Pre-requisite: Engineering Mathematics.

Course Objectives:
This course will enable students to:

1. Learn how to prepare Engineering Drawings by Manual Drafting and Computer-Aided Drawings and Practice various methods of drawing Conic Sections & Curves.
2. Learn the principles of Orthographic Projections to show the projections of points, lines and planes effectively.
3. Learn to use the various methods for drawing the projections of solids.
4. Learn to use various methods for drawing the projections of sections of solids and surface developments of solids.
5. Learn to convert orthographic views into isometric views and vice versa.

Module 1
Unit 1: Principles of Engineering Drawing: Introduction to Engineering Drawings, Significance, Introduction to AutoCAD.
Unit 2: Conic Sections: Ellipse – Eccentric Method, Arcs Method, Concentric, Circle Method, Rectangular Method; Parabola – Eccentric Method, Rectangular Method, Tangent Method; Hyperbola – Eccentric Method, Rectangular Hyperbola.
Unit 3: Curves: Cycloid – Epicycloid, Hypocycloid, Involute of Circles.
Unit 4: Scales: Construction of Plain, Diagonal Scales.

Module 2
Unit 1: Principles of Orthographic Projections: Introduction to Orthographic Projections, Conventions.
Unit 2: Projections of Points and Lines: Projections of Points in four Quadrants, Projection of Lines in first quadrant, Inclined to both Principle Planes.
Unit 3: Projections of Planes: Projections of Planes in first quadrant and inclined to both Principle Planes for Regular Geometrical Figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.

Module 3
Unit 1: Projections of Solids: Projections of Right Regular Solids – Prisms and Pyramids of Square, Rectangle, Pentagon, Hexagon; Projections of Generated Solids – Cone, Cylinder.

Module 4
Unit 1: Sections of Solids: Sectional and Auxiliary Views of Right Regular Solids – Prisms and

Pyramids of Pentagon, Hexagon; Generated solids – Cylinder and Cone.

Unit 2: Development of Surfaces of Solids: Surfaces of Right Regular solids – Prism, cylinder pyramid and cone

Module 5

Unit 1: Isometric Projections and Views: Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and Compound Solids; Conversion of Orthographic Views of simple objects to Isometric Views.

Unit 2: Orthographic Views: Conversion of Isometric Views to Orthographic Views.

(First Angle Projection Convention to be followed)

Note: *Practice of few exercises from Unit I to Unit V using open source AutoCAD software to be considered for Internal Evaluation only.*

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., "Engineering Drawing", Charotar Publishing House,2014.
2. K. Venugopal & V. Prabhu Raja, "Engineering Drawing + Auto CAD", New Age International Publishers. Fifth Edition, 2011.
3. AutoCAD Software Theory and User Manuals

Reference Books:

1. Narayana, K.L. & P Kannaiah, "Text book on Engineering Drawing", Scitech Publishers, 2008
2. Agrawal B. & Agrawal C. M., "Engineering Graphics", TMH Publication, 2012.

E - Resources:

1. https://nptel.ac.in/courses/112/103/112103019/
2. http://www.autocadtutorials.net/
3. https://urlzs.com/fLJ3T
4. https://urlzs.com/zky46
5. **Course Outcomes:**

the students will be able to:

1. Equipped with the basic knowledge of using the drawing instruments and dimensioning practice.
2. Represent any three-dimensional object with two-dimensional drawings and exposed to the visual aspects of lines and planes.
3. Visualize of solids inclined to both the planes.
4. Visualization of sections of solids and their developments.
5. Representation of 3D objects through isometric and orthographic views

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3		3									
CO2	3	3	2		2		2							
CO3	3	3			3		2							
CO4	3	3		3	2		3			3				
CO5	3	3		3	3					3				
Average	**3.0**	**3.0**	**2.5**	**3.0**	**2.6**		**2.3**			**3.0**				

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-IISem			
Course Code: L1203	**CHEMISTRY Lab** (COMMON TO: AIDS, CSE, IT and ECM)	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Nil

List of experiments(Any 10-12 experiments)

Volumetric Analysis:

1. Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Determination of total hardness of water by complexometric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Fe^{2+} in Mohr's salt using permanganomerty.
5. Estimation of ferrous iron by dichrometry.

Instrumental methods of Analysis:

6. Estimation of an HCl by Conductometric titrations using NaOH.
7. Estimation of Acetic acid by Conductometric titrationsusing NaOH.
8. Estimation of HCl by Potentiometric titrationsusing NaOH.
9. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$.

Determination of Physico-Chemical Properties:

10. Determination of viscosity of a given liquid by using Ostwald's viscometer.
11. Determination of surface tension of a given liquid using stalagmometer.
12. Determination of partition coefficient of acetic acid between n-butanol and water.

Synthesis of Nanomaterials, Polymers and drug molecules:

13. Synthesis of drug molecule Aspirin.
14. Synthesis of Polymer-Bakelite.
15. Synthesis of Iron nanoparticles.

Text Books

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg, (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D.S. Sharma, (Vikas publishing, N. Delhi)
3. "Text book of practical organic chemistry", Vogel's ,5th edition.
4. "Text book on Experiments and calculations in engineering chemistry", S.S. Dara

Course Outcomes

At the end of the course, the students will be able to:

CO1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.

CO2. Calculate the concentration and amount of various substances using instrumental techniques.
CO3. Synthesize the engineering materials like nanomaterials, polymers and drug molecules.
CO4. Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.
CO5. Determine the partition coefficient of organic compound in two immiscible liquids.

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3					2			3			2		
CO2	3								3					
CO3	3								3					
CO4	3								3					
CO5	3								3					
Average	**3.0**					**2.0**			**3.0**			**2.0**		

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT I Year-II Sem			
Course Code: L1221	**Basic Electrical and Electronics Engineering Lab (Common to AIDS, IT, CSE & ECM)**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites:

List of Experiments

1. Verification of Ohms Law.
2. Determination of unknown resistance.
3. Verification of KVL and KCL.
4. Resonance in series RLC circuit.
5. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
6. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
7. Performance Characteristics of a DC Shunt Motor.
8. Performance Characteristics of a Three-phase Induction Motor.
9. Characteristics of PN Junction Diode & Zener diode
10. Characteristics of Transistor in CB Configuration.
11. Characteristics of Transistor in CE Configuration.
12. Half Wave Rectifier & Full Wave Rectifier without & with capacitor filter
13. FET characteristics
14. Frequency Response of CE Amplifier.

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Analyze DC Circuits using basic Laws.

CO 2. Determine the impedance and current of RL, RC and RLC series circuits.

CO 3. Analyze the performance characteristics of DC and AC electrical machines. **CO4.** Describe the principle and characteristics of semiconductor diode **CO5.** Analyze various transistor configurations and rectifiers

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2						3					
CO2	3	2	2						3					
CO3	3	2	2						3					
CO4	2								3					
CO5	2								3					
Average	**2.6**	**2.0**	**2.0**						**3.0**					

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **L12M1**	**FUNCTIONAL ENGISH** (Audit Course-II) COMMON TO: ALL	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1:FUNCTIONAL ENGLISH

Introduction - Functional Spoken English;Listening – Speaking**:** Do's and Don'ts; Expressing: Ability/ Admiration/ Agreement/ Anger/ Annoyance/ Appreciation/ Pleasure/ Sarcasm/ Satisfaction/ Surprise/ Approval/ Capability/ Certainty/ Condolences/ Doubt/ Fear/ Gratitude/ Possibility/ Worry; Asking for: Advice/Clarification/Direction/Information/ Permission/ Predictions/ Recommendation.

Module 2: VOCABULARY BUILDING

Vocabulary for Day-to-day Conversations; Introduction: Vegetables/ Groceries/ Fruits/ Weather; Parts of Human body/ Dresses/ Furniture/ Relations; Birds/ Cries of Animals; Food/ Hospitality/ Houses/ Rooms/ Tools; Airport/ News Paper/ Books/ Gems; Corporate Vocabulary/ Jobs/ Occupations; Diseases; Slang Words and Technical Jargon.

Module 3: FUNCTIONAL GRAMMAR - I

Introduction: Parts of Speech;Verb Forms; Phrases and Clauses; Tenses; Speeches; Voices; Degrees of Comparison;Simple, Complex and Compound Sentences.

Module 4: FUNCTIONAL GRAMMAR - II

Sentence Making for Effective Communication; Sentence Structure – 'Wh' Questions - How to Frame Questions and Give Answers; Question Tags; Spotting Errors.

Module 5:COMMUNICATION SKILLS

Polite, Courteous and Diplomatic Terms; Useful Daily Expressions; Courtesy, Good Manners and Etiquettes; Conversation Techniques; Story Telling.

Text Books

1. L. Adinarayana and V. Prakasam, *Spoken English*, Neelkamal Publications Pvt. Ltd., New Delhi, 2008.
2. Ram Bhasker Raju, *The Complete Book on Spoken English*, Goutham Buddha Publications, Hyderabad, 2002.

Reference Books

1. Sabina Pillai, *Spoken English for My World*, Oxford University Press, New Delhi, 2016.
2. K. R. Lakshminarayanan, *Speak in English*,Scitech Publications, Chennai, 2009.

E-Resources

- https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.
- https://www.fluentu.com/blog/english/websites-to-learn-english/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.
CO3. Learn the transformation of sentences and use them effectively.
CO4. Understand making small sentences and use them in daily colloquial situation.
CO5. Learn the useful communication expression and use them in day-to-day life.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	**2**	2	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**2**	**2**	-	3	-	-
CO3	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT II Year-I Sem			
Course Code: L210C	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	L	T	P	D
Credits:3		3	0	0	0

Pre-Requisites:

Module 1: Mathematical Logic [10L]

Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.

Predicates:

Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

Module 2: [12L]

Relations:

Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

Functions:

Inverse Function Composition of functions, recursive Functions, Lattice and its Properties.

Algebraic structures:

Algebraic systems Examples and general properties, Semi groups and monoids, groups, sub groups, homomorphism, Isomorphism.

Module 3: [10L]

Elementary Combinatorics:

Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems,

The principles of Inclusion – Exclusion: The principles of Inclusion ,Exclusion. Pigeon hole principles and its application.

Module 4: Logic [8L]

Generating Functions: Generating Functions, Function of Sequences Calculating Coefficient of generating function,

Recurrence relations: solving recurrence relation by substitution and Generating functions. Characteristics roots solution of Inhomogeneous Recurrence Relation.

Module 5: [8L]

Graph Theory:

Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs.

Applications of Graph Theory: Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text Books

1. Elements of DISCRETE MATHEMATICS- A computer Oriented Approach- C L Liu, D P Mohapatra. Third Edition, Tata McGraw Hill.
2. Discrete Mathematics by RK Bisht,HS Dhami, Oxford University Press.

Reference Books

E-Resources

1. https://www.smartzworld.com/notes/mfcs-notes-pdf-mathematical-foundation-of-computer-science/
2. https://www.pdfdrive.com/elements-of-discrete-mathematics-liu-mohapatra-3rd-e136110192.html
3. https://www.iare.ac.in/sites/default/files/PPT/MFCS%20PPT.pdf
4. https://nptel.ac.in/courses/111/107/111107058/

Course Outcomes

At the end of the course, the student will be able to:

CO1.Use the notions of propositions and predicate formulae, satisfiability and formal proof.

CO2.Identify the properties of relations, functions and algebraic structures.

CO3. Apply the Permutations and combinations in problem solving

CO4. Solve recurrence relations using different methods.

CO5.Apply graph theory in solving computer science problems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	2	-	3	-	-	-	-	-	-	-	1	3	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	1	-	-	-	-	-	-	-	-	3	-
CO5	3	2	3	3	-	-	-	-	-	-	-	1	3	-
Average	**3.0**	**2.0**	**2.5**	**2.0**	-	-	-	-	-	-	-	**1.0**	**2.8**	-

.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT II Year-I Sem			
Course Code: L210A	**Probability and Statistics (Common to CE,CSE, IT, ECM, MIE,AI&ML & AI&DS)**	L	T	P	D
Credits:**4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1:Single Random variables [10L]

Introduction to probability, Random Variables, Discrete and Continuous. Probability distributions, mass function/ density function of a probability distribution, mathematical expectation, moments about origin, central moments. Moment generating function of probability distribution.

Module 2: Probability Distributions [12L]

Binomial, Poisson, Normal, exponential distributions and their Properties. moment generating functions of the above distributions and hence finds the mean and variance.

Module 3: Correlation & Regression Sampling Distributions [10L]

Correlation: Types of correlation, coefficient of correlation, the rank correlation, Covariance of two random variables. Regression- Regression coefficient, the lines of regression.

Sampling: Definitions of population, sampling, statistic, and parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means, sampling distribution of variance and sampling distribution of proportions, Parameter estimation- Point estimation and interval estimation.

Module 4: Testing of Hypothesis-I [8L]

Testing of hypothesis: Null hypothesis, Alternate hypothesis, Type I& Type II errors – critical region, confidence interval, and Level of significance. One sided test, two sided test.

Large sample tests:

(i) Test of Equality of means of two samples, equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)

(ii) Tests of significance of difference between sample S.D and population S.D.

(iii) Tests of significance difference between sample proportion and population proportion, difference between two sample proportions.

Module 5: Testing of Hypothesis-II [8L]

Student t-distribution, its properties and applications, test of significance sample mean and population mean, difference between means of two small samples. Snedecor's F- distribution and its properties. Test of equality of two population variances. Chi-square distribution, its properties, Chi-square test of goodness of fit, Chi-square test for independence & applications of attributes.

Text Books

1. S.C.Gupta and V.K.Kapoor : Fundamentals of Mathematical Statistics, 2006
2. Kantiswarup, P.K.Gupta and Manmohan Singh : Operations Research, S.Chand & Co, 2010

Reference Books

1. R. A. Johnson: Miller and Freund's Probability and Statistics for Engineers, Pearson Publishers, 9th Edition, 2017
2. Freund: Modern elementary statistics, PHI, 2006
3. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall

E-Resources

1. https://nptel.ac.in/courses/111/108/111108098/

2. https://en.wikipedia.org/wiki/Probability_distribution
3. http://www.randomservices.org/random/sample/Covariance.html
4. https://www.nptel.ac.in/ content/storage2/courses/103106120/Lecture Notes/Lec3_1.pdf
5. https://www.smartbugmedia.com/blog/hypotheses-worth-testing-on-your-website

Course Outcomes

At the end of the course, the student will be able to:
CO1. Understand the concept of probability and statistics
CO2. Find the mean and variance of a given probability distribution
CO3.Find the coefficient of correlation and lines of regression.
CO4. Test the hypothesis for large samples.
CO5. Test the hypothesis for small samples

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO2	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO3	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO4	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO5	3	1	2	2	-	-	-	-	-	-	-	1	-	-
Average	3	1	2	2	-	-	-	-	-	-	-	1	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IT II Year – I Sem			
Course Code: L216A	DATA STRUCTURES USING C	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:
1. The Algorithmic Design and Techniques.
2. Fundamentals of C Programming.

Course objectives:
The Student will:

1. Define the basic data structures like linear arrays.
2. Understand the fundamentals and applications of linked list and stacks.
3. Classify different types of tree data structures
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic sorting and pattern matchingalgorithms.

Module 1:

Introduction: Definition and classification of data structure, data structure operations. Algorithms: Complexity, Time Space trade off, Complexity of Algorithms, Asymptotic Notations for Complexity of Algorithms.

Linear arrays: Representation of linear arrays in memory, Address calculation of using row and column major ordering, Traversing linear arrays. Representation of Two-Dimensional arrays in memory, Pointers: Pointers arrays, Matrices, Sparse Matrices.

Module 2:

Linked lists: Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List (Insertion, Deletion, Traversal).

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression.

Module 3:

Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.
Trees: Basic terminology, Binary Trees, Binary Tree Representation, Tree Traversal algorithms: Inorder, Preorder and Postorder, Binary Search Trees(BST), Insertion and Deletion in BST.

Module 4:

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Graph Traversal, Depth First Search and Breadth First Search.

Hashing- Hash table, Hash table representations, hash functions, collision resolution techniques-separate chaining, open addressing-linear probing, quadratic probing.

Module 5:

Sorting- selection sort, Insertion sort, Quick sort, merge sort, Heap sort, Radix sort

Pattern matching : Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm.

Textbooks:

1. Data Structures Using C, ReemaThareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

References:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Universities Press.

E – Resources:

1. http://masterraghu.com/subjects/Datastructures/ebooks/rema%20thareja.pdf.
2. https://www.slideshare.net/adisesha12/data-structure-ppt-138483078
3. https://lecturenotes.in/subject/81/data-structure-using-c-ds
4. http://www.tutorialspoint.com/data_structures_algorithms
4. http://www.geeksforgeeks.org/data-structures/
5. http://www.coursera.org/specializations/data-structures-algorithms

Course outcomes:

The student will be able to:

1. Demonstrate operations like Address calculation of using row and column major ordering, Traversing linear arrays
2. Use linear and non-linear data structures like linked list and stacks.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic sorting and pattern matching Techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	2
CO5	3	1	-	-	-	-	-	-	-	-	-	-	-	2
Average	**2.8**	**1.4**	-	-	-	-	-	-	-	-	-	-	-	**2.0**

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – I Sem</td></tr>
<tr><td>Course Code: L215E</td><td rowspan="2">OPERATING SYSTEMS
(Common to CSE & IT)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Programming for Problem solving, Data structures and Algorithms (not mandatory).
2. Computer Organization

Course objectives:

The Student will:

1. Understand the basic concepts and functions of computer operating systems.
2. Apply the concurrency control among the operating system programs execution.
3. Demonstrate the techniques used to manage the memory during program execution.
4. Explain the various storage management methods and functions of operating systems.
5. Design the security features against attacks on operating system.

Module 1:

Basic Concepts

Overview: OS Introduction, Computer Systems Organization, Computer System Architecture, Operating System Architecture, Resource Management, Virtualization, Distributed Systems, Open-source operating system.

Operating System Structures: Systems Calls, System services, Linkers and Loaders, Operating System Design and Implementation, Operating System structure, Building and Booting an Operating System.

Module 2:

Process Management

Process Concepts: Introduction, Process Scheduling, Interprocess Communication, Communication in Client- Server systems, Thread concepts, Multithreading Model, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

Process Synchronization: Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Mutex Locks, Semaphores, Monitors, Classic Problems of Synchronization, System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Module 3:

Memory Management

Main Memory: Background, Contiguous Memory Allocation, Paging, Page-Table Structure, Swapping, Segmentation.

Virtual Memory: Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4:

Storage Management

File system Management: File Concepts, Access Methods and Directory Structure, File Protection, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery

Mass-Storage Structure: Overview, Disk Scheduling, Storage Device Management, Swap-Space Management, Storage Attachment, RAID Structure.

Module 5:

Security and Protection

Security: Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Case Studies: Windows 10.

Protection: Goals of Protection, Principles of Protection, Protection Rings, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Role-based Access Control, Capability-Based Systems, Language Based Protection.

Text Books:

1. **Operating System Concepts-Abraham Silberchatz**, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. **Operating Systems- A Concept based Approach**-D.M.Dhamdhere, 2nd Edition, TMH.

Reference Books:

1. **Principles of Operating Systems-Naresh Chauhan,** Oxford Higher Education.
2. **Operating System A Design Approach**-Crowley, TMH.
3. **Modern Operating Systems**-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

E - Resources:

1. https: // www.tutorialspoint .com/operating_system/
2. https: // www.studytonight.com/operating-system/
3. https: // learn.saylor.com/course/view.php?id=948&sectioned=967
4. https: //nptel.ac.in/courses/106/105/106105214/
5. https://www.edx.org/course/computer-hardware-and-operating-systems

Course outcomes:

The student will be able to:

1. Compare differing structures of operating systems including process management.
2. Apply different CPU scheduling algorithms and various Memory management techniques.
3. Illustrate the use of Bankers algorithm for deadlock avoidance and File system organization.
4. Demonstrate various mass storage management techniques.
5. Analyze different aspects of protection and security concepts.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	2
Average	**2.8**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.2**

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT II Year – I Sem			
Course Code: L215C	COMPUTER NETWORKS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on Digital Logic Design.
2. Knowledge on Computer Organization.
3. Knowledge on Data Structures.

Course objectives:

The Student will:

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols, Ethernet technologies and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Examine IP protocol, addressing, various protocols like CIDR, ICMP, ARP and RARP of internet Layer and examination of transport layer services.
5. Examine Transport layer protocols like TCP, UDP, RPC and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

Module 1:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Module 2:

Data Link Layer: design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.

Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.

Connecting Devices: Repeaters, Hubs, Switches, Gateways and Bridges - Learning and Spanning tree bridges.

Multi Access protocols- Random access - ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

Module 3:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.

Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunneling and Packet Fragmentation.

Address Mapping: Address Resolution Protocol(ARP), Reverse Address Resolution Protocol

(RARP), Dynamic Host Configuration Protocol (DHCP), Internet Control Message Protocol(ICMP) andInternet Group Management Protocol(IGMP).
Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4:
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release.
Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

Module 5:
Application Layer: Introduction, services, Application layer paradigms.
Applications: Domain Name System(DNS), World Wide Web(WWW), HeperText Transfer Protocol(HTTP),File Transfer Protocol(FTP),Electronic Mail(E-MAIL), TELNET,Simple Network Management Protocol(SNMP), Secure Shell(SSH).

Text Books:
1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books:
1. "ComputerNetworks",5E, Peterson, Davie, Elsevier
2. "Introduction to Computer Networks and Cyber Security",Chawan-HwaWu, Irwin, CRC Publications.
3. "Computer Networks and Internets with Internet Applications", Comer.

E - Resources:

2. https://lecturenotes.in/subject/2234/Computer_Network
3. http://nptel.ac.in/courses/106102234/
4. https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf
5. http://www.coursera.org/
6. http://ocw.mit.edu/index.htm.

Course outcomes:
The Student will be able to:
1. Demonstrate the networking concepts, various Layering approaches, functionalities and some protocols of Link layer.
2. Operate with Data link Layers.
3. Do fragmentation, assigning of logical address and judge on routingand congestion.
4. Apply the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Demonstrate the services of Application Layer while using popular applications

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	2	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	2	2
Average	**2.4**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**2.0**

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT II Year – I Sem			
Course Code: L2161	DATA STRUCTURES LAB	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. The Algorithmic Design and Techniques.
2. One programming language like C.

Course objectives:

The Student will:

1. Define the basic data structures like linked list.
2. Understand the fundamentals and applications of linked list, stacks and queues.
3. Classify different types of tree data structures
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic searching, sorting and pattern matching algorithms.

Experiment 1:

Write a C program that uses functions to perform the following operations on singly linked list:

I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists

Experiment 2:

Write a C program that uses functions to perform the following operations on doubly linked list.

I) Creation II) Insertion III) Deletion IV) Traversal

Experiment 3:

Write a C program that implement stack operations using

I) Arrays II) Linked Lists

Experiment 4:

I) Write a C program to convert infix expression to postfix expression using stack

II) Write a C program to evaluate postfix expression

Experiment 5:

I) Programs using recursion

II) Write a C program to convert infix expression to prefix expression using stack

Experiment 6:

Write a C program to implement Linear queue using

I) Arrays II) Linked Lists

Experiment 7:

Write a C program to perform following operations on a circular Queue

I) insertion II) deletion III) search and count

Experiment 8:

Write a C program to perform following operations on a circular DeQueue

I) insertion II) deletion III) search and count

Experiment 9:

I) Write a C Program to implement binary tree traversals

II) Write a C Program to implement AVL tree operations

Experiment 10:

I) Implementation of a Graph representation using Adjacency Matrix

II) Write a C program to implement graph traversals.

Experiment 11:

I) Write a C program to implement Linear search

II) Write a C program to implement Binary Search

Experiment 12:

I) Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Bubble sort II) Selection sort III) Insertion Sort

Experiment 13:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Merge sort II) Quick sort

Experiment 14:

I) Write a C Program to Implement the Hashing technique

II) Write a C Program to Implement the KMP Pattern Searching Algorithm

Course outcomes:

The Student will be able to:

1. Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.
2. Use linear and non-linear data structures like stacks, queues etc.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting and pattern matching Techniques.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart **3/2/1 indicates the strength of the calculation** **3-Strong, 2-Medium, 1-Low**														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**P O3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	3	2	-	-	-	-	-		2				-	2
CO2	3	2	-						1				-	2
CO3	3	2	-	-	-	-	-	-	1	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	1		-	-	-	2
CO5	3	2	-	-	-	-	-	-	1				-	2
Average	**3.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**-**	**-**	**-**	**-**	**2.0**

<table>
<tr><td>AY 2022-23
onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – I Sem</td></tr>
<tr><td>Course
Code:
L2154</td><td rowspan="2">OPERATING SYSTEMS AND COMPUTER NETWORKS LAB
(Common to CSE & IT)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1.5</td><td>0</td><td>0</td><td>3</td><td>0</td></tr>
</table>

Pre-Requisites:
1. Programming for Problem solving, Data Structures (not Mandatory)
2. Computer Networks
3. Computer Organization

Course objectives:
The Student will:
1. Identify Error control technique such as CRC-12 CRC-16 CRC-32.
2. Demonstrate Hamming Code error control algorithm and simulation of stop and wait protocol and Client-Server program.
3. Implement network layer routing algorithms such as: Dijkstra’s, Distance Vector and Broadcast routing techniques.
4. This course will introduce the basic principles in Operating System and providing error detection methods.
5. It will cover all the management modules present in the OS like process management, Memory management, File management, Disk management, Network management, I/O management.

OPERATING SYSTEMS

Experiment 1: Simulate the following CPU scheduling algorithms
a) Round Robin b) SJF c) FCFS d) Priority

Experiment 2: Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked

Experiment 3: Simulate MVT and MFT

Experiment 4: Simulate all File Organization Techniques
a) Single level directory b) Two level c) Hierarchical d) DAG

Experiment 5: Simulate Bankers Algorithm for Dead Lock Avoidance

Experiment 6: Simulate Bankers Algorithm for Dead Lock Prevention

Experiment 7: Simulate all page replacement algorithms
a) FIFO b) LRU c) LFU Etc. …

Experiment 8: Simulate Paging Technique of memory management.

Experiment 9: Experiments on fork, shared memory and semaphores.

COMPUTER NETWORKS

Experiment 1: Implement the data link layer framing methods such as character, character stuffing and bit stuffing.

Experiment 2: Implement on a data set of characters the three CRC polynomials – CRC 12, CRC

16and CRC CCIP.

Experiment 3: Implement Dijkstra 's algorithm to compute the Shortest path thru a graph.

Experiment 4: Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm

Experiment 5: Take an example subnet of hosts. Obtain broadcast tree for it.

Experiment 6: Take a 64 bit playing text and encrypt the same using DES algorithm.

Experiment 7: Using RSA algorithm Encrypt a text data and Decrypt the same.

Text Books:

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating Systems A Design Approach-Crowley, TMH.
3. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
4. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books:

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems- A Concept based Approach- D.M.Dhamdhere, 2nd Edition, TMH.
3. ComputerNetworks, 5E, Peterson, Davie, Elsevier
4. Introduction to Computer Networks and Cyber Security ,Chawan-HwaWu, Irwin, CRC Publications.
5. Computer Networks and Internets with Internet Applications, Comer.

E - Resources:

1. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
2. https://courses.lumenlearning.com/computerapps/chapter/reading-the-internet /
3. https: // www.tutorialspoint .com/operating_system/
4. https: // www.studytonight.com/operating-system/
5. https: // learn.saylor.com/course/view.php?id=948&sectioned=967
6. https://www.edx.org/course/computer-hardware-and-operating-systems

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	3	2	-	-	-	-	-	2	-	-	-	2	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	2
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	**2.6**	**2.2**	**2.5**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**2.0**

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT II Year – I Sem			
Course Code: L21M2	ENVIRONMENTAL SCIENCE (Common to ALL)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil.

Module 1:

Unit-I: Ecosystem and Natural Resources

Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats to Biodiversity, Conservation of Biodiversity.

Module 2:

Unit-I: Global Environmental Problems and Global Efforts

Deforestation, Greenhouse effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Unit-2: Environmental Impact Assessment (EIA) And Environmental Management Plan

Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

Module 3:

Unit-1: Environmental Policy, Legislation, Rules and Regulations

Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act.

Unit-2: Towards Sustainable Future:

Concept of Sustainable Development, Threats to Sustainability, Strategies for achievingSustainable development, Environmental Ethics, Environmental Economics, Concept of GreenComputing.

Text Books:

1. “Textbook of Environmental Science And Technology” by M Anji Reddy, BS Publications, 2007.
2. “Principles of Environmental Science and Engineering” by Rao P. Venugopala, Prentice Hall India Learning Private Limited (1 January 2006)

Reference Books:

1. “Environmental Studies” by Benny Joseph, McGraw Hill Education 2008.
2. “Textbook of Environmental Studies for Undergraduate Courses” by Erach Bharucha 2005, University Grants Commission, University Press

E-Resources

1. https://nptel.ac.in/courses/120/108/120108004/#

Course Outcomes:

On completion of the course, the students will be able to:

1. **Compare** the different natural resources available and how to use them.
2. **Describe** about biodiversity.
3. **Analyze** the Global Environmental Problems and Global Efforts.
4. **Categorize** the global environmental problems.
5. **Prioritize** the Sustainable development

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO2	-	-	-	-	-	3	3	-	-	-	-	2	1	1
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO4	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO5	-	-	-	-	-	3	3	-	-	-	-	2	2	1
Average	**1.8**	**1.8**	**1.2**	**1.2**	**-**	**1.2**	**1.8**	**-**	**-**	**-**	**-**	**1.4**	**1.8**	**1**

<table>
<tr><td>AY 2022-23 onwards</td><td colspan="1">J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech-IT
II Year – II Sem</td></tr>
<tr><td>Course Code: L225E</td><td rowspan="2">SOFTWARE ENGINEERING</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-requisite: Knowledge of Object Oriented Principles

Course Objectives: At the end of the course, students will:

1. Analyze basic Software engineering methods.
2. Describe software engineering layered technology and Process frame work.
3. Design software architecture and UML modelling
4. Recognize testing approaches such as unit testing and integration testing.
5. Demonstrate software evolution and related issues such as version and risk management

Module 1:

Unit 1 : Introduction to Software Engineering: The evolving role of Software, changing nature of Software, Software Myths. A Generic view of process: Software engineering- A layered technology, a process framework,

Unit 2: The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Module 2:

Unit 1 : Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

Unit 2: System Analysis Models: Context models, 65odelling65l models, data models, object models, structured methods

Module 3:

Unit 1: Design Engineering: Design process and Design quality, Design concepts, the design model. Creating an architectural design: Software architecture, Data design, Introduction to UML, Importance of 65odelling, Principle of 65odelling, Concepts of 65odelling and architecture.

Unit 2: Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution. Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation

Module 4:

Unit 1: Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Unit 2 : Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality.

Module 5:

Unit 1 : Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan

Unit 2 : Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards

Text Books:

1) Software Engineering A Practitioner's Approach, Roger S Pressman, 6th edition. McGraw-Hill International Edition.
2) Software Engineering, Ian Sommerville, 7th edition, Pearson education.

Reference Books:

1. The Unified Modeling Language, User Guide by Grady Booch, James Rambaugh, Ivar Jaccobson.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.

Web Resources:

1. https://www.geeksforgeeks.org/software-engineering/

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 – Weak

Course Outcomes (Cos)	Program Outcomes (Pos)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	-	-	-	2	1	-	-	3	2
CO2	3	3	3	3	3	-	-	-	2	1	-	-	3	2
CO3	3	3	3	2	2	-	-	-	1	1	-	-	3	3
CO4	3	2	2	2	3	-	-	-	2	1	-	-	2	2
CO5	3	2	2	2	3	-	-	-	2	1	-	-	2	2
Average	**3.0**	**2.6**	**2.6**	**2.4**	**2.6**	**-**	**-**	**-**	**1.8**	**1.0**	**-**	**-**	**2.6**	**2.2**

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B.Tech IT
II Year – II Sem</td></tr>
<tr><td>Course Code: L224F</td><td rowspan="2">DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 4</td><td>3</td><td>1</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Including basic design concepts and implementation technology
2. Number representation,
3. Synthesis of combinational and sequential logic
4. Foundations of Computer Systems Design

Course objectives:

The Student will:

1. Get the fundamental knowledge of the basic structure and operation of a digital computer.
2. Solve logic expression and design combinational circuits.
3. Discuss operation of arithmetic unit including implementation of fixed-point and floating-point addition, subtraction, multiplication and division.
4. Classify different hierarchical memory systems including cache memory and virtual memory.
5. Recognize different ways of communicating with input/output devices and standard i/o interfaces.

Module 1:

Basic Structure of Computers

Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations. Data Representation: Binary Numbers Fixed Point Representation. Floating – Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.

Module 2:

Digital Logic Circuits - I

Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. Flip-flops, Combinational Circuits. Digital Logic Circuits -II: Registers,
Shift Registers, Binary counters, Decoders, Multiplexers, Programmable Logic Devices.

Module 3:

Computer Arithmetic

Algorithms for fixed point and floating point addition, subtraction, multiplication and division operations. Hardware Implementation of arithmetic and logic operations, High performance arithmetic. Instruction Set & Addressing: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats, Basic Machine Instructions. IA- 32 Pentium example.

Module 4:

Processor Organization

Introduction to CPU, Register Transfers, Execution of Instructions, Multiple Bus Organization, Hardwired Control, Micro programmed Control Memory Organization: Concept of Memory, RAM, ROM memories, memory hierarchy, cache memories, virtual memory, secondary storage, memory management requirements.

Module 5:

Input/ Output Organization

Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Direct memory access, buses, interface circuits, standard I/O Interfaces.

Text Books:

1. Computer Organization – Carl Hamacher, ZvonkoVranesic, SafwatZaky, fifth edition, McGraw Hill.
2. Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India.

Reference Books:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson
3. Digital Logic Design & Computer Organization with Computer Architecture for Security- NikrouzFaroughi, McGrawHill Education

E - Resources:

1. www.wjec.co.uk/uploads/publications/4891.doc?language_id
2. http://www.ece.rutgers.edu/~marsic/Teaching/DLD/slides/lec-12.pdfW3
3. http://web2.uwindsor.ca/courses/cs/aggarwal/cs60265/Multiplexer.ppt
4. http://nptel.ac.in/pdf/nptel/NPTEL%20Local%20Chapter%20PPT%20-%20Jan%202017.pptx
5. https://www.slideshare.net/foyezahammad1/digital-logic-design- dld-presentation

Course outcomes:

The Student will be able to:

1. Illustrate basic structure of digital computer.
2. Apply knowledge of different digital logic circuits.
3. Apply arithmetic operations of binary number systems.
4. Show organization of control unit and arithmetic logic unit.
5. Recognize different ways of communicating with input/output devices and standard i/o interfaces.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3											2		
CO2	2	3	3								2	3	2	
CO3	3	2	3								2		2	
CO4	3	3												
CO5	3											2		
Average	**2.8**	**2.7**	**3.0**								**2.0**	**2.3**	**2.0**	

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT II Year – II Sem			
Course Code: L225F	**PYTHONPROGRAMMING** (Common to IT,CSE & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Need basic knowledge about computer.
2. Need Basic understanding of Programming language.

Course objectives:
The Student will:

1. Design and program Python applications.
2. Use lists, tuples, and dictionaries in Python programs.
3. Learn to identify Python object types, Components, decision statements, pass arguments in Python.
4. Build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Use exception handling in Python applications for error handling.

Module 1:
Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance;
Introduction to Python: Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition.
Functions: Function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion,infinite recursion.
Module 2:
Python data structures: Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.
Dictionaries
Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

Set: operations and methods**, Frozenset**: operations and methods

Module 3:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, objects are mutable, copying; Access modifiers, classes and functions: pure function, modifiers, Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism.

Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem;

Module 4:

Exceptions: raising exceptions, handling exceptions, exception hierarchy.

Regular Expressions, match, search & replace function, Regular Expression modifiers, Special Character Classes, Repetition Cases, Non-greedy repetition grouping with Parentheses Back-references Anchors.

Module 5:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;

Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Introduction to Machine Learning With Python ,Tasks in Machine Learning Using Python, Applications of Python Machine Learning.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfield, Addison-Wesley 2010.
3. Introduction to Machine Learning with Python: A Guide for Data Scientists Book by Andreas C. Müller and Sarah Guido Publisher(s): O'Reilly Media, Inc.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E - Resources:

1. https://www.youtube.com/watch?v=MLP1v80yU14
2. https://pythonprogramming.net/functions-python-3-basics-tutorial/
3. https://www.youtube.com/watch?v=QGLNQwfTO2w
4. https://www.youtube.com/watch?v=ZDa-Z5JzLYM
5. https://www.youtube.com/watch?v=M-t4ILRHnxE

Course outcomes:

The Student will be able to:

1. Explain basic principles of Python programming language
2. Analyze the use of lists, tuples, and dictionaries in Python programs.
3. Implement object oriented concepts in Python, and how to use exception handling in Python applications for error handling.
4. Demonstrates how to achieve reusability using inheritance, interfaces and packages.
5. Explain how to read and write files in Python and evaluate different database operations.

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	**3.0**	**2.0**	**1.8**	**2.2**	-	-	-	-	-	-	-	-	**1.5**	**2.4**

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – II Sem</td></tr>
<tr><td>Course Code: L225C</td><td rowspan="2">DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE & IT)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Knowledge on data structures.

Course objectives:

The Student will:

1. Know about on time and space complexity and learning asymptotic notations
2. Understand union and find algorithms, connected components and bi-connected components.
3. Gain knowledge in divide and conquer methods
4. Familiar with greedy method and dynamic programming
5. Understand the back tracking and can application

Module 1:

Introduction to algorithms

Algorithm, Pseudo Code for expressing Algorithms, Performance Analysis: Space Complexity, Time Complexity, asymptotic Notations: Big-oh Notation, Omega Notation, Theta Notation, Little- oh Notation.

Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Spanning Trees, Connected Components and Biconnected Components.

Module 2:

Divide and Conquer

General Method, Applications: Binary Search, Quick Sort, Merge Sort, Stassen's Matrix Multiplication.

Greedy Method

General Method Applications: Job Sequencing with Deadlines, 0/1 Knapsack Problem, Minimum Cost Spanning Trees: Prim's and Kruskal's Algorithms, Single Source Shortest Path Problem, Huffman Codes.

Module 3:

Dynamic Programming

General Method, Principle of Optimality, Applications: Multistage Graphs, Matrix Chain Multiplication, Optimal Binary Search Trees, 0/1 Knapsack Problem, All Pairs Shortest Path Problem, Travelling Sales Person Problem, Reliability Design.

Module 4:

Backtracking

General Method, Applications: Nqueen Problem, Recursive Permutation Generator, Sum of Subsets Problem, Graph Coloring, Hamiltonian Cycles.

Module 5:

Branch and Bound

General Method, Applications: Travelling Sales Person Problem, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution.

NP-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cook's Theorem.

Text Books:

1. Fundamentals of Computer Algorithms-Ellis Horowitz, SatrajSahni and Rajasekharam, Galgotia Publications Pvt. Ltd.
2. Introduction to Algorithms-T.H.Cormen, C.E.Leiserso, R.L.Rivest and C.Stein, 2nd Edition, Pearson Education, PHI Pvt. Ltd.

Reference Books:

1. Algorithm Design: Foundations, Analysis and Internet Examples-M.T.Goodrich and R.Tomassia, John Wiley and Sons.
2. Introduction to Design and Analysis of Algorithms A strategic Approach-R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc-Graw Hill.
3. Design and analysis of Algorithms-S. Sridhar, Oxford Higher Education.

E - Resources:

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
3. http://www.cse.iitd.ernet.in/~ssen/csl356/notes/root.pdf
4. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_tutorial.pdf
5. https://mrcet.com/downloads/digital_notes/IT/Design%20and%20Analysis%20Algorithms.pdf

Course outcomes:

The Student will be able to:

1. Analyze time Time complexity and space complexity as well as asymptotic notations for a given algorithm, union and find algorithms, connected components and bi-connected components.
2. Apply divide and conquer method for solving sorting and searching problems and greedy method to solve variety of problems.
3. Make use of dynamic programming to solve a collection of problems.
4. Utilize back tracking to solve different types of problems.
5. Choose branch and bound to unravel diverse forms of predicaments

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	3	-	-	-	-	-	-	-	-	2	2
CO2	2	3	3	3	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	3	3	-	-	-	-	-	-	-	-	2	2
CO5	2	3	3	3	-	-	-	-	-	-	-	-	2	2
Average	**2.4**	**2.8**	**2.8**	**3.0**	-	-	-	-	-	-	-	-	**2.0**	**2.0**

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT II Year – II Sem			
Course Code: L226B	**DATABASE MANAGEMENT SYSTEMS** (Common to CSE & IT)	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

Module 1:

Unit I: Introduction

Database System Applications, Database Systems Vs File Systems, View of Data-Data Abstraction, Instances and Schemas.Data Models – The ER Model, Relational Model, Other Data Models. Database Languages – DDL, DML. Database Access for Applications Programs, Data Base Users and Administrator, Transaction Management, Data Base System Structure, Storage Manager, The Query Processor.

Unit 2: Database Design and ER-Diagrams

Beyond ER Design, Entities, Attributes and Entity Sets,Relationships and Relationship Sets, Additional Features of ERModel, Conceptual Design with the ER Model.

Module 2:

Unit 1: The Relational Model

Introduction to the Relational Model,Integrity Constraints Over Relations, Enforcing Integrity Constraints, Querying Relational Data,Logical Database Design,Introduction to Views, Destroying /Altering Tables and Views.

Unit 2: Relational Algebra and Calculus

Relation Algebra-Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries.Relational Calculus – Tuple Relational Calculus, Domain Relational Calculus, Expressive Power of Algebra and Calculus.

Module 3:

Unit 1: SQL Queries

Form of Basic SQL Query, Examples of Basic SQL Queries, Union, Intersect and Except. Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators. Aggregative Operators, Null Values, Comparison Using Null Values, Logical Connectives AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing Null Values. Complex IntegrityConstraints in SQL, Triggers and Active Databases.

Unit 2: Schema Refinement: Problems Caused by Redundancy, Decompositions, Problem Related to Decomposition, Reasoning about FDs. Normal Forms-First, Second, Third Normal Forms, BCNF. Lossless Join Decomposition – Dependency Preserving Decomposition, Schema Refinement in Data Base Design, Multi Valued Dependencies, Forth Normal Form.

Module 4:

Unit 1: Transaction Management

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for Serializability. Lock –Based Protocols, Timestamp- Based Protocols, Validation- Based Protocols, Multiple Granularity.

Unit 2: Recovery System

Failure Classification, Storage Structure, Recovery and Atomicity**,** Log- Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Nonvolatile Storage, Advance Recovery Techniques, Remote Backup Systems.

Module 5

Unit 1: Storage and Indexing

Data On External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index Data Structures, Hash Based Indexing, Tree Base Indexing, Comparison of File Organizations, Indexes and Performance.

Unit 2:Tree Structured Indexing

Intuitions for Tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:

1. **Data Base Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Data base System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. **Data base Systems design,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems,**ElmasriNavrate Pearson Education
3. **Introduction to Database Systems,**C.J.Date Pearson Education.

E - Resources:

1. https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs15/
2. https://www.alljntuworld.in/download/database-management-system-dbms-materials-notes/

Course outcomes:

The Students will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language SQL.
5. Analyze functional dependencies for designing a robust database

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	2	-	-	-	-	-	-	-	-	3	-
CO3	-	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	3	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	3	-
Average	**2.5**	**2.0**	**3.0**	**2.3**	**3.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**	**-**

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – II Sem</td></tr>
<tr><td>Course Code: L226C</td><td rowspan="2">AUTOMATA AND COMPILER DESIGN
(Common to CSE & IT)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives:

At the end of the course , students will :

1. Illustrating different phases of compilation.
2. Describe the steps and algorithms used by language translators and features.
3. Enumerating top down and bottom up parsing techniques used in compilation process.
4. Introducing the syntax directed translation and type checking and learning the effectiveness of optimization.
5. To learn to develop algorithms to generate code for a target machine.

Module I

UNIT – I

Formal Language and Regular Expressions: Languages, Definition Language regular expressions, Finite Automata-DFA, NFA.

UNIT – II

Conversions: Conversion of regular expression to NFA, NFA to DFA, Applications of Finite Automata to lexical analysis-lex tools.

Module II

UNIT – I

Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL (K) Grammars and LL (1) parsing.

UNIT – II

Bottom up parsers: Bottom up parsing handle pruning LR Grammar Parsing, LALR Parsing, Parsing ambiguous grammars, YACC Programming specification.

Module III

UNIT – I

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, and Intermediate code-abstract, syntax tree, translation of simple statements and control flow statements.

UNIT – II

Type checking: Type checking, type conversions, equivalence of type expressions, overloading of functions and operations. Context sensitive features- Chomsky hierarchy of languages and recognizers

Module IV

UNIT – I

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

UNIT – II

Code optimization: Principal sources of optimization of basic blocks, peephole optimization, flow graphs, data flow analysis of flow graphs.

Module V

UNIT – I

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm.

UNIT – II

register allocation and assignment using DAG representation of Block.

TEXT BOOK:

1. Compilers Principles, Techniques & Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffery D. Ullman, Pearson Addison Wesley Education, Second Edition.
2. Modern Compiler Implementation in C, Andrew N. Appel, Cambridge University Press.

REFERENCE BOOKS:

1. Lex&yacc , John R. Levine, Tony Mason, Doug Brown, O"reilly
2. Modern Compiler Design, Dick Grune, Henry E. BAL, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler, Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson.
5. Systems Programming and Operating Systems, D

Course Outcomes:

At the end of the course , students will be able to:

1. Analyze phases of compilation, particularly lexical analysis, parsing, semantic analysis and code generation.
2. Construct parsing tables for different types of parsing techniques.
3. Classify the Semantic Analysis and Intermediate code generation phase.
4. Apply code optimization techniques to different programming languages.
5. Generate object code for natural language representations.

<table>
<tr><td>AY 2020-21 onwards</td><td>J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – II Sem</td></tr>
<tr><td>Course Code: L2252</td><td rowspan="2">PYTHON PROGRAMMING LAB
(Common to IT,CSE & ECM)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1.5</td><td>0</td><td>0</td><td>3</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Need basic knowledge about how to operate computer.
2. Need Basic understanding of how to write code for Programming language.

Course objectives:

The Student will:

1. Implement Basic input /output operations with various Data Types supported by python.
2. Develop functions for code reusability and experiment string manipulation operations with the use of inbuilt functions.
3. Create a python program for experimenting list, tuple and dictionary
4. Demonstrate Class and objects to make use of object oriented programming concepts.
5. Implement File handling operations to access the contents of file

Experiment 1.

i. Write a python program to obtain user input data (int, float, string) and display.

ii. Write a python program to find the roots of a quadratic equation

iii. Write a python program to perform arithmetic operations (+, -, *, /, %) for given input values and printout the result values.

Experiment 2.

i. Write a python programs that use both recursive and non-recursive functions to find the factorial of a given integer

ii. Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements.

iii. (Assignment statement); Taking input (using raw input () and input ()) and displaying output (print statement); Putting Comments.

Experiment 3.

i. Write python programs to perform operation on Strings using following functions: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitile, partition, replace, join, split, count, decode, encode, swapcase.

ii. Enter the details of 5 **Student** and display the details sequentially.

Experiment 4.

i. Write python programs to perform List operators: (joining, list slices)

ii. Write python programs to perform List functions: len, insert, append, extend, sort, remove, and reverse, pop.

iii. Write python programs to check whether the string is palindrome or not?

Experiment 5.

i. Write python programs to perform Tuple functions: cmp(), len(), max(), min(), tuple()

ii. Write python programs to check whether the word is present in the tuple or not?

iii. Write python programs to Take a string as ("1234567890") and create a pair {(1,2),(3,4),(5,6),(7,8),(9,0)} using tuple.

Experiment 6.

i. Write python programs to perform Dictionary functions & Methods: cmp, len, clear (), get(), has_key(), items(),keys(), update(), values() .

ii. Write python programs to Create a list of animal using dictionary variable "animal" and find out if the specific animal present in the list or not?

Experiment 7.

i. Write a python program to create a class, its objects and accessing attributes.

ii. Create a Customer class and check the balance and withdraw and deposit some amount.

Experiment 8. Write a python script to implement exception handling.

i. Check whether the input no is integer or not.

ii. Handel the exceptions that are come at the time of division.

Experiment 9. Write a python script to perform inheritance.

Experiment 10. Write a python script to perform various FILE handling operations.
Open, close, read, write, copy.

Experiment 11.

i. Write a python script to connect to the database and perform DDL operations.

ii. Create table, insert data into table and display the table data.

Experiment 12. Write a python script to connect to the database and perform various DML and DQL operations.

Text Books:

1. **Programming in Python 3**- A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.
2. **Programming Python**- 4th Edition, Mark Lutz, O'Reilly, 2011.

Reference books:

1. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E - Resources:

1. https://www.tutorialspoint.com/python3/python_strings.htm
2. https://www.youtube.com/watch?v=yCH9CUiXrP0
3. https://www.youtube.com/watch?v=RSl87lqOXDE
4. https://www.youtube.com/watch?v=bSZtsYYwFS0

Course outcomes:

The Student will be able to:

2. Apply Basic input /output operations for working with different data types in python.
3. Design functions for achieving code reusability and string manipulations.

4. Create a python program for implementing list, tuple dictionary.
5. Demonstrate Class and objects
6. Implement File handling operation

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	**3.0**	**2.0**	**1.8**	**2.2**	**2.0**	-	-	-	-	-	-	-	**1.5**	**2.4**

<table>
<tr><td>AY 2022-23 onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B.Tech: IT
II Year – II Sem</td></tr>
<tr><td>Course Code:
L2261</td><td rowspan="2">DATABASE MANAGEMENT SYSTEMS LAB</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1.5</td><td>0</td><td>0</td><td>3</td><td>0</td></tr>
</table>

Pre-Requisites: Nil
Course objectives:
The Student will:

1. Familiarize with the nuances of database environments towards an information- oriented data-processing oriented framework.
2. Gain a good formal foundation on the relational model of data present sql and procedural interfaces to Sql comprehensively.
3. Gain an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design and to motivate the Student to relate all these to one or more commercial product environments as they relate to the developer tasks.
4. Present the concepts and techniques relating to query processing by sql engines and present the concepts and techniques relating to ODBC and its implementations.
5. Introduce the concepts of transactions and transaction processing and to present the issues and

Experiment – 1.
E-R Model: Analyze the Problem with the entities which identify data persisted in the database which contains entities, attributes**.**
Experiment – 2.
Concept design with E-R Model
.**Experiment – 3.**
Relational Model
Experiment – 4.
Normalization
Experiment - 5.
Installation of Mysql and Practicing DDL and DML commands
Experiment – 7
Querying using Aggregate functions, GROUP BY,HAVING and creation and dropping of views
Experiment – 8.
Create tables for the following schema. Student(snum: integer, sname: string, major: string, level: string, age: integer) Class(name: string, meets at: time, room: string, fid: integer) Enrolled(snum: integer, cname: string) Faculty(fid: integer, fname: string, deptid: integer)
Experiment – 9.Querying

1. Find the names of all Juniors (Level = JR) who are enrolled in a class taught by I. Teacher.
2. Find the age of the oldest student who is either a History major or is enrolled in a course

taught by I. Teacher.

3. Find the names of all classes that either meet in room R128 or have 5 or more **Student** enrolled.
4. Find the names of all **Student** who are enrolled in two classes that meet at the same time.
5. Find the names of faculty members who teach in every room in which some class is taught.
6. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than 5
7. Print the Level and the average age of **Student** for that Level, for each Level.
8. Print the Level and the average age of **Student** for that Level, for all Levels except JR. 9
9. Print the Level and the average age of **Student** for that Level, whose average age is greater than 20.
10. Find the names of **Student** who are enrolled in the maximum number of classes.
11. Find the names of **Student** who are not enrolled in any class.
12. Count the number of junior level **Student**.
13. Display all the **Student** whose names starts with the letter "p".
14. Display all the teachers whose names contain letter 'a' or 'I' in their names.

Experiment – 10. Procedures

Experiment – 11.CASE STUDY E-R MODEL: GENERAL HOSPITAL

Course outcomes:
The student will be able to:

1. Acquire the underlying concepts of database technologies
2. Design and implement a database schema for a given problem-domain
3. Apply Normalization to a database.
4. Populate and query a database using SQL DML/DDL commands.
5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	3	2	3	1	-	-	-	-	-	2	2	-
CO2	3	3	2	2	2	1	-	-	-	-	-	2	-	-
CO3	3	3	2	3	3	1	-	-	-	-	-	-	2	-
CO4	2	3	3	2	2	-	-	-	-	-	-	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	-
Average	**2.6**	**2.6**	**2.4**	**2.2**	**2.4**	**1.0**	-	-	-	-	-	**2.0**	**2.0**	-

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT II Year- II Sem			
Course Code: L22M1	**GENDER SENSITIZATION** (Mandatory Course) COMMON TO: ALL	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1:UNDERSTANDING GENDER[6L]

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction. Preparing for Womanhood.Growing up Male. First lessons in Caste. Different Masculinities.

Module 2: GENDER AND BIOLOGY[6L]

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)
Two or Many? Struggles with Discrimination.

Module 3: GENDER AND LABOUR[6L]

Housework: The Invisible Labour (*Towards a World of Equals*: Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

Module 4: ISSUES OF VIOLENCE-I[6L]

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu*".
Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Module 5ISSUES OF VIOLENCE-II[6L]

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)
Blaming the Victim- "I Fought for my Life…."
Additional Reading: The Caste Face of Violence.

Text Books

1. **"*Towards a World of Equals: A Bilingual Textbook on Gender*"** written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu.

Reference Books

1. Raj Paul Singh, Anupama Singh. Gender Sensitization: Issues and Challenges: Raj Publications: 2019.

E-Resource

- https://www.medicalnewstoday.com/articles/232363
- https://web.stanford.edu/~eckert/PDF/Chap1.pdf
- https://open.lib.umn.edu/sociology/chapter/11-1-understanding-sex-and-gender/

Course Outcomes

At the end of the course, the student will be able to:

CO1. develop a better understanding of important issues related to gender in contemporary India. **CO2**. sensitize to basic dimensions of the biological, sociological, psychological and legal aspectsof gender. This will be achieved through discussion of materials derived from research, facts,everyday life, literature and film.

CO3. attain a finer grasp of how gender discrimination works in our society and how to counter it. **CO4**. acquire insight into the gendered division of labour and its relation to politics and economics.**CO5**. be better equipped to work and live together as equals.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	**2**	2	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**2**	**2**	-	3	-	-
CO3	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech- IT III Year- I Sem			
Course Code: **L31EA**	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:
NIL
Course Objectives:
The Student will:
1. Learn principles and practices of the organization.
2. Learn preparation of balance sheet and accounting standards.
3. Understand the principles of management.
4. Gain knowledge on graphical presentation of improving the quality.
5. Understand the importance of inventory control in the organization.

Module 1:
Introduction to Business and Economics:

Unit – 1: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Unit – 2: Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Module 2:
Demand and Supply Analysis:

Unit – 1: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Unit – 2: Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

Module 3:
Production, Cost, Market Structures & Pricing:
Unit – 1: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions.
Unit – 2: Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

Module 4:
Unit – 1: Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

Module 5:
Unit – 1: Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).
Unit – 2: Introduction to Fund Flow and Cash Flow Analysis (simple problems)

Text Books

1. Managerial Economics & Financial Accounting – Prentice Hall of Inadia: Dr. M. Kasi Reddy, Dr. S. Saraswathi
2. Varshney & Maheswari: Managerial Economics, Sulthan Chand, 2009.
3. P. Subba Rao: Human Recourse Management.

Reference Books

1. Ambrish Guptha, Financial Accounting for Management, Pearson Education, New Delhi, 2009.
2. Naraanaswamy: Financial Accounting – A Managerial Perspective, PHI, 2008.
3. S. N. Maheswari& S. K. Maheswari, Financial Accounting, Vikas, 2008. .

E-Resources

1. https://nptel.ac.in/courses/110/101/110101005/
2. https://sites.google.com/site/economicsbasics/
3. http://www.whatishumanresource.com/system/app/pages/search?scope=searchsite&q=Compensation+and+Reward+Management

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the market dynamics namely business, economics, trends in market.

CO2. Estimate the demand elasticity of demand and supply in different market conditions.

CO3. Analyse the important investment and financing decisions respective to production, cost, and pricing in different markets.

CO4. Evaluate a company's financial statements and come to a reasoned conclusion about the financial situations of the company.

CO5. Interpret the financial statements through ratio analysis.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech: IT III Year – I Sem.			
Course Code: **L316A**	**Object Oriented Programming through JAVA**	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites : Programming for Problem Solving.

Course Objectives: The objective of the course is to

1) learn the constructs of the Java programming language along with built-in facilities
2) applying knowledge of object-oriented programming
3) to create different applications such as console & graphical user interfaces.

Module-I

Introduction to OOP: Programming paradigms, procedural programming language versus object-oriented language, principles of OOP.

Introduction to JAVA: Data types, variables, keywords, operators, and control statements. Introduction to Classes and Object: Class definition, variables, and methods. Declaring Objects, Constructors, and this keyword.

Module-II

Classes and objects: overloading methods and constructors, parameter passing, returning objects, recursion. Access control, nested and inner classes, final and static keyword, variable and command-line arguments.

Inheritance and polymorphism: Inheritance, types of inheritance, super keyword, polymorphism (overloading & overriding), dynamic method dispatch, abstract class, using final with inheritance.

String handling classes: String, StringBuffer, StringTokenizer.

Module-III

Interfaces and packages: Interface methods, inheritance in interfaces. API : The built-in JAVA packages and creating and managing user defined packages, importance of CLASSPATH.

Exception Handling: Exception hierarchy, importance of try, catch, throw, throws and finally. Block creation of user-defined exceptions, Assertions.

Module-IV

Multithreading: Introduction, thread life cycle, creation of threads, naming a thread, joining a thread, thread priorities, daemon thread, thread pool, thread group, thread synchronization, Interthread communication.

Collection Framework: Introduction, generics, collection framework hierarchy, list, set, queue, and map.

Module-V

AWT: AWT hierarchy, components and containers, Button, Label, Text Field, Checkbox, Choice, List, Canvas, Scrollbar, Menu Item & Menu, Container class, Layout managers (Border Layout, Flow Layout, Grid Layout, Card Layout).

Event handling: Event delegation model, event classes (Action Event, Mouse Event, Key Event, Window Event), listener interfaces (Action Listener, Mouse Listener and MouseMotionListener, Key Listener, Window Listener), adapter classes, close AWT window.

TEXTBOOKS:

1. Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.
2. Cay S. Horstmann, "Core Java Volume I – Fundamentals", Pearson, Eleventh edition, 2018.

REFERENCES:

1) Dr.R.NageswaraRao, “Core JAVA: An Integrated Approach”, Dreamtech Press, 1st Edition2008.
2) 2. E. Balaguruswamy, “Programming with JAVA”, TMH Publications, 2ndEdition, 2000.
3) 3. Patrick Niemeyer & Jonathan Knudsen, “Learning Java”, O‘REILLY Publications, 3rd Edition, 2005.
4) 4. Benjamin J Evans & David Flanagan, “Java–in a Nutshell – A desktop quick reference”, O‘REILLY Publications, 6th Edition, 2014.

Web Resources:

1.

Course Outcomes: At the end of this course, the student will be able to

1. Demonstrate the fundamentals of object-oriented programming and basic building blocks of Java.
2. Apply object-oriented programming principles for the development of reusable applications.
3. Understand the importance of abstraction, user defined package creation and handling different exceptions.
4. Develop multitasking applications using JAVA multithreaded programming and perform different operations upon various data structures by using collection framework.
5. Develop GUI applications using AWT (Abstract Window Toolkit).

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B.Tech: IT III Year – I Sem.			
Course Code: L3162	Data Science through Python	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites : Python Programming

Course Objectives: The objective of the course is to

1) Apply the concept of Data Science to various applications.
2) Analyse the usage of appropriate Data analytics technique for a given application.
3) Design and develop a data analytics method for different applications.

Module-I

Introduction to Data Science:

Data Analysis Life Cycle Overview. Data analysis Discovery, Framing Problem, Developing Initial Hypothesis, Sources of Data, Process for Making Sense of Data, Data Preparation, Performing ETLT, Data Conditioning, Survey and Visualize, Common tools for Data Preparation Phase, Data Exploration and Variable Selection, Common tools for the Model Planning and Building Phase, Communicate Results, Operationalize

Module-II

Describing Data: Observations and Variables, Types of Variables, Central Tendency, Distribution of the Data, Confidence Intervals, Hypothesis Tests, Student t-test

Module-III

Preparing Data Tables: Cleaning the Data, Removing Observations and Variables, Generating Consistent Scales across Variables, New Frequency Distribution, Converting Text to Numbers, Converting Continuous Data to Categories, Combining Variables, Generating Groups, Preparing Unstructured Data

Module-IV

Understanding Relationships: Visualizing Relationships between Variables, Calculating Metrics about Relationships. Identifying And Understanding Groups: Clustering, K-means, Association Rules, Apriori Algorithm and Applications of Association Rules

Module-V

Building Models from Data: Linear Regression, Logistic Regression, Bayes Theorem, Naive Bayes Classifier, k-Nearest Neighbours, and Learning Decision Trees from Data

TEXTBOOKS:

1) A Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, 2nd Edition, Glenn J. Myatt, Wiley, 2014.
2) 2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education services, 2015..

REFERENCES:

1) Python Data Science Handbook,1st Edition, Jake VanderPlas, O'Reilly, 2017.
2) Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A. (Eds.), Springer, 2008

3) Handbook of Biometrics, Anil K. Jain, Patrick Flynn, Arun A. Ross, Springer, 2007

Web Resources:

1.

Course Outcomes: At the end of this course, the student will be able to:

1. Understand basic introduction concepts of Data science
2. Explore how to describe data
3. Apply mathematical concepts to prepare data tables
4. Identify relations and groups in data science
5. Analyze machine learning models

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: **L315E**	**CLOUD COMPUTING (Professional Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
1. A course on “Computer Networks”.
2. A course on “Operating Systems”.
3. A course on “Data base management systems

Course Objectives:
The students should be able to
1. Understand the fundamentals of the Cloud Computing and strategies in the New Economy.
2. Provide a fundamental understanding of different types of cloud computing applications.
3. Provide insights to implement virtualization techniques.
4. Understand the design of cloud and its architecture.
5. Outlines the security and legal issues in Cloud Computing

Module 1:
Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture,
Cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and MapReduce.

Module 2:
Cloud Platforms in the Industry, Understanding Scientific Applications for Cloud Environments, cloud applications. Healthcare and education, Scientific Applications, Business and Consumer Applications

Module 3:
Virtualization, cloud virtualization technology, deep dive: cloud virtualization, migrating in to cloud computing. Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems.

Module 4:
Enterprise cloud computing Paradigm, Federated cloud computing Architecture,
SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

Module 5:
Cloud management, Organizational Readiness and change management in the cloud age, Cloud Security, Data security in the cloud, Legal Issues in the Cloud, Achieving Production Readiness for the cloud Services.

Text Books
1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011.

Reference Books
1. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

E-Resources
1. https://nptel.ac.in/courses/106/105/106105167/
2. https://sjceodisha.in/wp-content/uploads/2019/09/CLOUD-COMPUTINGPrinciples-and-Paradigms.pdf
3. https://www.alljntuworld.in/download/cloud-computing-cc-materials-notes/
4. https://www.slideshare.net/jeetraj17/cloud-computing-it703-unit-1-5

Course Outcomes

At the end of the course, the student will be able to:
CO1. Identify different elements of cloud computing.
CO2. Analyze the impact of Cloud Computing on organizations and strategy.
CO3. Analyze the different types of virtualization.
CO4. Design cloud based application.
CO5. Identify security and legal issues in the cloud management.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech- IT III Year- I Sem			
Course Code: **L316F**	**INFORMATION RETRIEVAL SYSTEMS (Professional Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Module I
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses. Information Retrieval System Capabilities, Search, Browse, Miscellaneous.

Module II
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure. Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

Module III
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters. User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

Module IV
Information Visualization: Introduction, Cognition and perception, Information visualization technologies. Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Module V
Multimedia Information Retrieval, Models and Languages, Data Modeling, Query Languages, Indexing and Searching. Libraries and Bibliographical systems, online IR system, OPACs,Digital Libraries. 180

TEXTBOOKS
1. Information Storage and Retrieval systems Theory and Implementation Second Edition
2. Modern Information Retrival By Ricardo Baeza-Yates, Pearson Education, 2007.

REFERENCE BOOKS
1. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir Frider, 2nd Edition, Springer.
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
3. Modern Information Retrival By Yates Pearson Education.
4. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons
5. Natural Language Processing and Information Retrieval, T.Siddiqui and U.S.Tiwary, Oxford University Press.

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech- IT
III Year- I Sem</td></tr>
<tr><td>Course Code:
L316G</td><td rowspan="2" colspan="4">PRINCIPLES OF PROGRAMMING LANGUAGES
(Professional Elective-I)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives
At the end of the course, students will:

1. Discuss the background for choosing appropriate programming languages for certain classes of programming problems
2. Explain how to solve the principle to program in an imperative (or procedural), an object-oriented, a functional, and a logical programming language
3. Recognize Increase the capacity to express programming concepts and choose among alternative ways to express things.
4. Discuss principle to design a new programming language.
5. Explain the use of debuggers and related tools.

Course Outcomes
At the end of the course, students will be able to:

1. Analyze semantic issues associated with function implementations, including variable binding, scoping rules, parameter passing, and exception handling.
2. Solve the implementation techniques for interpreted functional languages.
3. Show design issues of object-oriented and functional languages.
4. Illustrate with language abstraction constructs of classes, interfaces, packages, and procedures.
5. Demonstrate how to design and construct with using functional languages, be exposed to using logic languages.

Module-I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments.

Syntax and Semantics: general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

Module-II :

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control
Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

Module-III

Subprograms and Blocks: Fundamentals of sub-programs, Scope of life time of variables, static and dynamic scope, design issues of subprograms and operations, local referencing environments, parameter passing methods.

Overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

Module IV :

Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95. Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.

Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java. Logic Programming Language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Module V:

Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python- Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Absraction, Separate Compilation, Module Library.

TEXT BOOK:

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education, 2008.
2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, rp-2007.

REFERENCE BOOKS:

1. Programming Languages, 2nd Edition, A. B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.
3. LISP Patric Henry Winston and Paul Horn Pearson Education.

<table>
<tr><td>AY 2022-23
onwards</td><td>J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech: IT
III Year – I Sem.</td></tr>
<tr><td>Course Code:
L3161</td><td rowspan="2">Object Oriented Programming through JAVA Lab</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1</td><td>0</td><td>0</td><td>2</td><td>0</td></tr>
</table>

Pre-Requisites: Programming for Problem Solving.

Course Objectives: The objective of the course is to

1) to apply the constructs of Java programming language along with built-in facilities
2) applying knowledge of object-oriented programming,
3) to create different applications such as console & graphical user interfaces.

Experiment 1:

a. Develop a java program to create class, which contains data & methods, create an object to access those members.

b. Develop a java program, which implements all types of java variables (local, class level: static, instance).

c. Develop a java program to calculate the sum of diagonal elements of given n x n matrix.

Experiment 2:

a. Develop a java program, which contains both static and non-static methods.

b. Develop a java program to find area of geometrical figures using method.

c. Develop a java program to initialize instance variables by using constructors.

d. Develop a java program, which implements constructor overloading by passing different number of parameters of different types.

Experiment 3:

a. Develop a java program to count the words, characters in the given line of text.

b. Develop a java program for sorting a given list of names in ascending order.

c. Develop a java program that reads a line of integers separated by commas and then displays each integer, find the sum of the integers (using StringTokenizer).

d. Develop a java program to implement multi-level inheritance.

Experiment 4:

a. Develop a java program to create and access user-defined package.

b. Develop a java program to identify the accessibility of a variable by means of different access specifies within and outside the package.

c. Develop a java program to implement the concept of method overloading.

d. Develop a java program to implement the concept of method overriding.

Experiment 5:

a. Develop a java program for abstract class to find areas of different shapes.

b. Develop a java program to achieve multiple inheritance using interfaces.

c. Develop a java program to create an interface named Vehicle which contains two abstract methods (Specifications (), Display ()). Provide two classes named Two-wheeler, Fourwheeler that is implemented by that interface.

Experiment 6:

a. Develop a java program that implements a multi-threaded program, which has three threads. First thread generates a random integer for every 1 second, if the generated integer is even the second thread computes the square of the number and print it. If the generated integer is odd the third thread will print the value of cube of the number.

b. Develop a java program to identify the use of synchronized blocks, synchronized methods and static synchronized methods in threads concept. c. Develop a java program to illustrate the concept of inter thread communication.

Experiment 7:

a. Develop a java program that creates a user interface to perform integer divisions with possible validations (Divide by Zero, NumberFormatException).

b. Develop a java program to implement mouse events like mouse pressed, mouse released, and mouse moved by means of adapter classes.

Experiment 8:

a. Develop a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

b. Develop a java program to simulate a traffic light, user can select any one of the three buttons with: red, yellow, and green color. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear with the selected button color.

Experiment 9:

a. Develop a java program to print the collection data by using the following ways i) for loop ii) for-each loop iii) Iterator iv) ListIterator

b. Develop a java program to perform all the operations in Collection interface.

Experiment 10:

a. Develop a java program to implement and perform all the operations in List, Set Interface.

b. Develop a java program to implement and perform all the operations in Map interface.

TEXTBOOKS:

1. Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.

2. Cay S. Horstmann, "Core Java Volume I – Fundamentals", Pearson, Eleventh edition, 2018.

REFERENCES:

4) Dr.R.NageswaraRao, "Core JAVA: An Integrated Approach", Dreamtech Press, 1st Edition2008.

5) 2. E. Balaguruswamy, "Programming with JAVA", TMH Publications, 2ndEdition, 2000.

6) 3. Patrick Niemeyer & Jonathan Knudsen, "Learning Java", O'REILLY Publications, 3rd Edition, 2005.

7) 4. Benjamin J Evans & David Flanagan, "Java–in a Nutshell – A desktop quick reference", O'REILLY Publications, 6th Edition, 2014.

Web Resources:

1.

Course Outcomes :

At the end of this course, the student will be able to:

CO1: Solve basic mathematical problems using fundamentals of Java and its object oriented principles.

CO2: Implement multithreading and exception handling mechanisms.

CO3: Develop GUI applications and basic data structures using collection framework.

CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

<table>
<tr><td rowspan="1">AY 2022-23
onwards</td><td>J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech:IT
III Year – I Sem.</td></tr>
<tr><td>Course Code:
L3162</td><td rowspan="2">Data Science through Python Lab</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1.5</td><td>0</td><td>0</td><td>3</td><td>0</td></tr>
</table>

Pre-Requisites :

Course Objectives: The objective of the course is to

1) Apply the concept of Data Science to various applications.
2) Analyse the usage of appropriate Data analytics technique for a given application.
3) Design and develop a data analytics method for different applications.

Week 1:
Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.

Week 2
Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.

Week 3
Write a program to demonstrate Regression analysis with residual plots on a given data set.

Week 4
Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Week 5
Write a program to implement the Naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Week 6
Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions using Java/Python ML library classes.

Week 7
Write a program to implement k-Means clustering algorithm to cluster the set of data stored in.CSV file. Compare the results of various “k” values for the quality of clustering.

Week 8
Case Study

TEXTBOOKS:

3) A Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, 2nd Edition, Glenn J. Myatt, Wiley, 2014.
4) 2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education services, 2015..

REFERENCES:

4) Python Data Science Handbook,1st Edition, Jake VanderPlas, O’Reilly, 2017.
5) Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A. (Eds.), Springer, 2008
6) Handbook of Biometrics, Anil K. Jain, Patrick Flynn, Arun A. Ross, Springer, 2007

Web Resources:

1.

Course Outcomes (CO): At the end of this course, the student will be able to:
CO1: Understand basic introduction concepts of Data science
CO2: Explore how to describe data
CO3: Apply mathematical concepts to prepare data tables
CO4: Identify relations and groups in data science
CO5: Analyze machine learning models

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
III Year- I Sem</td></tr>
<tr><td>Course Code:
L31M2</td><td rowspan="2">CYBER SECURITY</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 0</td><td>2</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: NIL

Course Objectives:

The students should be able to

1. Recognize cybercrimes and how they are planned.
2. Identify the vulnerabilities of mobile and wireless devices.
3. Examine the crimes in mobile and wireless devices and Acts.
4. Understand about Computer Forensics
5. Explored to Cyber Security- Organizational Implications

Module 1:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defence, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy .

Module 2:

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Module 3:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and WirelessComputing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Module 4:

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Module 5:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. **Mini-Cases:** The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

Text Books

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

Reference Books

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson,CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC PressT&F Group

E-Resources

1. https://lecturenotes.in/subject/611/cyber-security .
2. https://www.slideshare.net/AvaniPatel61/ppt-on-cyber-security .
3. https://onlinecourses.swayam2.ac.in/ugc19_hs25/preview

Course Outcomes

At the end of the course, the student will be able to:

CO1. Demonstrate cybercrimes and how they are planned.
CO2. Develop a framework to secure Mobile and wireless devices.
CO3. Interpret crimes and Acts related to mobile and wireless devices.
CO4. Memorize Computer Forensics and its related matters.
CO5. Identify Cyber Security-Organizational Implications

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	-	2	-	1	-	-	-	-	-	-	-	-
CO2	2	-	3	2	-	-	-	-	-	-	-	-	3	1
CO3	-	2	-	2	-	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5		2	-	-	-	2	-	-	-	-	-	-	-	-
Average	**2.0**	**2.3**	**3.0**	**2.0**	-	**1.5**	-	-	-	-	-	-	**3.0**	**1.5**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- I Sem			
Course Code: **L31T2**	**FOUNDATIONS OF ENTREPRRENEURSHIP**	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:
NIL
Course Objectives:
The students should be able to

1. To implore an understanding of the dimensions and traits required to become an entrepreneur.
2. To understand the Entrepreneurial process and also inspire them to be Entrepreneurs.
3. To understand the Entrepreneurship and its role in the society
4. To understand the process of Entrepreneurship & preparing business plans
5. To gain knowledge about the Entrepreneurship Development Institutions of Government

MODULE I:
UNIT - 1:
Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs –
UNIT - 2:
Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

MODULE:II

UNIT:1
The Individual Entrepreneurial Mind-Set and Personality- The entrepreneurial journey-Stress and the entrepreneur - the entrepreneurial ego - Entrepreneurial motivations-
UNIT:2
Motivational cycle – Entrepreneurial motivational behaviour – Entrepreneurial competencies. Corporate Entrepreneurial Mindset, the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

MODULE: III
UNIT - 1:
Launching Entrepreneurial Ventures - opportunities identification- Finding gaps in the marketplace – techniques for generating ideas- entrepreneurial Imagination and Creativity- the nature of the creativity process - Innovation and entrepreneurship.
UNIT -2:
Methods to initiate Ventures- Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising- advantage and disadvantages of Franchising.

MODUL IV:
UNIT - 1:
Legal Challenges of Entrepreneurship - Intellectual property protection - Patents, Copyrights - Trademarks and Trade secrets - Avoiding trademark pitfalls Feasibility Analysis - Industry and competitor analysis - Formulation of the entrepreneurial Plan.
UNIT - 2:
The challenges of new venture start-ups, developing an effective business model – Sources of finance - Critical factors for new venture development - The Evaluation process.

MODULE: V
UNIT - 1:
Strategic Perspectives in Entrepreneurship - Strategic planning - Strategic actions-strategic positioning- Business stabilization - Building the adaptive firms.

UNIT - 2:
Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship -T-hub, J-hub.

Text Books

1. S.S. Khanka, Entrepreneurship Development, S. Chand Publications, 2015. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
2. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012

Reference Books

1. D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, Cengage Learning, 2012.
2. Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching new ventures, 4e, Pearson, 2015
3. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013
4. Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.

E-Resources

1. https://nptel.ac.in/courses/127105007

Course Outcomes

At the end of the course, the student will be able to:
CO1. Understand the need and significance of Entrepreneurship in the Economy
CO2. Develop Entrepreneurial Competencies
CO3. Develop Business Plan with the required contents.
CO4. Understand contribution of family business and Social Entrepreneurship in the Economy.
CO5. Plan Strategic perspectives in entrepreneurship.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	2	1	-	-	2	2	-	3	-	-	-
CO2	-	2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	1	-	3	-	-	-
CO4	-	-	-	-	-	-	2	-	2	-	2	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	2	2	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: **L325B**	**WEB TECHNOLOGIES**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Fundamental programming skills to look for in a web developer-training program include HTML, CSS and JavaScript (the basic building blocks of most websites).
2. Programming skills for back-end web development positions include PHP, XML and SQL.

Course Objectives:

The students should be able to

1. Get best technologies for solving web client/server problems
2. Solve and use JavaScript for dynamic effects and form input entry
3. Recognize appropriate client-side or server-side applications
4. Receive ability to adapt to changing web development and design Skills and Solid and understanding of common design trends.
5. Develop web application software tools i.e. AJAX, PHP and xml etc. and identify the environments currently available on the market to design web sites

Module 1:

Basic Tags of HTML, Introduction HTML5, new HTML5 Form input Types. Cascading Style Sheets. Introduction to JavaScript: declaring variables, functions, event handlers (on Click, on submit etc.). Form validation.

Module 2:

Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX. Introduction to web service solution stacks XAMPP: Introduction to content Management Systems Joomla, word press.

Module 3:

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, Deploying Servlet, Servlet API, Reading Servlet parameters, Reading initialization parameters, handling Http Request & Responses. Session tracking, cookies. Connecting to a database using JDBC.

Module 4:

Introduction to JSP: The anatomy of a JSp page, JSP processing, Declarations, Directives, Expressions, code snippets, implicit objects. Using beans in JSP pages. Using cookies for session tracking. Connecting to database in JSP.

Module 5:

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

Text Books

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book

2. Web Technologies, Uttam K Roy, Oxford Press.3. Introduction to Machine Learning with Python: A Guide for Data Scientists Book by Andreas C. Müller and Sarah Guido Publisher(s): O'Reilly Media, Inc

Reference Books

1. Chris Bates, "Web Programming, building internet applications", 2ndEdition, WILEY, Dreamtech, 2008.
2. Herbert Schildt, "The complete Reference Java 2", 8th Edition, TMH, 2011.
3. Hans Bergsten : "Java Server Pages", 3rdEdition, O'Reilly publication, 2008.

E-Resources

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
3. https://www.javatpoint.com/
4. https://www.geeksforgeeks.org/web-technology/
5. https://www.coursera.org/learn/web-development

Course Outcomes

At the end of the course, the student will be able to:

CO1. Design web pages using HTML, Cascading Style Sheets and JavaScript
CO2. Write XML documents and Schemas.
CO3. Implement server-side programming using JDBC
CO4. Create dynamic web pages
CO5. Create web application development using bdk, jsp and servlets.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	3		2	-	-	-	-	-	-	-	-	3
CO2	2	2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	2	2	3		2	-	-	-	-	-	-	-	-	3
CO4	2	2	2		-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	3	2	-	-	-	-	-	-	-	-	2
Average	**2.2**	**2.0**	**2.6**	**3**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.4**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: L326A	LINUX PROGRAMMING	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives:

The students will :

1. Know the basic concept of Linux scripting.
2. Control the resources with various commands.
3. Understand File systems and File structures.
4. Understand the usage of inter process communications (IPC).
5. Understand the concepts of multithreaded programming and socket programming.

Module I

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

sed – scripts, operation, addresses, commands, applications, awk – execution, fields andrecords, scripts, operation, patterns, actions, functions, using system commands in awk.

Module II

Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution.

Shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Module III

Files: File Concept, File System Structure, I-nodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls(File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links.

Process – Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs.

Module IV

Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions. Interprocess Communication: Introduction to IPC, Pipes and FIFOs.

Message Queues- Kernel support for messages, UNIX system V APIs for messages,client/server example. Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores. Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, semaphore and shared memory example

Module V

Multithreaded Programming: Differences between threads and processes, Thread structure and uses, Threads and Lightweight Processes, POSIX Thread APIs, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs.

Sockets: Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs.

TEXT BOOKS:

1. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH
2. Unix System Programming using C++, T.Chan, PHI.(UNIT III to UNIT VIII)

REFERENCE BOOKS:

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley IndiaEdition.
2. Linux System Programming, Robert Love, O'Reilly, SPD.

Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, PearsonEducation.

Course Outcomes:

The students will be able to:

1. Analyze all the Linux utilities, and implement shell scripting.
2. Express pipes and redirection, Linux environment, traps, signals, filter parameters,filter options and Regular Expressions.
3. Describe the basic Linux process structure and the Linux file system.
4. Define Inter-process Communication using pipes, shared memory, semaphores andMessages.
5. Design various client server applications using TCP or UDP protocols.

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: **L325E**	**SOFTWARE TESTING METHODOLOGY (Professional Elective –II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
A course on "Software Engineering".

Course Objectives:
The students should be able to

1. Explain various software testing issues and solutions in software unit test, Integration, regression, and system testing.
2. Discuss how to planning a test project, design test cases and data, conduct testing Operations, manage software problems and defects, and generate a testing report.
3. Explain the advanced software testing topics, such as object-oriented software, testing methods, and component-based software testing issues, challenges, and Solutions.
4. Recognize software test automation problems and solutions.
5. Identify how to write software-testing documents, and communicate with Engineers in various forms.

Module 1:

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, Taxonomy of bugs. Basics concepts of path testing, predicates, path predicates and Achievable paths, path sensitizing, path instrumentation, application of path testing.

Module 2:

Transaction Flow Testing: Transaction flows, transaction flow testing techniques. Dataflow testing: - Basics of dataflow testing, strategies in dataflow testing, application Of dataflow testing. Domain Testing:-domains and paths, Nice & ugly domains, domain Testing, domain and interface testing, domains and testability.

Module 3:

Paths, Path products and Regular expressions: Path products & path expression, Reduction procedure, applications, regular expressions & flow anomaly detection.

Module 4:
Logic Based Testing: Overview, decision tables, path expressions, kv charts, Specifications. State, State Graphs and Transition testing: State graphs, good & bad state Graphs, state testing, Testability tips.

Module 5:
Graph Matrices and Application: Motivational overview, matrix of graph, relations, Power of a matrix, node reduction algorithm, building tools.
Regression testing, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

Text Books

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

Reference Books

1. The craft of software testing - Brian Marick, Pearson Education.

2. Software Testing Techniques – SPD (Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.

E-Resources

1. https://www.guru99.com/testing-methodology.html
2. www.ieeexplore.ieee.org
3. www.tutorialspoint.com

Course Outcomes

At the end of the course, the student will be able to:

CO1: Analyse and design test cases using black box testing technique, which includes decision tables domain testing and transition testing.

CO2: Analyse and design test cases for a white box testing technique, which includes path testing, data flow graphs and matrix representation for a given problem.

CO3: Compute the path product and construct regular expression, which is used to identify the alternate paths from source node to destination node for any Application.

CO4: Execute how to run test script wizard and execute how to do performance testing using testing tools including win runner and j meter respectively.

CO5: Demonstrate the importance of testing and its role in need of software development.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: **L325F**	**SOFTWARE PROJECT MANAGEMENT (Professional Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Software Engineering

Course Objectives:
The students should be able to

1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics unsuccessful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
5. Determine the modern project transition.

Module 1:
Conventional Software Management: The waterfall model, conventional software Management performance.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

Module 2:
The old way and the new way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.
Life cycle phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Module 3:
Work Flows of the process: Software process workflows, Iteration workflows. Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Module 4:
Process Automation: Automation Building blocks.
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. **Tailoring the Process**: Process discriminants.

Module 5:
Project Organizations and Responsibilities: Line-of-Business Organizations Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.
Case Study: The command Center Processing and Display system- Replacement (CCPDS-R) 151.

Text Books

1. Software Project Management, Walker Royce: Pearson Education, 2005.
2. Software Project Management, Joel Henry, Pearson Education.

Reference Books

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw- Hill Edition.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

E-Resources

1. https://www.javatpoint.com/software-project-management
2. https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the different project contexts and suggest an appropriate management strategy.
CO2. Practice the role of professional ethics unsuccessful software development.
CO3. Identify and describe the key phases of project management.
CO4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
CO5. Determine the modern project transition.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT III Year- II Sem			
Course Code: **L325E**	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS (Professional Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

- Knowledge of Software Engineering

Course Objectives:

The students should be able to

1. Understand that design patterns are standard solutions to common software designproblems.
2. Discuss to know how to use systematic approach that focus and describe that describeabstract systems of interaction between classes, objects and communication flow.
3. Understand the architecture evaluation and design decision making.
4. Understand how to apply these patterns on various platforms.
5. Understand the responsibilities for developing software.

Module 1:

Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture Quality Attributes, Achievingqualities, Architectural styles and patterns, designing the Architecture, Documentingsoftware architectures, Reconstructing Software Architecture.

Module 2:

Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Moving from one system to many Software Product Lines, Building systems from off the shelf components, Software architecture in future

Module 3:

Patterns Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage. Creational and Structural patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, fly weight.

Module 4:

Behavioral patterns Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Module 5:

Case Studies A-7E –A case study in utilizing architectural structures, The World Wide Web -a case study in interoperability, Air Traffic Control –a case study in designing for high availability, Celsius Tech –a case study in product line development

Text Books

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995

Reference Books

1. Architecture in Practice, Len Bass, Paul Clements, Rick Kazman.
2. Software Documenting Software Architectures: Views and Beyond Paul Clements, Felix Bachmann, Len Bass, David Garlen, James Ivers, Reed Little, Robert Nord, Judith Stafford

E-Resources

1. http://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Architecture/Design_Patterns

Course Outcomes

At the end of the course, the student will be able to:

CO1. Apply a deeper knowledge of the principles of Object-Oriented Design.

CO2. Analyse the Software architectures in terms of performance, availability, security and cost benefit analysis.

CO3. Illustrate the knowledge of various patterns that are related to object-oriented design.

CO4. Analyse behavioural architectural patterns

CO5. Apply the Knowledge of Design Patterns for developing a software.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO2	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO3	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO4	1	-	-	-	-	-	-	3	-	3	-	1	-	1
CO5	2	-	-	-	-	-	-	2	-	3	-	1	-	1
Average	**1.2**	-	-	-	-	-	-	**2.2**	-	**3.0**	-	**1.0**	-	**1.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

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Onwards</td><td colspan="1">J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
III Year- II Sem</td></tr>
<tr><td>Course Code:
L326H</td><td rowspan="2">Open Source Software
(Professional Elective-III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
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Course Outcomes:
CO 1: Differentiate between Open Source and Proprietary software and Licensing.
CO 2: Recognize the applications, benefits and features of Open-Source Technologies
CO 3: Gain knowledge to start, manage open-source projects.

Module I
introduction to Open-Source:
Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

Module II
Open-Source Principles and Methodology:
Open-Source History, Open- Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.

Module III
Understanding Open-Source Ecosystem:
Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies.

Module IV
Open-Source Ethics and Social Impact:
Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, shared software, Shared source, Open Source as a Business Strategy

Module V
Case Studies:
Example Projects-Mozilla (Firefox), Wikipedia, GitHub, Open Office, LibreOffice.

Textbooks:
1. "Open-Source Technology", Kailash Vadera & Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. "Open-Source Technology and Policy", Fadi P. Deek and James A. M. McHugh, Cambridge University Press, 2008.

<table>
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Onwards</td><td>J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
III Year- II Sem</td></tr>
<tr><td>Course Code:
L326I</td><td rowspan="2">Object Oriented Analysis and Design
(Professional Elective-III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Module - I
Introduction to UML:
Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

Module - II
Basic Structural Modeling:
Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Module - III
Class & Object Diagrams:
Terms, concepts, modeling techniques for Class & Object Diagrams.

Module - IV
Basic Behavioral Modeling-I:
Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams

Module - V
Advanced Behavioral Modeling:
Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOK
1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education**.**

Course Outcomes: After the completion of the course, students should be able to:
CO 1: Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.
CO 2. Apply basic and Advanced Structural Modeling Concepts for designing real time applications.
CO 3. Design Class and Object Diagrams that represent Static Aspects of a Software System.
CO 4. Analyze Dynamic Aspects of a Software System using Use Case, Interaction and Activity Diagrams.
CO 5. Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
III Year- II Sem</td></tr>
<tr><td>Course Code:
L326J</td><td rowspan="2">OBJECT ORIENTED SOFTWARE ENGINEERING
(Professional Elective-III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives

At the end of the course , students will :

1. Understand software process models such as waterfall and evolutionary models.
2. Identify software requirement specification and document it.
3. Identify an ability to practically apply knowledge software engineering methods, such as object-oriented analysis and design methods with a clear emphasis on UML.
4. Describe a working ability and grasping attitude to design and conduct object-oriented analysis and design experiments using UML, as well as to analyze and evaluate their models.
5. Discuss software testing approaches such as unit testing and integration testing.

Module –I

Introduction to Software Engineering: The evolving role of Software, changing nature of Software, Software Myths.

Generic view of Process: Software Engineering, Process Framework, The Capability Maturity Model Integration (CMMI), Process Patterns, Process Assessment, Personal and Team Process, Process Technology, Product and process.

Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, The Unified Process.

Module -II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document**.**

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System Models: Context models, behavioral models, data models, object models, structured methods.

Creating an architectural design: Software architecture, data design, architectural styles and patterns, architectural design.

Module -III

Design Engineering: Design process and Design quality, design concepts, the design model, data flow diagrams, data dictionaries.

Introduction to UML: Importance of modeling, Principles of modeling, Object oriented modeling, Conceptual model of UML, Architecture.

Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class diagrams.

Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages, Instances, Object diagrams.

Module -IV

Behavioral Modeling: Use Cases, Use case diagrams, Interactions, Interaction diagrams, Activity diagrams.

Advanced Behavioral Modeling: Events and Signals, Time and Space , State machines, Processes and Threads, State Chart diagrams.

Architectural Modeling: Components, Component diagrams, Deployment, Deployment diagrams, Patterns and Frameworks.

Module -V

Software Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing, the art of debugging.
Product Metrics: Software quality, metrics for analysis model, Metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.
Metrics for Process and Products: Software Measurement, Metrics for software quality
Quality management: Quality concepts, software quality assurance, software reviews, software reliability, the ISO 9000 quality standards.

TEXT BOOK:

1. Roger S.Pressman, "Software Engineering: A Practitioners Approach" ,7th edition, McGrawHill, 2009
2. Software testing techniques-Baris Beizer, Dreamtech, 2nd edition
3. The Unified modeling language, User guide by Grady Booch, James Rumbaugh, Ivar Jaccobson

REFERENCE BOOKS:

1. Software engineering, Ian Sommerville, 7th Edition, Pearson Education
2. Ali Behforoz and Frederic J.Hadson, "Software Engineering Fundamentals", Oxford Semester-End Press, 1996.
3. The craft of software testing- Brian Marick, Pearson Education

Course Outcomes
At the end of the course, students will be able to:

1. Apply the process of software development life cycle.
2. Solve practical solutions to the problems.
3. Apply object oriented programs using a selected OOP programming language.
4. Apply object oriented software development techniques from requirements gathering to implementation.
5. Apply Object Oriented Software Development Process.

AY: 2022-23 Onwards	**J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY** (UGC Autonomous)	**B. Tech-IT III Year- II Sem**			
Course Code: **L3252**	**WEB TECHNOLOGIES LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Pre-Requisites:

1. Fundamental programming skills to look for in a web developer-training program include HTML, CSS and JavaScript (the basic building blocks of most websites).
2. Programming skills for back-end web development positions include PHP, XML and SQL.

Course Objectives:

The students should be able to

1. Use the fundamental concepts and features of java programming language.
2. Recognize the basic principles of object oriented programming, which includes inheritance, polymorphism, encapsulation and abstraction, and also arrays, data and text file operations.
3. Gain (1) interaction, communication and collaboration, (2) knowledge creation, (3) Ease of use and flexibility, and (4) writing and technology skills
4. Execute and incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.
5. Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

EXPERIMENT 1

Create HOME PAGE for an online bookstore

EXPERIMENT 2:

Login page for an online bookstore

Experiment 3:

Create CATOLOGUE PAGE

Experiment 4:

Create registration form with the following fields Name, Password, confirm password, E-mail id, Phone number, Sex, Date of birth, Address

Experiment 5:

Write JavaScript to validate the following fields of the above registration modify web page appearance using CSS

Experiment 6:

Write an XML file, which will display all your subjects, Books information such as title, author, isbn, name of the publisher. Create a DTD, XML Schemas to validate this XML document. Create CSS, XSL do display XML data

Experiment 7:

Install XAMPP and JOOMLA or Word Press and test.

Experiment 8:

Write Servlet Program to read data submitted from Registration form and store it into the MySQL database

Experiment 9:

Write a JSP program user validation web application to read username and password submitted by the user and return successful login if the data matches, otherwise failure login.

Experiment 10:

Write a PHP program to store current date-time in a COOKIE and display the “Last visited on" date-time on the web page upon reopening of the same page.

Experiment 11:

Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page. Apply web application development software tools i.e. AJAX, PHP and xml etc. and identify the environments currently available on the market to design web sites

Experiment 12:

Using PHP and MySQL develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information ina database and to search for a book with the title specified by the user and to display the search results with proper headings.

E-Resources

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
3. https://www.javatpoint.com/
4. https://www.geeksforgeeks.org/web-technology/
5. https://www.coursera.org/learn/web-development

Course Outcomes

At the end of the course, the student will be able to:

CO1.Execute dynamic html with java script, methods in JAVASCRIPT, functions in JAVA SCRIPT, events.

CO2. Solve JAVASCRIPT, MARKUP elements, style sheets, validation, accessibility,standards, and browsers upon completion

CO3. Develop hand- coded web pages using current MARKUP standards

CO4. Design and conduct experiments, as well as to analyse and interpret data

CO5. Identify the environments currently available on the market to design web sites

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO2	2	2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	3	2	-	-	-	-	-	-	-	-	2
Average	**3.0**	**2.0**	**1.8**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.4**

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="1">AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B.Tech-IT
III Year – II Sem</td></tr>
<tr><td>Course Code:L3261</td><td rowspan="2">LINUX PROGRAMMING LAB</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1</td><td>0</td><td>0</td><td>2</td><td>0</td></tr>
</table>

Pre-requisite: Computer Organization, Computer Networks, C Programming, etc…

Course Objectives

At the end of the course, students will:

1. Know about the Linux environment.
2. Understand the fundamentals of shell scripting/programming.
3. Describe various system calls and their usage.
4. Discuss about the Zombie process.
5. Discuss about the Inter Process Communication.

Note: Use Bash for Shell scripts.

Experiment 1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

Experiment 2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

Experiment 3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

Experiment 4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

Experiment 5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

Experiment 6. Write a shell script to list all of the directory files in a directory.

Experiment 7. Write a shell script to find factorial of a given integer.

Experiment 8. Write an awk script to count the number of lines in a file that do not contain vowels.

Experiment 9. Write an awk script to find the number of characters, words and lines in a file.

Experiment 10. Write a C program to create a child process and allow the parent to display “parent”and the child to display “child” on the screen.

Experiment 11. Write a C program to create a Zombie process.

Experiment 12. Write a C program that illustrates how an orphan is created.

Experiment 13. Write C programs that illustrate communication between two unrelated processes using named pipe.

Experiment 14. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.

Experiment 15. Write a C program that receives the messages (from the above message queue as specified in (14)) and displays them.

Experiment 16. Write a C program that illustrates suspending and resuming processes using signals.

Experiment 17. Write a C program that implements a producer-consumer system with two processes. (using Semaphores).

Experiment 18. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.

Experiment 19: Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.

Experiment 20. Write a C program that illustrates two processes communicating using shared memory.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart 3/2/1 indicates the strength of the calculation 3-Strong, 2-Medium, 1-Low														
Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)												Course Outcomes	
	PO1		**PO1**		**PO1**		**PO1**		**PO1**		**PO1**		**PO1**	
CO1	2	3	2	2	2	-	-	-	-	-	-	-	2	-
CO2	2	2	2	2	1	-	-	-	-	-	-	-	2	-
CO3	2	2	2	1	1	-	-	-	-	-	-	-	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	1	2	-	-	-	-	-	-	-	2	-
Average	**2.0**	**2.2**	**2.0**	**1.5**	**1.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**1.0**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-IT III Year-II Sem			
Course Code: L3201	**LIFE SKILLS AND PROFESSIONAL SKILLS LAB** COMMON TO: ALL	L	T	P	D
Credits: 2		**0**	**0**	**4**	**0**

Pre-Requisites:

Module 1: COMMUNICATION SKILLS [8L]

Introduction- Channel of communication, Process of communication, Language as a tool of communication, levels of communication, the flow of communication, communication networks, Barriers to Communication; Body language – Eye contact, facial expressions, gestures, posture, and body movements.

Module 2: PRESENTATION SKILLS [8L]

Nature and Importance of Oral Presentation; Planning the Presentation-Define the Purpose, Analyze the Audience, Analyze the Occasion and Choose a suitable title; Preparing the Presentation-Develop the Central Idea, Develop the Main Ideas, Gather Supporting Material and Plan Visual Aids; Organizing the Presentation-Introduction, Body, Conclusion; Rehearsing the Presentation; Improving Delivery and Choosing Delivery Methods; Handling the Stage Fright.

Module 3: GROUP DISSCUSSIONS [8L]

Nature of GD- What is a GD? GD and Debate, Importance of GD skills; Characteristics of successful GDs- Subject knowledge, Oral Communication skills, Leadership skills, Team Management; GD Strategies- Getting the GD Started, Contributing Systematically, Creating a Friendly Cooperative Atmosphere, Moving the Discussion along, Promoting Optimal Participation, Handling Conflict and Effecting Closure; Techniques for Individual Contribution- Topic Analysis, Discussing Problems, Discussing Case Studies; Group Interaction Strategies-Exchanging Opinions, Exchanging Suggestions and Proposals.

Module 4: INTERVIEW SKILLS [8L]

The Interview process; Characteristics of the Interview- Planning, Purpose, Conversation, Two-way Interaction and Informality; Pre-interview Preparation Techniques-Self-analysis, Research the Organization, Job Analysis, Revise your Subject Knowledge, Develop the Interview File; Interview Questions- Types of Interview Questions, Answering Strategies; FAQs and Practice; Projecting a positive image; Alternative Interview formats.

Module 5: PROFESSIONAL WRITING SKILLS [8L]

Resumes -Resume Design, Parts of Resume, Resume style; Job Applications-opening, body, and closing; E-mail writing-Format, Standard E-mail practices and E-mail writing strategies; Report writing-nature and significance, types of reports, formats of reports; Proposals- types of Proposals, structure of Formal Proposals, parts of a formal Proposals; Technical Articles-types of Technical Articles, Journal articles and Research papers-Review and Research Articles, Elements of Technical Articles and Writing Strategies.

Reference Books

1. Ashraf Rizvi. M. *Effective Technical Communication*. McGraw-Hill: New Delhi: 2010
2. K. R. Lakshminarayanan, *Speak in English*, Scitech Publications, Chennai, 2009. Print.
3. Dr. Alex. K. Soft Skills: *Know yourself and Know the World*. S. Chand & Company Pvt. Ltd: New Delhi: 2014. Print.
4. Raman Meenakshi and Sangeeta Sharma. *Technical Communication: Principles and Practice*. Oxford University Press: New Delhi: 2007.Print.

E-Resources

https://www.skillsyouneed.com/ips/communication-skills.html
https://www.skillsyouneed.com/presentation-skills.html
https://www.coursera.org/articles/presentation-skills
https://www.javatpoint.com/group-discussion
https://hbr.org/1964/01/strategies-of-effective-interviewing
https://en.wikipedia.org/wiki/Professional_writing

Course Outcomes

At the end of the course, the student will be able to:

CO1. Learn the importance of communication skills.

CO2. Understand how to give the presentation.

CO3. Participate in GDs by applying appropriate speaking techniques.

CO4. Know the required skills to face interviews.

CO5. Write letters and resumes effectively by applying appropriate writing techniques.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**2**	**2**	-	3	-	-
CO3	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IT III Year – II Sem			
Course Code: L32M1	ARTIFICIAL INTELLIGENCE (Common to EEE, CSE, IT &ECM)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites:

1. Mathematics, Probability and statistics
2. Knowledge in programming Language

Course objectives:

The Student will:

1. Know the AI based problems.
2. Illustrate AI techniques for representing the basic problem.
3. Illustrate Advanced AI techniques to solve the problem.
4. Define Learning and explain various learning techniques.
5. Understand the usage expert system.

Module 1:
UNIT-I:
Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents
Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-firstwithIterativeDeepening),HeuristicSearch(HillClimbing,GenericBest-First,A*),Constraint Satisfaction (Backtracking, LocalSearch)
Module 2:
UNIT-I:
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning
Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem.
Module 3:
UNIT-I:
Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.
Module 4:
UNIT-I:
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.
Module 5:
UNIT-I:
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge

Acquisition.

TEXT BOOKS:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall,2010

REFERENCES:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition,2009.
2. GeorgeF.Luger,ArtificialIntelligence:StructuresandStrategiesforComplexProblemSolving, Pearson Education, 6th ed.,2009.

E - Resources:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_pdf_version.htm
2. https://www.alljntuworld.in/download/artificial-intelligence-ai-materials-notes/
3. https://drive.google.com/file/d/1mPiI4jy6YkJRDiCT21xgzN0VDNkrW23X/view
4. https://nptel.ac.in/courses/106/105/106105077/

Course outcomes:

The Student will be able to:

1. Identify the AI based problems.
2. Apply AI techniques for representing the basic problem.
3. Apply Advanced AI techniques to solve the problem.
4. Analyze Learning and explain various learning techniques.
5. Illustrate the use of expert system.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart 3/2/1 indicates the strength of the calculation 3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**P O3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3
Average	**3.0**	**3.0**	**3.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.0**	**3.0**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -IT III Year-II Sem			
Course Code:L32T1	**EMPLOYABILITY SKILLS** (Audit Course-III) COMMON TO: AI & DS, CSE, IT, CSE (AIML & DS) and ECM	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1: SOFT SKILLS [6L]

Introduction - What are Soft Skills? - Importance of Soft Skills - Marketing Your Soft Skills - Negotiating - Exhibiting Your Soft Skills - Identifying Your Soft Skills - Improving Your Soft Skills - Top 60 Soft Skills.
Know Thyself/ Self – Discovery - Process of Knowing Yourself - SWOT Analysis.

Module 2: CAREER PLANNING [6L]

Introduction - Benefits of Career Planning - Guidelines for choosing a career - Myths about choosing a career goal - Final thoughts on career planning - Things one should know while starting career and during his/her career.

Module 3: ART OF SPEAKING [6L]

Introduction - What Makes Communication Important? - Defining Communication - Process of Communication - Channels of Communication - Formal and Informal Communication Network - Barriers to Communication - Tips for Effective Communication - Art of Public Speaking.

Module 4: ART OF WRITING [6L]

Introduction - Importance of Writing - Creative Writing - Writing Tips - Drawbacks of Written Communication - Letter Writing and Resume Writing.

Module 5: ETIQUETTES AND MANNERS [6L]

Introduction - Modern Etiquettes - Benefits of Etiquettes - Classification of Etiquettes.
Introduction - Practicing Good Manners - Manners at the Wheel - Professional Manners - Social Skills (Manners) - Getting Along with People - Corporate Grooming Tips.

Text Books

1. Dr. Alex. K. Soft Skills: *Know yourself and Know the World*. S. Chand & Company Pvt. Ltd: New Delhi: 2014.

Reference Books

1. Ashraf Rizvi. M. *Effective Technical Communication*. McGraw-Hill: New Delhi: 2010
2. K. R. Lakshminarayanan, *Speak in English*, Scitech Publications, Chennai, 2009.

E-Resources

- https://en.wikipedia.org/wiki/Soft_skills
- https://www.mbaskool.com/business-concepts/human-resources-hr-terms/1779-career-development.html

Course Outcomes

At the end of the course, the student will be able to:

CO1. Learn the importance of soft skills and knowing thyself.

CO2. Understand how to build their (students) career.

CO3. Communicate effectively by applying appropriate speaking techniques.

CO4. Write letters and resumes effectively by applying appropriate writing techniques.

CO5. Learn the good manners and social etiquettes.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	**2**	2	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**2**	**2**	-	3	-	-
CO3	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B.Tech-IT IV Year – I Sem.			
Course Code: L416B	**Data Analytics using R**	**L**	**T**	**P**	**D**
Credits: 4		**3**	**1**	**0**	**0**

Pre-Requisites : Any Programming Language

Course Objectives: The objective of the course is to

1) To learn R. Programming language,
2) to understand data analytics,
3) and to learn data visualisation and statistical model for data analytics.

Module I

Introduction to Data Analysis Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.

Module II

R Programming Basics Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.

Module III

Data Visualization using R Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files.

Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts

Module IV

Statistics with R Random Forest, Decision Tree, Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression, Logistic Regression, Survival Analysis.

Module V

Prescriptive Analytics Creating data for analytics through designed experiments,Creating data for analytics through active learning, Creating data for analytics through reinforcement learning

TEXTBOOKS:

1) An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16).

REFERENCES:

2) Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013
3) 2. Dunlop, Dorothy D., and Ajit C. Tamhane Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000

Web Resources:

1. URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf

Course Outcomes (CO): At the end of this course, the student will be able to:

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- I Sem			
Course Code: **L416B**	**DATA WAREHOUSING AND DATA MINING**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
Basic knowledge in **DBMS**
Course Objectives:
The students should be able to

1. Introduce the basic concepts and techniques in building a Data Warehouse.
2. Apply pre-processing techniques for any given raw data.
3. Implement and apply basic algorithms for finding frequent patterns in transactional databases.
4. Implement and apply basic algorithms for supervised and unsupervised learning.
5. Discuss an overview of mining complex types of data.

Module 1:

Introduction:
Fundamentals of data mining, Data Mining Functionalities, Classification of Data Miningsystems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Preprocessing:
Need for preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Module 2:

Data Warehouse and OLAP Technology for Data Mining:
Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, DataWarehouse Implementation, From Data Warehousing to Data Mining.

Data Cube Computation and Data Generalization:
Efficient Methods for Data Cube Computation and Data Generalization, Attribute-Oriented Induction.

Module 3:

Mining Frequent Patterns:
Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods

Associations and Correlations:
Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Module 4:

Classification:
Issues Regarding Classification and Prediction, Classification by Decision TreeInduction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines.

Prediction:
Simple linear regression, Logistic Regression, Accuracy and Error measures, evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Module 5:

Cluster Analysis Introduction:

Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods,Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-BasedMethods, Model-Based Clustering Methods, Outlier Analysis.

Mining Complex Types of Data:

Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series andSequence Data, Mining Text Data and Mining the World Wide Web.

Applications and Trends in Data Mining: Data Mining Applications, Data MiningSystem Products and Research Prototypes

Text Books

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, MorganKaufmann Publishers, Elsevier,2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar,Pearson education

Reference Books

1. Data Mining Techniques – Arun K Pujari,2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI, 2008.

E-Resources

1. https://drive.google.com/file/d/1KwbqsxdL-R3PoRyf8o4Ewdjm98MOKFJv/view
2. https://onlinecourses.nptel.ac.in/noc18
3. www.vssut.ac.in/lecture_notes/lecture1428550844.pdf
4. www.vssut.ac.in/lecture_notes/lecture1428550844.pdf

Course Outcomes

At the end of the course, the student will be able to:

CO1. Assess raw input data and process it to provide suitable input for a range of datamining algorithms.
CO2. Identify a data warehouse for an organization.
CO3. Apply Data mining techniques such as characterization, comparison, association.
CO4. Apply an appropriate data Mining algorithms for classification and clusteringfrom large databases.
CO5. Demonstrate knowledge on mining complex types of data.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	2	2	-	-	-	-	-	-	-	2	-
CO2	2	2	3	2	2	-	-	-	-	-	-	-	3	-
CO3	2	3	2	1	1	-	-	-	-	-	-	-	-	1
CO4	2	3	2	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	2	1	2	-	-	-	-	-	-	-	2	-
Average	2.2	2.4	2.2	1.6	1.6	-	-	-	-	-	-	-	2.3	1.0

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="1">J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
IV Year- I Sem</td></tr>
<tr><td>Course Code:
L416E</td><td rowspan="2">Ad hoc SENSOR NETWORKS
(Professional Elective-IV)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives
At the end of the course , students will :

1. Understand the application, issues and challenges of MANET’s.
2. Recognize the various routing protocols in MANET’s.
3. Classify the security issues of wireless sensor networks
4. Estimate the sensing , communication range and its energy consumption of wireless sensor networks

Course Outcomes
At the end of the course , students will be able to:

1. Demonstrate the application, issues and challenges of MANET’s.
2. Apply the various routing protocols when ever required.
3. Predict and deal with the security issues of WSNs.
4. Show how data retrieval is done in sensor networks.

MODULE -I:
Introduction to Ad Hoc Wireless Networks
Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs.
Routing in MANETs: Classification of Routing Protocols, Topology-based versus Position-based Approaches, Topology based Routing Protocols, Position based Routing, Other Routing Protocols.

MODULE -II:
Data Transmission in MANETs
The Broadcast Storm, Multicasting, Geocasting, TCP over Ad Hoc Networks-TCP Protocol overview, TCP and MANETs, Solutions for TCP over Ad Hoc.
Security in MANETs: Security in Ad Hoc Wireless Networks, Key Management, Secure Routing, Cooperation in MANETs, Intrusion Detection Systems.

MODULE -III:
Basics of Wireless Sensors and Applications
The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications. Sensor Node Hardware

MODULE -IV:
Data Retrieval in Sensor Networks
Classification of WSNs, MAC Layer, Routing Layer, High-Level Application Layer Support, Adapting to the Inherent Dynamic Nature of WSNs.

MODULE -V:
Security in WSNs
Security in Wireless Sensor Networks, Key Management in Wireless Sensor Networks, Secure Data Aggregation in Wireless Sensor Networks.

Introduction to Vehicular Ad Hoc Networks, Introduction to Wireless Mesh Networks

TEXT BOOK:

1. Ad Hoc and Sensor Networks: Theory and Applications, Carlos de Morais Cordeiro and Dharma Prakash Agrawal, World Scientific Publications / Cambridge University Press, 2006.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science Imprint, Morgan Kauffman Publishers, 2005.

REFERENCE BOOKS:

1. Manoj, Pearson Education, 2004.
2. Guide to Wireless Ad Hoc Networks, Sudip Misra, Isaac Woungang, and Subhas Chandra Misra, Springer International Edition, 2011.
3. Guide to Wireless Sensor Networks, Sudip Misra, Isaac Woungang, and Subhas Chandra Misra, Springer International Edition, 2012.

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- I Sem			
Course Code: **L416F**	**STORAGE AREA NETWORKS** (Professional Elective-IV)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives:
After completion of this course, students will:

1. Directly assess the technical capabilities of a variety of storage technologies in light of business and technical needs.
2. Design storage configurations that effectively meet scalability, security, resilience, and availability requirements.
3. Develop and implement migration strategies for growing business storage needs and network capabilities.
4. Discuss Fibre Channel protocol basics and identify key differences between various Fibre Channel topologies.
5. Describe and discuss IP convergence in the SAN and its implications.

Course Outcomes:
After completion of this course student is able to:

1. Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, CAS.
2. Define information security and identify different storage virtualization technologies.
3. Develop techniques for evaluating policies for LUN masking, file systems.
4. Define backup, recovery, disaster recovery, business continuity, and replication.
5. Describe processes and technologies for identifying, analyzing, and mitigating security risks in storage infrastructure.

MODULE I:
Introduction to Storage Technology: Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage.
Storage system environment: Core elements of a data center infrastructure, role of each element in supporting business activities.

MODULE II:
Storage Systems Architecture: Hardware and software components of the host environment, Key protocols and concepts used by each component , Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications.
Data Protection: Concept of RAID and its components , Different RAID levels and their suitability for different application environments, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system.

MODULE III:
Introduction to Networked Storage: Evolution of networked storage, Architecture, components, and topologies of FC-
SAN, NAS, and IP-SAN: Benefits of the different networked storage options understand the need for long-term archiving solutions and describe how CAS fulfills the need, understand the appropriateness of the different networked storage options for different application environments.

MODULE IV:

Introduction to Business Continuity: Information Availability & Monitoring & Managing Datacenter List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures.

Backup and Recovery: Architecture of backup/recovery and the different backup/recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities. Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center.

MODULE V:

Securing the Storage Infrastructure: Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain.

Storage Virtualization: Virtualization technologies, block-level and file-level virtualization technologies and processes.

TEXT BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley.
2. Robert Spalding, "Storage Networks: The Complete Reference ", Tata McGraw Hill, Osborne, 2003.

REFERENCE BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley,
2. Robert Spalding, "Storage Networks: The Complete Reference ", Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- I Sem			
Course Code: **L416G**	**WIRELESS NETWORKS AND MOBILE COMPUTING** (Professional Elective-IV)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives

At the end of the course , students will :

1. Understand Wireless Application Standards & Protocols.
2. Discuss the components and important developments in Wireless Communication Networks.
3. Discuss both theoretical and practical issues of mobile computing.
4. Describe the MANET's and its routing protocols.

Course Outcomes

At the end of the course , students will be able to:

1. Apply the concepts of wireless computing as compared to the conventional wire-based computing.
2. Illustrate the Framework and Principles related to wireless communications.
3. Analyze the operation of a range of commonly used wireless communication technologies.
4. Apply the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities.

Module I

Wireless Transmission: Frequencies for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular system.

(Wireless) Medium Access Control (MAC): Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals), SDMA, FDMA, TDMA, CDMA, MAC Protocols for GSM.

Module II

Wireless LAN: IEEE 802.11, Personal Area Network, IEEE 802.15.1 and IEEE 802.15.4 (Bluetooth and ZigBee), Ad-hoc and Sensor network-Introduction, Characteristics of MANET and Applications.

Mobile Computing: Types of Networks, Architecture for Mobile Computing, 3-tier Architecture

Module III

Mobile Computing Environment:

Design Considerations for Mobile Computing, Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging.

GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, and New Data Services.

Module IV

Mobile IP Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Module V

Mobile OS and Building Mobile Internet Applications: Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development : The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.

Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP).

TEXT BOOK:

1. Mobile Communications‖, Jochen Schiller, Addison-Wesley, Second Edition, 2004
2. Mobile Computing, Raj Kamal, Oxford University Press ,2007
3. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley, 2003

REFERENCE BOOKS:

1. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML—, Reza Behravanfar, Cambridge University Press, Oct2004.
2. Handbook of Wireless Networks and Mobile Computing‖, Stojmenovic and Cacute, Wiley, 2002

<table>
<tr><td>AY: 2022-23
Onwards</td><td>J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
IV Year- I Sem</td></tr>
<tr><td>Course Code:
L416G</td><td rowspan="2">Data Analytics using R LAB
(Common to CSE & IT)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 1.5</td><td>0</td><td>0</td><td>3</td><td>0</td></tr>
</table>

Course objectives:

The Student will:

Experiment 1: R AS CALCULATOR APPLICATION

Write an R script, to create R objects for calculator application.

Experiment 2: DESCRIPTIVE STATISTICS IN R

a. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets.
b. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset.

Experiment 3: READING AND WRITING DIFFERENT TYPES OF DATASETS

a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
b. Reading Excel data sheet in R.

Experiment 4: VISUALIZATIONS

a. Find the data distributions using box and scatter plot.
b. Find the outliers using plot.
c. Plot the histogram, bar chart and pie chart on sample data.

Experiment 5: CORRELATION AND COVARIANCE

a. Find the correlation matrix.
b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

Experiment 6: REGRESSION MODEL

Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign),
require (MASS).

Experiment 7: MULTIPLE REGRESSION MODEL

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.

Experiment 8: REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset.

Experiment 9: CLASSIFICATION MODEL

a. Install relevant package for classification.
b. Choose classifier for classification problem.
c. Evaluate the performance of classifier.

Experiment 10: CLUSTERING MODEL

a. Clustering algorithms for unsupervised classification.
b. Plot the cluster data using R visualizations.

REFERENCE BOOKS:

1. Yanchang Zhao, ―R and Data Mining: Examples and Case Studies‖, Elsevier, 1st Edition, 2012.

Course outcomes:

The Student will be able to:

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- I Sem			
Course Code: **L4162**	**DATA MINING LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Course Objectives

At the end of the course , students will :

1. Discuss to perform data mining tasks using a data mining toolkit (such as open source WEKA),
2. Express the practical exposure on implementation of well known data mining tasks
3. Examine to real life data sets for analysis and prediction.
4. Predict the performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

Credit Risk Assessment

Description: The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. **Knowledge Engineering**. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. **Books.** Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. **Common sense.** Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. **Case histories.** Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset Error! Hyperlink reference not valid. Excel Error! Hyperlink reference not valid. version of the German credit data. (Down load from web) In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset

- DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
- owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
- foreign_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.

- There are 20 attributes used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

(Turn in your answers to the following tasks)

Experiment 1: Study thoroughly the credit assessment problem.
Experiment 2: List all the categorical (or nominal) attributes and the real-valued attributes separately.

Experiment 3: What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.

Experiment 4: One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.

Experiment 5: Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?

Experiment 6: Is testing on the training set as you did above a good idea? Why or Why not?

Experiment 7: One approach for solving the problem encountered in the previous question is using cross-validation? Describe what cross-validation is briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?

Experiment 8: Check to see if the data shows a bias against "foreign workers" (attribute 20),or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.

Experiment 9: Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

Experiment 10: Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

Experiment 11: Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

Experiment 12: You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

Experiment 13: How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error).

Experiment 14: Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

TEXT BOOK:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier,2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

REFERENCE BOOKS:

1. Data Mining Techniques – Arun K Pujari,2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI,2008.

Course Outcomes
At the end of the course , students will be able to:

1. **Apply** data mining process and important issues around data cleaning, pre-processing and integration.
2. **Demonstrate** the classification and clustering techniques in large data sets.
3. **Develop** the algorithms used for various types of Data Mining problems using WEKA tool.
4. **Show** practical experience using data mining techniques on real world data sets.
5. **Show** hands-on experience working with all real data sets.

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech-IT IV Year – I Sem			
Course Code: L41M6	Unified Modelling Language	L	T	P	D
Credits: 0		2	0	0	0

Pre-requisite: Understanding of OOPS concepts

Course Objectives: At the end of the course, students will:

1. Understand the principles of modelling
2. Describe the concept of classes and relationships.
3. Design the Use cases and Interactions.
4. Understand Advanced Behavioural modeling.
5. Understand the concept of Architectural Modelling.

Module 1:

Unit-1:Introduction to UML: Importance of modelling, principles of modelling, object orientedmodelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Module 2:

Unit 1:Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams

Unit 2 :Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Typesand Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

Module 3:

Unit 1 :Basic Behavioural Modelling-I: Interactions, Interaction diagrams.
Unit 2 :Basic BehavioralModeling-II: Use cases, Use case Diagrams, Activity Diagrams.

Module 4:

Unit 1 :Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads,time and space, state chart diagrams

Module 5:

Unit 1:Architectural Modelling: Component, Deployment, Component diagrams and Deploymentdiagrams.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling

Language UserGuide,PearsonEducation.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-DreamtechIndiaPvt.Ltd.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. AtulKahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.

Web Resources:

1. https://nptel.ac.in/content/storage2/courses/106105153/Assignment-Week7.pdf
2. **https://studentsfocus.com/cs8592-ooad-notes-object-oriented-analysis-and-design-notes- csc-5th-sem/**

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the concept of UML modelling.
2. Understand the concept of classes and relationships.
3. Draw the use case and interaction Diagrams.
4. Draw State machines and State chart diagrams.
5. Draw the Component and Deployment Diagrams.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart 3/2/1 indicates the strength of the calculation 3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	3	-	-	-	-	2	2	-	2	2
CO2	3	3	3	3	2	-	-	-	-	2	2	-	3	2
CO3	3	3	3	3	3	-	-	-	2	1	1	-	3	2
CO4	3	3	3	3	3	-	-	-	2	1	1	-	3	2
CO5	3	3	3	2	3	-	-	-	2	2	1	-	3	2
Average	**3.0**	**3.0**	**3.0**	**2.0**	**3.0**	**-**	**-**	**-**	**2.0**	**2.0**	**2.0**	**-**	**2.0**	**2.0**

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tec-IT IV Year- I Sem			
Course Code: **L416H**	**DATA SCIENCE FOR HEALTH CARE (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
Probability Statistics, linear algebra. Machine learning.

Course Objectives:
The students should be able to

1. Understand Healthcare Data Analytics and its Benefits.
2. Gain knowledge of Biomedical Image analysis, Genomic Data Analysis.
3. Apply NLP, mining techniques on healthcare data.
4. Use data analytics in Fraud Detection in healthcare and pharmaceutical discoveries.
5. Understand the security aspects of healthcare data and use of emerging technologies in healthcare.

Module 1:

Introduction to Healthcare Data Analytics, Electronic Health Records, Components of Health care, Benefits of health care data analytics, how to use Health care analysis.
Benefits of Electronic Health Recorder, Barrier to Adopting, Challenges, Phenotyping Algorithms, the role of health care analyst.

Module 2:

Image Analysis Biomedical Image Analysis, Mining of Sensor Data in Healthcare, Biomedical Signal Analysis
Genomic Data Analysis for Personalized Medicine, steps involved in Genomic data analysis, different type of genomic analysis, different tools.

Module 3:

Data Analytics Natural Language Processing and Data Mining for Clinical Text, Mining the Biomedical Social Media Analytics for Healthcare
Advanced Data Analytics for Healthcare, Review of Clinical Prediction Models, Temporal Data Mining for Healthcare Data, Visual Analytics for Healthcare, Predictive Models for Integrating Clinical and Genomic Data.

Module 4:

Information Retrieval for Healthcare - Data Publishing Methods in Healthcare Applications and Practical Systems for Healthcare.
Data Analytics for Pervasive Health Fraud Detection in Healthcare, Applications and Practical Systems for Healthcare Data Analytics for Pharmaceutical Discoveries, Clinical

Module 5:

Data Confidentially, Data Integrity, Data Protection, Security awareness, Emergent threats: Autonomous, IoT heterogeneity and ubiquity, Physical environment
Decision Support Systems- Computer-Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data. Emerging Technologies for Health and Medicine Virtual Reality, Augmented Reality, Artificial Intelligence, Robotics, Industry 4.0.

Text Books

1. Chandan K. Reddy and Charu C Aggarwal, “Healthcare data analytics”, Taylor & Francis,2018 Edition
2. Dac-Nhuong Le, Emerging Technologies for Health and Medicine: Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things, Robotics, Industry 4.0

Reference Books

1. Hui Yang and Eva K. Lee, “Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016

E-Resources

1. https://www.youtube.com/watch?v=k63cXMTQFPA
2. https://www.youtube.com/watch?v=9iHhXX3GMWA

Course Outcomes

At the end of the course, the student will be able to:
1. Identify the benefits of Data Analytics in Healthcare.
2. Analyse the Biomedical Images and Genomic Data.
3. Apply NLP, mining techniques on healthcare data.
4. Apply data analytics for pharmaceutical discoveries and Fraud Detection in healthcare.
5. Use emerging technologies in healthcare and medicine.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L416I**	**QUANTUM COMPUTING (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
Knowledge on "Machine Learning".
Knowledge on "Probability and Statistics"

Course Objectives:
The students should be able to
1. Interpret the fundamentals of quantum computing.
2. Know the how quantum Mechanics is applied in quantum computing.
3. Illustrate the Quantum information with architecture and algorithms.
4. Develop the quantum programming languages.
5. Explain the current status of quantum computing.

Module 1:
Introduction to Basic quantum Mathematics
Complex numbers and its geometrical representations, Complex vector spaces, inner products and Hilbert spaces, Hermitian and unitary matrices, Tensor products of vector spaces.

Module 2:
Basic Quantum Mechanics
Deterministic Systems, Probabilistic descriptions and Quantum systems, Basics of Quantum theory, Schrodinger's time dependent equation, Wave nature of Particles, state vector, operators, postulates of quantum mechanics, Dirac formalism, Stern-Gerlach experiment, electron spin, superposition of states, entanglement.

Module 3:
Quantum Information
Bits and Qubits, Classical gates versus quantum gates, Deutsch's Algorithm, Deutsch- Jozsa Algorithm, Simon's periodicity algorithm, Grover's search algorithm, Shor's Factoring algorithm.

Module 4:
Quantum Programming
Quantum programming languages, Probabilistic and Quantum computations, introduction to quantum cryptography and quantum information theory.

Module 5:
Current Status of Quantum Computing
Multi Qubit Systems why are qubits superior, Quantum computing and Security, Sycamore processors, IBM Quantum Computer, Quantum Simulations.

Textbooks

1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008.

Reference Books:

1. Quantum computing explained, David McMahon, Wiley-intercedence, John Wiley & Sons, Inc. Publication 2008.

2. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010.

3. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995.

E-Resources

1. http://patrickjmt.com/
2. https://homepages.cwi.nl/~rdewolf/qcnotes.pdf
3. https://homes.cs.washington.edu/~oskin/quantum-notes.pdf
4. https://nptel.ac.in/courses/104/104/104104082/

Course Outcomes

At the end of the course, the student will be able to:

1. Identify the Basics of complex vector spaces.
2. Analyse Quantum mechanics as applied in Quantum computing.
3. Analyse the quantum information with Architecture and algorithms.
4. Apply the quantum programming languages.
5. Interpret the current status of quantum computing.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- I Sem			
Course Code: **L416J**	**SOFTWARE PROCESS AND PROJECT MANAGEMENT (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course objectives:The students will:

1. Discuss the software process maturity and conventional software project management principles.
2. Discuss the key phases of project management and their key skills.
3. Understand the ability to assess and plan project schedule and assign resources
4. Select an appropriate project development methodology among various alternating processes.
5. Identify project risks, understand the responsibilities, monitor and track project deadlines and the capability to work in a team environment.

UNIT-I

Software Process Maturity: Software Maturity Framework, Principles of Software Process Change, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models: PCMM, PSP, TSP.

Conventional Software Management: Conventional Software Management Performance.

UNIT-II

Evolution of Software Economics: Software Economics

Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality.

The old way and the New way: The principles of Conventional Software Engineering, Principles of Modern Software Management.

Life Cycle Phases: Engineering and Production stages, Inception, Elaboration, Construction, Transition phases.

UNIT-III

Artifacts of the Process: The Artifact Sets, Management Artifacts, Engineering Artifacts, Model Based Software Architectures: A Management Perspective and Technical Perspective.Work Flows of the Process: Software Process Workflows, Iteration Workflows.

Checkpoints of the Process: Major Milestones, Minor Milestones, Periodic Status Assessments.

UNIT-IV

Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, Cost andSchedule Estimating, Iteration planning Process.

Project Organizations and Responsibilities: Line-Of-Business Organizations, Project Organizations.

Process Automation: Automation Building Blocks.

UNIT-V

Project Control and Process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations.

Tailoring the Process: Process Discriminants.

Future Software Project Management: Modern Project Profiles, Next Generation Software Economics.

Case Study: The Commands Centre Processing and Display System-Replacement (CCPDS-R).

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humprey, Pearson Education.
2. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-HillEdition.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005

COURSE OUTCOMES:The students will be able to:

1. Describe the Software Process Maturity and explain the conventional s/w management principles.
2. Understand and discuss the key phases of project management and the key skills associated with each.
3. Explain the concept of workflows and checkpoints of the processes.
4. Discuss the responsibilities in the project organization.
5. Distinguish between conventional project and modern project profiles.

<table>
<tr><td>AY: 2022-23
Onwards</td><td>J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-IT
IV Year- II Sem</td></tr>
<tr><td>Course Code:
L42DB</td><td rowspan="2">BIG DATA ANALYTICS
(Professional Elective-VI)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:
Database Management Systems, Cloud Computing.

Course Objectives:
The students should be able to

1. Understand the basics of Big Data and Big data Platform.
2. Attain the knowledge of Big Data analytics, Approaches and Tools
3. Describe Map Reduce fundamentals and HDFC File system.
4. Differentiate between Hadoop and RDBMS concepts.
5. Apply analytics on Structured and Unstructured Data

Module 1:

Big Data Analytics: What is big data, History of Data Management; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing forBig Data;

Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing BigData; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools

Module 2:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

Module 3:

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop

Introduction of HDFS: Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS

Module 4:

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors;

HDFC (Hadoop Distributed File System): HDFC Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN

Module 5:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing

Social Media Analytics and Opinion Mining on Tweets;

Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools

Text Books

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

Reference Books

1. Rajiv Sabherwal, Irma Becerra- Fernandez,” Business Intelligence –Practice, Technologies and Management”, John Wiley 2011.
2. Lariss T. Moss,ShakuAtre, “ Business Intelligence Roadmap”, Addison-WesleyIt Service.
3. Yuli Vasiliev, “ Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting”, SPD Shroff, 2012.

E-Resources

1. https://www.coursera.org/learn/big-data-introduction
2. https://www.tutorialspoint.com/big_data_analytics/index.htm
3. www.upgrad.com/Big-Data
4. https://www.javatpoint.com/what-is-big-data
5. https://www.edx.org/course/big-data-analytics-using-spark

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the basics of Big Data and its environment.

CO2. Use Big Data analytics Tools and its Approaches.

CO3. Define Map Reduce fundamentals and HDFC Architecture

CO4. Distinguish between Hadoop and RDBMS concepts.

CO5. Illustrate analytics on Structured and Unstructured Data.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	3	-	-	-	-	-	-	-	-	-
CO3	1	2	2	1	2	-	-	-	-	-	1	-	2	2
CO4	1	-	1	1	-	-	-	-	-	-	-	-	-	-
CO5	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Average	**1.0**	**1.5**	**1.3**	**1.0**	**2.5**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**2.0**	**2.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- II Sem			
Course Code: **L427E**	**INTERNET OF THINGS (Professional Elective – VI)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
NIL
Course Objectives:
The students should be able to
1. Understand the current vision of the Internet of Things and its impact on the world
2. Classify basic concepts of IoT and M2M & IoT system management
3. Describe concepts of python language and different python packages.
4. Explain how to design IoT Physical devices with built-ins of python Programs
5. Identify the advanced concepts of IoT physical servers, cloud offerings

Module 1:

Introduction to Internet of Things –Introduction, Definition and Characteristics of IoT, **Physical Design of IoT** – Things in IoT, IoT Protocols, Logical Design of IOT- IoT Functional Blocks, IoT Communication Models, IoT Communication APIs

IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems.

Domain Specific IoTs – Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Module 2:

IoT and M2M – Introduction, M2M, Difference between IOT and M2M, **SDN and NFVfor IoT**-Software Defined Networking, Network Function Virtualization,

IoT System Management with NETCONF-YANG- Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, NETOPEER

Module 3:

IoT Systems-Logical Design Using Python-Introduction, Installing Python, Data types and Data Structures, Control Flow, Functions, Modules, Packages, File handling, Date/Time Operations, Classes.
Python Packages of Interest for IoT- JSON, XML, HTTP Lib, URL Lib, SMTP Lib

Module 4:

IoT Physical Devices and Endpoints – What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry PI-Interfaces (Serial, SPI, I2C), Programming.

Raspberry Pi with Python-Controlling LED, Interfacing an LED and Switch and interfacing a light sensor with Raspberry Pi.

Module 5:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage Models and communication APIs, WAMP-AutoBahn for IoT,Xively Cloud for IoT, Python webapplication framework Designing a RESTful web API.

Text Books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Reference Books

1. Internet of Things by Jeeva Bose 1st edition, Khanna publishing.

E-Resources

1. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf
2. https://nptel.ac.in/courses/106/105/106105166/
3. https://www.slideshare.net/MohanKumarG/internetofthings-iot-aseminar-ppt-by- mohankumarg

Course Outcomes

At the end of the course, the student will be able to:

CO1. Analyse current vision of the Internet of Things and its impact on the world.
CO2. Identify basic concepts of IoT and M2M & IoT system management.
CO3. Practice the concepts of python language using different python packages.
CO4. Design IoT Physical devices using python Programming.
CO5. Categorize advanced concepts of IoT physical servers, cloud offerings and Hadoop.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	1	2
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	2
Average	**3.0**	**3.0**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**2.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J.B.INSTITUTEOFENGINEERINGANDTECHNOLOGY (UGC Autonomous)	B. Tech-IT IV Year- II Sem			
Course Code: **L42AC**	**MACHINE LEARNING (Professional Elective – VI)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. A course on Linear Algebra and Advanced Calculus.
2. A course on "Probability and Statistics."
3. A course on "Data structures

Course Objectives:

The students should be able to

1. Use Models, methods and tools to solve regression, classification, feature selection,dimensionality reduction and density estimation problems.
2. Learn and adapt in supervised, unsupervised and semi-supervised modes of learning.
3. Gain knowledge of recognition, decision-making and statistical learning problems.
4. Understand current research topics and issues in machine learning.
5. Conduct and present a literature review on a research topic

Module 1:

Introduction - Well-posed learning problems, designing a learning system, Perspectivesand issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept-learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on versionspaces and candidate elimination, Inductive bias

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning,Issues in decision tree learning

Module 2:

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing-learning algorithms.

Module 3:

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example learning to classify text, Bayesian belief networks The EM algorithm,

Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, the mistake bound model of learning

Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, LocallyWeighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning,

Genetic Algorithms –Motivation, Genetic Algorithms, an illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Paralleling Genetic Algorithms

Module 4:

Learning Sets of Rules –Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog- EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module 5:

Combining Inductive and Analytical Learning –Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using PriorKnowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning –Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Text Books

1. Machine Learning – Tom M.Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor &Francis (CRC).

Reference Books

1. Machine Learning Methods in the Environmental Sciences, Neural Networks,William whsieh, Cambridge Univ Press.
2. Richard O. Duda. Peter E. Hart and David G. Stork, Pattern classification, John Wiley& Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Presss,1995.

E-Resources

1. https://www.slideshare.net/darshanharry/machine-learning-46440299
2. https://news.vidyaacademy.ac.in/
3. https://nptel.ac.in/courses/106/106/106106202/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Summaries on well-posed problem, concept learning and various perspectives of machine learning

CO2. Apply machine-learning algorithms such as Decision tree, Artificial Neural Networks to solve real world problems and formulate evaluation hypotheses.

CO3. Compare and contrast various machine-learning methodologies such as Bayesian Learning, Computational learning theory, instance based learning and Genetic algorithms.

CO4. Implement rule based learning and analytical learning strategies to solve complex problems.

CO5. Combine inductive learning with analytical learning and deploy Reinforcement learning which supports dynamic programming.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	2	-	-	-	-	-	-	-	-	1	2
CO2	-	2	2	2	-	-	-	-	-	-	-	-	-	2
CO3	2	2	-	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	2	1	-	-	-	-	-	-	-	-	1	2
CO5	2	1	2	2	-	-	-	-	-	-	-	-	2	2
Average	**2.0**	**2.0**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

OPEN ELECTIVE-I

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CE III Year-I Sem			
Course Code: **L31OA**	**ELEMENTS OF CIVIL ENGINEERING (OE-I)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Module 1:

Unit-1: Introduction:

History of the civil engineering, sub – disciplines of civil engineering.

Module2

Unit-1: Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing, and back bearing. Traverse surveying –introduction, chain, and compass traversing, closing error and adjustments. Levelling–introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff

Module 3: Unit-1: Building Materials and Construction

Materials: Introduction to construction materials like ferrous and nonferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete, and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments, and constructions of buildings

Module 4: Unit-1: Fire and Earthquake Protection in Building: Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift

Module 5: Unit-1: Water Supply, Sanitary and Electrical Works in Building:

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Unit-2: Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

Text Books :

1. “Elements of Civil Engineering’’ by Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das, PHI Learning Private Limited New Delhi.

2. Elements of Civil Engineering'' by Dr. R.K. Jain and Dr. P.P. Lodha, McGraw Hill Education, India Pvt. Ltd.
3. "Surveying Vol. I'' by Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.

Reference Books

1. "Surveying Theory and Practice" by James M Anderson and Edward M Mikhail McGraw Hill Education, India Pvt. Ltd. (7th Edition).
2. "Surveying and Leveling" by R. Subramanian, Oxford University.
3. "Building drawing" by M.G.Shah, C.M.Kale and S.Y.Patki,Tata McGraw Hill.
4. "Civil Engg. Drawing" by S. C. Rangwala, Charotar Pub. House Anand.

E-Resources:

1. https://nptel.ac.in/courses/105/106/105106201/

Course Outcomes

On completion of the course, the students will be able to:

1. Explain the ba sic requirements of civil engineering components.
2. Evaluate area for irregular shaped bodies.
3. Explain the various building materials.
4. Plan the building against the fire.
5. Discuss the highway development in India.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO5	2	1	-	-	-	1	-	-	-	-	-	-	-	-
Average	2	1	-	-	-	1	-	-	-	-	-	-	-	-

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31OB**	**Introduction to Computer Networks (Open Elective -I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

1. Understand importance of Internet, Computer networks, and their elements
2. Identify the data link layer design Issues and protocols.
3. Examine design issues of network layer and corresponding protocols.
4. Identify the transport layer services and demonstrate the working of its protocols.
5. Identify the application layer services, protocols like HTTP, FTP, E-Mail etc.

Module 1:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Comparison of the OSI and TCP/IP reference model. **Physical Layer:** Guided transmission media, wireless transmission media. **Connecting Devices:** Repeaters, Hubs, Switches, Gateways and Bridges.

Module 2:

Data Link Layer: Design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.

Protocols: Noiseless Channels, Noisy Channels

Multi Access protocols- Random access - ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization

Module 3:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection-oriented network services.

Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunnelling and Packet Fragmentation.

Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release, The TCP sliding window, The TCP congestion control.

Module 5:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

Textbooks

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books

1. Computer Networks,5E, Peterson, Davie, Elsevier
2. Introduction to Computer Networks and Cyber Security, Chawan -HwaWu, Irwin, CRC Publications.
3. Computer Networks and Internets with Internet Applications, Comer.

E - Resources:

1. https://lecturenotes.in/subject/2234/Computer_Network
2. http://nptel.ac.in/courses/106102234/
3. https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf
4. http://www.coursera.org/
5. http://ocw.mit.edu/index.htm.

Course Outcomes

At the end of the course, the student will be able to:

CO1. Demonstrate the networking concepts, various Layering approaches, functionalities and internetworking devices used and some protocols of Link layer.

CO2. Identify how error control, flow control can be achieved, and a medium can be shared among multiple devices,

CO3. Identify how to do fragmentation, assigning of logical address and judge on routing, congestion.

CO4. Illustrate the working of IP Protocol, other protocols of internet layer and services of transport layer.

CO5. Demonstrate the transport layer and application layer protocols, their working.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&ML III Year / I Sem			
Course Code: **L310C**	**INTRODUCTION TO MACHINE LEARNING (Open Elective I)**	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: Data Structures, Design and Analysis of Algorithms, Python Programming & Mathematics for Machine Learning

Course objectives:

The student will:

1. To introduce the fundamental concepts of machine learning and its applications.
2. To learn the classification, clustering, regression-based machine learning algorithms
3. To understand the deep learning architectures.
4. To understand the methods of solving real life problems using the machine learning techniques.
5. Understand the limitations of machine learning algorithms.

Module 1:

Introduction: Programming Vs Learning-Types of Learning- Statistical Decision Theory – Regression-Classification- Bias Variance-Linear Regression- Multivariate Regression- Subset Selection- Shrinkage Methods

Principal Component Regression- Partial Least squares- Linear Classification- Logistic Regression- Linear Discriminant Analysis-Perceptron- Support Vector Machines

Module 2:

Neural Networks-Introduction- Early Models- Perceptron Learning- Backpropagation- Initialization- Training & Validation- Parameter Estimation – MLE- MAP-Bayesian Estimation

Decision Trees- Regression Trees- Stopping Criterion & Pruning loss functions- Categorical Attributes- Multiway Splits- Missing Values- Decision Trees – Instability Evaluation Measures

Module 3:

Ensemble Learning-Bootstrapping & Cross Validation-Class Evaluation Measures- ROC curve-MDL- Ensemble Methods – Bagging- Committee Machines and Stacking- Boosting

Gradient Boosting- Random Forests- Multi-class Classification- Naive Bayes- Bayesian Networks

Module 4:

Undirected Graphical Models- HMM- Variable Elimination-Belief Propagation- Partitional Clustering, Hierarchical Clustering

Birch Algorithm, CURE Algorithm, Density-based Clustering- Gaussian Mixture Models Expectation Maximization

Module 5:

Deep Learning Architectures and Applications: Convolution neural networks (CNN) - Layers in CNN - CNN architectures.

Recurrent Neural Network. Applications: Speech-to-text conversion- image classification-time series prediction. Recent trends in various learning techniques of machine learning and classification methods for solving real world problems.

Text Books:

1. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman (2009). Springer-Verlag.
2. Pattern Recognition and Machine Learning, by Christopher Bishop, Springer 2006
3. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", Second Edition, MIT Press, 2019
4. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014.

Reference Books:

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
2. Francois Chollet, "Deep Learning with Python, Manning Publications, Shelter Island, New York, 2018.
3. Navin Kumar Manaswi, Deep Learning with Applications using Python, Apress, New York, 2018.

Course outcomes:

The student will be able to:

1. Identify the basic concepts of machine learning.
2. Predict the various classification, clustering, and regression algorithms.
3. Apply the deep learning architectures for real world problems.
4. Implement a method for solving real life problem using a suitable machine learning technique.
5. Prioritize the various Machine Learning algorithms.

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&DS III Year –I Sem			
Course Code: L310D	OPEN ELECTIVE – I FUNDAMENTALS OF DATA SCIENCE	L	T	P	D
Credits: 3		3	0	0	0

Module I: Introduction to Data Science & Big Data Unit 1:

Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues.

Unit 2:

Introduction to Big Data, Elements of Big Data, Big Data Classification, Structured, Un Structured and Semi Structured Data

Module II: Data Collection and Data Pre processing

Unit 1: Data Collection Strategies, Data Pre-Processing Overview

Unit 2: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization

Module III: Exploratory Data Analytics Unit 1:

Introduction to Exploratory Data Analytics, Visualization the data (Histogram, bar plot, box plot, pie chart, scatter plots)

Unit 2:

Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Correlation Statistics, ANOVA

Module IV: Model Development Unit 1:

Introduction to Regression, Simple and Multiple Regression, Model Evaluation using Visualization

Unit 2:

Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making.

Module V: Model Evaluation Unit I:

Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Under Fitting and Model Selection.

Unit II:

Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big Data Analytics”, EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data

Analytics", IGI Global.

Course outcomes:

1. Analyze the fundamental concepts of Data Science.
2. Evaluate the Data analysis and Data Science Process and Linear Regression.
3. Analyze the various methods of Data Analysis.
4. Apply the Basics of R in its Environment
5. Evaluate the Data Science analysis using R programming and Data Visualization

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:ECE III Year-I Sem			
Course Code: **L31OE**	**PRINCIPLES OF COMMUNICATIONS** (OE-01)	L	T	P	D
Credits: **3**		**3**	**1**	**0**	**0**

Pre-Requisites: Basic electronics and Electricals

Course Objectives: Distinguish analog and digital Modulation techniques used in various Communication systems.

Module 1: Introduction [10L] Unit-I: [6L]

Block diagram of Electrical communication system, Radio communication: Types of communications, analog, pulse and digital types of signals, Introduction to Modulation, Need for Modulation,

Unit-II: [4L]

Amplitude Modulation: Ordinary Amplitude Modulation – Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM demodulation, Applications of AM.

Module 2: Angle Modulation [9L]

Unit-I: [5L]

Angle Modulation: Phase Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband FM, Comparison of Phase Modulation and Frequency Modulation verses Amplitude Modulation, FM demodulation, Applications of FM.

Unit-II: [4L]

Types of noise, sources of noise, calculation of noise in Linear systems and noise figure.

Module 3: Pulse Modulations [8L] Unit-I: [4L]

Signal Sampling and Analog Pulse Communication:

Sampling, Nyquist rate of sampling, sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM.

Unit-II: [4L]

Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

Module 4: Digital Communication [10L] Unit-I: [5L]

Advantages, Block diagram of PCM, Quantization, and effect of quantization, quantization error, Base band digital signal, DM, ADM, DPCM and comparison. **Unit-II: [5L]**

Transmission of Binary Data in Communication Systems: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception,

Module 5: Information Theory [9L]

Unit-I: [5L]

Concept of information, rate of information and entropy, Source coding for optimum rate of information, coding efficiency,

Unit-II: [4L]

Shanon-Fano and Huffman coding and its problems

Text Books

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

Reference Books

1. Electronic Communication Systems – Kennedy and Davis, TMH , 4th edition, 2004.
2. Communication Systems Engineering -John. G. Proakis and MasoudSalehi, PHS, 2nd ed.2004.

E-Resources

1. https://nptel.ac.in/courses/Nanoelectronics/ IIT Madras/ab1011/102/111102111/

Course Outcomes

At the end of the course, the student will be able to:

CO1. **Illustrate** the main concepts of analog and digital communication systems.

CO2. **Analyze** the AM and FM modulator/demodulator

CO3. **Explain**, discuss, and compare different binary digital modulation techniques.

CO4. **Distinguish** different types of noise and explain the effects of noise on communication system.

CO5. **Use** the basic concepts of information theory.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	-
CO3	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	**2.0**	**2.0**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**1.2**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech ECM III Year-I Sem**			
Course Code: **L31OF**	**FUNDAMENTALS OF DIGITAL LOGIC DESIGN (Open Elective -I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basics of Boolean algebra

Course Objectives:

Students will learn to

1. Understand basic tools for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. Understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. Implement simple logical operations using combinational logic circuits.
4. Design combinational logic circuits, sequential logic circuits.
5. Impart the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

Module 1:

Unit 1: Binary Systems:

Digital systems, binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic.

Module 2:

Unit-I: Boolean Algebra And Logic Gates

Basic definitions, axiomatic definition of boolean algebra, basic theorems and properties of boolean algebra, boolean functions canonical and standard forms, other logic operations, digital logic gages, integrated circuits.

Module 3:

Unit-I: Gate – Level Minimization

The map method, four-variable map, five-variable map, product of sums simplification don't-care conditions, nand and nor implementation other two- level implementnations, exclusive – or function, hardward description language (hdl).

Module 4:

Unit-I: Combinational Logic

Combinational circuits, analysis procedure design procedure, binary adder- subtractor decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers, hdl for combinational circuits.

Module 5:

Unit-I:

Registers, shift registers, ripple counters synchronous counters, other counters, hdl for registers and counters.

Text Books

1. Digital design – third edition ,m.morrismano, pearson education/phi.
2. Fundamentals of logic design, roth, 5th edition,thomson.

Reference Books

1. Switching and finite automata theory by zvi. Kohavi, tatamcgraw hill.
2. Switching and logic design, c.v.s. rao, pearson education
3. Digital principles and design – donaldd.givone, tatamcgraw hill, edition.
4. Fundamentals of digital logic & micro computer design , 5th edition, m. Rafiquzzaman john wiley

E-Resources

1. https://nptel.ac.in/courses/106/105/106105185/
2. https://www.coursera.org/learn/digital-systems

Course Outcomes

At the end of the course, the student will be able to:

CO1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.

CO2. Build Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

CO3. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits. **CO4**. Analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

CO5. Construct digital systems by Algorithmic State Machine Charts

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1	-	-	-	-	-	-	-	-	2	2	-
CO2	3	2	-	-	1	-	-	-	-	-	-	2	1	2
CO3	3	-	2	2	1	-	-	-	-	-	-	-	2	2
CO4	3	2	2	2	1	-	-	-	-	-	-	-	2	-
CO5	2	2	2	1	1	-	-	-	-	-	-	-	-	2
Average	2.4	2	1.75	1.67	1	-	-	-	-	-	-	-	1.75	2

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="2">AY: 2022-23
Onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: EEE III Year-I Sem</td></tr>
<tr><td rowspan="3">Energy Engineering (OPEN ELECTIVE-I)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Course Code:
L31OG</td><td rowspan="2">3</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td></tr>
<tr><td>Credits: 3</td></tr>
</table>

MODULE-I: Fundamentals of Energy: [10L]

Energy consumption and standard of living, Classification of energy resources, Consumption trend of primary energy resources, importance and salient features of conventional energy sources and non- conventional energy sources, Energy scenario in India.

MODULE-II: Energy Sources-I: :(Elementary Aspects) [10L]

Coal fired steam thermal power plant – layout, working, Gas turbine power plant, Nuclear power plants, Hydro Electric plants.

MODULE-III: Energy Sources-II :(Elementary Aspects): [10L]

Solar energy, OTEC, Wind power plants, Tidal power plants and geothermal resources, Biomass, Fuel cell.

MODULE-IV: Environmental Pollution and Control: [10L]

Overview of Environmental Concepts: Global Warming - Ozone Layer & UV Radiations - Deforestation Pollution Control: Air Pollution, Solid Waste, Water Pollution, Influence of pollution regionally and globally.

MODULE-V: Energy Conservation And Management: [10L]

Principle of energy conservation, electrical energy conservation opportunities, Definition and Objectives of Energy Management, Energy Management System, Top management support, Energy policy purpose, Roles and responsibilities of energy manager.

Text Books

1. S.Rao and Dr.B.B.Parulekar, "Energy Technology", Khanna pub., Third edition, 1999.
2. Non-conventional energy resources by B.H.Khan, TMH, 2006.
3. Desai,AV, "Energy Demand: Analysis, Management and Conservation", Wiley Eastern Limited,1990.

Reference Books

1. Management of Energy Environment Systems, W.K.Foell, John Wiley and Sons.
2. Environmental Impact Analysis Handbook, J.G.Rau, D.C.Wood, Mc Graw Hill.
3. Energy & Environment, J.M. Fowler, Mc Graw Hill.
4. Power Plant Engineering, P.K.Nag / Tata McGraw Hill.
5. G.D.Rai, "Non-conventional energy sources", Khanna pub. Fourth Edition, 2002.
6. Energy Management Handbook, John Wiley & Sons, Wayne C.Turner.

E-Resources

1. http://nptel.ac.in/courses/112105051/
2. https://www.youtube.com/watch?v=Ota2_LUuar0
3. https://www.youtube.com/watch?v=3dJAtHaSQ98
4. https://www.youtube.com/watch?v=xokHLFE96h8
5. http://www.tatapower.com/businesses/renewable-energy.aspx
6. http://www.cleanlineenergy.com/technology/wind-and-solar

Course Outcomes

The students will be able to:

CO 1. Collect and organize information on renewable energy technologies as a basis for further analysis

CO 2. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.

CO 3. List and describe the primary renewable energy resources and technologies.

CO 4. Understand effect of using these sources on the environment and climate.

CO 5. To quantify energy demands and make comparisons among energy uses, resources, and technologies

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	-	-	2	-	-	3	2	3	-	-	-	-	-	2
CO2	-	-	3	-	-	2	3	2	-	-	-	-	-	3
CO3	-	-	3	-	-	3	3	3	-	-	-	-	-	2
CO4	-	-	3	-	-	3	3	2	-	-	-	-	-	3
CO5	-	-	3	-	-	2	3	3	-	-	-	-	-	2
Average	-	-	**2.8**	-	-	**2.6**	**2.8**	**2.6**	-	-	-	-	-	**2.4**

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="2">AY: 2022-23
Onwards</td><td rowspan="2" colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech:IT III Year - I Sem</td></tr>
<tr></tr>
<tr><td>Course Code:
L31OH</td><td rowspan="2">(Open Elective-I)
Open Source Software's</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Unit I introduction to Open-Source:

Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

Unit II Open-Source Principles and Methodology:

Open-Source History, Open- Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.

Unit III Understanding Open-Source Ecosystem:

Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies.

Unit IV Open-Source Ethics and Social Impact:

Open source vs. closed source, Open-source Government, Ethics of Open- source, Social and Financial impacts of open-source technology, shared software, Shared source, Open Source as a Business Strategy

Unit V Case Studies:

Example Projects-Mozilla (Firefox), Wikipedia, GitHub, Open Office, LibreOffice.

Course Outcomes:

CO 1: Differentiate between Open Source and Proprietary software and Licensing.
CO 2: Recognize the applications, benefits and features of Open-Source Technologies
CO 3: Gain knowledge to start, manage open-source projects

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: ME III Year - I Sem</td></tr>
<tr><td>Course Code:
L31OI</td><td rowspan="2" colspan="4">AUTOMOTIVE TECHNOLOGY
(Open Elective-I)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Engineering Physics.

Module 1:

Unit-1: Structural Systems of Automobile– C hassis and B ody, Power unit, Transmission System, Rear wheel drive, Front wheel drive, 4-wheel drive.

Unit-2: Other systems of Automobile- Ignition systems, Fuel System, Cooling System, Electrical System.

Module 2:

Unit-1: Fuels: Types of Fuels – Gasoline fuels, CNG, Biofuels, Hydrogen as a fuel for IC Engines, advantages and limitations.

Unit-2: Steering, Suspension and Braking Systems: Terminology in Steering geometry, Ackerman steering mechanism, Davis steering mechanism, steering linkages. Objects of suspension systems – Rigid axle suspension system. Mechanical brake system, Hydraulic brake system – Requirement of brake fluid. Pneumatic and Vacuum brakes.

Module 3:

Unit-1: Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

Unit-2: Electric and Hybrid Vehicles: Electric vehicles - Layout of an electric vehicle, performance, energy consumption, advantage and limitations. Hybrid electric vehicles - Concepts, types of hybrid drive train architecture, merits and demerits.

Module 4:

information systems, navigation system.

Unit-2: Comfort Systems: Automotive vision system, active suspension system, power steering and power windows.

Module 5:

Unit-1: Safety Systems: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti-lock braking systems, traction control system.

Unit-2: Emission and noise control regulations- Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

Text Books

1. William B Riddens, “Understanding Automotive Electronics”, 5th edition, Butter worth Heinemann Woburn, 1998.

2. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2005.
3. Kripal Singh, “Automobile Engineering”, Standard Publishers, Vol. 1 & 2, 2007

Reference Books

1. Automotive Hand Book” Robert Bosch, SAE, 5th edition, 2000.
2. Ljubo Vlacic, Michel Parent and Fumio Harashima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001.
3. Iqbal Husain, “Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
4. “Navigation and Intelligent Transportation Systems – Progress in Technology”, Ronald K Jurgen, Automotive Electronics Series, SAE, USA, 1998.

E-Resources

1. https://rb.gy/zm8le8
2. https://rb.gy/ceck4k
3. https://nptel.ac.in/courses/107/106/107106088/
4. https://nptel.ac.in/courses/108/102/108102121/

Course Outcomes

At the end of the course, the student will be able to:

CO1: Outline the overview of automobile engineering

CO2: Identify the different fuels and control systems

CO3: Develop the concepts and drive train configurations of electric and hybrid-electric vehicles

CO4: Apply the use of intelligent vehicle technologies like navigation in automobiles

CO5: Aware of safety, security and regulations

CO-PO/PSO Mapping

Course Outcome s	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO2	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO3	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO4	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO5	3	-	3	3	3	-	-	-	-	-	-	2	3	3
Averag e	3	-	3	3	3	-	-	-	-	-	-	2	3	3

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -MIE III Year-I Sem			
Course Code: **L31OJ**	**INTRODUCTION TO MINING TECHNOLOGY (OPEN ELECTIVE – I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives

This course will enable students to:

1. To introduce about distribution of mineral deposits in India
2. To acquaint with different stages of mining process
3. To get idea about Drilling and its machinery
4. To get idea about Explosives and blasting in mines
5. To know about shaft sinking methods, precaution & lining during shaft sinking

Module 1

Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology.

Module 2

Stages in the life of the mine - prospecting, exploration, development, exploitation, and reclamation. Access to mineral deposit- selection, location, size, and shape (incline, shaft and Adit), brief overview of underground and surface mining methods.

Module 3

Drilling: Types of drills, drilling methods, electric, pneumatic, and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

Module 4

Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.; Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

Module 5

Shaft sinking: Ordinary and special methods, problems, and precautions, shaft supports and lining.

Textbooks

1. R. P. Pal, Rock blasting effect and operation, A. A. Balkema, 1st Ed, 2005.
2. D. J. Deshmukh, Elements of mining technology, Vol. 1, Central techno, 7th Ed, 2001.

Reference Books

1. C. P. Chugh, Drilling technology handbook, Oxford and IBH, 1st Ed, 1977.
2. R. D. Singh, Principles and practices of modern coal mining, New age international, 1st Ed, 1997.

Course Outcomes

At the end of the course, the student will be able to:

CO1: Learn about distribution of mineral deposits in India

CO2: Learn about stages on mining process

CO3: Learn about drilling and its machinery

CO4: Understand about explosives, blasting and blasting mechanism **CO5:** Understand about shaft sinking methods, precautions, and lining of shaft

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech -MBA III Year-I Sem</td></tr>
<tr><td>Course Code:
L31OK</td><td rowspan="2" colspan="4">Open Elective-I
Entrepreneurship for Micro, Small and Medium Enterprises</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objective:

To understand the setting up and management of MSMEs and initiatives of Government and other institutions support for growth and development of MSMEs.

UNIT-I:

Introduction for Small and Medium Entrepreneurship (SME): Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs

UNIT-II:

Setting of SMEs': Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies, Rural entrepreneurship – Women entrepreneurship.

UNIT-III:

Institutions supporting MSMEs: –Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions, Central level institutions, State level institutions, Other agencies, Commercial Bank – Appraisal of Bank for loans. Institutional aids for entrepreneurship development – Role of DST, SIDCO, NSIC, IRCI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureaus

UNIT-IV:

Management of MSME: Management of Product Line; Communication with clients - Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies — Evaluating entrepreneurial performance.

UNIT-V:

Role of Government in promoting Entrepreneurship: MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Course Outcomes: Students will be able to understand

a) Issues and Challenges in MSMEs

b) Setting up of MSMEs

c) Management of MSMEs

d) Institution and Government support.

Suggested Readings:

1. Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya Publishing House, 2003.
2. Poornima M Charanthimath, Entrepreneurship Development Small Business Enterprises, Pearson, 2006.
3. Paul Burns & Jim Dew Hunt, Small Business Entrepreneurship, Palgrave Macmillan publishers, 2010.
4. Suman Kalyan Chaudhury, Micro Small and Medium Enterprises in India Hardcover, Raj Publications, 2013.
5. Aneet Monika Agarwal, Small and medium enterprises in transitional economies”, challenges and opportunities, DEEP and DEEP Publications.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech SH III Year-I Sem			
Course Code: **L31OL**	**Open Elective-I Numerical Solution of Ordinary Differential Equations**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module –I Solution of Equations and Eigen value Problems [10L]

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method.

Module 2: Interpolation and Approximation [9L]

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

Module 3: Numerical Differentiation and Integration [10L]

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

Module 4: Initial Value Problems for Ordinary Differential Equations[10L]

Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and AdamsBash forth predictor corrector methods for solving first order equations.

Module5: Boundary Value Problems in Ordinary Differential Equations[9L]

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two-dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5 th Edition, New Delhi, 2007.

Reference Books

1. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

E-Resources

1. http://www.brainkart.com/article/Solution-of-Equations-and-Eigenvalue- Problems_6462/
2. http://www.cs.nthu.edu.tw/~cchen/CS3331/ch6.pdf
3. http://www.vbspu.ac.in/wp-content/uploads/2016/02/Differentiation-and- Integration.pdf
4. https://link.springer.com/chapter/10.1007/978-1-4612-6390-6_4
5. https://www.youtube.com/watch?v=ZaaeInBsRfo

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand the basic knowledge on solution of Eigen values

CO2. Use interpolation and approximation to solve engineering problems.

CO3. Discuss the numerical differentiation and integration.

CO4. Apply initial value problems for solving first order differential equation. **CO5**. Apply the boundary value problems in ordinary and partial differential equations

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	2	-	-
Averag e	3	3	2	3	-	-	-	-	-	-	-	2	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -SH III Year- I Sem			
Course Code: **L31OM**	**NANOMATERIALS** **(Open Elective-I)** (COMMON TO: All branches**)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Physics.

Module -1: Introduction to Nanomaterials [9L]

Introduction to nanotechnology and materials, Nano materials, Introduction to nano sizes and properties comparison with the bulk materials, Different Shapes and Sizes and Morphology. Classification of nanomaterials. Fullerene, carbon, Nanotubes (CNT's), Nanoparticles. Physical, Chemical, Electrical, Optical, Magnetic and mechanical properties of nanomaterials.

Module -2: Physical and Chemical methods [9L] Physical Methods:

Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, and electro deposition. **Chemical Methods:** Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module–3: Synthesis of Nanomaterials [9L]

Thermolysis route – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method, PVD method.

Module–4: Properties of Nanomaterials [9L]

Quantum Structure: 3D-Pontential Wells (Spherical & Rectangular Parallelepiped), 2D (Circular & Square, Quantum Corrals), 1D (Quantum Wires), 0D (Quantum Dots).

Module–5: X-RAY Characterization techniques [9L]

X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, and Electron probe microanalysis(EPMA), SEM and TEM method.

Text Books

1. C N R Rao, A Muller and A K Cheetham "The chemistry of Nano materials: Synthesis, Properties and Applications" John Wiley, First Edition, 2004
2. Hari Singh Nalwa, "Nano structured Materials and Nanotechnology", Academic Press, First Edition, 2002.

Reference Books

1. Charles P Poole Jr "Introduction to Nanotechnology", John Willey & Sons, 1st Edition, 2003
2. C Dupas, P Houdy, M Lahmani, Nanoscience: "Nanotechnologies and Nano physics", Springer-Verlag Berlin Heidelberg, 1st Edition, 2007.

E-Resources

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf
2. http://courses.washington.edu/overney/NME498_Material/NME498_Periods/ Lect ure4-Overney- NP-Synthesis.pdf.
3. http://www.materialstoday.com/nanomaterials/journals/
4. https://www.journals.elsevier.com/nanoimpact
5. http://www.springer.com/materials/nanotechnology/journal/12274

Course Outcomes

After completion of this course the student is able to

1. Understand the properties of Nano-structured materials.
2. Get the knowledge of different physical and chemical methods of synthesis of Nano materials.
3. Apply basic knowledge on the properties and applications of few nanomaterials.
4. Understand different thermal methods of synthesis of nano materials and to learn different surface characterization techniques.
5. Acquire the different compositional and structural characterization techniques.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -SH III Year-I Sem			
Course Code: **L31ON**	**Chemistry of Engineering Materials (Open Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Phase Rule and alloys [8L]

Phase Rule: Definition of terms: Phase, component, degree of freedom, phase rule equation. Phase diagrams-one component system-water system. Two component system Lead-Silver, cooling curves, heat treatment based on iron- carbon phase diagram - hardening, annealing and normalization. Introduction to alloys-fabrication of alloys-ferrous alloys-nonferrous alloys-industrial applications.

Module 2: Composites, Abrasives and Adhesives [10L]

Composites: Basics of composites, composition and characteristics-types of composites –particle and fiber reinforced composites and their applications. Abrasives- natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives- classification -action of adhesives- factors influencing adhesive action development of adhesive strength.

Module 3: Cement and Concrete: [10L]

Introduction-Classification of cement-natural-chemical composition of cement- Portland cement-chemical reactions involved in setting and hardening of cement-additives for cement-mortars and concretes-pre stressed concrete- post tensioning-curing-overall scenario of cement industry-Reinforced concrete, constructions-testing and decaying of cement-prevention of cement decay.

Module 4: Glass, Ceramics and Refractories:[9L]

Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

Module 5: Colloids and surfactants[9L]

Introduction to solution-types of colloids-characteristics of lyophilic and lyophobic solutions-preparation of colloids (Dispersion methods & Aggregation methods)-purification of colloids (Dialysis, Electro dialysis and Ultrafiltration).Characteristics of colloidal solutions-coagulation of colloids- origin of charge on colloids-protective colloids-emulsions-gels-applications of colloids. Introduction to surfactants-classification of surfactants-CMC (critical micelle concentration)-HLB scale-detergents-cleaning action.

Text Books

1. "A text Book of Engineering Chemistry", P.C.Jain and Monica Jain, Dhanpat Rai Publications, New Delhi, 12th Edition 2006.

2. “Text Book of Engineering chemistry”, B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, Cengage Learning India Pvt. Ltd, 2016.

3. “Colloids and Interfaces with Surfactants and Polymers”, J. Goodwin, 2nd Edition 2009.

Reference Books

1. “Principles of Physical Chemistry”, B.R.Puri, L.R.Sharmaand M.S.Pathania, S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.

2. “Engineering Chemistry”, M.ThirumalaChary and E.Laxminarayana, SciTech publications(INDIA) PVT Ltd, Third Edition,2016

E-Resources

1. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry- careers/materials-science.html
2. https://www.sciencedirect.com/science/article/pii/S1369702110701875
3. https://engineering.purdue.edu/MSE/aboutus/whatsmaterials
4. https://www.engineergirl.org/32721/Difference-between-chemical-and- materials-engineering
5. https://www.webpages.uidaho.edu/catalog/2013/chemical-and-materials- engineering.htm

Course Outcomes

At the end of the course, the students will be able to:

1. Interpret the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
2. Understand the concepts of abrasives, adhesives and liquid.
3. Know the importance of basic constructional material, Portland cement in Civil Engineering works.
4. Acquire the knowledge about properties and applications of glass, ceramics and refractories.
5. Understand the relationships between macroscopic material properties and microscopic structures.

AY 2022-23 onwards	**J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)**	**B. Tech -SH III Year – I Sem**			
Course Code**: L31OO**	**TECHNICAL WRITING SKILLS (COMMON TO ALL)**	**L**	**T**	**P**	**D**
Credits: 3	**Pre-Requisites: Nil**	**3**	**0**	**0**	**0**

Course Objectives: To learn

1. Know the elements of effective writing
2. Understand the letter writing and resume writing
3. Classify the types and styles of report writing
4. Understand the proposal writings
5. Examine the research papers and research articles

Module-I Elements of Effective Writing

Introduction-Characteristics of Good Writing-words, phrases, sentences and developing effective paragraphs.

Module -II Academic Writing

Letter writing and Job Application: Introduction-types of letter writing-the seven C's of letter writing- significance- purpose-structure-layout-principles-planning a letter and cover letter.

Resume writing: Introduction-Resume design- parts of a Resume-Resume Styles and final tips.

Module -III Technical Report Writing

Introduction-importance of Reports-Objectives of Reports-Categories of Reports-Formats-prewriting-structures of reports-types of reports- short reports- long reports-research and writing the report-first draft-revising, editing, and proofreading.

Module -IV Technical Proposals

Introduction-definition and purpose-types-characteristics-structure of proposals- style and appearance-evaluation of proposals.

Module -V Writing Research Papers and Articles

Introduction-writing strategies-nature and significance-types of research papers and articles-journal articles-conference papers-review and research articles and elements of articles.

References:

1. Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.
2. Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.
3. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
4. Cooper, Donald R. Pamela S Schindler. Business Research Methods. New Delhi: Tata McGraw-Hill, 2006.

Web Sources:

Course outcomes: At the end of this course students will be able to

1. Use the characteristics of good writing like words, phrases, sentences and

2. Understand the role of letters and resumes getting jobs.
3. Utilize the report writing skills in business environment

4. Define the style, appearance, and evaluation of proposals.
5. Write the academic and research papers and articles

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart 3/2/1 indicates the strength of the calculation 3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	..	..	..	..	..	..	..	..	**2**	3	..	3	..	..
CO2	..	..	..	..	..	..	..	..	**2**	3	..	3	..	..
CO3	..	..	..	..	..	..	..	..	**2**	3	..	3	..	..
CO4	..	..	..	..	..	..	..	..	**2**	3	..	3	..	..
CO5	..	..	..	..	..	..	..	..	2	3	..	3	..	..
Total	..	..	..	..	..	..	..	..	**2**	**3**	..	3	..	..
The above syllabus is approved														
Signature of the members:														

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech -SH III Year-II Sem</td></tr>
<tr><td>Course Code:
L31OP</td><td rowspan="2">Indian Constitution (COMMON TO: All branches)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil

Module 1: Evolution of the Indian Constitution

1909 Act, 1919 Act end 1935 Act. Constituent Assemtily Composition and Functions Fundamentals features of the Indian Constitution.

Module 2: Union Government

Executive: President. Prime Minister, Council of Minister Executive:
Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government.

Module 3: Rights and Duties

Fundamental Rights. Directive principles. Fundamental Duties.

Module 4: Relation between Federal and provincial units

Union State relations. Administrative, legislative and Financial. Inter State council. NITI Ayog Finance Commission of India

Module 5: Statutory Institutions.

Elections-Election Commission of India, National Human Rights Commission National Commission for Women.

Text Books:

1 D.D. Basu, Introduction to the constitution of India. Lexis Nexis. Now Delhi

2. Subhash Kashyap, Our Parliament, National Book Trust. New Delhi.

Reference Books:

1. Peu Ghosh Indian Government & Polities. Prentice Hell of India, New Delhi

2 B.Z. Fadia & Kuldeep Fadia, Indian Government & Polices, LexisNexis. New Delhi

Course Outcomes:

At the end of the course, the student will be able to:
COI: Know the background of the present constitution of India. CO2: Understand the working of the union, state and local levels. CO3. Gain consciousness on the fundamental rights and duties
CO4. Be able to understand the functioning and distribution of financial resources between center and states.

Be exposed to the realty of hierarchical Indian social structure and the way the grievances the deprived sections can be addressed to raise human dignity in a democratic way

OPEN ELECTIVE-II

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech CE III Year-II Sem</td></tr>
<tr><td>Course Code:
L32OA</td><td rowspan="2" colspan="4">CONSTRUCTION MANAGEMENT, CONTRACTS AND VALUATION (OE-II)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>1</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Construction Technology and Project Management, Estimation and Costing.

Module 1: Unit-I: Concept of a Project

Characteristic features – Project Life cycle – Phases – Project Management – tools and techniques for project management – role of project managers.

Module 2: Unit-I: Project management plan and objectives Programming – scheduling – project organization – organization and project team – role of communication in project management – controlling systems.

Module 3: Unit-I:Safety Management Function

Importance of safety in construction industry, Line versus staff authority, Safety responsibility and accountability in construction industry, Safety organizations, Role of various parties, duties, responsibilities of top management, site managers, supervisors etc., Role of safety officers, Responsibilities of general employees, Safety administration.

Module 4: Unit-I: Types of contract documents

Essentials of contract agreement – legal aspects, penal provisions on breach of contract. Definition of the terms – Tender, earnest money deposit, security deposit, tender forms, documents, and types. Acceptance of contract documents. Termination of contract, completion certificate, quality control, right of contractor, refund of deposit. Administrative approval – Technical sanction. Nominal muster roll, measurement books – procedure for recording and checking measurements – preparation of bills.

Module 5: Unit-I:Valuation

Types of value, purposes of valuation factors affecting value. Different methods of valuation for

different types of assets such as land and building, horticulture, historical places. Valuation Report, contents, standard formats, Case study of any one Report.

Text Books

1. “Construction Technology” by Subira K. Sarkar, Subhajit Saraswathi / Oxford University Press, 3rd edition, Apr 2009.
2. "Project management- strategic Financial Planning, Evaluation and Control" by B M Patel, Vikas Publishing House Pvt. Ltd. New Delhi, 2nd edition oct 2000.

Reference Books

1. "Total Construction Project Management" by George J.Ritz , McGraw- Hill Inc, 2nd edition Jan 2013.
2. "Construction Project Management Planning, Scheduling and Control" by K K Chitkara

E-Resources

1. https://nptel.ac.in/courses/105/103/105103093/
2. https://nptel.ac.in/courses/105/103/105103023/

Course Outcomes

At the end of the course, the student will be able to:

1. **Describe** the different approaches for successful handling of the project
2. **Apply** different plans and schedules for the development of the project.
3. **Describe** the importance of safety management in construction industry.
4. **List** out the different tenders and contract document for a construction project.
5. **Evaluate** the different types of reports for different construction projects

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	-	-	2	1	-	-	2	-	3	1	1	-
CO2	2	1	2	-	-	-	-	-	-	-	2	2	2	-
CO3	2	1	-	-	-	3	-	-	-	-	-	1	1	-
CO4	2	1	-	-	-	2	-	-	-	-	3	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	2	-	1	-
Average	2	1.4	0.4	-	0.4	1.2	-	-	0.4	-	2	0.8	1.4	-

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="1">J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-CSE III Year- II Sem</td></tr>
<tr><td>Course Code:
L32OB</td><td rowspan="2">Principles of Operating Systems (Open Elective -II)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

1. Understand the basic concepts and functions of computer operating systems.
2. Apply the concurrency control among the operating system programs execution.
3. Demonstrate the techniques used to manage the memory during program execution.
4. Explain the various storage management methods and functions of operating systems.
5. Design the security features against attacks on computer system.

Module 1:

Overview: Basic Elements, Evolution of the Microprocessor, Instruction Execution, Interrupts, Cache Memory, Direct Access Memory.

System Structures: Computer Systems Organization, Computer System Architecture, Operating System Architecture, Systems Calls, Operating System structure, Building and Booting an Operating System.

Module 2:

Process Concepts: Introduction, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Mutex Locks, Semaphores, Monitors, Classic Problems of Synchronization.

Deadlock: Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Module 3:

Main Memory: Background, Contiguous Memory Allocation, Paging, Page- Table Structure, Swapping, Segmentation.

Virtual Memory: Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4:

Mass-Storage Structure: Overview, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure.

File system Management: File Concepts, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management.

Module 5:

Security Threats: Computer security concepts, Threats, Attacks and Assets, Intruders, Malicious software, Viruses, Worms, Bots, Rootkits.

Security Techniques: Authentication, Access Control, Intrusion Detection, Malware Defense, Dealing with Buffer Overflow attacks.

Textbooks

1. Operating System Concepts-A. Silberschatz, Peter B. Galvin, Greg Gagne, 10th Edition, John Wiley& Sons inc.
2. Operating Systems Internals and Design Principles – William Stallings, 7th Edition, Prentice Hall.

Reference Books

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

E - Resources:

1. https://lecturenotes.in/subject/2234/Computer_Network
2. http://nptel.ac.in/courses/106102234/
3. https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf
4. http://www.coursera.org/
5. http://ocw.mit.edu/index.htm.

Course Outcomes

At the end of the course, the student will be able to:

CO1: Identify the different structures and functions of operating systems and it's components.

CO2: Apply different algorithms and methods to achieve concurrency among the operating system programs.

CO3: Analyse the memory management techniques used in the execution of operating system programs.

CO4: Implement the suitable methods to improve the efficiency of storage management devices.

CO5: Apply suitable algorithms to ensure the security of computer system.

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: AI&ML III Year / II Sem</td></tr>
<tr><td>Course Code:
L320C</td><td rowspan="2">INTRODUCTION TO PREDICTIVE ANALYTICS
(Open Elective II)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

Data mining, Machine Learning

Course objectives:

The student will:

1. Know the basics of predictive analytics and summarize Data, Categorize Models, and techniques
2. Know about the Decision tree, Support Vector Machine for Data Classification
3. Describe Methods such as Naïve Bayes Markov Model, Linear Regression, Neural Networks to Boost Prediction Accuracy for Data Classification.
4. Study the predictive models for various Real-Time Applications.
5. Study the Analysis and Visualized predictive Model's results using Data Visualization tools.

Module 1:

INTRODUCTION TO PREDICTIVE ANLAYTICS

Introduction – Predictive Analytics in the Wild – Exploring Data types and associated Techniques - Complexities of data - Applying Models: Models and simulation, Categorizing Models, Describing, summarizing data, and decisions – Identify similarities in Data: Data Clustering, converting Raw Data into a Matrix, Identify K- groups in Data.

Module 2:

DATA CLASSIFICATION – PART I

Background – Exploring Data classification process - Using Data Classification to predict the future: Decision tree, Algorithm for generating Decision Trees, Support Vector Machine.

Module 3:

DATA CLASSIFICATION – PART II

Ensemble Methods to Boost Prediction Accuracy: Naïve Bayes Classification Algorithm, The Markov Model, Linear Regression, Neural Networks – Deep learning.

Module 4:

DATA PREPARATION AND MODELLING

Adopt predictive analytics - Processing data: identifying, cleaning, generating, reducing dimensionality of data – Structuring Data – Build predictive model: develop and test the model.

Module 5:

FORECASTING AND TIME SERIES ANALYSIS

Forecasting- Time Series Analysis-Additive & Multiplicative models- Exponential smoothing techniques - Forecasting Accuracy - Auto-regressive and moving average models.

Text Books:

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, "Predictive Analytics For Dummies", Wiley Publisher, 2nd Edition, 2016.

Reference Books:

1. Bertt Lantz, Machine Learning with R: Expert techniques for predictive modeling to solve all your data analysis problems, Pack Publisher, 2nd Edition, 2015.
2. Aurelien,"Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'Reilly Publisher, 5th Edition, 2017.
3. Max Kuhn, Kjell Johnson, " Applied Predictive Modeling" Springer, 2013.

E - Resources:

1. https://vuquangnguyen2016.files.wordpress.com/2018/03/applied-predictive- modeling-max-kuhn-kjell-johnson_1518.pdf
2. https://www.researchgate.net/publication/329873035_Prediction_Modeling_Methodol ogy
3. https://www.coursera.org/learn/predictive-modeling-analytics
4. https://www.edx.org/course/predictive-analytics

Course Outcomes:

The student will be able to:

1. Identify the basics of predictive analytics and summarize Data, Categorize Models, and techniques
2. Apply Decision tree, Support Vector Machine for Data Classification
3. Apply Methods such as Naïve Bayes Markov Model, Linear Regression, Neural Networks to Boost Prediction Accuracy for Data Classification.
4. Construct predictive models for various Real-Time Applications.
5. Analyze and Visualize predictive Model's results using Data Visualization tools

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: AI&DS III Year – II Sem			
Course Code: **L320D**	**OPEN ELECTIVE – II BUSINESS DATA ANALYTICS**	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Course Objective:

This course enables the students to have a formal introduction to Business Analytics and Fundamentals of R Programming

MODULE 1: **Introduction Business Analytics Unit 1:**

Introduction to Business Analytics -Competing on Analytics - The New Science of Winning Business Analytics.

Unit 2:

Introduction to Market, Trends and People- The Paradigm Shift from Data to Insight and from Business.

MODULE 2: **Intelligence to Business Analytics Unit 1:**

Intelligence to Business Analytics- Descriptive, Predictive and Prescriptive Analytics - Introduction to R programs-Running R programs.

Unit 2:

Mastering Fundamental R concepts -How to diagnose and correct syntax errors-

MODULE 3: **Data Sets &Variables Unit 1:**

Getting familiar with R data sets- Creating R data sets- Reading data files into R - Excel, .txt, SPSS, SAS.

Unit 2:

Html-Assigning variable attributes Changing variable attributes,

MODULE 4: **Data Visualization**

Unit 1: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques. Icon-Based Visualization Techniques, Hierarchical Visualization Techniques.

Unit 2: Visualizing Complex Data and Relations, Charts, Plots, Maps, Diagrams and Matrices

MODULE 5: **Visualization Patterns Unit 1:**

Visualize Patterns over Time- Visualizing Relationship- Spotting Differences- Visualizing Spatial Relationships.

Unit 2:

Data Visualization Using R, Tools, Ggplot2, Bar chart, Pie Chart, Tableau, Plotly, Histogram, Box Plot, Scatter Plot, Heat Map.

Text Books

1. Essentials of Business Analytics: Camm, Cochran, others, Cengage Learning,2016

2. R for Dummies: Andrie De Varies and Joris Mays: Wiley,2016
3. Introductory Statistics with R: Peter Dalgaard, Spr

Course Outcomes:

1. Identify the source of a quantifiable problem, recognize the issues involved and produce an appropriate action plan.
2. Translate a problem into a statistical model
3. Gather Data and Employ R Programming software to fit model to data and solve problem
4. Calculate and interpret numerous statistical values and appreciate their value to the business Manager

<table>
<tr><td rowspan="2">AY: 2022-23
Onwards</td><td rowspan="2">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4" rowspan="2">B. Tech ECE III Year-II Sem</td></tr>
<tr></tr>
<tr><td>Course Code:
L32OE</td><td rowspan="2">Basics of IC Technology
(Open Elective)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: NIL

Module 1: INTRODUCTION TO IC TECHNOLOGIES [10L]

Unit-I: [6L]

Fabrication steps for BJT Transistor, Fabrication steps for MOSFET Transistor, Comparison between BJT and MOSFET fabrication.

Unit-II: [4L]

Semiconductor Substrate-Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth

Module 2: Wafer Preparation & Epitaxy [9L]

Unit-I: [5L]

Wafer Preparation-Silicon Shaping, Etching and Polishing, Chemical cleaning.

Unit-II: [4L]

Epitaxy. Defects in Epitaxial growth, Liquid phase Epitaxy, Vapor Phase Epitaxy and Molecular Beam Epitaxy.

Module 3: Oxidation and Diffusion [8L]

Unit-I: [4L]

Oxidation and Kinetics of oxide growth, Deal-Grove Model of oxidation, Linear, and Parabolic Rate coefficient.

Unit-II: [4L]

Diffusuion- Ficks First law and Second law of Diffusion.

Module 4: Ion Implantation and Chemical Vapour Deposition [10L]

Unit-I: [5L]

Diffusion Vs Ion Implantation, Ion Implantation system

Unit-II: [5L]

CVD for deposition of dielectric and polysilicon- a simple CVD system, Chemical equilibrium and the law of mass action

Module 5: Pattern Transfer and Etching[9L]

Unit-I: [5L]

Lithography and types. Step by step process of Photo Lithography, photo resist, Figures of Merit.

Unit-II: [5L]

Wet etching, Plasma etching, Reaction ion etching.

Text Books

1. S.M. SZE "VLSI Technology" 2nd edition
2. Plummer Deal griffin, "Silicon VLSI Technology" Pearson Publication

Reference Books

1. VLSI Design by Sujata Pandey.
2. J. Bhasker "VHDL for Beginner" Pearson

E-Resources

1. NPTEL-VLSI Design by Dr. Nandita Das Gupta, IIT Madras

Course Outcomes

At the end of the course, the student will be able to:

CO1. Familiarize with IC fabrication steps.

CO2. Examine Wafer Preparation and Epitaxies.

CO3. Analyse oxidation and Diffusion Techniques.

CO4. Explain Ion Implantation and Chemical Vapour Deposition

CO5. Assess Photolithography and Etching process.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	3		-	-	-	-	-	-	-	-	-	3	-
CO2	3	2		-	-	-	-	-	-	-	-	-	3	-
CO3	3	1		-	-	-	-	-	-	-	-	-	3	-
CO4	3	3		-	-	-	-	-	-	-	-	-	3	-
CO5	3	2		-	-	-	-	-	-	-	-	-	3	-
Averag e	**3**	**2. 2**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **L32OF**	**INTRODUCTION TO MICROPROCESSORS AND MICRO CONTROLLERS (Open Elective -II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic of ICs

Course Objectives:

Students will learn to:

1. Study the Architecture of 8085&8086 microprocessor
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study the Architecture of 8051 microcontroller

Module 1

Unit-I: 8086 Introduction

8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization

Unit-II: 8086 Architecture

Architecture of 8086, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

Module 2

Unit-I: Instruction set of 8086

Instruction formats, addressing modes, instruction set, assembler directives, macros.

Unit-II: Assembly language programming of 8086

Simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

Module 3

Unit-I: I/O Interface

8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.

Unit-II: Interfacing with advanced devices

Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

Module 4

Unit-I: Introduction to Microcontrollers

Overview of 8051 microcontrollers, architecture, I/O ports, memory organization.

Unit-II: Addressing Modes

Addressing modes and instruction set of 8051, simple programs.

Module 5:

Unit-I: 8051 Real Time control 1

Programming Time Interrupts, Programming External Hardware Interrupts.

Unit-II: 8051 Real Time control 2

Programming the serial communication interrupts, programming 8051 Timers and counters

Text Books

1. D.V.Hall, Microprocessors and interfacing, TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The8051Microcontroler,3rdEd., C engage Learning

Reference Books

1. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH,2 nd Edition 2006.
2. The 8051 Microcontrollers. Architecture and programming and applications- K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro computer system 8086/8088 family architecture. Programming and design-Du and GA Gibson, PHI 2nd Edition.

E-Resources

1. https://nptel.ac.in/courses/106/108/106108100/
2. https://www.youtube.com/watch?v=o6W0opScrKY&list=PLuv3GM6-gsE01L9yDO0e5UhQapkCPGnY3
3. https://www.youtube.com/watch?v=liRPtvj7bFU&list=PL0E131A78ABFBFDD0 At the end of the course, the student will be able to:

CO1. Design programs on 8085 microprocessors **CO2**. Implement programs on 8086 microprocessors. **CO3**. Design interfacing circuits with 8086.

CO4. Design and implement 8051 microcontroller-based systems.

CO5. Understand the concepts related to I/O and memory interfacing.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	1	1	-	-	2
CO4	2	-		2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	2	1	-	-	-	-	-	-	-	-	-	-
Average	**2**	**2**	**2**	**1.5**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**2**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE III Year-II Sem			
Course Code: **L32OG**	**HYBRID ELECTRIC VEHICLES (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1: History of hybrid and electric vehicles [12L]

History of hybrid and electric vehicles – social and environmental importance of hybrid and electric vehicles – impact of modern drive-trains on energy supplies – Basics of vehicle performance, vehicle power source characterization transmission characteristics – Mathematical models to describe vehicle performance.

Module 2: Hybrid traction [8L]

Basic concept of hybrid traction – Introduction to various hybrid drive train topologies – power flow control in hybrid drive – train Topologies-Fuel efficiency analysis.

Module 3: DC & AC Electrical Machines [14L]

Introduction to electric components used in hybrid and electric Vehicles- Configuration and control of DC motor Drives-Configuration and control of introduction motor drive configuration and control of permanent magnet motor drives configuration and control of switch reluctance-motor drives, drive system efficiency.

Module 4: Batteries [12L]

Matching the electric machine and the internal combustion engine (ICE) Sizing the propulsion motor, sizing the power electronics selection the energy storage technology – Communications, supporting subsystems.

Module 5: Energy management and their strategies [6L]

Introduction to energy management and their strategies used in hybrid and electric vehicle Classification of different energy management strategies comparison of different energy management strategies implementation issues of energy strategies.

Text Books

1. Iqbal Husain, "Electric and Hybrid Electric Vehicles", CRC Press, 2011..
2. Wei Liu, "Hybrid Electric Vehicle System Modeling and Control", Second Edition, WILEY,
3. Sira – Raminez ,R.SilvaOrtigoza, control Design techniques in power electronics Devices, Springer.
4. Siew – Chong tan, Yuk-Ming lai Chi Kong Tse, "Sliding mode control of switching power Converters"..

Reference Books

1. James Larminie and John Lowry, "Electric Vehicle Technology Explained", Second Edition 2012.
2. Christopher D Rahn, Chao-Yang Wang, "Battery Systems Engineering", Wiley, 2013.

E-Resources

1. https://nptel.ac.in/courses/108/103/108103009/
2. https://nptel.ac.in/courses/108/102/108102121/
3. https://nptel.ac.in/content/storage2/courses/108103009/download/M12.pdf
4. https://nptel.ac.in/content/storage2/courses/108103009/download/M1.pdf
5. https://nptel.ac.in/content/storage2/courses/108103009/download/M3.pdf

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Understand the working of different configurations of electric vehicles, hybrid vehicles and its components.

CO 2. ApplythebasicconceptsofbatteriesandMotorsinthedesignofElectricandHybrid Vehicles.

CO 3. Differentiate the modes of operation of Hybrid Vehicles.

CO 4. Analyze the performance of hybrid vehicles.

CO 5. Design the basic parameters of Electric and Hybrid Electric Vehicles.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	2	-	-	-	2	-	-	-	-	-	3	2
CO2	3	2	3	2	-	-	2	-	-	-	-	2	2	2
CO3	3	2	3	-	-	-	-	-	-	-	-	-	2	2
CO4	2	3	2	-	-	-	-	-	-	-	-	-	3	3
CO5	2	3	3	-	-	-	-	2	-	-	-	-	2	2
Average	2.6	2.5	2.6	2	-	-	2	2	-	-	-	2	2.4	2.2

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech IT III Year-II Sem</td></tr>
<tr><td>Course Code:
L32OH</td><td rowspan="2">Distributed Systems (Open Elective-II)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Unit I: Characterization of Distributed Systems:

Introduction, Examples of distributed systems, Trends in distributed systems, Focus on resource sharing, Challenges

Un it II: System Models:

Introduction, Physical models, Architectural models, Fundamental models.

Unit III: Inter process Communication:

Introduction, The API for the Internet protocols, External data representation and marshalling, Multicast communication, Network virtualization: Overlay networks.

Unit IV: Remote Invocation:

Introduction, Request-reply protocols, Remote procedure call, Remote method invocation. Indirect Communication: Introduction, Group communication, Publish- subscribe systems, Message queues, Shared memory approaches.

Unit V: Distributed Objects and Components:

Introduction, Distributed objects, Case study: CORBA, From objects to components.

Text Book

1. Distributed System: Concepts and Design, Coulouris, Dollimore, Kindberg, 2006, Pearson Education.

Course Outcomes:

CO 1: Understand of the principles and foundations on which the Internet and other distributed systems are based.

CO 2: Apply different approaches for supporting distributed applications. **CO3**: Analyze the role of middleware technologies in designing Distributed systems

CO 4: Analyze the sharing of data in distributed environment using various distributed algorithms

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: ME
III Year - II Sem</td></tr>
<tr><td>Course Code: L32OI</td><td colspan="4" rowspan="2">FUNDAMENTALS OF OPERATIONS RESEARCH
(Open Elective - II)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Engineering Mathematics.

Module 1:

Unit 1: Introduction: Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.

Unit 2: Allocation: Linear Programming Problem - Formulation – Graphical solution –Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

Module 2:

Unit 1: Transportation problem: Formulation – Optimal solution, unbalanced transportation problem – Degeneracy

Unit 2: Assignment problem: Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

Module 3:

Unit 1: Sequencing: Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through "m" machines

Unit 2: Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

Module 4:

Unit 1: Inventory: Introduction – Single item, Deterministic models – Types – Purchase inventory models with one price break and multiple price breaks – inventory models with and without shortage cost. Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

Unit 2: Waiting lines: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.

Module 5:

Unit 1: Theory of Games: Introduction – Terminology – Solution of games with saddle points and without saddle points- 2 x 2 games – m x 2 & 2 x n games - graphical method – m x n games - dominance principle.

Unit 2: Dynamic programming: Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem

Text Books

1. P. Sankara Iyer, “Operations Research”, Mc Graw Hill, 2017.
2. J. K. Sharma, “Operation Research”, MacMillan Publishers India Ltd, 4th Edition, 2009.
3. A.C.S Kumar, “Operations Research (Quantitative Analysis for Business decision)”, Yesdee, 2015.

Reference Books

1. Maurice Saseini, Arhur Yaspanand and Lawrence Friedman, “*Operations Research: Methods and Problems”,* Literary Licensing Publisher, 2013
2. A. M. Natarajan, P. Bala Subramani and A. Tamilarasi “*Operations Research*” Pearson Education, 4th *Edition*, 2009.
3. Wagner H. M, “*Principles of Operations Research”,* PHI Publications, 2nd Edition, 2006.

E-Resources

1. https://rb.gy/1ckbxh
2. https://nptel.ac.in/courses/112/106/112106134/
3. https://nptel.ac.in/courses/111/107/111107128/

Course Outcomes

At the end of the course, the student will be able to:

CO1: Allocate optimally the resources in any industry, to maximize the overall gain and determine the number of each item to be produced / procured, and the optimal product mix, within the framework of constraints in any organization

CO2: Find the optimal number of units to be transported such that the total transportation cost will be minimum and Assign the required men / machines to perform the given tasks in an optimal way

CO3: Schedule and sequence production runs by proper allocation of machines and men to get maximum gain or profit and Compute the economic order quantity

CO4: Decide the optimal inventory to be maintained under different situations involving different types of demand and inventory costs, find how to strike a balance between the waiting time cost and service facility cost for different waiting line models

CO5: Find how to strike a balance between the waiting time cost and service facility cost and apply the Dynamic Programming model to practical problems like finding the shortest path for a salesman, optimal solution to a linear programming problem.

CO-PO/PSO Mapping

Course Outcome s	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	2	3	2	-	-	3	-	-	-	-	-	2	2	2
CO2	3	3	3	-	-	3	-	-	-	-	-	2	3	3
CO3	2	3	2	-	-	3	-	-	-	-	-	2	2	2
CO4	3	3	2	-	-	3	-	-	-	-	-	2	3	3
CO5	2	3	1	-	-	3	-	-	-	-	-	2	2	2
Average	2.4	3	2	-	-	3	-	-	-	-	-	2	2.4	2.4

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech: MIE III Year - II Sem**			
Course Code: **L32OJ**	**INTRODUCTION TO SURFACE MINING (OPEN ELECTIVE – II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives:

This course will enable students to:

1. To introduce surface mining terms and applicable conditions
2. To acquaint with different machinery used in surface mining
3. To get idea about Drilling and blasting of surface ore bodies
4. To get idea about lighting, dust, and slopes in surface mines.
5. To know about ore and waste transportation.

Module 1

Definition, Terminology, Applicability and limitations of surface mining, Classification, Advantages, and dis-advantages of surface mining.

Module 2

Introduction to surface mining machinery: Equipment selection; Working with rippers, shovels, draglines, shovel-dragline combination; bucket wheel excavator. Disposal of OB/waste material

Module 3

Drilling & blasting**:** Drilling mechanism, drilling patters, Drill bits Explosives, Blasting accessories, Bulk explosives, problems in blasting.

Module 4

Basics of Mine lighting, Sources of dust in surface mining, dust control, and slope stabilization

Module 5

Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environment due to surface mining

Text Books

1. D.J. Deshmukh, Elements of Mining Technology, Vol 1, Central Techno, 7th Edition, 2001.
2. Principles & Practices of Coal Mining, R.D. Singh

Reference Books

1. Surface Mining Technology, by Prof S.K. Das, Lovely Prakashan, Dhanbad

Course Outcomes

At the end of the course, the student will be able to:

CO1: Understand about surface mining terms and conditions of applicability

CO2: Learn about different machinery used in surface mining

CO3: Learn drilling and blasting in surface mining

CO4: Understand mine lighting, dust, and slopes in surface mining

CO5: Understand the transportation of ore and waste in surface mining.

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech: MBA III Year - II Sem**			
Course Code: **L32OK**	**INTELLECTUAL PROPERTY RIGHTS (Open Elective - II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives:

1. The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
3. Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's.

UNIT - I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II:

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV:

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT - V:

New development of intellectual property: New developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

Course outcomes:

The students once they complete their academic projects, they get awareness of acquiring the patent and copyright for their innovative works. They also get the knowledge of plagiarism in their innovations which can be questioned legally.

Text Books:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddhaganguli, Tata McGraw Hill Publishing Company Ltd.
3. Managing Intellectual Property-The Strategic Imperative, Second Edition by Vinod V Sople, PHI.
4. Intellectual Property –Copyrights, Trademarks and patents by Richard Stim, Cengage Learning.
5. Niraj Pandey & Khushdeep Dharani –Intellectual Property rights
6. V.K. AHUJA – Law relating to Intellectual Property

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -SH III Year-II Sem			
Course Code: **L32OL**	**Open Elective-II Numerical Solution of Partial Differential Equations**	L	T	P	D
Credits: 3		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1: Linear Systems of Equations [10L]

Iterative methods for solving large linear systems of algebraic equations: Jacobi, Gauss-seidel and S.O.R methods - Conditions for convergence of them
- Methods for accelerating convergence: Lyusternite's & Aitken's methods - Optimum acceleration parameter for S.O.R method.

Module 2: One Dimensional Parabolic Equations [9L]

Explicit and Crank-Nicolson Schemes for - Weighted average approximation - Derivative boundary conditions - Truncation errors - Consistency, Stability and convergence - Lax Equivalence theorem.

Module 3: Matrix Norms &Two Dimensional Parabolic Equation [10L]

Vector and matrix norms - Eigen values of a common tridiagonal matrix - Gerischgorin's theorems - Stability by matrix and Fourier-series methods -
A.D.I. methods.

Module 4: Hyperbolic Equations [10L]

First order quasi-linear equations and characteristics - Numerical integration along a characteristic - Lax- Wendroff explicit method - Second order quasi- linear hyperbolic equation - Characteristics - Solution by the method of characteristics.

Module 5: Elliptic Equations [10L]

Solution of Laplace and Poisson equations in a rectangular region - Finite difference in Polar coordinate Formulas for derivatives near a curved boundary when using square mesh - Discretisation error - Mixed Boundary value problems

Text Books

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5 th Edition, New Delhi, 2007.
2. Equations", John Wiley and sons, New York, 1980.
3. Smith G.D., "Numerical Solution of P.D.E.", Oxford University Press, New

Reference Books

1. Morton K.W., Mayers, D.F., "Numerical Solutions of Partial Differential Equations", Cambridge University Press, Cambridge, 2002.
2. Iserles A., "A first course in the Numerical Analysis of Differential Equations", Cambridge University press, New Delhi, 2010. xx t u u

3. Mitchel A.R. and Griffiths S.D.F., “The Finite Difference Methods in Partial Differential

E-Resources

1. https://www.purplemath.com/modules/systlin1.htm
2. https://nptel.ac.in/courses/111/107/111107063/
3. https://www.researchgate.net/publication/227760098_Numerical_solution_of_twodimensional_parabolic_equation_subject_to_nonstandard_boundary_specifications_using_the_pseudospectral_Legendre_method
4. https://link.springer.com/chapter/10.1007/978-3-662-09207-1_2
5. https://www.researchgate.net/publication/310744390_Numerical_Solutions_of_Elliptic_Partial_Differential_Equations_by_Using_Finite_Volume_Me thod

Course Outcomes

At the end of the course, the student will be able to:

CO1. Know the knowledge of solving large number of algebraic linear equation.
CO2. Understand the knowledge of solving one dimensional parabolic equations by numerical methods
CO3. Recognize the knowledge of solving two dimensional parabolic equations by numerical methods.
CO4. Apply and understand the knowledge of solving hyperbolic equation by numerical methods
CO5. Know the knowledge of solving elliptic equations by numerical methods.

CO-PO/PSO Mapping

Course Outcom es	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	2	-	-
Averag e	3	3	2	3	-	-	-	-	-	-	-	2	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -SH III Year-II Sem			
Course Code: **L32OM**	**ADVANCED PHYSICS FOR ENGINEERS (Open Elective)**	L	T	P	D
Credits: **3**	(COMMON TO: All branches)	**3**	**0**	**0**	**0**

Pre-Requisites: Foundations of Mechanics & Physics

Module- 1: Special Theory of Relativity [9L]

Introduction, Concept of theory of relativity, Frames of reference-Inertial, noinertial; Galilean transformation equations, Michelson-Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity, Relativistic relation between energy and momentum.

Module -2: Holography [9L]

Introduction, Basic principle, Construction and Reconstruction of Hologram, Properties of Hologram, Types of Holograms, Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

Module -3: Thin films Synthesis [9L]

Introduction, Deposition Techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).

Module -4: Photonic Crystals [9L]

Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Micro cavity, effects in Photonic Crystals, fabrication of photonic Crystals, Dielectric mirrors and interference filters, PBC based LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

Module- 5: Solar cell Physics[9L]

Single, poly and amorphous silicon, GaAs, CdS, Cu_2S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

Text Books

1. R K Gaur and SL Gupta, “Engineering Physics” Dhanpat Rai Publications, 8th revised Edition, 2006.
2. B K Pandey and S Chaturvedi, “Engineering Physics” Cengage Learning India, Revised Edition, 2014.

Reference Books

1.R F Bun shah, “Hand Book of Technologies for Films and coating”, Noyes publishers,1st Edition, 1996.
2.B E A Saleh and A C Tech, “Fundamentals of Photonics”, John Wiley and Sons, New York 1st Edition, 1993.

E-Resources

1. http://physics.mq.edu.au/~jcresser/Phys378/LectureNotes/SpecialRelativity Notes. pdf
2. http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSCDec20.pdf
3. https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells
4. https://www.journals.elsevier.com/journal-of-alloys-and-compounds/
5. http://aip.scitation.org/journal/apl
6. http://nptel.ac.in/courses/115101011/

Course Outcomes

After completion of this course the student is able to

1. Explain special theory of relativity and apply its concepts in various fields of physicsand engineering.
2. Analyze the basic concepts of Holography and applications.
3. Identify different concepts of film deposition.
4. Apply basic knowledge on the photonic crystals.
5. Apply the basic concepts of solar cell physics.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -SH III Year-II Sem			
Course Code: **L32ON**	**Nano Chemistry** (COMMON TO: All branches)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Synthesis of Nano materials [8L]

Introduction -synthesis of Nanostructure materials, Bottom-up approach and Top-down approach with examples-sol-gel method-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

Module 2: Properties of Nano materials [10L]

Properties of Nanomaterials-Electronic properties, Energy bands and gaps in semiconductors, Fermi Surfaces-Optical properties- Fluorescence, Photoluminescence, Electroluminescence. Magnetic properties-mechanical properties-thermal properties.

Module 4: Instrumental Analysis [10L]

Characterization techniques- Principle and block diagram of Scanning Electron Microscopy (SEM), Electron Dispersion Spectroscopy(EDS). Principle and block diagram of Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy(AFM) -Illustrative examples.

Module 5: Carbon Nano structures and Applications [10L]

Carbon Nano structures, carbon clusters, types and preparation of carbon Nano tubes-optical and telecommunication applications, Nano structured crystals (graphite), graphene, carbon fibers, fullerenes and their applications.
Nano solar cells and its applications.

Module 5: Environmental Nanotechnology [9L]

Implications of Nanotechnology & Research needs-Nanostructured Catalysts TiO_2 Nanoparticles for Water purification- Nano membranes in drinking water treatment and desalination, Nanomembranes in Sea desalination-Nano particles for treatment of Chlorinated Organic Contaminants.

Text Books

1. "Nanotechnology a gentle introduction to the next big idea",Mark A. Ratner, D. Ratner. Pearson Education Inc., Asia, 2003.
2. "Nano: The essentials-understanding Nanoscience and Nanotechnology", Pradeep.T. Tata Mc.Graw Hill, New Delhi, 2007.

Reference Books

1. "Green Chemistry: Theory and Practice", Anastas, P.; Warner, J. Oxford University Press: London, 1998.

2. "Nanomaterials: Synthesis, Characterization, and Applications", A. K. Haghi, Ajesh K. Zachariah, Nandakumar Kalariakkal. Apple Academic Press, 2013.
3. "Nanomaterials and Nanochemistry", Brechignac C., Houdy P., Lahmani M. (Eds.) (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
4. "Principles of Nanotechnology", Phanikumar. SciTech Publications 2nd Edition, 2010.
5. "Environmental Nanotechnology"Preetijain, Shankar lalGarg. Lap lambert Academic publishing, 2015.

E-Resources

1. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/nanochemistry.html
2. https://www.sciencedirect.com/book/9780444519566/nanochemistry
3. https://www.researchgate.net/publication/320068992_Introduction_to_Nan o-chemistry_and_Nano-materials
4. https://www.kemi.dtu.dk/english/research/organic-inorganic-chemistry/nanochemistry
5. https://www.cambridge.org/core/books/engineering-chemistry/nanochemistry/D6DB35E32E530525DD927E68CED43197

Course Outcomes

At the end of the course, the students will be able to:

1. Learn the different synthetic methods of the Nano materials.
2. Know the student Electronic, optical and magnetic properties of Nano materials.
3. Acquire the knowledge various instrumental methods of analysis (TEM, EDS, SEM, DLS &AFM).
4. Know the carbon nanotubes, carbon Nano fibers, Nano structured catalysts and Nano solar cells.
5. Learn usage of Nano materials in the purification of water.

<table>
<tr><td>AY 2022-23 onwards</td><td colspan="4">J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-SH III Year – II Sem</td></tr>
<tr><td>Course Code:
L32OO</td><td rowspan="2">TEAMWORK AND TEAM BUILDING
(COMMON TO ALL)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil Objectives:

1. Know the working experience in the group and team
2. Understand the process and role of the team
3. Apply the knowledge of team building
4. Understand the role of team leader.
5. Plan the meetings and understanding the role of meetings

Module -I Working in Groups and Teams

Introduction-defining Types of Groups and Teams- Understanding the role of Teams in Organization; Recognizing differences between group and Teams- ensuring team success-empowering teams- working with a distributed team- technology @work: virtual worlds.

Module -II Exploring Team Roles and Processes

Defining common team roles-selecting team members-choosing the optimal team size-establishing team rules-clarifying team objectives-making collective decisions etc.

Module -III Building and Developing Team

Understanding the benefits of working in teams-fostering Resistance-using team-building activities-creating a team identity-coping with conflict and ego- dealing with difficult team members and celebrating successes.

Module -IV Leading a Team

Pursuing team leadership-preparing to be a team leader-getting start with your team-taking a project management approach- managing a team diplomatically-being sensitive to intangibles and concluding team activities.

Module -V Managing Meetings

Scheduling meeting-developing meeting agenda- planning meetings- understanding the role of meetings-conducting meetings effectively-taking notes and publishing minutes-concluding meetings and creating action plans and solving common meeting problems.

Reference/text book:

1) Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.

Course outcomes:

1. Recognize differences between group and team, ensuring team success, and empowering teams.
2. Define common team roles, establishing team rules, selecting team members, and making collective decisions
3. Understand the benefits of working in teams, fostering Resistance, using team- building activities
4. Manage a team diplomatically, and preparing to be a good team leader.
5. Create action plans and solving common meeting problems

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcome s (COs)	Program Outcomes (POs)												Program Specific Outcomes *	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	..	..	..	..	..	..	..	..	3	2	..	3	..	..
CO2	..	..	..	..	..	..	..	..	3	2	..	3	..	..
CO3	..	..	..	..	..	..	..	..	3	2	..	3	..	..
CO4	..	..	..	..	..	..	..	..	3	2	..	3	..	..
CO5	..	..	..	..	..	..	..	..	3	2	..	3	..	..
Total	..	..	..	..	..	..	..	..	3	2	..	3	..	..

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-SH III Year-I Sem			
Course Code: **L320P**	**Essence of Indian Traditional Knowledge** (COMMON TO: All branches)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1: Introduction to Culture

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

Module 2: Indian Languages, Culture and Literature

Indian Languages and Literature-l the role of Sanskrit, significance of scriptures to scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India

Indian Languages and Literature-II. Northern Indian languages & literature

Module 3: Religion and Philosophy

Religion and Philosophy in ancient India Religion and Philosophy in Medieval India Religious Reform Movements in Modern India (selected movements only) **Module 4: Fine Arts in India (Art, Technology & Engineering)**

Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient medieval, and modern) Science and Technology in India, development of science in ancient medieval and modern India.

Module 5: Education System in India

Education in ancient, medieval and modern India, aims of education, subjects' languages Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India.

Text Books

1. Kapil Kapoor. "Text and Interpretation: The India Tradition" ISBN: 81246013375 2005.
1. "Science in Sanskrit". Samskrita Bharti Publisher, ISBN 978- 8187276731.2007

Reference Books

1.NCERT, "Position paper on Arts, Music, Dance and Theatre". ISBN 81-7450 494- 200.

Course Outcomes

At the end of the course, the student will be able to: COI:

Understand philosophy of Indian culture.

CO2: Distinguish the Indian languages and literature

CO3: Learn the philosophy of ancient, medieval and modern India. CO4: Acquire the information about the fine arts in India.

COS: Know the contribution of scientists of different eras.

Open Elective-III

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CE III Year-II Sem			
Course Code: **L32OQ**	**ROAD SAFETY EINGINEERING (OE-III)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: Fundamentals of Traffic Engineering Unit-I:
Road User Characteristics, Vehicular Characteristics, Applications of Traffic Control Devices, Traffic signs, Road Marking.

Module 2: Introduction to Road Safety Unit-I:
Accident Situation in India, International Comparison of Accident Data, Standard Definitions by IRC, Collection of Accident Data, Collision and Condition Diagrams.

Module 3: Statistical Methods and Analysis of Accident Data Unit-I:
Methods in Analysis of accident Data, Regression Method, Poisson Distribution, Chi-Squared Distribution, Statistical Comparisons, Black Spot Identification & Investigations.

Module 4: Road & its Effect on Accidents Unit-I:
Factors Causing Accidents, Skidding, Factors Determining Skid Resistance, Pedestrian Safety, Measures to Increase Pedestrian Safety, Safety Improvement Strategies.

Module 5: Accident Mitigation Measures Unit-I
Accident prevention by better planning, Accident prevention by better design of roads, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety.

Text Books

1. ‘Transport planning and Traffic Engineering” by Dr. L. R. Kadiyali, Khanna Publications 9th Edition (2017).
2. ’Principles of Transportation Engineering’’ by Partha Chakroborty &Aminesh Das; Prentice Hall of India, 2nd edition (October 2017).

Reference Books

1. Fundamentals of Traffic Engineering, Richardo G Sigua Road Safety by NCHRP.

E- Resources

1. https://nptel.ac.in/courses/105/101/105101087/

Course Outcomes

At the end of the course, the student will be able to:

1. Understand the Traffic characteristics
2. Analyze Collision and Condition Diagrams.

3. Describe Road & its Effect on Accidents
4. Understand the various Accident prevention measures.
5. Understand the statistical analysis of traffic flow variables.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcome s (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes ***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	1	1	-	-	-	-	-	-	-	-	-	1	1
CO2	1	1	1	-	-	3	2	-	-	-	-	-	2	2
CO3	1	1	1	-	-	3	1	-	-	2	-	2	1	1
CO4	1	1	1	-	-	2	-	-	-	-	-	2	1	2
CO5	1	1	1	-	-	2	-	-	-	-	-	2	1	1
Average	1	1	1	-	-	2	0.6	-	-	0.4	-	1.2	1.2	1.4

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="1">J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-CSE III Year- II Sem</td></tr>
<tr><td>Course Code:
L32OR</td><td rowspan="2">Introduction to Java Programming (Open Elective -III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

1. Familiar with OOPs, constructors, and string handling functions
2. Understand inheritance and polymorphism.
3. Gain knowledge of with packages and interfaces
4. Understand the with exception handling and multithreading.
5. Know the applet programming, event handling and scripting.

Module 1:

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Classes and Objects: concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion.

String handling: String, String Buffer, String Tokenize.

Module 2:

Inheritance: base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Interfaces: defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

Module 3:

Exception handling: concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of- try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Module 4:

Multithreading: differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Applets: concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Module 5:

Event Handling: events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists

Textbooks

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pears on education.

Reference Books

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, Pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson education.

E - Resources:

1. http://www.javasoft.com
2. http://www.w3schools.com

Course Outcomes

At the end of the course, the student will be able to:

CO1: Use OOP concepts in problem solving.

CO2: Demonstrate Inheritance and Polymorphism

CO3: Create user defined Packages and Interfaces

CO4: Illustrate the concept of Exception handling and Multithreading. **CO5:** Design GUI based applications using Applet Programming and Event Handling

<table>
<tr><td rowspan="1">AY 2022-23 onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: AIML
III Year II Sem</td></tr>
<tr><td>Course Code:
L320S</td><td rowspan="2">INTRODUCTION TO NEURAL NETWORKS
(Open Elective III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Data Structures
2. Design and Analysis of Algorithms
3. Python Programming
4. Mathematics for Machine Learning

Course objectives:

The student will:

1. Become familiar with the fundamental concepts of Neural Networks and its applications.
2. Learn various learning strategies for solving real world problems.
3. Demonstrate various architectures of Artificial neural networks.
4. Summarise the limitations of the perceptron model
5. Understand the paradigms of associative memories.

Module 1:

INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Module 2:

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

Module 3:

SINGLE LAYER FEED FORWARD NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

Module 4:

MULTI- LAYER FEED FORWARD NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm Kolmogorov Theorem, Learning Difficulties, and Improvements.

Module 5:

ASSOCIATIVE MEMORIES: Linear Association, Basic Concepts of recurrent Auto associative memory: rentrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

SELF ORGANIZING NETWORKS: Unsupervised learning of clusters, winner- take-all learning, recall mode, Initialisation of weights, seperability limitations

Text Books:

1. Laurene Fausett, "Fundamentals of Neural Networks" , Pearson Education,2004..
2. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.

Reference Books:

1. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
2. Timothy J. Ross, " Fuzzy Logic with Engineering Applications", Tata McGraw- Hill Inc. 2000

Course outcomes:

The student will be able to:

1. Analyze Neural Networks and its applications.
2. Apply learning strategies for solving real world problems.
3. Implement various architectures of Artificial neural networks.
4. Categorize the merits of various perceptron models.
5. Construct the paradigms of associative memories.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech : AI&DS III Year-II Sem			
Course Code: **L320T**	**Open Elective-III** **HEALTH CARE DATA ANALYTICS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Module I: Introduction to Health Care Data Analytics & Electronic Health Record
Unit I: Introduction to Health care data sources and basic analytics, advanced data analytics, Applications and practical systems for health care, resources for health care data analytics,
Unit II: Electronics Health Records, Components of EHR, Coding System of EHR, Benefits of EHR- Barrier to Adopting EHR Challenges-Phenotyping Algorithms, Conclusion.

Module II: Biomedical image modalities and Mining of Sensor Data in Health Care
Unit 1: Biomedical image modalities, Object Detection**,** Image Segmentation, Image Registration, Feature Extraction, Conclusion and Feature work.
Unit II: Introduction Mining sensor data in medical informatics, scope and challenges, Challenges in the Health care data analysis, Sensor Data Mining Applications, Non clinical Health Care Application, Summary and concluding remarks.

Module III: Biomedical Signal Analysis and Genomic data analysis Unit I: -introduction types of biomedical signal analysis, ECG signal analysis, denoising of signals, multivariate bio medical signal analysis, cross correlation analysis.
Unit II: introduction genomic data generation, methods and standards for genomic data analysis, types of computational genomics studies towards personalized medicine, genetic and genomic study to the bed side of personalized medicine, concluding remarks.

Module IV: Natural language processing and data mining for clinical text & Biomedical literature Unit I: Introduction to Natural language processing, Mining information for clinical text,
Challenges of processing clinical reports, clinical applications, conclusions. **Unit II**: Introduction terminology acquisition and management information extraction, text mining environments, applications integration with clinical text mining, conclusions.

Module V: Social media and analytics for health care and Advanced data analytics for health care Unit I: Introduction to social media analysis for detection and trapping of infectious disease outbreaks, social media analysis for public health research and analysis of social media used in health care, conclusions.
Unit II: introduction basics statistical predication model, alternative, clinical predication model, surviv l models, evaluation and validation and conclusion.

TEXT BOOKS

1. Chandan K. Reddy and Charu C Aggarwal, "Healthcare data analytics", Taylor & Francis,2020 Edition

REFERENCE BOOKS

1. Hui Yang and Eva K. Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **L320U**	**MATLAB PROGRAMING LANGUAGE** OE-III	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Course Objectives:

The students will

1. To understand the basic principles of programming and of implementing mathematical concepts in MATLAB.
2. To write numerical algorithms with MATLAB Programming language.
3. To evaluate the computational results using graphical representations.
4. To gain knowledge about advanced MATLAB Programming methods.
5. To gain knowledge on Simulink used in MATLAB.

Module 1: Introduction to MATLAB [10L]

Unit-I: [6L]

Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).

Unit-II: [4L]

Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Module 2: Data Flow in MATLAB [10L]

Unit-I: [10L]

Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Module 3: MATLAB Programming [10L]

Unit-I:

Conditional Statements, Loops, Writing Script Files, Error Correction, saving Files, Worked out Examples.

Module 4: MATLAB Advanced [10L]

Unit-I: [10L]

Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface). Matlab-Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Module 5: SIMULINK [9L]

Unit-I: [9L]

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling, Converting Mathematical Model into Simulink Model, Running Simulink

Models, Importing Exporting Data, Solver Configuration, Masking Block/Model.

Text Books

1. Getting Started WithMatlab: A Quick Introduction For Scientists And Engineers (English) by Rudra Pratap, OXFORD University Press.
2. MATLAB Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication.

3. Reference Books

1. MATLAB® Programming For Engineers, Fourth edition by Stephen J. Chapman.
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang Wenwu Cao, Tae-Sang Chung, John Morris.

Course Outcomes

CO1. Translate mathematical methods to MATLAB code.
CO2. Generalize results and represent data visually.
CO3. Apply computer methods for solving a wide range of engineering problems.
CO4. Utilize computer skills to enhance learning and performance in other engineering and science courses.
CO5. acquire knowledge of Advanced Matlab programming methods and Simulink.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averag e	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech ECM III Year-II Sem**			
Course Code: **L32OV**	**INTRODUCTION TO SENSORS AND ITS APPLICATIONS (Open Elective -III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives:

Students will learn to:

1. To understand the concepts of measurement technology.
2. To learn the different sensors used to measure various physical parameters.
3. To Acquire knowledge on Optical sensors.
4. To understand the concepts Acoustic sensors.
5. To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

Module 1:

Unit-I: Introduction

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers.

Unit-II: Performance measures of sensors

Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types.

Module 2:

Unit-I: Motion, Proximity And Ranging Sensors

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive

Unit-II:

LVDT – RVDT – Synchro – Microsyn, Accelerometer.,– GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

Module 3:

Unit-I: Force, Magnetic And Heading Sensors

Strain Gage, Load Cell, Magnetic Sensors–types, principle, requirement and advantages: Unit 2: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclinometers.

Module 4:

Unit-I: Optical, Pressure And Temperature Sensors

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors

– Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature

– IC, Thermistor, RTD.

Unit-II:

Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors, Film sensor, MEMS & Nano Sensors, LASER sensors.

Module 5:

Unit-I: Signal Conditioning And Daq Systems

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi-channel data acquisition

Unit-II:

Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring

Text Books

1. S Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill,2009.
2. Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", 12th edition, Dhanpat Rai & Co, New Delhi,2013.

Reference Books

1. Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi,2010.
2. 1. John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications,1999.
3. 2. Richard Zurawski, "Industrial Communication Technology Handbook" 2nd edition, CRC Press, 2015.

E-Resources

1. https://www.sciencelearn.org.nz/resources/1602-electricity-and-sensors
2. https://predictabledesigns.com/introduction-to-electronic-sensors/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Expertise in various calibration techniques and signal types for sensors. **CO2**. Apply the various sensors in the Automotive and Mechatronics applications.

CO3. Study the basic principles of various smart sensors..

CO4. Apply Optical and Acoustic sensors in Home Appliances..

CO5. Implement the DAQ systems with different sensors for real time applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-		-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	3	-	-	-	-	-	-	-	-	-	-
Averag e	2.4	2	2.5	2.6 7	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech EEE III Year-II Sem</td></tr>
<tr><td>Course Code:
L32OX</td><td rowspan="2">Non-Conventional Energy Sources (OPEN ELECTIVE - III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives:

This course will enable students:

1. To elucidate the fundamentals of various energy sources and future energy requirement.
2. To impart a thorough knowledge about the application of solar energy.
3. To inculcate the students on feasibility and limitations of wind Energy Systems.
4. To analyse the principle and operation of Biomass energy.
5. To analyse the principle and operation of ocean energy and it's potential in india.

Module 1: Introduction [9L]

Introduction to energy Sources-Renewable and non-renewable energy sources –energy consumption as a measure of Nation's development – Strategy for meeting the future energy requirement – Global and national level energy scenarios –Prospects of renewable energy sources.

Module 2: Solar Energy [12L]

Fundamentals of Solar Energy, Solar Radiation on Earth's surface, Solar radiation geometry, Solar radiation measurements, Solar radiation data, Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion: Flat plate collectors and concentrated collectors, collector efficiency. Solar applications: Heating, distillation, pumping, drying, cooking and solar electric power generation

Module 3: Wind Energy [10L]

Basic principle of wind energy conversion, site selection consideration, Betz Limit, Aerodynamics of wind turbine, basic components of wind energy conversion systems (WECS), types of WECS, applications of wind energy, safety system.

Module 4: Bio-Mass [9L]

Energy from Bio Mass: Various fuels, Conversion technologies, Aerobic digestion and anaerobic digestion, types of Bio-gas digesters, applications of bio-gas plants Factors affecting generation of bio gas, Community biogas plant, compare biomass and biogas.

Module 5: Geo-Thermal and Ocean Energy [10L]

Geothermal energy: Resources, methods of harnessing the energy, potential in India **Ocean energy:** Principle of ocean thermal energy conversion (OTEC), types: open cycle OTEC system, closed cycle and hybrid cycle, applications. Tidal and wave energy: Potential and conversion techniques.

Text Books

1. "G. D. Rai", "Non-Conventional Energy sources", Khanna publishers, 2004
2. "John Twidell & Wier", "Renewable Energy Resources", CRC Press, 2009.

Reference Books

1. "D. P .Kothari, Singal, Rakesh and Ranjan", "Renewable Energy sources and Emerging Technologies", PHI, 2009.
2. "F. C. Treble", Generating Electricity from Sun, Pergamon Press, 1st Edition 1991
3. "C. S. Solanki", "Solar Photovoltaics - Fundamentals- Principles and Applications", PHI, 2009
4. "S. P. Sukhatme", "Solar Energy Principles and Application", TMH, 2009.
5. Agarwal, M.P., 'Future Sources of Electrical Power', S.Chand & Co. Ltd, New Delhi, 1999.

E-Resources

1. https://nptel.ac.in/courses/121106014
2. https://www.energy.gov/eere/geothermal/electricity-generation
3. https://beeindia.gov.in/sites/default/files/4Ch12.pdf
4. https://www.ireda.in/home
5. https://mnre.gov.in/wind/current-status/
6. https://mnre.gov.in/solar/current-status/
7. https://mnre.gov.in/bio-energy/current-status

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Understand the need of utilization of alternate energy resources & fundamentals of various non-conventional energy Systems.

CO 2. Analyze solar thermal and photovoltaic systems and related technologies for energy conversion.

CO 3. Understand Wind energy conversion and devices available for it.

CO 4. Understand Biomass conversion technologies, Geo thermal resources and energy conversion principles and technologies.

CO 5. Realize Power from oceans (thermal, wave, tidal) and conversion devices

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	2	-	-
Average	3	3	2	3	-	-	-	-	-	-	-	2	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT III Year-II Sem			
Course Code: **L32OY**	**Soft Computing (OPEN ELECTIVE - III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Unit I Soft Computing:
Introduction to soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Unit II Artificial Intelligence:
Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques.

Unit III Neural Network:
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, characteristic and applications of ANN.

Unit IV: Perceptron
Perceptron training algorithm, Linear separability.

Unit V Genetic algorithm:
Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling.

Text Books:

1. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
2. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.

Course Outcomes: At the end of the course the student should be able to

CO 1. Learn about soft computing techniques and their applications
CO 2. Analyze various neural network architectures
CO 3. Understand perceptrons.
CO 4. Define the fuzzy systems
CO 5. Analyze the genetic algorithms and their applications

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ME III Year – II Sem			
Course Code: **L32OZ**	**BASICS OF ROBOTICS** (Open Elective-III)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Engineering Physics, Engineering Mathematics

Module 1

Unit 1: Introduction: Robotics-Introduction-classification with respect to geometrical configuration (Anatomy), Controlled system & chain type: Serial manipulator & Parallel Manipulator.

Unit 2: Components of Industrial robotics - precession of movement - resolution, accuracy & repeatability – Dynamic characteristics- speed of motion, load carrying capacity & speed of response

Module 2

Unit 1: Grippers - End effectors: Mechanical gripper – Magnetic – Vacuum cup and other types of grippers.

Unit2: Industrial robots specifications. Selection based on the Application.

Module 3:

Unit 1: Rotation Matrix, Homogenous Transformation Matrix, transformation matrix problems.

Unit 2: Kinematics-Manipulators Kinematics, D-H method of assignment of frames. Direct and Inverse Kinematics for industrial robots.

Module 4:

Unit 1: Trajectory planning: Joint space scheme- Cubic polynomial fit- Obstacle avoidance in operation space-cubic polynomial fit with via point, blending scheme.

Unit 2: Types of motion: Slew motion – joint interpolated motion – straight line motion – problems.

Module 5:

Unit 1: Sensors-Internal sensors: Position sensors & Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

Unit 2: Programming of Robots and Vision System-Lead through programming methods- Teach pendent- overview of various textual programming languages like VAL etc.

Text books

1. Industrial Robotics / Groover M P /McGraw Hill

2. Introdu`ction to Robotics / John J. Craig/ Pearson

Reference books

1. Theory of Applied Robotics / Jazar/Springer.H. Asada and J. J. E. Slotine, ―Robot Analysis and Intelligence‖, Wiley Inter-Science. 1986.

E- Resources

1. https://rb.gy/dw0rkv https://rb.gy/iayh9d
2. https://nptel.ac.in/courses/112/105/112105249/
3. https://nptel.ac.in/courses/112/101/112101098/

Course outcomes

At the end of the course, the student will be able to:

CO1: Apply the basic components of robots
CO2: Differentiate types of robots and robot grippers.
CO3: Model forward and inverse kinematics of robot manipulators.
CO4: Analyze the path planning of the robot.
CO5: Program a robot to perform tasks in differential applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	1	2	3	3	-	-	-	-	-	-	3	3	3
CO2	3	3	2	3	3	-	-	-	-	-	-	3	3	3
CO3	3	2	2	3	3	-	-	-	-	-	-	3	3	3
CO4	3	2	2	3	3	-	-	-	-	-	-	3	3	3
CO5	1	2	2	3	3	-	-	-	-	-	-	1	3	3
Average	2.6	2	2	3	3	-	-	-	-	-	-	2.6	3	3

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="4">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td>B. Tech -MIE III Year-II Sem</td></tr>
<tr><td>Course Code:
L32O1</td><td rowspan="2">BASIC MINING GEOLOGY
(OPEN ELECTIVE – III)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil

Course Objectives

This course will enable students to:

1. To introduce rock types and their physical properties
2. To acquaint with different structures occurring in rocks
3. To get idea about Ground water, and aquifers
4. To get idea about coal formation and its stages.
5. To know about minerals occurring in India.

Module 1

Introduction, Definitions, Importance of geology in mining, Types of rocks, Physical properties of rocks.

Module 2

Structural Geology: Definition, terminology, and Primary and secondary structures: Bedding, lineation, foliation, cleavage, Strike and dip. Definition of faults, folds and joints and their types, Unconformities, and its kinds.

Module 3

Ground Water: Introduction, Hydrological Cycle, origin and occurrence of groundwater, water table. Aquifers: Types of aquifers, confined and unconfined aquifers, perched aquifers.

Module 4

Coal: Stages of formation, composition, theories of formation of coal.

Module 5

Occurrence and distribution of important metallic mineral deposits in India: Iron, Copper-Lead and Zinc–Manganese– Aluminum–Chromium. Occurrence and distribution of important non-metallic mineral deposits in India: Asbestos–kyanite–Sillimanite.

Textbooks

1. Structural Geology – Billings, M.P. Prentice Hall.
2. Engineering geology –by Dr. Chennkeshavulu.

Reference Books

1. A Textbook of Geology: Mukherjee P.K., The World Press Pvt. Limited Calcutta.

Course Outcomes

At the end of the course, the student will be able to:

CO1 : Understand about rocks and their properties

CO2 : Learn about different structures occurring in rocks

CO3 : Understand about ground water, water table and aquifers

CO4 : Learn about coal and its formation theories

CO5 : Distinguish metallic and non-metallic minerals.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -MBA III Year-II Sem			
Course Code: **L32O2**	**Open Elective-III DIGITAL MARKETING**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective:

To understand the importance of digital marketing and its applications

1. To understand the basics of Digital Marketing
2. To understand the Channels of Digital Marketing
3. To develop the capability to form Digital Marketing strategy
4. To enable the students to use new media such as Search Engine and Social Networking

UNIT - I: Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends, Practical Exposure towards Social Media Marketing.

UNIT - II: Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels, Affiliate Marketing.

UNIT - II: Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

UNIT - III: Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan– Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

UNIT - IV: Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click), Display Ads

- choosing a Display Ad Format, Landing Page and its importance.

UNIT - V: Social Media Marketing: Understanding Social Media, Social Networking with Face book, LinkedIn, Blogging as a social medium, Micro blogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention.

Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Course outcomes:

Upon successfully completing the course, students should be able to:

1. Apply digital marketing in the globalized market
2. Define Channels of Digital Marketing
3. Design and develop Digital marketing plan
4. Understand Search engine marketing
5. Acquainted with Online Advertising

Suggested Readings:

1. Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
2. Vandana Ahuja, Digital marketing, Oxford University Press 2015
3. Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015. Judy Strauss & Raymond Frost, E-Marketing, Pearson, 2016
4. Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approach Oxford University Press 2007.
5. Arup Varma, Pawan S. Budhwar, Angelo S. De Nisi, Digital Marketing, Wiley, 2016.
6. David Bain – Digital Marketing in 2017

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -S&H III Year-II Sem			
Course Code: **L32O3**	**Open Elective-III Number Theory & Cryptography**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module –I Divisibility Theory And Canonical Decompositions[9L]

Division algorithm – Base – b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.

Module 2: Diophantine Equations And Congruence's [10L]

Linear Diophantine equations – Congruence's – Linear Congruence's – Applications: Divisibility tests – Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.

Module 3: Classical theorems and Multiplicative functions [9L]

Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phi functions

Module 4: Classical Encryption Techniques [10L]

Classical encryption techniques: Symmetric chipper model – Substitution techniques – Transposition techniques – Steganography.

Module 5: Block chippers public key Encryption [10L]

Block chipper principles – block chipper modes and operations – advanced encryption standards (AES) – Public key cryptography – Principles of public key cryptosystem – The RSA algorithm – Elliptic curve arithmetic – Elliptic curve cryptosystem.

Text Books

1. Koblitz, N. "Course on Number Theory and Cryptography", Springer Verlag, 1986
2. Menezes, A, et.al. "Handbook of Applied Cryptography", CRC Press, 1996

Reference Books

1. Ivan Niven, Herbert S. Zukerman, Hugh L. Montgomery, "An Introduction to the Theory of Numbers".

E-Resources

1. https://people.maths.bris.ac.uk/~mazag/nt/lecture1.pdf
2. https://www.diva-portal.org/smash/get/diva2:530204/FULLTEXT01.pdf
3. https://en.wikipedia.org/wiki/Multiplicative_function
4. https://www.slideshare.net/PrachiGulihar/elementary-cryptography
5. https://en.wikipedia.org/wiki/Public-key_cryptography

Course Outcomes

At the end of the course, the student will be able to:

CO1. Ability to think and reason about abstract mathematics

CO2. Analyze the vulnerabilities in any computing system and hence be able to design a security solutions

CO3. Evaluate security mechanisms using rigorous approaches, including theoretical

CO4. Solve problems in elementary number theory

CO5. Apply elementary number theory to cryptography

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO2	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO4	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO5	3	2	3	3	-	-	-	-	-	-	-	2	-	-
Averag e	3	2	3	3	-	-	-	-	-	-	-	2	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -S&H III Year-II Sem			
Course Code: **L32O4**	**NDT and VACUUM TECHNOLOGY (Open Elective)**	L	T	P	D
Credits: **3**	(COMMON TO: All branches)	**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module- 1: Introduction to Non-destructive testing [8L]

Introduction, Objectives of Non-destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

Module -2: Methods of Non-destructive Testing [9L]

Methods of Nondestructive Testing: Liquid penetration method, Dye penetration method, Ultrasonic Inspection method, Pulse Echo method, Radiographic testing Magnetic particle testing, Eddy current Testing.

Module- 3: Vacuum Technology and Flow Meters [9L]

Vacuum Technology: Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen's and Reynolds' numbers; Throughput, mass flow and conductance. **Flow meters:** Molar flow, Mass flow.

Module- 4: Pressure gauges [8L]

Pressure gauges: Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge.

Module-5 : Vacuum Pumps [9L]

Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps.

Text Books

1.B K Pandey, S Chaturvedi, "Engineering Physics", Cengage learning, 1st Edition, 2014.

2. John. F. O'Hanlon, "A User's guide to Vacuum technology", Wiley, 3rd Edition, 2003.

Reference Books

1. R Srinivasan, "Physics for Engineers", New Age international, 1st reprint, 2007.
2. R K Gaur and S L Gupta, "Engineering Physics", Dhanpat rai, Reprint, 2006.
3. Krishna Seshan, "Hand Book of Thin film deposition", Noyes, 2nd Edition, 2002.

E-Resources

1. http://www.enfm.net/catalog/catalog/enfm-usa.pdf
2. http://web.itu.edu.tr/~arana/ndt.pdf

3.http://www.issp.ac.ru/ebooks/books/open/Nondestructive_Testing_Methods

_and_New_Applications.pdf
4. http://nptel.ac.in/courses/114106035/35
5. http://nptel.ac.in/courses/112101004/37

Course Outcomes

After completion of this course the student is able to

1. Describe the Types of defects and analyze them.
2. The principles of NDT methods.
3. Analyze Vacuum technology and concepts of flow meters.
4. Apply the basic knowledge on pressure gauges.
5. Understand the concepts of different vacuum pumps.

<table>
<tr><td>AY: 2022-23 Onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech -S&H IV Year-I Sem</td></tr>
<tr><td>Course Code: L3205</td><td rowspan="2">Chemistry for Engineers (COMMON TO: All branches)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil

Module 1: Fibres and Rubbers [9]

Fibres-classification-Characteristics of fibres-Preparation and applications of Nylon-6, 6 and Dacron-Fibre reinforced plastics(FRP)-Applications.

Rubbers-Natural rubber and its vulcanization. Elastomers-Buna-S, Butyl rubber and Thiokol rubber.

Module 2: Polymers for Electronics[10]

Polymer resists for integrated circuit fabrication, lithography and photolithography, Electron beam, X-ray and ion sensitive resists, Conducting polymers, types, properties and applications, electroluminescence, molecular basis of electrical conductivity, Photonic applications and non-linear optics, optical information Storage.

Module 3: Analysis and Testing of Polymers [8]

Chemical analysis of Polymers: Spectroscopic methods – IR spectroscopy, Raman spectroscopy, NMR spectroscopy, Mass spectroscopy – X-Ray Diffraction analysis. Thermal analysis: Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Thermo Gravemetric Analysis (TGA).

Module 4: Surfactants and Lubricants[10]

Methods of preparation, cleaning mechanism. Critical micelle concentration and its determination. Hydrophobic and hydrophilic interactions. Micelles and reverse micelles. Detergents. Fricohesity of surfactants. Lubricants-physical and chemical properties, types and mechanism of lubrication. Additives of lubricants and freezing points of lubricants.

Module 5: Metals and Alloys [9]

Phase rule and applications to one, two and multi-component systems. Iron- carbon phase diagram. Types of alloys, carbon steel, alloy steel, alloys of Cu, Al, Pb.

Text Books

1. A Textbook of Engineering Chemistry, by Shashi Chawla
2. Engineering Chemistry, by S. S. Dara

Reference Books

1. Engineering Chemistry, by P. C Jain and M. Jain
2. Advanced Polymer Chemistry, by M. Chanda

E-Resources

1. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/nanochemistry.html
2. https://www.sciencedirect.com/book/9780444519566/nanochemistry
3. https://www.researchgate.net/publication/320068992_Introduction_to_Na no-chemistry_and_Nano-materials
4. https://www.kemi.dtu.dk/english/research/organic-inorganic-chemistry/nanochemistry
5. https://www.cambridge.org/core/books/engineering-chemistry/nanochemistry/D6DB35E32E530525DD927E68CED43197

Course Outcomes

At the end of the course, the students will be able to:

1. Learn the different synthetic methods of the fibres and rubbers.
2. Know the electronic applications of polymers.
3. Acquire the knowledge on various instrumental methods of analysis.
4. Know the use of surfactants and lubricants.
5. Learn the use and applications of alloys.

<table>
<tr><td>AY 2022-23 onwards</td><td>J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech S&H III Year – II Sem</td></tr>
<tr><td>Course Code: L32O6</td><td rowspan="2">TECHNICAL COMMUNICATION SKILLS
(COMMON TO ALL)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil Objectives:

1. Understand the role of language as a communication
2. Employ the role of presentation skills in public speaking
3. Know the importance of body language
4. Examine the role of group discussion for getting jobs
5. Understand the importance of interview skills for getting jobs

Module -I Language as a Communication

Introduction-definition-the process of communication-types of communication- barriers of communication; language and communication-properties of language.

Module -II Presentation Skills

Nature and importance of oral presentation-planning the presentation- preparing the presentation-organizing the presentation-rehearsing the presentation and checklist for making oral presentation

Module -III Body Language

Introduction-definition-eye contact- facial expressions-gesture and posture.

Module -IV Group Discussion

Nature of GD- Characteristics and Strategies of GD-Techniques for Individual Contribution-Group Interaction Strategies.

Module -V Interview Skills

The Interview Process-Characteristics of Interview-Pre-interview preparation Techniques-interview questions-FAQ- Projecting a Positive Image and Alternative Interview Format.

References:

1) Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.
2) Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw- Hill., 2005.

Course outcomes:

1. Use the language skills in order to better communication
2. Learn the presentation skills and use them in conferences and seminars
3. Identify the role of presentation skills in expressing our feelings and emotions
4. Understand the role of group discussion for getting jobs
5. Know the importance of interview skills for getting jobs

CO-PO/PSO Mapping

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak													
Course Outcome s (COs)	**Program Outcomes (POs)**											**Program Specific Outcomes ***	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	..	..	..	..	..	..	..	..	2	3	..	3	..	..
CO2	..	..	..	..	..	..	..	..	2	3	..	3	..	..
CO3	..	..	..	..	..	..	..	..	2	3	..	3	..	..
CO4	..	..	..	..	..	..	..	..	2	3	..	3	..	..
CO5	..	..	..	..	..	..	..	..	2	3	..	3	..	..
Total	..	..	..	..	..	..	..	..	2	3	..	3	..	..

OPEN ELECTIVE-IV

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech CE IV Year-I Sem**			
Course Code: **L41OA**	**ENVIRONMENTAL IMPACT ASSESSMENT (OE-IV)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: Environmental Science.

Module 1:

Unit-1: Initial Environmental examination –Factors affecting EIA – Need for Environmental Impact Assessment (EIA), Rapid and Comprehensive EIA, Environmental Impact statement (EIS) – EIA capability and limitations – Legal provisions on EIA – stages of EIA.

Module 2:

Unit-1: Role of NEPA in EIA, CEQ, Environmental documents. EIA/ EIS& FONSI relationship, processing of EIA/EIS, Environmental attributes.

Methodologies: Criteria to be considered for the selection of EIA methodologies, Adhoc, overlays, Check lists – Matrices – Networks – Cost- benefit analysis with their advantages and limitations.

Module 3:

Unit-1: EIA guidelines for Development Projects, Prediction and Assessment – Assessment of Impact on land, water, air, and noise. Social and cultural activities and on flora and fauna – mathematical models – public participation, Forest act 1980, Wild life Protection Act-1972, The water (Prevention and control) Act-1974

Module 4:

Unit-1: Environment management plan:

Plan for mitigation of adverse impact on Environment – Options for mitigation of impact on water, air, land and on flora and fauna – Addressing the issues related to project affected people. Post project monitoring. ISO 9000, 14000 & 18000.

Module 5:

Unit-1:

EIA for Water resource developmental projects, Highway projects: Nuclear Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.

Text Books

1. "Environmental Impact Assessment" by S.R. Khandeshwar N.S. Raman, A.R. Gajbhiye, I k international house publishing, pvt ltd. 1st addition Sep 2019.
2. "Environmental Impact Assessment" by Barthwell, R. R. New Age International Publications. 3rd addition Oct 2017.

Reference Books

1. "Environmental Impact Analysis" by Jain R.K.-Van Nostrand Reinhold Co, H

K E S international publication, 3rd addition oct 2014.

2. “Environment Impact Assessment” by Anjaneyulu, B S Publication, 2nd addition Jan 2010

Web Resources

1. https://nptel.ac.in/courses/120/108/120108004/

Course Outcomes

On completion of the course, the students will be able to:

1. **Explain** the stages and need for environmental impact assessment.
2. **Discuss** different methodologies for environmental impact prediction and assessment.
3. **Evaluate** the environmental management plans.
4. **Solve** the problems associated with adverse impact on environment.
5. **Apply** the knowledge of EIA on different construction projects

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	-	2	-	-	-	1	2	3	-	-	-	-	2	1
CO2	-	-	-	-	-	2	3	1	-	-	-	-	1	1
CO3	-	-	-	-	-	2	2	3	-	-	-	-	2	1
CO4	-	2	-	-	-	1	2	3	-	-	-	-	1	3
CO5	-	-	-	-	-	1	3	2	-	-	-	-	2	2
Average	-	0.8	-	-	-	1.4	2.4	2.4	-	-	-	-	1.6	1.6

<table>
<tr><td rowspan="2">AY: 2022-23
Onwards</td><td rowspan="2">J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)</td><td colspan="4">B. Tech-CSE IV Year- I Sem</td></tr>
<tr></tr>
<tr><td>Course Code:
L41OB</td><td rowspan="2">INTRODUCTION TO PYTHON PROGRAMMING
(Open Elective -IV)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: NIL Course

Objectives:

The students should be able to

1. Acquire programming skills in core Python.
2. Apply the Python programming language operations, control structures
3. Develop the ability to use built-in data types
4. Develop the skill of creating functions, writing data to files
5. Acquire Object Oriented Skills in Python

Module 1: Introduction

Unit-I: History

Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Introduction to anaconda.

Unit-II: Variables

Python IDE, python variable declaration, Keywords, Indents in Python, Python input/output operations.

Module 2: Operators, Conditional Statements, Loops

Unit-I: Operators

Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence.

Unit-II: Conditional Statements, Loops

Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements)

Module 3: Built-in Data types

Unit-I: Strings, Lists

Strings Creating, initializing and accessing the elements; String operators, String functions and methods. Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements

Unit-II: Tuple, Set, Dictionary

Tuples creating, initializing and accessing the elements in a tuple. Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations, Dictionary functions and methods.

Module 4: Functions and Files

Unit-I: Functions

Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python.

Unit-II: Files

Concept of Files, File opening in various modes, closing of a file. Reading from a file, writing onto a file, some important File handling functions.

Module 5: Object oriented Programming

Unit-I: Programming types

Programming types, Procedure-oriented programming, Object Oriented Programming.

Unit-II:

Accessing Databases using Python.

Text Books

1. Python for Everybody: Exploring Data in Python 3 by Charles Severance

Reference Books

1. Programming in Python 3 - A complete Introduction to the Python Language Second Edition, Mark Summerfield, Addison-Wesley 2010
2. Object-Oriented Programming in Python, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.
3. Programming Python- 4 th Edition, Mark Lutz, O'Reilly, 2011.

E-Resources

1. https://www.youtube.com/watch?v=YYXdXT2l-Gg&list=PL-osiE80TeTskrapNbzXhwoFUiLCjGgY7
2. https://docs.python.org/3/tutorial/
3. https://www.programiz.com/python-programming
4. https://www.w3schools.com/python/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Choose the right data representation formats based on the requirements of the problem.
CO2. Identify tasks and write programs in python, to solve the task.
CO3. Use the comparisons and limitations of the various built-in data types and choose the right one.
CO4. Identify and write the functions, programs required for accessing files.
CO5. Demonstrates how to achieve reusability using inheritance, interfaces.

<table>
<tr><td>AY 2022-23 onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech: AI&ML IV Year-I Sem</td></tr>
<tr><td>Course Code:
L410C</td><td rowspan="2">INTRODUCTION TO DEEP LEARNING
(Open Elective IV)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

1. Probability Statistics, linear algebra. Machine learning .

Course Objectives:

The Student will:

1. Get introduced to various learning techniques of machine learning and understand differences between machine learning and deep learning
2. Understand and analyse optimization techniques and improvements in learning methods
3. Appreciate, understand and apply neural networks as tools for complete learning problems
4. Investigate and deploy/club multi-layer neural networks for learning related to images, text and speech sequences.
5. Appreciate, understand and implement Deep learning in real world practical problems

Module 1:

Introduction to Deep Learning

Introduction to Deep Learning, Brief History of Deep Learning, AI, Machine Learning and Deep Learning, Statistical Learning,

Bayesian Learning, Decision Surfaces, Success stories of Deep Learning

Module 2:

Linear Classifiers

Linear Classifiers, Linear Machines with Hinge Loss, Optimization Techniques, Gradient Descent, Batch Optimization,

Revisiting Gradient Descent, Momentum Optimizer, RMSProp, Adam.

Module 3:

Neural Network

Introduction to Neural Network, Multilayer Perceptron, Back Propagation Learning, Unsupervised Learning with Deep Network, Autoencoders, Convolutional Neural Network, Building blocks of CNN, Transfer Learning, LSTM Networks.

Module 4:

Deep Neural Net

Effective training in Deep Net- early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization,

Recent Trends in Deep Learning Architectures, Residual Network, Skip Connection Network, Fully Connected CNN

Module 5:

Applications

Detection & Segmentation problem definition, challenges, Evaluation, Datasets and Localization by regression, Detection as classification

Region proposals, RCNN and YOLO architectures, fully convolutional segmentations, Mask-RCNNs.

Text Books:

1. Deep Learning- Ian Goodfelllow, YoshuaBenjio, Aaron Courville, The MIT Press
2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Reference Books:

1. Deep Learning: A Practitioner's Approach by Josh Patterson & Adam Gibson, OReilly Press
2. Python Deep Learning: Exploring deep learning techniques and neural network architectures with PyTorch, Keras, and TensorFlow, 2nd Edition by Ivan Vasilev, Pakt Publication.

E - Resources:

1. https://nptel.ac.in/courses/106/105/106105215/
2. https://www.slideshare.net/LuMa921/deep-learning-a-visual-introduction
3. https://yiqiaoyin.files.wordpress.com/2018/02/deep-learning-notes.pdf

Course Outcomes:

The student will be able to:

1. Identify tools of machine learning and deep learning, appropriate to any problems
2. Apply optimization techniques to improve the quality of various learning solutions.
3. Apply and investigate, neural network for complete learning problems.
4. Implement deep learning methods in the area of multidimensional and sequential inputs.
5. Investigate the scope of implementation of various deep learning techniques in any real world problem

<table>
<tr><td>AY 2022-23 Onwards</td><td colspan="1">J. B. Institute of Engineering and Technology (UGC Autonomous)</td><td colspan="4">B. Tech: AI&DS IV Year – I Sem</td></tr>
<tr><td>Course Code: L410D</td><td rowspan="2">OPEN ELECTIVE – IV
FUNDAMENTALS OF BIG DATA</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objectives:

1. The purpose of this course is to provide the students with the knowledge of Big data Analytics principles and techniques.
2. This course is also designed to give an exposure of the frontiers of Big data Analytics

MODULE-I: Introduction to Big Data and Big Data Analytics Unit 1:

Introduction to Big Data: Big Data and its Importance, Four V's of Big Data,Structring Big Data

Unit 2:

Drivers for Big Data, Introduction to Big Data Analytics, Classification of Analytics, Big Data Analytics applications

MODULE- II: Big Data Technologies Unit 1:

Big Data Technologies: Hadoop's Parallel World, Data discovery, Open source technology for Big Data Analytics, cloud and Big Data.

Unit 2:

Predictive Analytics, Mobile Business Intelligence and Big Data **MODULE- III: Introduction to Hadoop and Map Reduce Unit 1:**

Introduction Hadoop: Big Data, Apache Hadoop & Hadoop Eco System, Moving Data in and out of Hadoop.

Unit 2:

Map Reduce, understanding inputs and outputs of Map Reduce - Data Serialization.

MODULE- IV:Hadoop Architecture & HDFS Architecture Unit 1:

Hadoop Architecture: Hadoop: RDBMS Vs Hadoop, Hadoop Overview, Hadoop distributors, HDFS,HDFS Daemons, Anatomy of File Write and Read., Name Node, Secondary Name Node, and DataNode.

Unit 2:

HDFS Architecture, Hadoop Configuration, Map Reduce Framework, Role of HBase in Big Data processing, HIVE, PIG.

MODULE- V: Data Analytics & Social Media Analytics Unit 1:

Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning.

Unit 2:

Collaborative Filtering, Social Media Analytics, Mobile Analytics, Big Data Analytics with Big R

TEXT BOOKS:

1. Big Data Analytics, Seema Acharya, Subhasini Chellappan, Wiley 2015.
2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O‟Reilly Media, 2012.
4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

REFERENCE BOOKS:

1. Big Data and Business Analytics, Jay Liebowitz, Auerbach Publications, CRC press (2013)
2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media (2013), Oracle press.
3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
4. Understanding Big data, Chris Eaton, Dirk deroos et al. McGraw Hill, 2012.
5. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.
6. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, 1st Edition, Wiley and SAS Business Series, 2012.

Courses Outcomes:

1. Ability to explain the foundations, definitions, and challenges of Big Data and various Analytical tools.
2. Ability to program using HADOOP and Map reduce, NOSQL
3. Ability to understand the importance of Big Data in social media and Mining.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE IV Year-I Sem			
Course Code: **L41OE**	**CONSUMER ELECTRONICS (OPEN ELECTIVE)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: [10L]

Unit-I: [6L]

Audio Fundamentals and Devices: Basic characteristics of sound signal: level and loudness, pitch, frequency response, fidelity and linearity, Reverberation. Audio level metering, decibel level in acoustic measurement. Microphone: working principle, sensitivity, nature of response, directional characteristics.

Unit-II: [4L]

Types: carbon, condenser, crystal, electrets, tie- clip, wireless. Loudspeaker: working principle, characteristic impedance, watt capacity. Types: electrostatic, dynamic, permanent magnet, woofers, and tweeters. Sound recording: Optical recording, stereophony and multichannel sound, MP3 standard.

Module 2: [8L]

Unit-I: [4L]Audio systems: CD player, home theatre sound system, surround sound. Digital console: block diagram, working principle, applications.

Unit-II: [4L]FM tuner: concepts of digital tuning, ICs used in FM tuner TDA 7021T. PA address system: planning, speaker impedance matching, Characteristics, power amplifier, Specification.

Module 3: [8L]

Unit-I: [4L]Television Systems: Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution. Composite video signal: horizontal and vertical sync details, scanning sequence.

Unit-II: [4L]Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance. Different types of TV camera. Transmission standards: PAL system, channel bandwidth

Module 4: [10L]

Unit-I: [5L]Television Receivers and Video Systems: PAL-D colour TV receiver, block diagram, Precision IN Line colour picture tube. Digital TVs: - LCD, LED, PLASMA, HDTV, 3-D TV, projection TV, DTH receiver.

Unit-II: [5L]Video interface: Composite, Component, Separate Video, Digital Video, SDI, HDMI Multimedia Interface), Digital Video Interface. CD and DVD player: working principles, Interfaces.

Module 5: [9L]

Unit-I: [5L]Home / Office Appliances: FAX and Photocopier. Microwave Oven: types, single chip controllers, wiring and safety instructions, technical specifications. Washing Machine: wiring diagram, electronic controller for washing machine, technical specifications, types of washing machine, fuzzy logic.

Unit-II:[4L]Air conditioner and Refrigerators: Components features, applications, and technical specification. Digital camera and cam coder: - pick up devices - picture processing - picture storage.

Textbooks

4. Consumer Electronics, Bali S.P., Pearson Education India,2010.
5. Audio video systems: principle practices & troubleshooting, Bali R and Bali S.P., Khanna Book Publishing Co. (P) Ltd., 2010Delhi, India.

Reference Books

3. Intellectual Property in Consumer Electronics, Software and Technology Startups, Springer Nature; 2014th edition (24 September 2013),ISBN- 10:9781461479116.
4. Consumer Electronics, B.R. Gupta , V. Singhal, S.K. Kataria & Sons; 2013th edition.

E-Resources

1. https://www.allaboutcircuits.com/videos/category/consumer-electronics/
2. https://www.youtube.com/watch?v=IttXKAGl6zE

Course Outcomes

At the end of the course, the student will be able to:

CO1. Learn how a Consumer Product is developed.

CO2. **Analyze** how to simulate and test that designs.

CO3. **Apply** in-depth study of systems and the use of those.

CO4. **Understand** concept of Audio Systems.

CO5. **Develop**Television Receivers & Video Systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	-	-	2	2	3	-	-	-	-	-	-	-	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	-	3	3	-	-	-	-	-	-	-	-	2	-
Averag e	2.3	2	2.5	2.5	3	-	-	-	-	-	-	-	2	-

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="1">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech ECM IV Year-I Sem</td></tr>
<tr><td>Course Code:
L41OF</td><td rowspan="2">INTRODUCTION TO EMBEDDED SYSTEMS
(Open Elective-IV)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Nil

Course Objectives:

Students will learn to

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

Module 1:

Unit-I: Embedded Computing

Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples

Unit-II: The 8051 Architecture

Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Module 2:

Unit-I: Basic Assembly Language Programming Concepts

The assembly language programming process, programming tools and techniques, programming the 8051.

Unit-II:

Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

Module 3:

Unit-I: Introduction to Real-Time Operating Systems

Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Unit-II: Basic Design Using a Real-Time Operating System

Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

Module 4:

Unit-I: Embedded Software Development Tools

Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Unit-II: Debugging Techniques

Testing on host machine, using laboratory tools, an example system.

Module 5:

Unit-I: Introduction to advanced Architectures

ARM and SHARC, processor and memory organization and instruction level parallelism.

Unit-II: Networked embedded systems: bus protocols, I2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

Reference Books

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

E-Resources

1. https://nptel.ac.in/courses/108/102/108102045/
2. https://www.edx.org/course/utaustinx/utaustinx-ut-6-02x-embedded- systems-4806

Course Outcomes

At the end of the course, the student will be able to:

CO1. Program an embedded system.

CO2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.

CO3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.

CO4. Design embedded systems and real-time systems.

CO5. Compare and contrast ARM, SHARC, internet enabled systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	2	1	2	-	-	-	-	-	1	-	2	2	2	-
CO2	2	2	2	-	-	-	-	-	2	-	2	2	3	1
CO3	2	2	-	-	-	-	-	-	2	-	-	2	3	1
CO4	1	3	-	-	-	-	-	-	2	-	-	2	3	1
CO5	2	1	-	-	-	-	-	-	2	-	2	2	2	1
Averag e	1.8	1.8	2	-	-	-	-	-	1.8	-	2	2	2.6	1

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE IV Year-I Sem			
Course Code: **L41OG**	**SPECIAL ELECTRICAL MACHINES (OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Electrical and Electronics Engineering

Module 1: PERMANENT MAGNET BRUSHLESS DC MOTORS [8L]

Fundamentals of permanent magnets – types - principle of operation- magnetic circuit analysis - EMF and torque equations, Characteristics and control.

Module 2: PERMANENT MAGNET SYNCHRONOUS MOTORS [12L]

Principle of operation – EMF and torque equations - Phasor diagram - Power controllers – performance characteristics – Digital controllers – Constructional features, operating principle and characteristics of synchronous reluctance motor.

Module 3: SWITCHED RELUCTANCE MOTORS [10L]

Constructional features – Principle of operation - Torque prediction – performance Characteristics-Power controllers – Control of SRM drive - Sensor less operation of SRM – Applications.

Module 4: STEPPER MOTORS [10L]

Constructional features –Principle of operation –Types – Torque equation – Linear and Nonlinear analysis – Characteristics – Drive circuits – Closed loop control – Applications.

Module 5: OTHER SPECIAL ELECTRICAL MACHINES [8L]

Principle of operation and characteristics of Hysteresis motor – AC series motors – Linear inductionmotor – Applications.

Text Books

1. T.J.E. Miller, Brushless magnet and Reluctance motor drives, Claredon press, London, 1989.
2. R.Krishnan, Switched Reluctance motor drives, CRC press, 2001.
3. T.Kenjo, Stepping motors and their microprocessor controls, Oxford University press, New Delhi, 2000.
4. K. Venkataratnam, Special Electrical Machines, Universities Press, 2014.

Reference Books

1. T.Kenjo and S.Nagamori, Permanent magnet and Brushless DC motors, Clarendon press, London, 1988.
2. R.Krishnan, Electric motor drives, Prentice hall of India, 2002.
3. D.P.Kothari and I.J.Nagrath, Electric machines, Tata Mc Graw hill publishing company, New Delhi,Third Edition, 2004
4. Irving L.Kosow, Electric Machinery and Transformers, Pearson Education,

Second Edition, 2007

E-Resources

1. https://nptel.ac.in/courses/108/102/108102156/
2. https://www.academia.edu/9885014/SPECIAL_ELECTRICAL_MACHINES_NPT EL_NOTES
3. https://easyengineering.net/ee6703-special-electrical-machines/

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Analyze given magnetic circuit and understand operation, characteristics and control of PMBLDC motor.
CO 2. Understand the construction, operation performance characteristics of PMSM and its power controllers.
CO 3. Understand the construction, operation and control of SRM drive and its power controllers.
CO 4. Understand the construction, operation, characteristics and control of stepper motor.
CO 5. Understand the operation & characteristics of other special electrical machines.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	1	3	3	3	-	-	-	-	-	-	-	-	3	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Averag e	1.8	2.2	3	3	-	-	-	-	-	-	-	-	3	3

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="1">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech IT IV Year-I Sem</td></tr>
<tr><td>Course Code:
L41OG</td><td rowspan="2">Object Oriented Analysis and Design (OPEN ELECTIVE-IV)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

UNIT - I Introduction to UML:

Importance of modeling, principles of modelling, object-oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

UNIT - II Basic Structural Modeling:

Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT - III Class & Object Diagrams:

Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - IV Basic Behavioral Modeling-I:

Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams

UNIT - V Advanced Behavioral Modeling:

Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOK

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.

Course Outcomes: After the completion of the course, students should be able to:

CO 1: Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.

CO 2. Apply basic and Advanced Structural Modeling Concepts for designing real time applications.

CO 3. Design Class and Object Diagrams that represent Static Aspects of a Software System.

CO 4. Analyze Dynamic Aspects of a Software System using Use Case, Interaction and Activity Diagrams.

CO 5. Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year-I Sem			
Course Code: **L41OI**	**BASICS OF MINE ENVIRONMENT (OPEN ELECTIVE – IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre- Requisites: Nil

Course Objectives

This course will enable students to:

1. To introduce about atmospheric, mine air & their limitations
2. To acquaint with spontaneous heating and explosions in coal mines
3. To get idea about sources of dust, and its control in mines
4. To get idea about miners' diseases & lighting in mines
5. To know about reclamation of mines, impact of mining on environment & sustainable mining

Module 1

Atmosphere and mine air composition. Origin of gases, properties, limitations of gases in underground mines

Module 2

Spontaneous Combustion: Factors, control measures.

Explosions: Causes of firedamp explosion, preventive measures against firedamp explosion.

Module 3

Dust: Sources in underground and opencast mines, standards, and control measures.

Module 4

Miner's diseases, Lighting standards in underground and opencast mines**.**

Module 5

Reclamation, plantation of surface mines, Impact of mining on environment & sustainable mining.

Textbooks

1. Elements of Mining Technology (VOL-2) – by D.J. Deshmukh.
2. Surface Mining – by S.K. Das.

Reference Books

1. Mine Ventilation – by G.B. Mishra.

Course Outcomes

At the end of the course, the student will be able to:

CO1 Learn about atmospheric and mine air

CO2 Learn about spontaneous combustion and explosion in coal mines

CO3 Understand about dust sources and its control in mines

CO4 Learn about miners' diseases, mine lighting, and its standards

CO5 Learn about reclamation of mines, impacts of mining on environment and sustainable mining

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)	**B. Tech MBA IV Year-I Sem**			
Course Code: **L41OJ**	**RURAL MARKETING (OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective: To understand the importance of Rural Marketing, Rural Environment, Problems in Rural Marketing in India and Strategies to be adopted by the corporate.

UNIT-I:

Introduction: Meaning - Evolution – Nature and Characteristics of Rural Market – Understanding the Indian Rural Economy –Rural Marketing Models – Rural Marketing Vs Urban Marketing – Parameters differentiating Urban & Rural Market - Differences in consumer behavior in Rural and Urban market.

UNIT-II:

Rural Market Research: Sources of Information- Factors influencing rural consumers during purchase of products – Rural consumer Life style – Approaches and Tools of Marketing Research - Rural Business Research- Evolution of Rural Marketing Research – Sources and methods of data collection , data collection approaches in rural areas, data collection tools for rural market. Limitation and challenges in rural marketing research, role of rural marketing consulting agencies

UNIT-III:

Rural Marketing Mix: Rural Marketing Mix – Additional Ps in Rural Marketing – 4As of Rural Marketing Mix – New Product Development for Rural Market – Rural Market Product Life Cycle – Objectives behind new product launch – New Product development process

UNIT-IV:

Rural Market Brand & Channel Management: Brand Loyalty in Rural Market – Regional Brands Vs National Brands – Channel Management – Indian Rural Retail Market – Rural Retail Channel Management – Strategies of Rural Retail Channel Management.

UNIT-V:

Applications and Innovations: Marketing of Consumer products, services, social marketing, agricultural marketing, rural industry products- Innovation for Rural Market – Marketing Strategies – e- Rural Marketing – Agricultural Co – operative Marketing – Rural Market Mapping – Corporate Social Responsibility – Organized Rural Marketing – IT for Rural Development – e-Governance for Rural India.

TEXT BOOKS:

1. C.S.G. Krishnamacharyulu, Lalitha Ramakrishnan, Rural Marketing: Text and Cases, Pearson Education, 2009.

2. Pradeep Kashyap, Rural Marketing, 3e Perason Education, 2016.
3. Balram Dogra & Karminder Ghuman, Rural Marketing, TMH, 2009.
4. Sanal Kumar Velayudhan, Rural Marketing, 2e Sage publications, 2012.
5. T P Gopalaswamy, Rural Marketing, Environment, problems, and strategies, 3e Vikas Publications, 2016.

OPEN ELECTIVE-V

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CE IV Year – II Sem			
Course Code: **L42OA**	**ENERGY AUDIT & GREEN BUILDINGS (Open Elective – V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-requisite: Green buildings

Module 1:

Unit 1: Energy Scenarios:

Energy Conservation-Energy Audit-Energy Consumption-Energy Security- Energy Strategy-Clean Development Mechanism.

Unit 2: Types of Energy Audits and Energy-Audit Methodology: Definition of Energy Audit-Place of Audit-Energy- Audit Methodology-Financial Analysis- Sensitivity Analysis-Project Financing Options-Energy Monitoring and Training

Module 2:

Unit 1: Environmental Audit:

Environmental Audit; Introduction-Necessity-Norms. Types: Objectives-Bases types; Liabilities Audit-Management Audit-Activities Audit-Client drive and types; regulatory external audits-independent external audit-internal environmental audit -third party audit.

Unit 2: Environmental Impact Assessment:

Introduction-EIA regulations-Steps in Environmental impact assessment process benefits of EIA-limitations of EIA-Environmental Clearance for Civil Engineering Projects.

Module 3:

Unit 1: Energy Sources:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards **Unit 2: Energy Conservation:** Introduction-Specific objectives-need of energy conservation-LEED India rating system and Energy Efficiency.

Module 4:

Unit 1: Green Building:

Introduction-Definition-Benefits-Principles; Planning concept of Green Building- Salient features of Green Building-Environmental Design-Strategies for Building Construction- Process; Improvement in Environmental Quality in Civil Structure. Materials; Bamboo, Rice Husk Ash, Concrete, Plastic Bricks-Reuse of waste materials- Plastic, Rubber, News Paper, Wood, Non- Toxic paint, Green roofing.

Module 5:

Unit 1: Rating system for Green Building:

Leadership in Energy and Environmental Design (LEED) Criteria-Indian Green Building Council (IGBC) Green Rating-Green Rating for Integrated Habitat Assessment (GRIHA) criteria-HVAC unit in Green Building-Certification

Programs (including GEM and ECBC Certifications).

TEXT BOOKS:

1. "Sustainable construction: Green Building design and delivery" by Kibert, C.J(John Wiley Hoboken, New Jersey).
2. "Non-Conventional Energy resources" by Chauhan, D S Sreevasthava, S K (New Age International Publishers, New Delhi).
3. "Alternative Building Materials and Technologies" by Jagadeesh, K S, Reddy Venkatta Rama, Nanjunda Rao K S (New Age International Publishers, New Delhi).
4. "Green Buildings" by Gevorkian (McGraw hill publication).

REFERENCES:

1. "Handbook of Green Building Design and Construction" by Sam Kubba (Butterworth-Heinemann).
2. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design.
3. Energy Conservation Building Code 2017.

E-Resources:

1. https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce06
2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce40

Course outcomes:

At the end of the course student will be able to:

1. Differentiate and select best of various energy scenarios and energy auditing methodology
2. Identify various Renewable and Non-renewable sources of energy.
3. Justify others to use the waste materials efficiently and effectively.
4. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.
5. Discuss the building codes, relevant legislation governing the consumption of resources

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1	1	-	1	2	-	-	-	-	-	1	1
CO2	1	2	1	1	-	2	2	-	-	-	-	-	1	-
CO3	2	1	2	1	-	1	2	-	-	-	-	-	-	1
CO4	1	1	1	1	-	2	2	-	-	-	-	-	1	1
CO5	-	1	1	1	-	1	2	-	-	-	-	-	1	-
Average	1	1.4	1.2	1	-	1.4	2	-	-	-	-	-	0.8	0.6

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- II Sem			
Course Code: **L41OB**	**INTRODUCTION TO DESIGN THINKING (Open Elective -V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL Course

Objectives:

The students should be able to

1. Understand design thinking skills and customer needs.
2. Use Applied creativity, design thinking approach for idea generation.
3. Understand Design Research strategies, teamwork, and Service design.
4. Understand the Economics of Innovation
5. Understand Design thinking and innovations in various companies.

Module 1:

Unit-I:

Understand the critical design thinking skills needed to either improve an existing product or design a new product.

Identifying & Understanding Customer Needs, Innovation and Business Success

Learn to identify customer needs and draft customer needs statements as a first step towards user innovations.

Unit-II:

Design Thinking Approach for New Product Development, Product Specifications. Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications. Learn the concepts that drive design thinking.

Module 2:

Unit-I:

Introduction to Synthesis, Applied Creativity, Design Thinking Approach for Idea Generation, Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions. Translate needs into product specifications, Choose the right development process. Present the final ideas, get real-time feedback.

Unit-II:

Introduction to Ideation and Prototyping Strategies, Prototyping Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications. Submit the project ideas around user innovations.

Module 3:

Unit-I:

Design Thinking Approach for Deciphering Needs, Introduction to Design Research Strategies, Design for Services, Team Work and Service Design Understand design of services, identify the potential for innovations within them, and learn how to apply product development frameworks to the service context.

Unit-II:

Design Thinking Approach for Concept Development, Product Architecture, Design Thinking Approach for Concept Evaluation, Analyse the economics of the innovation.

Learn to use the modular and integral product architectures in determining the building blocks of a product. Identify customer needs and user groups.

Module 4:

Unit-I:

Analyse the economics of the innovation Learn to perform financial analysis of your project idea and decide if it is backed by a strong business rationale (Worth-It). Design for Environment, User Testing.

Unit-II:

Learn how to apply design for environment principles to a product life cycle. Product Development Processes, Design Thinking Approach for Obtaining User Feedback (What Works), Marketing of Innovation and Designing Business Models, learn to select and implement a product development process (staged, spiral, and agile) that's aligned to this project needs.

Module 5: Case Studies

Unit-I:

Design Thinking and Innovation at Apple, IDEO Human Centred Service Design,

Unit-II:

Asia Miles Road to Stakeholder Centric Insight Driven Innovation. Present the final ideas, get real-time feedback.

Text Books

1. Design Thinking: A Guide to Creative Problem Solving for Everyone, Andrew Pressman, Routledge Taylor & Francis eBooks, 2018.

Reference Books

1. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown, HarperCollins Publishers, 2009.

2. The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems, Michael Lewrick, Wiley Publishers, 2017.

E-Resources

1. https://www.researchgate.net/publication/329310644_Handbook_of_Desig n_Thinking
2. https://www.rcsc.gov.bt/wp-content/uploads/2017/07/dt-guide-book- master-copy.pdf
3. http://www.designthinkingbook.co.uk/DT_MJV_book.pdf
4. https://www.tutorialspoint.com/hi/design_thinking/design_thinking_tutorial .pdf
5. https://www.uni- due.de/imperia/md/content/innovationhub/designthingkingforlibraries.pdf
6. https://www.ibm.com/cloud/architecture/files/design-thinking-field- guide.pdf
7. https://thisisdesignthinking.net/on-design-thinking/design-thinking- resources/

Course Outcomes

At the end of the course, the student will be able to:

CO1: Identify the Design Thinking skills and customer needs.
CO2: Apply creativity, design thinking approach for idea generation. **CO3:** Identify Design Research strategies, teamwork, and Service design. **CO4:** Analyse the economics of innovation.
CO5: Identify the Design thinking and innovations in various companies.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: **AI&ML** IV Year – II Sem			
Course Code: **L420C**	**INTRODUCTION TO GENERATIVE ADVERSARIAL NETWORKS (Open Elective V)**	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Math: Linear Algebra, Calculus, Probability and Statistics
2. Data Structures
3. Machine Learning
4. Deep Learning

Course objectives:

The student will:

1. Understand the difference between generative and discriminative models.
2. Identify problems that GANs can solve.
3. Understand the roles of the generator and discriminator in a GAN system.
4. Understand the advantages and disadvantages of common GAN loss functions.
5. Identify possible solutions to common problems with GAN training.

Module 1:

Introduction to GANs:-

What are GANs?- How do GANs work?- GAN Training- Reaching Equilibrium- Applications of GANs

Generative Modelling with encoders:-

Introduction to Generative Modelling- Working of Auto Encoders at high level- Auto Encoders to GAN- Usage of Auto Encoders

Module 2:

Convolutional Neural Networks:

Introduction to CNN- Convolutional Filters- Parameter sharing- ConvNets Visualized.

Deep GAN:

Introduction to Deep GAN- Batch Normalization- Understanding Normalization- Computing Normalization.

Module 3:

Evaluation:

Evaluation Framework- Inception Score- Frechet Inception Distance

Challenges in Training:

Adding Network depth- Min-Max GAN- Non-Saturating GANs- When to Stop training?- Wasserstein GAN

Module 4:

Semi Supervised GAN:

What is Semi Supervised GAN?- Architecture- Training Process- Training Objectives- Implementation- Comparison to fully supervised Classifier

Conditional GAN:

Motivation- CGAN Generator- CGAN Discriminator- Architecture- Implementation

Module 5:

Cycle GAN:

Image to Image Translation- Cycle Consistency Loss- Adversarial Loss- Identity Loss- Architecture- Applications of Cycle GAN

Applications of GAN:

Image Generation- Training GANs for specific image generation tasks- Style Transfer- photo-to-painting and day-to-night style transfer- Data Augmentation- generating realistic synthetic data to enhance the performance and generalization of machine learning models.

Text Books:

1. GANs in Action, Deep learning with Generative Adversarial Networks, Jakub Langr, Vladimir Bok, Manning Publication
2. Generative Deep Learning by David Foster, O'Reilly Media, Inc.

Reference Book:

1. Learning Generative Adversarial Networks,Kuntal Ganguly, Packt Publishing
2. Generative Adversarial Networks Cookbook, Josh Kalin,Packt Publishing

Course outcomes:

The student will be able to:

1. Design generative and discriminative models.
2. Implement problems that GANs can solve.
3. Compare and contrast the roles of the generator and discriminator in a GAN system.
4. Inspect the challenges posed by common GAN loss functions.
5. Implement possible solutions to common problems with GAN training.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: AI&DS IV Year – II Sem			
Course Code: L420D	CLOUD COMPUTING (Open Elective V)	L	T	P	D
Credits: 3		3	0	0	0

Module 1:

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

Module 2:

Cloud Platforms in the Industry, Understanding Scientific Applications for Cloud Environments, cloud applications Healthcare and education, Scientific Applications, Business and Consumer Applications.

Module 3:

Virtualization, cloud virtualization technology, deep dive: cloud virtualization, migrating in to cloud computing.

Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T- Systems.

Module 4:

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

Module 5:

Cloud management, Organizational Readiness and change management in the cloud age, Cloud Security, Data security in the cloud, Legal Issues in the Cloud
, Achieving Production Readiness for the cloud Services.

Text Books:

1. Cloud Computing: Raj Kumar Buyya ,James Broberg, andrzej Goscinski, 2013 Wiley.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011 **Reference Books:**
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi- 2013.

E - Resources:

1. https://nptel.ac.in/courses/106/105/106105167/1
2. https://sjceodisha.in/wp-content/uploads/2019/09/CLOUD-COMPUTING- Principles-and-Paradigms.pdf
3. https://www.alljntuworld.in/download/cloud-computing-cc-materials-notes/
4. https://www.slideshare.net/jeetraj17/cloud-computing-it703-unit-1-5

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	1	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	2
Average	**2.0**	**2.0**	**2.0**	**2.0**	**1.7**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**2.0**

<table>
<tr><td>AY: 2022-23
Onwards</td><td colspan="1">J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech ECE IV Year-II Sem</td></tr>
<tr><td>Course Code:
L420E</td><td rowspan="2">Principles of Sensors and their Application (OE-05)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites:

Course Objectives:

1. Understand the fundamental principles of various sensors and their classifications.
2. Gain knowledge of signal conditioning and interfacing techniques for sensor integration.
3. Explore the applications of physical, chemical, and biological sensors in different domains.
4. Learn about smart sensors, IoT, and their integration in sensor networks.
5. Develop skills in sensor data processing, fusion, and application-specific algorithms.

Module 1: Introduction to Sensors [8L]

Unit-I: Overview of Sensors [4L]

Introduction to sensors: Definition, types, and classifications; Sensing principles: Mechanical, electrical, thermal, and optical; Sensor characteristics: Range, sensitivity, accuracy, resolution, and response time

Unit-II: [4L]

Sensor signal conditioning: Amplification, filtering, and linearization; Sensor interfacing: Analog and digital interfaces; Sensor calibration and compensation techniques

Module 2: Physical Sensors [9L]

Unit-I: [5L]

Temperature sensors: Thermocouples, RTDs, thermistors, and semiconductor temperature sensors; Pressure sensors: Piezoresistive, capacitive, and optical pressure sensors; Strain sensors: Resistive, capacitive, and piezoelectric strain gauges

Unit-II: [4L]

Accelerometers: Piezoresistive, piezoelectric, and capacitive accelerometers; Gyroscopes: Vibrating structure, fiber optic, and MEMS-based gyroscopes; Force and torque sensors: Load cells, strain gauge-based force sensors, and optical torque sensors.

Module 3: Chemical and Biological Sensors [8L]

Unit-I: [4L]

pH sensors: Glass electrode and ion-sensitive field-effect transistor (ISFET) sensors; Gas sensors: Electrochemical, semiconductor, and optical gas sensors; Biosensors: Enzyme-based, DNA-based, and immune sensors.

Unit-II: [4L]

Biosensors (continued): Lab-on-a-chip technology and bio-electrochemical sensors; Environmental sensors: CO_2 sensors, humidity sensors, and particulate matter sensors; Biomedical sensors: ECG, EEG, and pulse oximetry sensors.

Module 4: Smart Sensors and Internet of Things (IoT)[10L]

Unit-I: [5L]

Introduction to smart sensors: Features, architecture, and applications; Sensor networks: Wireless sensor networks, ad-hoc networks, and protocols; IoT and sensor integration: Data acquisition, processing, and communication. **Unit-II: [5L]**

Energy harvesting for sensors: Solar, thermal, and vibration energy harvesting; Wearable sensors: Applications in healthcare, sports, and activity monitoring; Industrial IoT: Sensor applications in manufacturing, automation, and predictive maintenance

Module 5: Name of the Module [9L]

Unit-I: [5L]

Signal processing techniques for sensor data: Filtering, noise reduction, and feature extraction; Data fusion: Sensor fusion techniques and algorithms Sensor arrays: Beamforming and spatial processing.

Unit-II: [4L]

Sensor-based localization and tracking: GPS, RFID, and computer vision-based methods; Sensor applications in robotics and automation Emerging trends in sensor technology and applications.

Text Books

1. Ernest O Doebelin, “Measurement Systems – Applications and Design”, Tata McGraw-Hill,2009.
2. Sawney A K and PuneetSawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, DhanpatRai & Co, New Delhi,2013.

Reference Books

1. Sensors and Signal Conditioning by Ramon Pallas-Areny and John G. Webster
2. Principles of Measurement Systems by John P. Bentley
3. Sensors and Sensing Technology by V. Venkatesh and R. Srinivasan
4. Biosensors: Essentials by Min Wang

E-Resources

1. NPTEL: Introduction to Sensors (https://nptel.ac.in/courses/117/101/117101073/)
2. Lecture Notes on Sensors and Transducers (http://people.scs.carleton.ca/~soma/tech-notes/Sensors.pdf)
3. Tutorialspoint: Sensors (https://www.tutorialspoint.com/sensors/index.htm)
4. NPTEL: Physical Sensors (https://nptel.ac.in/courses/117/105/117105057/)
5. Lecture Notes on Physical Sensors (http://www-personal.umich.edu/~johannb/Pubs/Sensors-Chapter-Outline.pdf)
6. Tutorialspoint: Physical Sensors (https://www.tutorialspoint.com/physical_sensors/index.htm)
7. NPTEL: Chemical Sensors (https://nptel.ac.in/courses/117/106/117106071/)
8. Lecture Notes on Chemical Sensors (http://www-personal.umich.edu/~johannb/Pubs/Sensors-Chapter-Outline.pdf)
9. Tutorialspoint: Chemical Sensors (https://www.tutorialspoint.com/chemical_sensors/index.htm)
10. NPTEL: Smart Sensors (https://nptel.ac.in/courses/117/107/117107044/)
11. Lecture Notes on IoT and Smart Sensors (https://www.iotforall.com/iot- resources/lecture-notes-internet-of-things/)
12. Tutorialspoint: IoT (https://www.tutorialspoint.com/internet_of_things/index.htm)
13. NPTEL: Sensor Data Processing (https://nptel.ac.in/courses/117/103/117103042/)
14. Lecture Notes on Sensor Data Processing (http://www.dca.fee.unicamp.br/~miyagi/lectures/dsp-lecture-notes.pdf)
15. Tutorialspoint: Signal Processing (https://www.tutorialspoint.com/digital_signal_processing/index.htm)

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify and select appropriate sensors for specific applications based on their sensing principles and characteristics.
CO2. Design sensor interfaces and signal conditioning circuits to enhance the accuracy and reliability of sensor measurements.
CO3. Analyze and evaluate the performance of physical, chemical, and biological sensors in real-world scenarios.
CO4. Develop solutions using smart sensors, IoT, and sensor networks for monitoring and control applications.

CO5. Apply signal processing techniques to sensor data for feature extraction, localization, and tracking in diverse applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averag e	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="2">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech ECM IV Year-II Sem</td></tr>
<tr><td rowspan="3">INTRODUCTION TO ELECTRONICS INSTRUMENTATION
(Open Elective-V)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Course Code:
L42OF</td><td rowspan="2">3</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td></tr>
<tr><td>Credits: 3</td></tr>
</table>

Pre-Requisites: Nil

Course Objectives:

Students will learn to

1. Get an understanding of various measurement systems functioning and metrices for performance analysis.
2. Understand the principle of operation, working of different electronic instruments viz. Signal generators, signal analyzers, recorders and measuring equipments.
3. Use various measurement techniques for measurement of different physical parameters using different classes of transducers.
4. Gain knowledge on parameters and functions of CRO.
5. Obtain knowledge on various transducers.

Module 1:

Unit-I:

Block Schematics of Measuring Systems, Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters.

Unit-II:

Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. Electronic Voltmeters, Multimeters, AC,DC Meters, Digital Voltmeters: Ramp Type, Staircase Ramp, Dual Slope Integrating type, Successive Approximation Type,Autoranging,31/2,33/4 Digit Display, Pico ammeter, High Resistance Measurements, Low current Ammeter, Applications.

Module 2:

Unit-I:

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator, Video Signal Generators, and Specifications.

Unit-II:

Signal Analyzers, AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillaors.

Module 3:

Unit-I:

DC and AC Bridges: Wheat Stone Bridge, Kelvin Bridge, AC Bridges, Maxwell, Hay, Schering, Wien, Anderson Bridges.

Unit-II:

Resonance Bridge, Similar Angle Bridge ,Wagner's ground connection, Twin T, Bridged T Networks, Detectors.

Module 4:

Unit-I:

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications, Specifications.

Unit-II:

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs, Frequency Measurement, Period Measurement, Errors in time/Frequency Measurements, universal counters, Extension of range; Recorders: Strip chart, X-Y, oscillographic recorders.

Module 5:

Unit-I:

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

Unit-II:

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

Text Books

1. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education - 2010.
2. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.

Reference Books

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003.
3. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
4. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

Course Outcomes

At the end of the course, the student will be able to:

CO1. List the various measurement techniques available and analyze the basic working of instruments used for measurement..

CO2. Compute the errors in measurements and their rectification

CO3. Analyse the working of AC and DC bridges.

CO4. Illustrate the basic principle and working of Oscilloscopes

CO5. Distinguish different types of transducers.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2	2
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	2	-
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO5	2	-	2	-	-	-	-	-	-	-	-	-	2	-
Averag e	2.2	2	2	2	-	-	-	-	-	-	-	2	2	2

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="1">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech EEE IV Year-II Sem</td></tr>
<tr><td>Course Code: L42OG</td><td rowspan="2">Instrumentation (Open Elective-V)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Pre-Requisites: Electrical Measurements

Module 1: Characteristics of Measuring Instruments and Signal Representations

Unit 1 [6L]

Measuring Systems, Performance Characteristics, – Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

Unit 2 [6L]

Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation.

Module 2: Oscilloscope and Digital Voltmeters

Unit 1 [6L]

Cathode ray oscilloscope-Cathode ray tube-time base generator-horizantal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.

Unit 2 [6L]

Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuos balance type-Microprocessor based ramp type DVM digital frequency meter-digital phase angle meter.

Module 3: Wave Analyzers and Spectrum Analyzers

Unit 1 [5L]

Wave Analyses - Frequency selective analyzers, Heterodyne, Application of Wave analyzers- Harmonic Analyzers, Total Harmonic distortion.

Unit 2 [5L]

Spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters.

Module 4: Transducers

Unit 1 [6L]

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications.

Unit 2 [6L]

Strain gauge and its principle of operation, gauge factor, Thermostats, Thermocouples, Synchros, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

Module 5: Measurement of Non-Electrical Quantities

Unit 1 [5L]

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.

Unit 2 [5L]

Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

Text Books

1. A. K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.
2. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

Reference Books

1. J.B. Gupta," A course in Electronics and Electrical Measurements and Instrumentation", S. K. Kataria & Sons, 2009.
2. H.S. Kalsi," Electronic Instrumentation", Tata McGraw Hill, 2004.
3. U. A. Bakshi, A. V. Bakshi "Electrical Measurements and Instrumentation", Technical Publications, 2009

E-Resources

1. https://nptel.ac.in/courses/108/105/108105153/
2. https://nptel.ac.in/courses/112/106/112106138/
3. https://nptel.ac.in/courses/112/107/112107242/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Compare the performance characteristics of Measuring Instruments.

CO2. Understand operating principles of CRO and Digital Voltmeters. **C03.**Understand operating principles of Wave Anlayzer and Spectrum Analyzer. **C04.**Summarize the operation of various Transducers.

C05. Measure Non-Electrical Quantities using Transducers.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	2	-	2	2	-	-	3	-	-	-	-	-	2	-
CO2	3	-	1	3	-	-	2	-	-	-	-	-	3	-
CO3	3	-	3	2	-	-	2	-	-	-	-	-	3	-
CO4	2	-	3	2	-	-	1	-	-	-	-	-	3	-
CO5	1	-	2	3	-	-	2	-	-	-	-	-	2	-
Averag e	2.2	-	2.2	2.4	-	-	2	-	-	-	-	-	2.6	-

Correlation: 3–Strong; 2–Medium; 1-Weak

<table>
<tr><td rowspan="1">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech IT IV Year-II Sem</td></tr>
<tr><td>Course Code: L42OH</td><td rowspan="2">Cyber Laws and Ethics (Open Elective-V)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Unit I: Information Technology & Cyber Crimes:

Introduction, Glimpses, Definition and Scope, Nature and Extent, Know no Boundaries, Rapid Transmission and Accuracy, Diversity and Span of Victimization, Cyber World, Inadequacy of Law, Influence of Teenagers

Unit II: Technology & Forms of Cyber Crimes:

Influence of Technology on Criminality, Forms of Cyber Crimes.

Unit III: Cyber Crimes 'and Global Response:

Global Perspective, Country wise Legal Response, Country wise Analysis.

Unit IV: Investigation in Cyber Crimes: Implications and Challenges: Introduction, Procedural Aspects, Issues, Complications and Challenges Concerning Cyber Crimes, Problems and Precautionary measures for Investigation.

Unit V: Cyber Crimes: Discovery and Appreciation of Evidences: Introduction, Law of Evidence, Evidences in Cyber Crimes: Challenges and Implications, Computer Generated Evidence and their Admissibility, Judicial Interpretation of Computer related Evidence.

Text Book:

1. Dr Pramod Kr.Singh, "Laws on Cyber Crimes [Along with IT Act and Relevant Rules]" Book Enclave Jaipur India..

Course Outcomes: on completion of this course, the students should be able to:

CO 1. Understand Cyber Space, Cyber Crime, Information Technology, Internet & Services.

CO 2. List and discuss various forms of Cyber Crimes

CO 3. Explain Computer and Cyber Crimes

CO 4. Understand Cyber Crime at Global and Indian Perspective.

CO 5. Describe the ways of precaution and prevention of Cyber Crime as well as Human Rights.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year-II Sem			
Course Code: **L42OI**	**FUNDAMENTALS TO ROCK MECHANICS (OPEN ELECTIVE – V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre Requisites: Nil

Course Objectives

This course will enable students to:

1. To introduce about concepts of stress and strain and failure criteria for rock and rock mass.
2. To acquaint with pre-mining stresses in rock and various methods of rock stress determination, its importance in mining applications.
3. To get idea about various engineering properties of rocks and soil; rock mass classification and soil classification methods
4. To get idea about instrumentation and monitoring systems used in surface and underground mine excavation stability.
5. To know about various ground improvement techniques and methods for safe mining operations

Module 1

Basic concept of stress, strain and failure of rock, Analysis of stress, Analysis of strain, Constitutive relations, Parameters influencing strength/stress-strain behavior, Failure Criteria for Rock and Rock Mass Classical theories of rock failure: Coulomb's criterion, Mohr's criterion, Pre-mining state of Stress Stresses in rock mass, Factors influencing the in-situ state of stress, Estimating in situ stresses

Module 2

Rock mass Classification and soil characterization, Overview of shear strength and compressibility of soil, Physico-mechanical properties of intact rock, Rock mass classification methods and their applications, Soil classification methods and their applications

Module 3

Response of rock mass and soil to excavation, Response of rock mass to Excavations Underground, Induced stresses and displacements around single opening in rock mass, Ground support interaction analysis and reinforcement of ground (rock mass and soil), selection and design of support systems. **Module 4**

Slope Engineering: Slope failure and causes; Basic approaches to slope stability analysis and stabilisation, Monitoring of Excavation Stability: Purpose and nature of monitoring, Instrumentation and monitoring systems - Load; Stress and Deformation measuring, devices; Interpretation of monitoring data; Practical aspects of monitoring

Module 5

Ground improvement; grouting, fore polling, pre-reinforcement, shotcreteing and other methods

Textbooks

1. Introduction to Rock Mechanics, Goodman, RE.
2. Fundamental of Rock Mechanics by Jaeger, J.C. and Cook, NGW

Reference Books

1. Underground Excavation in Rock, Hoek, E and Brown, ET
2. Rock Mechanics for Underground Mining, Brady, BHG and Brown, ET

Course Outcomes

At the end of the course, the student will be able to:

1. Learn about concepts of stress and strain and failure criteria for rock and rock mass.
2. Learn about pre-mining stresses in rock and various methods of rock stress determination, its importance in mining applications.
3. Understand various engineering properties of rocks and soil; rock mass classification and soil classification methods.
4. Learn about instrumentation and monitoring systems used in surface and underground mine excavation stability.
5. Learn about various ground improvement techniques and methods for safe mining operations

<table>
<tr><td rowspan="1">AY: 2022-23
Onwards</td><td>J. B. Institute of Engineering and Technology
(UGC Autonomous)</td><td colspan="4">B. Tech MBA IV Year-II Sem</td></tr>
<tr><td>Course Code:
L42OK</td><td rowspan="2">CUSTOMER RELATIONSHIP MANAGEMENT
(Open Elective-V)</td><td>L</td><td>T</td><td>P</td><td>D</td></tr>
<tr><td>Credits: 3</td><td>3</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Course Objective: To understand the importance of Customer Relationship Management in Business.

UNIT-I:

Introduction to CRM: Concepts, Evolution, Need, understanding goals and objectives of CRM, Components of CRM, Benefits, CRM as a strategic marketing tool, CRM significance to the stakeholders, CRM Applications in Consumer and Business Markets, CRM Issues & Problems.

UNIT-II:

Building Customer Relations: Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behaviour in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments - Customer Life Cycle, Business Networks and CRM.

UNIT-III:

CRM Process: Introduction and Objectives of a CRM Process; an Insight into CRM and e-CRTA/online CRM, The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase; Modules in CRM, 4C's (Elements) of CRM Process, CRM Process for Marketing Organization, CRM Value Chain, CRM Affiliation in Retailing Sector.

UNIT-IV:

CRM Structures: Elements of CRM – CRM Process – Strategies for Customer acquisition – Customer Retention and Development – Strategies for Customer Retention, Models of CRM – G-SPOT Model, KOEL's Model, WebQual Audit Model, ONYX Model - CRM road map for business applications.

UNIT-V:

CRM Planning and Implementation: Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM –Operational CRM – Call centre management – Role of CRM Managers, Trends in CRM- e-CRM Solutions –Features and advantages of e CRM, Functional Components of e CRM- Data Warehousing – Data mining for CRM – an introduction to CRM software packages.

Course Outcome: Students will be able to understand

1. need of CRM
2. building customer relations
3. CRM process
4. CRM structures
5. Planning and Implementation of CRM.

Suggested Readings:

1. G. Shainesh, Jagdish, N.Sheth, Atul Parvatiyar, Customer Relationship Management: Emerging Concepts, Tools and Applications, Macmillan 2005.
2. Francis Buttle, Customer Relation Management: Concepts and Technologies, 2e, Routledge, 2013.
3. Ekta Rastogi, Customer Relation Management: Text and Cases, Excel Books, 2011.
4. Zikmund, Customer Relationship Management, Wiley 2012.
5. Paul Greenberg, CRM at the speed of light, 4e, TMH, 2009.
6. Lakshman Jha, Customer Relationship Management: A Strategic Approach, Global India Pvt Ltd, 2008.