ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

ELECTRONICS AND COMPUTER ENGINEERING

B. TECH FOUR YEAR UG COURSE

(Applicable for the batches admitted from 2022-2023)

REGULATION: R22
(I & II 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 be a centre of excellence in the field of engineering and technology by imparting core values to the learners with focus on Research and Development along with social responsibilities and global perception.

MISSION:

M1: To prepare Electronics and Computer Engineering graduates with competence in engineering with interdisciplinary subjects, so that they can excel in professional career, to pursue higher studies and/or research and development activities.

M2: To develop liaison with Academia - Industry for exposure to the practical and innovative aspects in engineering, entrepreneurial pursuit and to promote social responsibility in the graduates.

M3: To inculcate technical skills along with leadership qualities in students to improve their employability opportunities

Program Educational Objectives (PEOs)

PEO1

Have a broad-based curriculum in Electronics & Computer Engineering area with solid foundation in core subjects such as Mathematics, Sciences and Engineering fundamentals that is required to solve hardware & software problems and an appreciation of arts, humanities and social sciences

PEO2

Should have an in-depth, sound scientific and engineering knowledge and leadership qualities to enable them to comprehend, analyze, design and create novel products and solutions for the real-life problems.

PEO3

Have an understanding of Professional and Ethical responsibility, Effective Communication skills, Multi-disciplinary approach, team work skills and the need for lifelong learning for a successful career

Program Outcomes and Program Specific Outcomes of ECM Department (Pos & 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 knowledgeand 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, Integrate electronics and computer knowledge to manage reliable application systems as per user requirements

PSO2

Design, Develop, Integrate electronics and computer knowledge to manage reliable application systems as per user requirements

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)

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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 (EIC)	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**	**30**	**70**

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 1,2 and the average of marks obtained 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 30 marks similar to the Theory courses. In addition to this an internal Examination for 70 marks covering the syllabus of 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 fourthyear second semester	Regular course of study of fourth year firstsemester

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 (Σ 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.

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

(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 awardedonly 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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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.

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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.

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JBIET-R22	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-ECM
B. Tech Course Structure		

I Year I Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L110A	Differential Equations and Calculus	3	1	0	4	BS	Y	Maths
2.	L110B	English	3	0	0	3	HS	Y	English
3.	L110C	Applied Physics	3	0	0	3	BS	Y	Physics
4.	L115A	Programming for Problem Solving	3	1	0	4	ES	Y	CSE
5.	L1101	English Language and Communication Skills Lab	0	0	2	1	HS	Y	English
6.	L1102	Physics Lab	0	0	2	1	BS	Y	Physics
7.	L1151	Programming for Problem Solving Lab	0	0	4	2	ES	Y	CSE
8.	L11M2	Human Values and Professional Ethics	2	0	0	0	AC	Y	MBA
		Total	**14**	**2**	**8**	**18**			

I Year II Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L120A	Linear Algebra and Advanced Calculus	3	1	0	4	BS	Y	Maths
2.	L120D	Engineering Chemistry	3	0	0	3	BS	Y	Chemistry
3.	L122A	Basic Electrical and Electronics Engineering	3	1	0	4	ES	Y	EEE&ECE
4.	L1231	Engineering Drawing	1	0	4	3	ES	Y	MECH
5.	L1203	Chemistry Lab	0	0	2	1	BS	Y	Chemistry
6.	L1233	Engineering Workshop/ Manufacturing Practices	1	0	4	3	ES	Y	MECH
7.	L1221	Basic Electrical and Electronics Engineering Lab	0	0	4	2	ES	Y	EEE&ECE
8.	L12M1	Functional English	2	0	0	0	AC	Y	English
		Total	**13**	**2**	**14**	**20**			

B. Tech Course Structure

II Year I Semester

S. No	Code	Course Title	L	T	P/D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L210A	Probability and Statistics	3	1	0	4	BS	Y	Maths
2.	L217B	Computer Organization	3	0	0	3	PC	N	ECM
3.	L216B	Object Oriented Programming Through JAVA	3	0	0	3	PC	Y	IT
4.	L217A	Electronic Circuit Analysis	3	0	0	3	PC	N	ECM
5.	L217C	Switching Theory And Logic Design	3	1	0	4	ES	N	ECM
6.	L2171	Electronic Circuit Analysis Lab	0	0	4	2	PC	N	ECM
7.	L2162	Object Oriented Programming Through JAVA Lab	0	0	2	1	PC	Y	IT
8.	L2172	Internship-I	0	0	2	1	PW	Y	ECM
9.	L21M2	Environmental Science	2	0	0	0	MC	Y	Civil
		Total	**17**	**2**	**8**	**21**			

II Year II Semester

S. No	Code	Course Title	L	T	P/D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L220D	Mathematical Foundations of Computer Science	3	0	0	3	BS	Y	Maths
2.	L227A	Pulse Digital Circuits	3	0	0	3	PC	N	ECM
3.	L227B	IC Applications	3	0	0	3	PC	N	ECM
4.	L225A	Operating Systems	3	0	0	3	PC	Y	CSE
5.	L225B	Computer Networks	3	0	0	3	PC	Y	CSE
6.	L225C	Design and Analysis of Algorithms	3	0	0	3	PC	Y	CSE
7.	L2271	Pulse Digital Circuits Lab	0	0	3	1.5	PC	N	ECM
8.	L2272	Operating Systems And Computer Networks Lab	0	0	3	1.5	PC	Y	CSE
9.	L22M1	Gender Sensitization	2	0	0	0	MC	Y	English
		Total	**20**	**0**	**6**	**21**			

B. Tech Course Structure

III Year I Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L31EA	Managerial Economics and Management Science	3	1	0	4	HS	Y	MBA
2.	L314C	Microprocessors and Microcontrollers Applications	3	0	0	3	PC	Y	ECE
3.	L315C	Python Programming	3	0	0	3	PC	Y	CSE
4.	BTECME1	Professional Elective- I	3	0	0	3	PE	N	ECM
5.	BTECMO1	Open Elective-I	3	0	0	3	OE	N	
6.	L3144	Microprocessors and Microcontrollers Applications Lab	0	0	3	1.5	PC	Y	ECE
7.	L3153	Python Programming Lab	0	0	3	1.5	PC	Y	CSE
8.	L3173	Internship-II	0	0	2	1	PW	Y	ECM
9.	L31M2	Cyber Security	2	0	0	0	MC	Y	IT
10.	L31T2	Foundations of Entrepreneurship	2	0	0	0	AC	Y	MBA
		Total	**19**	**1**	**8**	**20**			

III Year II Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L326C	Database Management Systems	3	0	0	3	PC	Y	IT
2.	L324C	VLSI Design and Architecture	3	1	0	4	PC	Y	ECE
3.	BTECME2	Professional Elective –II	3	0	0	3	PE	N	ECM
4.	BTECME3	Professional Elective –III	3	0	0	3	PE	N	ECM
5.	BTECMO2	Open Elective–II	3	0	0	3	OE	N	
6.	BTECMO3	Open Elective –III	3	0	0	3	OE	N	
7.	L3262	Database Systems Lab	0	0	2	1	PC	Y	IT
8.	L3201	Life Skills and Professional Skills	0	0	4	2	HS	Y	English
9.	L32M1	Artificial Intelligence	2	0	0	0	MC	Y	CSE
10	L32T1	Employability Skills	2	0	0	0	AC	Y	English
		Total	**22**	**1**	**6**	**22**			

B. Tech Course Structure

IV Year I Semester

S. No	Code	Course Title	L	T	P/D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L415C	Web Technologies	3	0	0	3	PC	Y	CSE
2.	L414C	Embedded Systems	3	0	0	3	PC	Y	ECE
3.	L416C	Linux Programming	3	0	0	3	PC	Y	IT
4.	BTECME4	Professional Elective –IV	3	0	0	3	PE	N	ECM
5.	BTECME5	Mandatory MOOC (Professional Elective -V)	3	0	0	3	PE	N	ECM
6.	BTECMO4	Open Elective-IV	3	0	0	3	OE	N	
7.	L4165	Linux Programming Lab	0	0	2	1	PC	Y	IT
8.	L4173	Mini Project	0	0	4	2	PW	Y	ECM
9.	L4174	Project Stage – I	0	0	4	2	PW	Y	ECM
10.	L41M7	IoT Architecture And Protocols	2	0	0	0	MC	N	ECM
		Total	**20**	**0**	**10**	**23**			

IV Year II Semester

S. No	Code	Course Title	L	T	P/D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	BTECME6	Professional Elective -VI	3	0	0	3	PE	Y	ECM
2.	BTECMO5	Open Elective -V	3	0	0	3	OE	N	
3.	L4271	Seminar	0	0	2	1	PW	Y	ECM
4.	L4272	Project stage – II	0	0	16	8	PW	Y	ECM
		Total	**6**	**0**	**18**	**15**			

B. Tech Course Structure

Professional Elective-I

S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L31DB	Data Science	3	0	0	0	3	PE-I	N	ECM
2.	L315E	Cloud Computing	3	0	0	0	3	PE-I	N	CSE
3.	L315F	Block Chain Technology	3	0	0	0	3	PE-I	N	CSE

Professional Elective-II

S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L327E	Control Systems	3	0	0	0	3	PE-II	N	ECM
2.	L327F	Analog and Digital Communications	3	0	0	0	3	PE-II	N	ECM
3.	L327G	Wireless Sensor Networks	3	0	0	0	3	PE-II	N	ECM

Professional Elective-III

S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L327H	Network Security	3	0	0	0	3	PE-III	N	ECM
2.	L327I	Neural Networks	3	0	0	0	3	PE-III	N	ECM
3.	L325G	Compiler Design	3	0	0	0	3	PE-III	N	CSE

Professional Elective-IV										
S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L417E	Cellular and Mobile Communications	3	0	0	0	3	PE-IV	N	ECM
2.	L414K	Satellite Communication	3	0	0	0	3	PE-IV	N	ECM
3.	L417F	Optical Communication	3	0	0	0	3	PE-IV	N	ECM

Professional Elective-V(Mandatory MOOC)										
S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L417H	Internet of Things	3	0	0	0	3	PE-V	N	ECM
2.	L414K	Deep Learning	3	0	0	0	3	PE-V	N	AIML
3.	L415K	Software Engineering	3	0	0	0	3	PE-V	N	CSE

Professional Elective-VI										
S. No	Code	Course Title	L	T	P	D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L42DB	Big Data Analytics	3	0	0	0	3	PE-VI	N	AIDS
2.	L426A	Storage Area Networks	3	0	0	0	3	PE-VI	N	ECM
3.	L425D	Android Application Development	3	0	0	0	3	PE-VI	N	CSE

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**	MECHX`1X`
10	L31OJ	Introduction to Mining Technology	**3**	**3**	MINING
11	L31OK	Entrepreneurship for Micro, Small and Medium Enterprises	**3**	**3**	MBA
12	L31OL	Numerical solutions of ODE	**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 solutions of PDE	**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 Actuators	**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

JBIET-R22	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-All
B. Tech All Branches		

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 to 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 MINEEnvironment	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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM 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 naturalgrowth 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 eax, sin (ax), cos (ax), polynomials in x, .V(x), xV(x). Method of variation of parameters, Equations reducible to linear ODEwith 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 improperintegrals 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 undetermined multipliers

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, 5thEdition, 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

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

Course Outcomes

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

CO1. Formulate and 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. Obtain 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)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	2	-	-
Average	3	3	1.9	1.6	-	-	-	-	-	-	-	2.4	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **L110B**	**ENGLISH** (Common to CSE, IT, ECM & AI&DS)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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=APqWBs4xyvTdVhFoCE_EIk0ydf4s65pmw%3A1650947439347&ei=b3VnYo7lFJqf4EP9fqTIA&ved=0ahUKEwjO2Ki98rD3AhWazzgGHXX9BAQQ4dUDCA4&uact=5&oq=Continuous+TransformationAzim+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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
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 ECM I Year-I 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.

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.

Direct and indirect band gap semiconductors, Carrier generation and Recombination, Drift and Diffusion, P-N junction diode: I-V Characteristics, Zener diode: I-V Characteristic, 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 optical fibers.

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. Avadhalu, 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=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0.
7. https://www.youtube.com/watch?v=4a0FbQdH3dY.

Course Outcomes

After completion of this course the student is able to

CO1. Realize the concept of uncertainty principle and to compute quantized energy levels.

CO2. Analyze the formation the bands thereby classification of materials on the basis of transport properties.

CO3. Identify the semiconductors for engineering applications.

CO4. Analyze working principle of lasers and to summarize its applications.

CO5. 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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	-
Average	**2.4**	**1.8**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**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 I Year-I Sem			
Course Code: **L115A**	**PROGRAMMING FOR PROBLEM SOLVING** (COMMON TO EEE, ECE, CSE, IT, ECM, CSE(AI&ML), CSE(DS), AI&ML & AI&DS)	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

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

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 complexity through 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, (3rdEdition).

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 (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. Byron Gottfried, Schaum's Outline 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

After completion of this course the student is able to

CO1. Design the algorithms/flowcharts of C-programs.

CO2. Write the Code and test a given logic in C programming language

CO3. Decompose a problem into functions and to develop modular reusable code

CO4. Make Use of arrays, pointers, strings and structures to write C Programs

CO5. Apply searching and sorting algorithms

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**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO2	2	2	3	2	2	-	-	-	-	-	-	-	2	-
CO3	3	2	2	-	-	-	-	-	-	-	-	1	-	3
CO4	3	2	2	2	-	-	-	-	-	-	-	1	-	3
CO5	3	2	2	-	-	-	-	-	-	-	-	1	2	3
Average	**2.8**	**2.0**	**2.3**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**2.0**	**2.8**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **L1101**	**ENGLISH LANGUAGE AND 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

1. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
2. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.

3. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.

E-Resources

1. https://bbamantra.com/listening/
2. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the%20physical%20properties%20of%20speech.
3. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with-your-students
4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. 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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	**3**	**3**	-	**2**	-	-
CO2	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
CO3	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	**2**	-	-
CO5	-	-	-	-	-	-	-	-	**3**	3	-	**2**	-	-
Average	-	-	-	-	-	-	-	-	**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 ECM 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.

Experiment List

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

CO1. Learn the experimental concepts on in LED, Electric and Electronic materials.

CO2. Get the knowledge of fundamentals of Semiconductor physics.

CO3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.

CO4. Be exposed to the phenomena of waves, oscillations and optics.

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

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**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO4	3	1	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	1	-
Average	**3.0**	**1.4**	**1.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **L1151**	**PROGRAMMING FOR PROBLEM SOLVING LAB** (COMMON TO: CSE, IT, ECM & AI&DS)	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

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

Experiment List

1. SIMPLE NUMERIC PROBLEMS:

a) Write a program for find the max and min from the three numbers.

b) Write the program for the simple, compound interest.

c) Write program that declares Class awarded for a given percentage of marks, where mark<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >=70% = Distinction. Read percentage from standard input.

2. EXPRESSION EVALUATION:

a) 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)

b) Write a program that finds if a given number is a prime number

A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

3. ARRAYS AND POINTERS AND FUNCTIONS:

a) Write a C program to find the minimum, maximum and average in an array of integers.

b) Write a C program to find Addition of Two Matrices

c) Write a C program to find Multiplication of Two Matrices.

d) Write C programs that use both recursive and non-recursive functions

e) Write a program for reading elements using pointer into array and display the values using array.

4. FILES:

a) Write a C program to display the contents of a file to standard output device.

b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents

c) 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.

5. STRINGS:

a) 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.)

b) Write a C program to count the lines, words and characters in a given text.

6. SORTING AND SEARCHING:

a) Write a C program for using binary search method.

b) Write a C program for linear search.

c) Write a C program that implements the Bubble sort method.

d) Write a C program that implements the Insertion sort method.

e) Write a C program that implements the Quick sort method.

f) Write a C program that implements the Merge sort method.

ADDITIONAL PROGRAMS (Given to Student as Assignment):

1) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

   a. 5 x 1 = 5

   b. 5 x 2 =10

   c. 5 x 3 =15

2) Write a program that shows the binary equivalent of a given positive number

   between 0 to255.

3) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

4) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

5) Write a C program to calculate the following, where x is a fractional value.

1-x/2+x^2/4-x^3/6.

6) Write a C program to read in two numbers, x and n, and then compute the sum of this Geometricprogression:1+x+x^2+x^3+ +x^n. For example: if n is3 and x is 5, then the program computes 1+5+25+125.

7) Write a C program to find the minimum, maximum and average in an array of integers.

8) Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

9) Write a C program that uses functions to perform the following:

   (a) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

   (b) To find the factorial of a given integer.

   (c) To find the GCD (greatest common divisor) of two given integers.

10) Write a C program that does the following:

   (a) It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.

(b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

11) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

12) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

13)Write a C program that uses functions to perform the following operations:

(a)To insert a sub-string in to a given main string from a given position.

(b) To delete n Characters from a given position in a given string.

14) Write a C program to construct a pyramid of numbers as follows:

```
1          *        1          1          *
1 2        * *      2 3        2 2        * *
1 2 3      * * *    4 5 6      3 3 3      * * *
                               4 4 4 4    * *
                                          *
```

15) Write a C program that sorts a given array of names.

Course Outcomes

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

CO1: Formulate the algorithms for simple problems

CO2: Examine syntax errors as reported by the compilers

CO3: Define and manipulate data with arrays, strings and structures

CO4: Make use of pointers of different functions types

CO5: Create, read and write to and from simple text and binary files

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**	**PSO2**
CO1	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	2	-	-	-	-	2
Average	**3.0**	**2.0**	-	-	-	-	-	-	**2.0**	-	-	-	-	**2.0**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **L11M2**	**HUMAN VALUES AND PROFESSIONAL ETHICS (COMMON TO: ALL BRANCHES)**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: NIL

Module-1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and processfor Value Education. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for selfexploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Module-2:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh andSuvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' andharmony in 'I'. Understanding the harmony of I with the Body: Sanyam andSwasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya

Module–3:

Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship : Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; **Trust (Vishwas) and Respect (Samman) as the foundational values of relationship**.Understanding the meaning of Vishwas; Differencebetween intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Module–4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence : Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and selfregulation in nature. Understanding Existence as Co- existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Module-5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics : Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universalhuman order, Ability to identify the scope and characteristics of people-friendly andecofriendly production systems, Ability to identify and developappropriate technologies andmanagement patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the presentstate to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations

Text Books

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. KV Subba Raju, 2013, Success Secrets for EngineeringStudents, Smart Student Publications,3rd Edition.

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics asif people mattered, Blond & Briggs, Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan,Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press.Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, Science and Humanism, CommonwealthPurblishers.
6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming,Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William
9. W. Behrens III, 1972, Limits to Growth – Club of Rome's report,Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethichs (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

E-Resources

Relevant CDs, Movies, Documentaries & Other Literature:

1. Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM 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.
3.

E-Resources

1. https://nptel.ac.in/courses/111/108/111108098/
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://nptel.ac.in/courses/111/107/111107108/
4. https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
5. 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)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	3	-	-
Average	3	3	1.6	3	-	-	-	-	-	-	-	2	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM 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 hetero nuclear 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

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

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

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

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

Text Books

1. Engineering Chemistry: P. C. Jain & M. Jain, Dhanpat Rai Publications, New Delhi.
2. Engineering Chemistry: Shashi Chawla, 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. Venkata Ramana Reddy and Prasanth Rath.
3. Engineering Chemistry (NPTEL Web-book)by B.L. Tembe, Kamaluddin and M.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. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecularorbitals.

CO2. Recognize and select the domestic and industrial problems caused by hard water andalso learn about the municipal water treatment using various methods.

CO3. Understand and interpret the important fundamental concepts of electrochemicalprocedures related to corrosion and its control.

CO4. Rate the fuels and suggest methods for enhancement of the quality of fuels for therequired output.

CO5. Identify & recognize the role of polymers and Nanomaterials in everyday life.

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	3	-	-	-	-	1	-	-	-	-	-	2	-	-
CO3	3	-	-	-	-	1	-	-	-	-	-	2	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	2	-	-	-	-	-	-	-	-	-
Average	**2.2**	-	-	-	**2.0**	**1.0**	-	-	-	-	-	**2.0**	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **L122A**	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	L	T	P	D
Credits: **4**	**(**Common to AIDS, IT, CSE & ECM**)**	**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

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:

CO1. Apply the basic laws of electricity in DC and AC circuits.

CO2. Describe the construction and operation of electrical machines.

CO3. Explain the functioning of measuring instruments and components of LT Switchgear.

CO4. Understand PN junction diode operation, characteristics and applications.

CO5. Gain Knowledge on characteristics of BJT & FET in various modes of operation.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **L1231**	**ENGINEERING DRAWING** (COMMON TO: CSE,IT,ECM,AIDS,CSE(AIML),CSE(DS))	L	T	P	D
Credits: **3**		**1**	**0**	**0**	**4**

Pre-Requisites: Engineering Mathematics.

Module 1: Principles of Engineering Drawing, Conic Sections, Curves, Scales [12L]

Unit-I: [2L]

Introduction to Engineering Drawings, Significance, Introduction to AutoCAD.

Unit-II: [4L]

Ellipse – Eccentric Method, Arcs Method, Concentric, Circle Method, Rectangular Method;Parabola – Eccentric Method, Rectangular Method.

Unit-III: [3L]

Cycloid – Epicycloid, Hypocycloid, Involute of Circles.

Unit-IV: [3L]

Construction of Plane, Diagonal Scales.

Module 2: Principles of Orthographic Projections, Projections of Points, Line, Planes [9L]

Unit-I: [3L]

Introduction to Orthographic Projections, Conventions.

Unit-II: [3L]

Projections of Points in four Quadrants, Projection of Lines in first quadrant, Inclined to bothPrinciple Planes.

Unit-III: [3L]

Projections of Planes in first quadrant and inclined to both Principle Planes for RegularGeometrical Figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.

Module 3: Projections of Solids [8L]

Unit-I: [5L]

Projections of Right Regular Solids – Prisms and Pyramids of Square, Pentagon, Hexagon;

Unit-II: [3L]

Projections of Generated Solids – Cone, Cylinder.

Module 4: Sections of Solids, Development of Surfaces of Solids [12L]

Unit-I: [6L]

Sectional and Auxiliary Views of Right Regular Solids – Prisms and Pyramids of Pentagon,Hexagon; Generated solids – Cylinder and Cone.

Unit-II: [6L]

Surfaces of Right Regular solids – Prism, cylinder pyramid and cone

Module 5: Isometric Projections, Orthographic Views [9L]

Unit-I: [5L]

Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and CompoundSolids; Conversion of Orthographic Views of simple objects to Isometric Views.

Unit-II: [4L]

Conversion of Isometric Views to Orthographic Views.

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.

Reference Books

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

E-Resources

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://urlzs.com/fLJ3T
3. https://urlzs.com/zky46

Course Outcomes

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

CO1. Equipped with the basic knowledge of using the drawing instruments and dimension practice

CO2. Represent any three-dimensional object with two-dimensional drawings and exposed to the visual aspects of lines and planes.

CO3. Visualize of solids inclined to both the planes.

CO4. Visualization of sections of solids and their developments.

CO5. Representation of 3D objects through isometric and orthographic views

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	1	2	-	-	-	-	-	-	3	1	1
CO2	3	3	2	1	2	-	-	-	-	-	-	3	2	1
CO3	3	3	2	1	2	-	-	-	-	-	-	3	2	1
CO4	3	3	3	1	2	-	-	-	-	-	-	3	2	2
CO5	3	3	3	1	2	-	-	-	-	-	-	3	2	3
Average	3	3	2.4	1	2	-	-	-	-	-	-	3	1.8	1.6

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
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 titrations using NaOH.
8. Estimation of HCl by Potentiometric titrations using 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

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	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**1.2**	-	-	-	-	**2.0**	-	-	-	-	-	**2.0**	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **L1233**	**ENGINEERING WORKSHOP /MANUFACTURING PRACTICES**	L	T	P	D
Credits: **3**	**(**COMMON TO AIDS, ECM, CSE(AIML), CSE(DS)**)**	**1**	**0**	**4**	**0**

Pre-Requisites: Basic knowledge about tools and different trades

List of Experiments

Experiments for Practice

1. To make a Half Lap joint from the given two reapers.
2. To make a Dovetail joint from the given two reapers.
3. To make a Straight fitting from the given two MS pieces.
4. To make a V- fitting from the given two MS pieces.
5. To make a Rectangular Scoop using the given Sheet metal.
6. To make a Hooper using the given Sheet metal.
7. To perform Parallel and Series wiring connection
8. To perform stair case wiring connection
9. To prepare a sand mould for the given single piece pattern.
10. To prepare a sand mould for the given Split-piece pattern.

Demonstration

11. To make a Square rod and S- hook from a given round rod
12. To make a Lap and Butt joint using the given two M.S pieces by arc welding
13. To perform Plain and Step turning operation on lathe machine.
14. To perform Taper turning and Thread cutting operation on lathe machine.
15. To perform a simple Milling operation on given workpiece.

Text Books

1. P.N.Rao,"Manufacturing Technology",TataMcGrawHill,4th Edition,2013.
2. K. C. John, "Mechanical Workshop Practice", PHI Publishers, 2nd Edition,2010.

Course Outcomes

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

CO1. Know the importance of general safety precautions on different shop floors.

CO2. Identify the basic tools and equipments used in fitting, carpentry, sheet metal, machineshop, welding and smithy.

CO3. Understand the basics of removal of material from workpiece surface to attain specificshape.

CO4. Familiarize with the production of simple models in fitting, carpentry, sheet metal,machine, welding and smithy trades.

CO5. Gain different skills of manufacturing and importance of dimensional accuracies and dimensional tolerances in assembling of various components.

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	3	3	3
CO2	-	-	-	-	-	-	-	-	2	2	2	3	3	1
CO3	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO4	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO5	-	-	-	-	-	-	-	-	2	2	2	3	3	2
Average	-	-	-	-	-	-	-	-	2	2	2	3	3	2.4

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **L1221**	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**	L	T	P	D
Credits: **2**	**(**Common to AIDS, IT, CSE & ECM**)**	**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.

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

Pre-Requisites:

Module 1: FUNCTIONAL ENGLISH [6L]

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 [6L]

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 [6L]

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 [6L]

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

Module 5: COMMUNICATION SKILLS [6L]

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

1. https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.
2. 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 ECM 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
3.

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)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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 ECM II Year-I Sem			
Course Code: **L217B**	**COMPUTER ORGANIZATION**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Knowledge of Computers

Module 1:

Unit-I: Basic Computer Organization

Functions of CPU, I/O units, Memory, Instructions: instruction formats- One Address, Two Addresses, Zero Addresses & Three Addresses & comparison.

Unit-II: Addressing Modes and Interrupts

Addressing modes with numeric examples: program control-status bit conditions, conditional branch instructions, Program interrupts: Types of interrupts.

Module 2:

Unit-I: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations.

Unit-II: Input-Output Organization

Peripheral Devices, Input-Output Interface, Input –Output Processor (IOP), Intel 8089 IOP

Module 3:

Unit-I: Input-Output Interface

Input-Output Interface, I/O bus & modules, I/O Vs memory bus, Isolated Vs memory mapped I/O, Asynchronous data transfer Modes of Transfer-Strobe control.

Unit-II: Input-Output Communications

Handshaking, Asynchronous serial transfer- Asynchronous communication interface, Modes of transfer- Programmed I/O, Interrupt driven I/O, DMA, DMA controller, DMA transfer.

Module 4:

Unit-I: Memory Organizations

Memory hierarchy, memories, RAM, ROM chips, Memory Address map, Memory connection to CPU, Associate memory, Cache memory.

Unit-II: Cache and Mapping Techniques

Data cache, instruction cache, miss & hit ratio, Access time, associative, set associative mapping, waiting into cache, introduction to virtual memory.

Module 5:

Unit-I: Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Unit-II: Multi Processors

Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

Text Books

1. Computer Organization–Carl Hamacher, Zvonks Vranesic, Safea Zaky, Edition, McGraw Hill.
2. Computer Systems Architecture–M.Moris Mano, IIIrd Edition, Pearson/PH

Reference Books

1. ComputerOrganizationandArchitecture–WilliamStallingsSixthEdition, Pearson/PHI
2. Structured Computer Organization–AndrewS.Tanenbaum,4thEdition PHI/Pearson
3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.

E-Resources

1. https://nptel.ac.in/courses/106/105/106105163/
2. https://www.coursera.org/learn/comparch.
3. file:///C:/Users/Roshan/Desktop/co/co%201.html#bci
4. file:///C:/Users/Roshan/Desktop/co/co%201.html#idf
5. file:///C:/Users/Roshan/Desktop/co/co%201.html#ca
6. file:///C:/Users/Roshan/Desktop/co/co%201.html#micro
7. file:///C:/Users/Roshan/Desktop/co/co%201.html#mo
8. https://www.geeksforgeeks.org/quiz-cornergq/#Computer%20Organization%20and%20Architecture
9. https://practice.geeksforgeeks.org/topics/Computer%20Organization%20and%20Architecture/

Course Outcomes

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

CO1. Understand the basic components and the design of CPU, ALU and Control Unit.

CO2. Analyse various arithmetic operations and Input –Output devices interfacing processor.

CO3. Knowing the functionality of different I/O devices and how they operate using synchronous and Asynchronous mode

CO4. Understand how memory is organized to make computer operation fast and in effective way

CO5. Understanding the concepts of Pipelining and advantages of Multi-processing system.

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	2
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	2
CO3	2	-	2	-	-	-	-	-	-	-	-	-	2	1
CO4	3	-	3	-	-	-	-	-	-	-	-	-	3	3
CO5	2	-	1	-	-	-	-	-	-	-	-	-	2	1
Average	2.4	-	2.2	-	-	-	-	-	-	-	-	-	2.2	1.8

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **L216B**	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**	L	T	P	D
Credits: **3**	**(**COMMON TO:ECM & CSE)	**3**	**0**	**0**	**0**

Pre-Requisites:

1. Knowledge on C programming language.
2. Fundamental knowledge on Data structures

Module 1:

Unit-I: Introduction

OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Unit-II: 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:

Unit-I: 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.

Unit-II: Packages

Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

Module 3:

Unit-I: 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

Unit-II: Multithreading

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups

Module 4:

Unit-I: Applets

Concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Unit-II: 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

Module 5:

Unit-I: Layout Manager

Layout manager types-border, grid, flow, card and grid bag.
Swing: Introduction, limitations of AWT, components, containers,

Unit-II: Exploring Swing

JApplet, JFrame and JComponent, Icons and Labels, Text fields, buttons – The JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees and Tables.

Text Books

1. Java The complete reference, 8th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, up dated edition, T.Budd, Pears on education.

Reference Books

3. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
4. An Introduction to OOP, second edition, T. Budd, pearson education.
5. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education. Edition.

E-Resources

1. www.javasoft.com
2. www.w3schools.com
3. www.tutorialpoint.com
4. www.oracle.com
5. https://www.youtube.com/watch?v=-HafzawNlUo&ab_channel=SundeepSaradhiKanthety.
6. https://www.youtube.com/watch?v=7WhnYwoBY24&list=PLlhM4lkb2sEhf5NlWeYh_gdcN49pHjVP0&ab_channel=SmartProgramming.
7. https://www.youtube.com/watch?v=G_t6BbZeyUU&ab_channel=VoidRealms.
8. https://www.youtube.com/watch?v=9kI0_F41i5Y&ab_channel=SundeepSaradhiKanthety
9. https://www.youtube.com/watch?v=DNmXTT-hZBM&ab_channel=SundeepSaradhiKanthety.
10. https://www.youtube.com/watch?v=JMkHA2ndook&abchannel=EasyEngineeringClasse s.
11. https://www.youtube.com/results?search_query=layout+manager+in+through++java

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.

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	3	-	3	-	-	2	-	-	3	-
CO2	-	-	2	-	-	3	-	3	-	-	3	-	-	3
CO3	3	-	-	3	-	2	-	-	3	-	-	3	-	-
CO4	3	-	-	-	3	-	-	3	3	3	-	-	3	-
CO5	-	3	-	-	-	-	2	-	-	-	3	-	-	3
Average	3.0	3.0	2.0	3.0	3.0	2.5	2.5	3.0	3.0	2.5	3.0	3.0	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 ECM II Year-I Sem			
Course Code: **L217A**	**ELECTRONIC CIRCUIT ANALYSIS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic of Electronics and circuits

Module 1: Analysis of Small Signal BJT Amplifiers

Unit-I:

Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors.

Unit-II:

Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier. The Hybrid- pi Common Emitter transistor model, CE short circuit current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product. Simple Problems.

Module 2: FET Amplifiers

Unit-I:

Comparison of performance of FET with BJT Amplifiers, Basic Concepts of MOSFET , Characteristics of MOSFET in Enhancement and Depletion mode.

Unit-II:

JFET & MOSFET Small signal model, Analysis of Common source amplifier & Source follower with resistive load using JFET , frequency response.

Module 3: Negative Feedback In Amplifiers

Unit-I:

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics

Unit-II: Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems

Module 4: Positive Feedback In Amplifiers

Unit-I:

Condition for oscillations, RC and LC type Oscillators – Frequency and amplitude stability of oscillators. RC-phase shift and Wien-bridge oscillators

Unit-II:

Generalized analysis of LC oscillators Hartley, Colpitts and Quartz oscillators

Module 5: Large Signal Amplifiers

Unit-I:

Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B Amplifier.

Unit-II:

Principle of operation of class –C Amplifier, Transistor Power Dissipation, Introduction to Tuned Amplifiers, Q-Factor, Single Tuned Amplifiers.

Text Books

1. Electronic Devices and Circuits, Jacob Millman, Christos C Halkias, TMH
2. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
3. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A Vallavaraj, 2 ed., 2009, TMH.

Reference Books

1. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky,9 ed.,
2. Electronic Circuit Analysis – K. Lal Kishore, 2004, BSP.
3. Electronic Devices and Circuits, David A. Bell – 5 ed., Oxford University Press.

E-Resources

1. https://nptel.ac.in/courses/108/102/108102095/
2. https://nptel.ac.in/courses/108/102/108102097/
3. https://nptel.ac.in/courses/108/105/108105158/
4. https://nptel.ac.in/courses/122/104/122104013/

Course Outcomes

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

CO1. Construct the single stage and multistage amplifiers.

CO2. Design the JFET & MOSFET amplifiers using small signal model.

CO3. Demonstrate the concept of feedback amplifiers.

CO4. Illustrate various types of oscillators.

CO5. Interpret large signal amplifiers and tuned amplifiers.

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	1	1	-	-	-	-	-	-	1	2	2
CO2	3	3	1	1	1	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO4	2	2	2	2	2	-	-	-	-	-	-		1	2
CO5	2	2	2	2	2	-	-	-	-	-	-	1	2	2
Average	2.6	2.4	1.6	1.6	1.6	-	-	-	-	-	-	-	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **L217C**	**SWITCHING THEORY AND LOGIC DESIGN**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Basics of Boolean algebra

Module 1:

Unit-I: Number Systems

Philosophy of Number Systems, Complement Representation of Negative Numbers, Binary Arithmetic

Unit-II: Codes

Binary Codes, Error Detecting & Error Correcting Codes, Hamming codes

Module 2:

Unit-I: Boolean Algebra

Fundamental Postulates of Boolean Algebra, Basic theorems and Properties, Switching Functions, Canonical and Standard forms, Algebraic simplification Digital Logic Gates, Properties of XOR gates, Universal Gates, Multilevel NAND/NOR Realizations.

Unit-II: Switching Functions

Minimization of Switching Functions: Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, Simplification rules.

Module 3:

Unit-I: Combinational Logic Design

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and Hazard Free Realizations

Unit-II: Programmable Logic Devices & Threshold Logic

Basic PLD's-ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's, Capabilities and Limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

Module 4:

Unit-I: Sequential Circuits – I

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic Flip-Flops, Triggering and Excitation tables, Steps in Synchronous Sequential Circuit Design, Design of modulo-N Ring & Shift counters, Serial binary adder, Sequence detector.

Unit-II: Sequential Circuits - II

Finite State Machine-Capabilities and Limitations, Mealy and Moore models, Minimization of Completely Specified and Incompletely Specified Sequential Machines, Partition Techniques and Merger chart methods, Concept of Minimal cover table

Module 5:

Unit-I: ASM chart

Salient features of the ASM chart, Simple examples, System design using data path and control subsystems

Unit-II:

Examples of Weighing Machine and Binary multiplier.

Text Books

1. Switching & Finite Automata theory – Zvi Kohavi, 2 ed., TMH.
2. Digital Design – Morris Mano, 3 ed., 2006, PHI.
3. Switching Theory and Logic Design – A. Anand Kumar, 2008, PHI

Reference Books

1. An Engineering Approach to Digital Design – Fletcher, PHI.
2. Fundamentals of Logic Design – Charles H. Roth, 5 ed., 2004, Thomson Publications.
3. Digital Logic Applications and Design – John M. Yarbrough,2006, Thomson Publications.

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. Solve various problems using Algorithmic state machines.

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	1	2	1	-	-	-	-	-	-	-	1		2
CO2	3	2	1	-	1	-	-	-	-	-	-	3		2
CO3	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO4	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO5	3	1	2	1	1	-	-	-	-	-	-			2
Average	3	1.6	2.2	1.5	1	-	-	-	-	-	-	2		1.6

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **L2171**	**ELECTRONIC CIRCUIT ANALYSIS LAB**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites: Basic of Electronics and circuits

Experiment List

1. Common Emitter Amplifier
2. Common Collector Amplifier
3. Two Stage RC Coupled Amplifier
4. Common Source amplifier
5. Current Shunt and Voltage Series Feedback Amplifier
6. RC Phase Shift Oscillator using Transistors
7. Wien Bridge Oscillator using Transistors
8. Hartley Oscillator
9. Colpitt's Oscillator
10. Class A Power Amplifier
11. Class B Complementary Symmetry Amplifier
12. Single Tuned Voltage Amplifier

Equipment required for Laboratories

1. RPS
2. CRO
3. Function Generators
4. Multimeters
5. Components

Course Outcomes

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

CO1. Analyse different meters and instruments for measurement of electronic quantities.

CO2. Compute the characteristics of different semiconductor devices like diode, BJT, FET.

CO3. Conduct experiment with various application circuits using diodes

CO4. Design and experiment with various signals and power amplifier circuits using BJT'S.

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	1	1	-	-	-	2	2	-	1	3	-
CO2	3	2	2	2	1	-	-	-	2	2	-	1	3	2
CO3	2	2	1	3	3	-	-	-	2	2	-	1	-	3
CO4	2	2	2	3	3	-	-	-	2	2	-	1	-	3
Average	2.5	2	1.75	2.25	2	-	-	-	2	2	-	1	-	2.67

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **L2162**	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB** (COMMON TO:ECM & CSE)	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites:

1. Knowledge on C programming language.
2. Fundamental knowledge on Data structures

Experiment 1:

Write java programs that implement the following

a) Constructor b) Parameterized constructor

c) Method overloading d) Constructor overloading.

Experiment 2:

a) Write a Java program that checks whether a given string is a palindrome or not.
Ex: MADAM is a palindrome.

b) Write a Java program for sorting a given list of names in ascending order.

c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use String Tokenizer class of java.uti.

Experiment 3:

Write java programs that uses the following keywords

a) this b) super

c) static d) final Course Outcomes

Experiment 4:

a) Write a java program to implement method overriding

b) Write a java program to implement dynamic method dispatch.

c) Write a Java program to implement multiple inheritance.

d) Write a java program that uses access specifiers

Experiment 5:

a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file

Experiment 6:

a) Write a Java program for handling Checked Exceptions.

b) Write a Java program for handling Unchecked Exceptions

Experiment 7:

a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

Experiment 8:

a) Develop an applet that displays a simple message.

b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked

Experiment 9:

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -,*, % operations. Add a text field to display the result

Experiment 10:

a) Write a Java program for handling mouse events.
b) Write a Java program for handling key events

Experiment 11:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.

The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.

Experiment 12:

a) Write a java program that simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No l Light is on when the program starts.
b) Write a Java program that allows the user to draw lines, rectangles and ovals

Experiment 12:

Create a table in Table.txt file such that the first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.

Course Outcomes

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

CO1. Implement arithmetic operators, control statements, type conversion, constructors and string handling.

CO2. Apply the OOP concepts using java.

CO3. Create user defined Packages and Interfaces.

CO4. Implement Exception handling and Multithreading.

CO5. Design GUI using Applets and AWT.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	3	-	-	2
CO2	-	-	2	-	2	-	-	-	-	-	3	-	-	2
CO3	-	-	2	-	3	-	-	-	-	-	2	-	-	3
CO4	-	-	2	-	3	-	-	-	-	-	2	-	-	3
CO5	-	-	3	-	3	-	-	-	-	-	2	-	-	3
Average	-	-	2.4	-	2.8	-	-	-	-	-	2.4	-	-	2.6

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **L21M2**	**ENVIRONMENTAL SCIENCE** (COMMON TO:ECM & CSE)	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Environmental Studies

Module 1:

Unit-I: Ecosystems & Natural Resources, Biodiversity

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-II: 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-I: 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-II: Towards Sustainable Future

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing..

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)
3. "Environmental Studies (A Text Book for Undergraduates)" by Dr. K Mukkanti, S. Chand , 2010
4. "Environmental Studies" by Kaushik Anubha, C P Kaushik, New Age International Private Limited (1 August 2018)

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

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

CO1. Compare the different natural resources available and how to use them.

CO2. Describe about biodiversity.

CO3. Analyze the Global Environmental Problems and Global Efforts.

CO4. Categorize the global environmental problems.

CO5. Prioritize the Sustainable 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	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

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L220D**	**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Computer knowledge

Module 1:

Unit 1: Mathematical Logic:

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

Unit 2 : Predicates:

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

Module 2:

Unit 1: Relations:

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

Functions:

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

Unit 2 : Algebraic structures:

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

Module 3:

Unit 1: Elementary Combinatorics:

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

Unit 2 : The principles of Inclusion – Exclusion:

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

Module 4:

Unit 1 : Generating Functions:

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

Unit 2 : Recurrence relations:

solving recurrence relation by substitution and Generating funds. Characteristics roots solutionof In homogeneous Recurrence Relation.

Module 5:

Unit 1: Graph Theory:

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

Unit 2: Applications of Graph Theory:

Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltoniangraphs, 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

1. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, PHI.
2. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition –Ralph. P.Grimaldi.Pearson Education
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.

E-Resources

1. https://www.smartzworld.com/notes/mfcs-notes-pdf-mathematical-foundation-ofcomputer-science/
2. https://www.pdfdrive.com/elements-of-discrete-mathematics-liu-mohapatra-3rde136110192.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)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L227A**	**PULSE AND DIGITAL CIRCUITS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic of Electronics and Digital circuits

Module 1:

Unit-I: Linear Wave Shaping

High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit

Unit-II: Non-Linear Wave Shaping

Diode clippers, Transistor clippers, Clipping at two independent levels, Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of diode characteristics on clamping voltage.

Module 2:

Unit-I: Switching Characteristics of Devices

Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Transistor in Saturation, Transistor-switching times.

Unit-II: Multivibrators

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Module 3:

Unit-I: Time Base Generators

General features of a Time base Signal, Methods of Generating Time Base Waveform, Miller and Bootstrap Time base Generators-Basic Principles, Transistor Miller Time Base generator, UJT as relaxation oscillator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

Module 4:

Unit-I: Synchronization and Frequency Division

Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuit, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.

Module 5:

Unit-I: Sampling Gates:

Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits, Six Diode Gate, Application of Sampling Gates.

Unit-II: Realization of Logic Gates Using Diodes & Transistors:

AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

Text Books

a. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub., 2 ed., 2008, TMH.

b. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S.Prakash Rao, 2 ed., 2008, TMH)

E-Resources

5. https://www.youtube.com/watch?v=8VYUgEcmrYQ&list=PL9zyqBvEBmDZauzGV3seHo1xqCAlti9fI
6. https://www.youtube.com/watch?v=6VKTC8A5HdU
7. https://www.youtube.com/watch?v=rCmvrsAgG6Q&list=PLDZhQoU91wvSryndQqT9fbUMJ19RxEoZy

Course Outcomes

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

CO1. Analyze the characteristics of Linear and Non-Linear wave shaping circuits.

CO2. Design the switching Diode and Transistor devices.

CO3. Differentiate various Multivibrators.

CO4. Construct various Sweeping circuits.

CO5. Evaluate different Logic Gates with various logic families.

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	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

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L227B**	**IC APPLICATIONS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic of Electronics and Digital circuits

Module 1:

Unit-I:

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting,

Unit-II:

Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

Module 2:

Unit-I:

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave

Unit-II:

IC555 Timer -Functional Diagram, Monostable, and Astable Operations, Applications, IC565 PLL – Block Schematic, Description of Individual Blocks, Applications

Module 3:

Unit-I:

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC

Unit-II:

Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

Module 4:

Unit-I:

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders

Unit-II:

Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators

Module 5:

Unit-I:

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers

Unit-II:

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs

Text Books

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005

Reference Books

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson, 2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC GRAW HILL EDUCATION.
5. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION, 2010

E-Resources

1. https://nptel.ac.in/courses/108/108/108108111/

Course Outcomes

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

CO1. Analyse the operational amplifier modes and charecteristics and its applications.

CO2. Design op amp as filters and oscilators, Study the principle and application of IC555, IC565, IC723.

CO3. Illustrate the working of A-to-D & D-to-A techniques using IC's.

CO4. Summarize the digital integrated circuits.

CO5. Design the combinational circuits and sequential circuits.

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	
CO2	2	2	2	-	-	-	-	-	-	-	-	-	3	3
CO3	1	2	2	-	-	-	-	-	-	-	-	-	1	2
CO4	1	2	1	2	-	-	-	-	-	-	-	-	1	2
CO5	2	2	2	-	-	-	-	-	-	-	-	1		3
Average	1.6	2	1.75	2	-	-	-	-	-	-	-	-	1.75	2.5

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L225A**	**OPERATING SYSTEMS** (COMMON TO:ECM & CSE)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

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

Module 1: Basic Concepts

Unit-I: Overview

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

Unit-II: 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

Unit-I: Process Concepts

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

Unit-II: 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

Unit-I: Main Memory

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

Unit-II: Virtual Memory

Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4: Storage Management

Unit-I: 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

Unit-II: Mass-Storage Structure

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

Module 5: Security and Protection

Unit-I: Security

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

Unit-II: 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

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

CO1. Compare differing structures of operating systems including process management.

CO2. Apply different CPU scheduling algorithms and various Memory management techniques

CO3. Illustrate the use of Bankers algorithm for deadlock avoidance and File system organization.

CO4. Demonstrate various mass storage management techniques..

CO5. Analyze different aspects of protection and security concepts.

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	-	-	-	-	-	-	-	-	-	-	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

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L225B**	**COMPUTER NETWORKS (**COMMON TO:ECM & CSE)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Knowledge on Digital Logic Design.
2. Knowledge on Computer Organization

Module 1:

Unit-I: 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.

Unit-II: Physical Layer: Guided transmission media, wireless transmission media

Module 2:

Unit-I: 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

Unit-II: 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:

Unit-I: Network Layer: Network layer design issues, Store and forward packet switching, connectionless and connection oriented network services.

Internetworking: Protocols-IPV4 and IPV6, Logical Addressing-IPV4, IPV6, Tunneling and PacketFragmentation

Unit-II: Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms

Module 4:

Unit-I: 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:

Unit-I: Application Layer: Introduction, services, Application layer paradigms

Unit-II: Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, 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, CRCPublications.
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 andsome protocols of Link layer.

CO2. Identify how a medium can be shared among multiple devices, Ethernettechnologies and internetworking devices used.

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 oftransport layer.

CO5. Explain the transport layer and application layer protocols, their working. concepts.

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
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

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L225C**	**DESIGN AND ANALYSIS OF ALGORITHMS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Knowledge on Algorithms.
2. Knowledge on data structures

Module 1:

Unit-I: Introduction

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

Unit-II: Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Spanning Trees, Connected Components and Biconnected Components

Module 2:

Unit-I: Divide and Conquer

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

Unit-II: 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:

Unit-I: 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.

Module 4:

Unit-I: Backtracking

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

Module 5:

Unit-I: Branch and Bound

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

Unit-II: 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, Satraj Sahni 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

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

CO1 Calculate time complexity and space complexity for given algorithm

CO2. Describe union and find algorithms, connected components and bi-connectedcomponents

CO3. Apply divide and conquer method for solving sorting and searching problems. **CO4**. Use greedy method and dynamic programming to solve variety of problems. **CO5**. Apply back tracking and branch and bound to solve different types of problems.

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	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

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **L2271**	**PULSE AND DIGITAL CIRCUITS LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List

1. Linear wave shaping-High Pass circuit.
2. Linear Wave shaping-Low Pass circuit.
3. Non Linear wave shaping – Clippers.
4. Non Linear wave shaping – Clampers.
5. Transistor as a switch.
6. Bistable Multivibrator.
7. Monostable Multivibrator.
8. Astable Multivibrator.
9. Schmitt Trigger.
10. UJT Relaxation Oscillator.
11. Bootstrap Sweep Circuit.
12. Study of Logic Gates & some applications.
13. Sampling Gates.
14. Study of Flip-Flops & some applications.

Equipment required for Laboratories

1. Regulated Power Supply –0-30V
2. CRO 0-20MHz
3. Function Generator 0-1MHz
4. Components
5. Multimeter

Course Outcomes

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

CO1. Analyze the characteristics of Linear and Non-Linear wave shaping.

CO2. Analyze the switching characteristics of a Transistor.

CO3. Design various Multivibrators

CO4. Design Boot Strap ,Miller Sweep Circuit.

CO5.Design Uni-Directional ,Bi-Directional Sampling gates and realize different Logic gates

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	1	1	-	-	-	1	-	-	-	3	2
CO2	2	3	2	1	2	-	-	-	1	2	-	-	3	2
CO3	2	2	2	2	2	-	-	-	1	2	-	-	3	3
CO4	2	2	2	2	2	-	-	-	1	2	-	-	3	3
Average	1	2	2	2	2	-	-	-	1	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 ECM II Year-II Sem			
Course Code: **L2272**	**OPERATING SYSTEMS & COMPUTER NETWORKS LAB**	L	T	P	D
Credits: **1.5**	**(**COMMON TO:ECM & CSE)	**0**	**0**	**3**	**0**

Pre-Requisites:

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

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.

Course Outcomes

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

CO1. Implement data link layer framing methods such as: Character Stuffing Bit Stuffing and Error control technique such as CRC-12 CRC-16 CRC CCIP.

CO2. Implement network layer routing algorithms such as: Dijkstra's, Distance Vector and Broadcast routing techniques.

CO3. Know how data is transmitted and checking of errors., Inter process communication including shared memory, pipes and messages.

CO4. Implement the CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)..

CO5. Implement the Banker's Algorithm for Deadlock Avoidance, Prevention Program for FIFO, LRU, and OPTIMAL page replacement algorithm.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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

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

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

Pre-Requisites: Nil

Module 1:

UNDERSTANDING GENDER AND BIOLOGY-1

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:

UNDERSTANDING GENDER AND BIOLOGY-2

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

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-1

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.

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.

Module 5:

JUST RELATIONSHIPS: BEING TOGETHER AS EQUALS

Mary Kom and Onler, love and acid just do not mix, love letters, mothers and fathers- further reading: Rosa Parks-The braveheart.

Course Outcomes

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

CO1. Students will have developed a better understanding of important issues related to gender in contemporary India.

CO2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film..

CO3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it..

CO4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.

CO5. Men and women students and professionals will be better equipped to work and live together as equals.

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	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	**2.0**	**2.0**	**1.0**	-	-

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: **L31EA**	**MANAGERIAL ECONOMICS AND MANAGEMENT SCIENCE**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1:

Unit-I: Introduction to managerial economics, concepts of Managerial Economics:
Demand Analysis: Law of Demand, Elasticity of demand & Demand forecasting.

Unit-II: Production & cost Analysis:
Production functions, Law of returns, Economies of scale.
Cost concepts: Variable cost, fixed cost, Marginal cost, Semi-variable cost. Break – even analysis.

Module 2:

Unit-I: Market Structures: Different types of Markets.
Pricing: Methods of pricing and Strategies, Skimming and Penetration pricing.

Unit-II: Capital Budgeting: Estimation of fixed and working capital, methods & sources of raising capital. Methods of capital budgeting, Traditional & Discounted Techniques.
Financial Accounting & Financial Analysis: Overview of financial Accounts, Journal, Subsidiary books, Ledger, Trial Balance and preparation of Trading Account, Profit& Loss Account and Balance Sheet. Financial Analysis with the help of Ratios.

Module 3:

Unit-I: Management: Functions of Management, Taylor's scientific management, Fayol's principles of management.
Designing of organization structures: Different methods with merits and demerits andtheir suitability

Unit-II: Human Recourse Management: Recruitment, Selection, Training and Developmentand Performance.

Module 4:

Unit-I: Operation Management: Types of plant layout, Methods of production, Work study –procedure involved in Methods study and work Measurement. Statistical quality control. X, R, C& P charts

Unit-II: Project Management: Program Evaluation & Review Technique (PERT), Critical Path Method (CPM), Identification of critical path.

Module 5:

Unit-I: Material Management: objectives, need for inventory control, EQC, ABC Analysis, VED Analysis, Purchase procedure, Store Management.

Unit-II: Marketing: Functions, Marketing Mix, Marketing strategies based on product life cycle,channels of distribution.

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

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=search-site&q=Compensation+and+Reward+Management

Course Outcomes

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

CO1. Develop analytical skills for investigating and analyzing quality management issuesin the industry and suggest implement able solutions to those.

CO2. Develop in-depth understanding on continuous process improvement & benchmarking process

CO3. Learn the applications of quality tools and techniques in both manufacturing and serviceIndustry.

CO4. Develop in-depth knowledge on various tools and techniques of quality management.

CO5. Develop analytical skills for investigating and analyzing quality management issues inthe industry and suggest implement able solutions to those.

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	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	3	-	-	-	-	-	-	-	-	-	-
Average	**2.4**	**2.0**	**2.5**	**2.67**	-	-	-	-	-	-	-	-	-	-

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: **L314C**	**MICROPROCESSOR AND MICROCONTROLLERS APPLICATIONS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Digital, Computer Organization

Module 1: Architecture of 8086 Microprocessor: [10L]

Unit-I: [6L]
Introduction, Microprocessors Vs Microcontrollers, 8086 Internal Architecture: Functional diagram, Register organization, memory segmentation, programming model, memory addresses, physical memory organization

Unit-II: [4L]
Signal description of 8086, Common function signals, minimum mode and maximum mode signals Timing diagrams for minimum mode and maximum mode systems.

Module 2: Instruction set and assembly language programming of: [9L]

Unit-I: [5L]
Addressing modes, Instruction formats, Instruction set- Data transfer instructions, String instructions, Logical instructions, Arithmetic instructions, control transfer instructions, Process control instructions.

Unit-II: [4L]
Assembler directives, Procedures and macros Simple assembly language programs.

Module 3: I/O Interface [8L]

Unit-I: [4L] Parallel I/O Interface 8255 A, Internal block diagram, Operational modes and initialization, interfacing with 8086. Interfacing Analog to Digital Converters (ADCs), Digital to Analog Converters (DACs), Stepper motor interfacing, keyboard and Display.

Unit-II: [4L] Interfacing with advanced devices: memory interfacing to 8086 and address decoding techniques, 8086 Interrupts - interrupts structure of 8086, vector interrupt table, interrupts service routine.

Module 4: Introduction to Microcontrollers [10L]

Unit-I: [5L]
Overview of 8051 microcontroller architecture, I/O Ports, memory organization, addressing modes and instruction set of 8051, simple programs

Unit-II: [5L] Interrupts, timer/Counter and serial communication, programming timer Interrupts, programming external hardware interrupts, programming the serial communication interrupts.

Module 5: Applications of 8051 [9L]

Unit-I: [5L]
Design and development of the applications in the area of communications (GSM module, GPS), keil IDE features and RTOS with 8051 in the area of automotive applications

Unit-II: [4L]
Introduction to ARM Processors: ARM processor families, architecture, registers, current program status register, pipeline, exception, interrupts and the vector table; core extension, introduction to ARM instruction set

Text Books

1. D.V.Hall, Microprocessors and interfacing, TMGH,2nd Edition 2006
2. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH, 2nd Edition 2006.
3. Andrew N.Sloss, Domonic Symes, Chris Wright "ARM System Developers Guide Designing and optimizing system software" Elsevier 1st Edition 2004

Reference Books

1. E Ayala, K.J., "The 8051 Microcontroller Architecture, Programming and Applications", Penram International, 2007
2. Mazidi M.A, Mazidi JG, & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C ", 2/e, Pearson Education, 2007.
3. Steve Furber., "ARM System-on-Chip Architecture" 2nd Edition Addison-Wesley, 2000

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

Course Outcomes

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

CO1. . Understand 8086 microprocessor architecture and its functionalities.

CO2. Design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.

CO3. Design different interfacing applications using microcontrollers and peripherals to 8086 Microprocessor.

CO4. Illustrate the basics of 8051 microcontroller's architecture and its functionalities.

CO5. Design real time microcontroller based projects.

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 ECM III Year-I Sem			
Course Code: **L315C**	**PYTHON PROGRAMMING**	L	**T**	**P**	**D**
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic knowledge of computer and Programming language.

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; Stringoperators, 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, listparameters, nested lists, Matrices. 96 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 Mutabilityand 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: userdefined 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 ParenthesesBack-references Anchors. Module

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 ScientistsBook 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, PearsonPrentice 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

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

CO1. Explain basic principles of Python programming language

CO2. Analyze the use of lists, tuples, and dictionaries in Python programs.

CO3. Implement object oriented concepts in Python, and how to use exception handling in Python applications for error handling.

CO4. Demonstrates how to achieve reusability using inheritance, interfaces and packages

CO5. Explain how to read and write files in Python and evaluate different database operations.

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	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**

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: **L31DB**	**DATA SCIENCE** (PROFESSIONAL ELECTIVE – I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic programming, Knowledge on Databases and Mathematics

Module 1:

Unit-I: Introduction:

Introduction to core concepts and technologies: Introduction, Terminology, data science process

Unit-II: Classification of Data:

Data science toolkit, Types of data, Example applications.

Module 2:

Unit-I: Data collection management:

Introduction, Sources of data, Data collection and APIs

Unit-II: Data management:

Exploring and fixing data, Data storage and management, using multiple data sources

Module 3:

Unit-I: Data analysis:

Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic.

Unit-II: Data Analytical Methods:

Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

Module 4:

Unit-I: Data visualization:

Introduction, Types of data visualization, Data for visualization

Unit-II: Data Types and Methods:

Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings.

Module 5:

Unit-I: Applications:

Applications of Data Science, Technologies for visualization, Bokeh (Python), recent trends invarious data collection and analysis techniques

Unit-II: Technologies:

Various visualization techniques, application development methods of used in data science

Text Books

1. Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O'Reilly, 2013.

Reference Books

1. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.

E-Resources

1. https://en.wikipedia.org/wiki/Data_science
2. https://www.crampete.com/blogs/data-science-course-syllabus/
3. https://www.coursera.org/specializations/jhu-data-science
4. https://www.edx.org/course/subject/data-science

Course Outcomes

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

CO1. Recognize the fundamental concepts of Data Science.
CO2. Understand to apply various Data Collection and storage methods from data sources.
CO3. Evaluate data analysis techniques for applications handling large data
CO4. Visualize and present the inference of Data and its encoding.
CO5. Learn to think through the Applications of Data Science and Technologies used for Data Visualisation.

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	2	2	3	1	2	-	-	-	-	-	-	-		-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	-	2
CO4	3	3	2	2	-	-	-	-	-	-	-	1	-	3
CO5	2	2	2	-	-	-	-	-	-	-	-	1	3	3
Average	**2.6**	**2.2**	**2.25**	**1.5**	**2**							**1.25**	**2.5**	**2.5**

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: **L315E**	**CLOUD COMPUTING** (PROFESSIONAL ELECTIVE – I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Knowledge of Operating Systems. Knowledge of Networking

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 Hadoopand 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 into cloud computing.
Virtual Machines Provisioning and Virtual Machine Migration Services, On the Managementof 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 ProductionReadiness 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-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

Course Outcomes

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

CO1. Identify different elements of cloud computing.
CO2. Examine the essential processes of a Cloud Computing system.
CO3. Analyse the impact of Cloud Computing on organizations and strategy.
CO4. Learns the various marketing strategies for an online business.
CO5. Explain the infrastructure and multimedia concepts.

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
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.0**

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: **L315F**	**BLOCKCHAIN TECHNOLOGY** (PROFESSIONAL ELECTIVE-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Data structures and Cyber Security

Module 1:

Introduction: History, what is block chain, the structure of block chains, types of block chain, block chain applications, block chain lifecycle. Limitations and challenges of block chain.

Module 2:

Crypto currencies: Cryptography, the science behind crypto currencies, Symmetric key cryptography, cryptography hash functions, MAC and HMAC, asymmetric key cryptography Diffie-Hellman key exchange, symmetric vs asymmetric key cryptography, game theory Nash equilibrium, prisoner's dilemma, byzantine Generals' problem, zero-sum games.

Module 3:

Bitcoin: History of Money, working with Bitcoins, the Bitcoin Block chain, Bitcoin network, bitcoin scripts, Full nodes vs SPVs, Bitcoin wallets.

Module 4:

Ethereum: Ethereum as Next-Gen Blockchain, Design Philosophy of Ethereum, Ethereum Blockchain, Ethereum Accounts, Trie Usage, RLP Encoding, Ethereum Transaction Message structure, Ethereum smart contracts, Ethereum Virtual Machine, Ethereum Eco System.

Module 5:

Block chain application development, interacting with bitcoin blockchain, interacting programmatically with ethereum for sending transactions, creating smart account, executing smart contract functions, decentralized application structure. Building an ethereum Dapp.

Text Books

1. Beginning Block chain: A Beginner's Guide to Building Block chain Solutions by Bikramaditya Singhal, Gautam Dhameja , Priyansu Sekhar Panda.
2. Block chain Technology Explained: The Ultimate Beginner's Guide About Block chain Wallet,Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash

Reference Books

1. Block chain Technology: Introduction to Blockchain Technology and its impact on Business Ecosystem
2. Block chain: Bitcoin, Ethereum & Block chain: Beginners Guide to Understanding the Technology Behind Bitcoin & Cryptocurrency

E-Resources

1. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/
2. https://nptel.ac.in/courses/106/105/106105184/
3. https://nptel.ac.in/courses/106/104/106104220

Course Outcomes

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

CO1. Describe the block chain Technology and limitations
CO2. Analyze the history of money and working with Bitcoin and Bitcoin wallets
CO3. Use cryptography in bitcoin transactions
CO4. Explain the Design philosophy of Block Chain Technology and Virtual Machine
CO5. Develop Decentralized applications and Building ethereum Dapp

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	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	-	3	2	2	-	-	-	-	-	-	-	2	2
Average	**1.5**	**2.0**	**3.0**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**2.0**	**2.0**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **L3144**	**MICROPROCESSORS AND MICROCONTROLLERS APPLICATIONS LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Pre-Requisites: Basic of Electronics, Digital circuits and C programming.

Note: - Minimum of 12 experiments to be conducted.

Experiment List

1. Programs for 16 bit arithmetic operations 8086(using various addressing modes)Programs for
2. sorting an array for 8086.
3. Programs for searching a number or character in a string for 8086.Programs for
4. string manipulation for 8086.
5. Programs for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Interfacing Matrix/Keyboard to 8086.
8. Interfacing Elevator to 8086.
9. Interfacing Traffic Light to 8086.
10. .Interfacing to 8086 and programming to control stepper motor
11. .Programming using a) arithmetic b) logical and bit manipulation instructions of 8051.
12. .Program and verify Timer/Counter in 8051.
13. .Program and verify interrupt handling in 8051.
14. .UART Operation in 8051.

Software Required

MASM & KEIL

Course Outcomes

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

CO1. Enhance programming skills (8086, 8051) for simple and complex tasks used in various engineering disciplines

CO2. Design various applications using Microprocessors

CO3. Apply the knowledge of interfacing techniques to design microprocessor-based systems

CO4. Program and verify interrupt handling in 8051

CO5. Demonstrate parallel and serial communication.

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	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	**2.2**	-	-

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: **L3153**	**PYTHON PROGRAMMING LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Pre-Requisites: Need basic knowledge about how to operate computer and of how to write code for Programming language.

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 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:

i. Write a python script to implement exception handling.

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

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

Experiment 9:

i. Write a python script to perform inheritance.

Experiment 10:

i. Write a python script to perform various FILE handling operations.

ii. 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:

i. 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,
2. Mark Summerfiels, Addison-Wesley 2010.
3. 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

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

CO1. Apply Basic input /output operations for working with different data types in python.
CO2. Design functions for achieving code reusability and string manipulations.
CO3. Create a python program for implementing list, tuple dictionary.
CO4. Demonstrate Class and objects
CO5. Implement File handling operation

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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**

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: **L31M2**	**CYBER SECURITY**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Nil

Unit 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 ofvarious attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Unit 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 Needfor 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.

Unit 3:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless ComputingEra, Security ChallengesPosedbyMobileDevices,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.

Unit 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 associatedchallenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyber space, theethical dimensions of cybercrimes the psychology, mindset and skills of hackers and othercyber criminals.

Unit 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 Millionsof 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 PropertyCrime, Financial Frauds in Cyber Domain.

Text Books:

1. Nina Godbole and SunitBelpure, 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,andPerspectives,CRCPress,ISBN9780815371335,2018

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 Press T&FGroup.

E- Resource:

1. http://uou.ac.in/foundation-course
2. http://uou.ac.in/progdetail?pid=CEGCS-17

Course Outcome

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

CO1. Understand cyber-attacks and types of cybercrimes.

CO2. Summarize Cyber Laws and Cyber Forensics.

CO3. Understand frauds in Wireless era.

CO4. Analyze and evaluate the cyber security needs of an organization.

CO5. Outline Data Privacy and privacy policies.

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	1	-	-	-	-	1	-	-
CO2	-	-	2	-	1	2	-	-	-	-	-	1	-	-
CO3	2	3	1	-	2	1	1	-	-	-	-	-	-	-
CO4	2	2	2	-	-	-	1	-	-	-	-	1	-	-
CO5	-	-	-	-	-	1	2	-	-	-	-	2	-	-
Average	1.2	1.4	1.4	-	1	1.2	1	-	-	-	-	1	-	-

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: **L31T2**	**FOUNDATIONS OF ENTREPRENEURSHIP**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1:

UNIT - I:
Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs - Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economicdevelopment- Twenty first century trends in entrepreneurship.

Module 2:

UNIT - I:
The Individual Entrepreneurial Mind-Set and Personality- The entrepreneurial journey- Stress and the entrepreneur - the entrepreneurial ego - Entrepreneurial motivations- Motivational cycle – Entrepreneurial motivational behavior – Entrepreneurial competencies. Corporate Entrepreneurial Mindset, the nature of corporate entrepreneur-conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Module 3:

Unit-I:
Launching Entrepreneurial Ventures - opportunities identification- Finding gaps in the market place – techniques for generating ideas- entrepreneurial Imagination and Creativity- the nature of the creativity process - Innovation and entrepreneurship. Methods to initiate Ventures- Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising- advantage and disadvantages of Franchising.

Module 4:

Unit-I:
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- The challenges of new venture start-ups, developing an effective business model – Sources offinance - Critical factors for new venture development - The Evaluation process.

Module 5:

Unit-I:
Strategic Perspectives in Entrepreneurship - Strategic planning - Strategic actions- strategic positioning- Business stabilization - Building the adaptive firms - Understandingthe rowth stage – Internal growth strategies and external growth strategies, Uniquemanagerial concern of growing ventures. Initiatives by the Government of India topromote entrepreneurship, Social and women entrepreneurship -T-hub, J-hub

Unit-II:

Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. The Indian Case of online Gambling, An Indian Case of Intellectual PropertyCrime, Financial Frauds in Cyber Domain.

Text Books:

1. D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, CengageLearning, 2012.
2. Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching newventures, 4e, Pearson, 2015
3. S. S.Khanka, Entrepreneurship Development, S. Chand Publications, 2015. StuartRead, Effectual Entrepreneurship, Routledge, 2013.
4. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012

Reference Books:

1. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013
2. Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.
3. S.K Mohanthy, Fundamentals of Entrepreneurship, Prentice Hall of India, New Delhi.

Course Outcome

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.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech ECM III Year-II Sem			
Course Code: **L326C**	**DATABASE MANAGEMENT SYSTEMS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

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 ER Model, Conceptual Design with the ERModel.

Unit 1: The Relational Model

Module 2:

Introduction to the Relational Model, Integrity Constraints Over Relations, EnforcingIntegrity 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 RelationalCalculus, Domain Relational Calculus, Expressive Power of Algebra and Calculus.

Module 3:

Unit-I: 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 ConnectivesAND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing Null Values.
Complex Integrity Constraints 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 DataBase 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 ofIsolation, 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 withLoss 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: ADynamic 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 & CarlosCoronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C. J. Date Pearson Education

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=search-site&q=Compensation+and+Reward+Management

Course Outcomes

At the end of the course, the student will be able to: **CO1.** Describe basic concepts of database system. **CO2.** Design a data model and schemas in RDBMS. **CO3.** Use RDBMS for developing industry applications

CO4. Be competent in use of structured query language SQL.

CO5. Analyze functional dependencies for designing a robust database

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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	2	-	-	-	-	-	-	-	-	3	-
CO3	-	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	3	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	3	-
Average	**2.5**	**2**	**3.0**	**2.3**	**3.0**	-	-	-	-	-	-	-	**3.0**	-

Correlation: 3–Strong; 2–Medium;

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech ECM III Year-II Sem			
Course Code: **L324C**	**VLSI DESIGN AND ARCHITECTURE**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: EDC, STLD

Module 1: Introduction to Basic FETs [10L]

Unit-I: Introduction to FETs **[4L]**
-MOS, PMOS, NMOS, CMOS and Bi-CMOS.

Unit-II: Basic Electric Properties **[6L]**
Basic electrical Properties of MOS and Bi-CMOS Circuits: Ids-Vds relationships. MOS transistor threshold voltage, gm, gds, Figure of merit, pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, BiCMOS inverters

Module 2: VLSI Circuit Design Processes [9L]

Unit-I: VLSI Circuit Design Processes **[5L]**
VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and layout, 2 μm CMOS design rules for wires.

Unit-II: Layout Diagram and Scaling **[4L]**
Contacts and Transistors layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS Circuits.

Module 3: Gate Level Design [8L]

Unit-I: Gate Level Design **[8L]**
Logic Gates and Other complex gates, Switch logic, alternate gate circuits , time delays Driving large capacitive loads, wiring capacitance, Fan-in, Fan-out, Choice of layers.

Module 4: Subsystems [10L]

Unit-I: Data path Subsystems **[5L]**
Subsystems Design, Shifters, Adders, ALUs, Multipliers, Parity generators, comparators, Zero/One Detectors, Counters.

Unit-II: Array Subsystems **[5L]**
SRAM, DRAM, ROM, Serial Access Memories.

Module 5: PLD & Testing [9L]

Unit-I: Programmable Logic Devices **[5L]**
PLAs, FPGA and its architecture, CPLD and its architecture, Standard Cells, Programmable ArrayLogic, design Approach, Parameters influencing low power design.

Unit-II: CMOS Testing **[4L]**
CMOS Testing, Need for testing, Test Principles, Design Strategies for test chip level Test Techniques.

Text Books

1. Essentials of VLSI circuits and systems-Kamran Eshraghian, Eshraghian Dougles and A.Pucknell,PHI, 2005 Edition.

2. CMOS VLSI Design-A Circuits and systems perspective,Neil H.E. Weste,David Harris, AyanBanerjee, 3rd Ed, Pearson,2009 Reference Books

Reference Books

1. Introduction to VLSI Systems: A Logic Circuit and system perspectives-Ming-BO Lin, CRC Press, 2011.
2. CMOS Logic circuit design –John. P.Uyemura, Springer, 2007.
3. Modem VLSI Design-Wayne Wolf, Pearson Education, 3rd Edition 1997.

Course Outcomes

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

CO1. Interpret the steps taken for MOS fabrication technologies.

CO2. Analyze electrical behaviour of MOS, CMOS and Bi CMOS circuits.

CO3. Construct the layout of integrated circuits following design rules.

CO4. Design combinational circuit and sequential circuits using different clocking disciplines.

CO5. Compare various Programmable logic devices and perform CMOS testing

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	2
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	2	-
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO5	2	-	2	-	-	-	-	-	-	-	-	-	2	-
Average	2.2	2	2	2	-	-	-	-	-	-	-	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 ECM III Year-II Sem			
Course Code: **L327E**	**CONTROL SYSTEMS** (Professional Elective-II)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1:

Mathematical Modeling of physical Control Systems-I

Basic elements of control system –Classification–Open and closed loop systems: Position Control Systems, Missile direction Control system,– Transfer function– Mathematical Modeling of Electrical, Mechanical, electro mechanical Systems and Thermal Systems.

Module 2:

Mathematical Modeling of physical Control Systems-II

Mathematical modeling of Synchros – AC and DC servomotors– Block diagram Algebra– Signalflow graphs, Mason's gainFormula. State variables–State variable representation of continuous time system– state equations– transfer function from state variable representation–Solutions of the state equations.

Module 3:

Time Domain Analysis of Control Systems Introduction–Typical test signals–Step response analysis of second order systems– Transient response specifications– steady state error constants– Generalized error series– Effect of P, PI & PID Controllers.

Module 4:

Stability & Root Locus Techniques Concept of BIBO stability-absolute stability–Routh-Hurwitz criterion – Root Loci theory– Application to systems stability studies–Illustration of the effect ofaddition of a zero and a pole.

Module 5:

Frequency Domain Analysis & Design of Control Systems Introduction– Polar plot –Nyquist stability criterion– Frequency domain indices (Gain margin, Phase margin and bandwidth) – Correlation between frequency and time 52 response – Bode plot. Need of Compensators– Design of lag and lead compensators using Bode plots– Applications.

Text Books

1 Control Systems Engineering', I.J. Nagrath and M. Gopal, New Age International Publishers,2007.
2 Automatic Control systems, Pearson Education, Benjamin C. Kuo, New Delhi, 2003.

Reference Books

1. K. Ogata, Modern Control Engineering', 4th edition, PHI, New Delhi, 2002.
2. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007. 3. SamarajitGhosh, Control systems, Pearson Education, New Delhi, 2004

Course Outcomes

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

CO1. Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form.

CO2. Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept.

CO3. Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis

CO4. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.

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	-	-	-	-	-	-	3	3
CO2	3	3	-	3	-	--	-	-	-	-	-	2	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	3
CO4	3	3	2	2	-	-	-	-	-	-	-	2	3	3
CO5	3	2	-	3	-	3	-	-	-	-	-	-	2	3
Average	**3**	**2.8**	**2.3**	**2.6**	-	**2.5**	-	-	-	-	-	**2**	**2.8**	**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: **L327F**	**ANALOG AND DIGITAL COMMUNICATIONS** (PROFESSIONAL ELECTIVE –II)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites Nil

Module 1:

Unit 1: AMPLITUDE MODULATION

Introduction to communication system, Need for modulation, Time domain and frequency domain representation of Amplitude Modulation, DSB Modulation, SSB modulation. Generationand Reception of AM, DSB Modulation ,SSB Modulation.

Unit-II: Vestigial side band modulation: Frequency description, Generation of VSB Modulatedwave, Time domain description, Applications of different AM Systems.

Module 2:

Unit-I: ANGLE MODULATION:

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysisof Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Comparison of FM & AM.

Unit II: Generation of FM Waves:

Direct Method: Parametric Variation Method: Varactor Diode, Reactance Modulator, indirect Method: Armstrong Method, Detection of FM Waves: Balanced Frequency discriminator, Zerocrossing detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

Module 3:

Unit I: TRANSMITTERS, RECEIVERS & PULSE MODULATION:

Radio Transmitters-Classification of Transmitters, Radio Receiver - Receiver Types - Tuned radio Frequency receiver, Superhetro dyne receiver

Unit II: PULSE MODULATION:

PAM, PWM and PPM, Introduction to Digital communication systems, PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Compounding, DPCM, DM, Noisein DM and Adaptive DM

Module 4:

Unit- I Digital Modulation Techniques:

Introduction, ASK,ASK Modulator, Coherent ASK Detector, Non- Coherent ASK Detector, Generation of FSK, Non Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL, BPSK, Generation of PSK, Coherent PSK Detection, Differential PSK,QPSK , QAM

Unit-II: Baseband Transmission and optimal Reception of Digital Signal :

A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Optimal of Coherent Reception, Probability of Error and Eye Diagrams for ASK, PSK, FSK, CrossTalk.

Module 5:

Unit-I: Source coding & Channel Coding Techniques —

Shannon Fano coding, Huffman Code, variable length coding, Linear Block Codes: Matrix Description of Linear Block codes, Error Detection and Error Correction Capabilities of Linear lockCodes

Unit-II:

Cyclic Codes: Algebraic Structure, Encoding, Syndrome Calculation, Decoding.
Convolution Codes: Encoding, Decoding using State, tree and trellis Diagrams, Decoding using Viterbi Algorithm. Comparison of error rated in Coded and Uncoded Transmission.

Text Books

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Principles of Communication Systems Herbert Taub, Donald I Schiling, Goutam Saha, 3rdEdition, Mcgraw- Hill, 2008.
3. Digital and Analog Communication Systems – Sam Shanmugani John Wiley, 2005.
4. Digital Communications – John G.Proakis , Masoud Salehi – 511 Edition, Mcgraw-Hill, 2008.

Reference Books

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck,2nd Edition, PHI.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Digital Communications – IanA.Glover, Peter M. Grant, 2nd Edition,Pearson Edu., 2008.
4. Communication Systems – B.P. Lathi, BS Publication, 2006

Web Resources:

1. http://nptel.ac.in/courses/117102062/4#
2. https://nptel.ac.in/courses/117/101/117101051/
3. https://nptel.ac.in/courses/117/105/117105144/
4. https://nptel.ac.in/courses/108/101/108101113/
5. https://nptel.ac.in/courses/108/102/108102096/

Course Outcomes:

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

CO1. Analyze and design various modulation and demodulation of analog and Digital systems.

CO2. Design low power AM and FM transmitters.

CO3. Analyze and design the various Pulse Modulation Systems.

CO4. Analyse the error performance of digital modulation techniques.

CO5. Know about different error detecting and error correcting codes like. block codes, cyclic codes and convolution codes

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	-	-	-	-	-	-	-	-	1	1	2
CO2	3	2	2	2	1	-	-	-	-	-	-	1	2	1
CO3	2	2	1	1	2	-	-	-	-	-	-	-	2	2
CO4	2	2	2	1	2	-	-	-	-	-	-	-	2	2
CO5	2	2	1	1	1	-	-	-	-	-	-	1	1	2
Average	**2.4**	**2**	**1.6**	**1**	**1.2**	-	-	-	-	-	-	**1**	**1.6**	**1.8**

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: **L327G**	**WIRELESS SENSOR NETWORKS** (PROFESSIONAL ELECTIVE-II)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1:

Unit-I:

Introduction Unique constraints and challenges, advantages of Sensor Networks, Sensor Network Applications, Collaborative Processing, Overview and applications of Wireless Sensor Networks.

Unit-II:

Basic Wireless Sensor Technology-Sensor Node Technology, Sensor Taxonomy, WN operating Environment, WN trends. Radio Propagation primer.

Module 2:

Unit-I:

MAC protocols for Wireless Sensor Networks Introduction, Background, and Fundamentals ofMAC protocols.

Unit-II:

MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR-WPANs standard casestudy.

Module 3:

Unit-I:

Routing protocols for Wireless Sensor Networks Introduction, background, Data disseminationand gathering, routing challenges and design issues, routing strategies in wireless sensor networks.

Unit-II:

Networking Sensors Key assumptions, Medium Access Control, General Issues, Geographic,Energy-Aware Routing, Attribute-based routing.

Module 4:

UNIT-I:

Transport Control protocols for Wireless Sensor Networks Traditional Transport control protocols, Transport protocol design issues, Examples of existing transport control protocols,performance of transport control protocols.

UNIT-II:

Performance and Traffic Management Introduction, background, WSN Design Issues, Performance Modeling of WSNs, Case Study-Simple computation of the system life span.

Module 5:

UNIT-I:

Network Management for Wireless Sensor Networks Introduction, Network management requirements, traditional network management models, network management design issues,MANNA, Naming and Localization.

UNIT-II:

Operating Systems for Wireless Sensor Networks Introduction, operating system design issues, Examples of operating systems-TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS,SenOS, EMERALDS, PicOS.

Text Books

1. Wireless Sensor Networks- Technology, protocols and applications, KazemSohraby, Daniel Minoliand TaiebZnati, Wiley Student Edition.
2. Wireless Sensor Networks-An Information processing approach, Feng Zhao, Leonidas Guibas,Morgan Kaufmann publications, 2004.

Reference Books

1. Adhoc Mobile Wireless Networks-Principles, Protocols and Applications, Subirkumar Sarkar, TG Basavaraju and C Puttamadappa, Auerbach Publications, Taylor & Francis group.
2. Adhoc Wireless Networks-Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj,Pearson Education

Course Outcomes

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

CO1. Compare the different natural resources available and how to use them.

CO2. List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc

CO3. Describe in detail of sensor network architecture, traffic related protocols, transmission technology etc.

CO4. Explain the design considerations for deploying the wireless network infrastructure.

CO5. Understand middleware protocol and network management issues of sensor networks

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	-	-	-	-	-	-	-	-	-	-	1
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1
CO3	1	-	2	2	-	-	-	-	-	-	-	-	-	1
CO4	1	-	3	-	-	-	-	-	-	-	-	-	-	1
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	1
Average	**1**	**2**	**2.2**	**2**	-	-	-	-	-	-	-	-	-	**1**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **L327H**	**NETWORK SECURITY** (PROFESSIONAL ELECTIVE –III)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIl

Module 1:

UNIT–I:
Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.

UNIT-II:

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques encryption and decryption, symmetric and asymmetric keycryptography, stenography, key range and key size, possible types of attacks.

Module 2:

UNIT–I:
Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt Analysis Block cipher modes of operation, Stream ciphers, RC4, Location andplacement of encryption, function, Key distribution.

UNIT-II:

Asymmetric key Ciphers: Principles of public key crypto systems, Algorithms (RSA, DiffieHellman,ECC), Key

Module 3:

UNIT-I:

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm

UNIT-II: Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

Module 4:

UNIT-I:

E-Mail Security: Pretty Good Privacy, S/MIME

UNIT-II:

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulatingsecurity payload, Combining security associations, key management.

Module 5:

UNIT-I:

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security,Secure electronic transaction

UNIT-II:

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus andrelated threats, Countermeasures, Firewall design principles, types of firewalls Case Studies on Cryptography and security: Secure Inter-Branch Payment Transactions, Cross site Scripting Vulnerability, Virtual E lections

Text Books

1. Cryptography and Network Security: William Stallings, Pearson Education,4" `Edition
2. Cryptography and Network Security : AtulKahate, Mc Graw Hill Edition

Reference Books

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan,Wiley India, 1st Edition
2. Cryptography and Network Security :Forouzan Mukhopadhyay, MC Graw Hill, 2ndEdition
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Course Outcomes

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

CO1. Analyse theory of fundamental cryptography, what is an attack and threat different types ofattacks, services and mechanisms.

CO2. Demonstrate how to encrypt "Plain Text" into "Cipher Text" and vice versa, using differentencryption and decryption algorithms.

CO3. Label the need of e-mail security and the algorithms used

CO4. Identify the need of IP security architecture and concepts of SSL (Secure socket layer), TLS(transport layer security) and SET (secure electronic transactions)..

CO5. Analyse what the Intruders, Viruses and related threats, are and how to design the Firewallsand Intrusion Detection Systems.

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	1	-	-	-	-	1	2	2
CO2	-	-	2	-	1	2	-	-	-	-	-	1	-	-
CO3	2	3	1	-	2	1	1	-	-	-	-	-	2	3
CO4	2	2	2	-	-	-	1	-	-	-	-	1	2	2
CO5	-	-	-	-	-	1	2	-	-	-	-	2	-	-
Average	**1.2**	**1.4**	**1.4**	-	**1**	**1.2**	**1**	-	-	-	-	**1**	**1.2**	**1.4**

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: **L327I**	**NEURAL NETWORKS** (PROFESSIONAL ELECTIVE –III)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1:

UNIT–I:

Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networksviewed as Directed Graphs, Network Architectures, Knowledge Representation.

UNIT-II:

Artificial Intelligence and Neural Networks.

Module 2:

UNIT–I:

Learning Process: Error Correction learning, Memory based learning, Hebbian learing, Competitive,Boltzmann learning, Credit Assignment Problem, Memory, Adaption.

UNIT-II: Statistical nature of the learning process.

Module 3:

UNIT-I:

Single layer perceptrons: Adaptive filtering problem, Uncontrained Organization Techniques, Linearleast square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier

for a Gaussian Environment

Module 4:

UNIT-I:

Multilayer Percertron: Back propagation algorithm XOR problem, Heuristics, Output representationand decision rule, comuter experiment, feature detection.

Module 5:

UNIT-I:

Neuron Dynamics: Dynamical systems, stability of equilibrium states, attractors, neuro dynamicalmodels, manipulation of attractors as a recurrent network paradigm.

UNIT-II:

Hopfield models: Hopfield models, computer experiment.

Text Books

1. Neural networks A comprehensive foundation, Simon Hhaykin, PHI edition.
2. Artificial neural networks-B.Vegnanarayana Prentice Halll of India P Ltd 2005.

Reference Books

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapurapearson education 2004.

Course Outcomes

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

CO1. Know differences and similarities between neural network, human brain and feedbacksystems

CO2. Get the knowledge of different learning techniques

CO3 Describe the concept of single layer perceptron and its algorithms.**CO4**.

Describe the concept of multilayer perceptron and its algorithms. **CO5**. Analyse

the self-organisation mapping techniques.

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	1	-	-	-	-	-	-	-	-	-
CO2	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO4	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO5	2	-	2	2	1	-	-	-	-	-	-	-	-	-
Average	**2**	-	**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 ECM III Year-II Sem			
Course Code: **L325G**	**COMPILER DESIGN** (PROFESSIONAL ELECTIVE –III)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1:

Overview of Compilation:

Language Processing System, Difference between Compiler and Interpreter, Phases ofCompilation, Role of a Lexical Analysis, Input Buffering.

Regular Grammar and Regular expression for common programming language features,Pass and Phases of translation, Bootstrapping, LEX lexical analyser generator

Module 2:

Parsing:

Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, and preprocessing steps required for predictive parsing. Bottom up parsing-Shift Reduce parsing, Operator precedence parser, SLR, CLR and LALRparsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

Module 3:

Semantic analysis:

Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes.

Attributed grammars, Syntax directed translation, Syntax directed definition, Conversion of popular Programming languages language constructs into Intermediate code forms, Type checking.

Module 4:

Symbol Tables: Symbol table format, organization for block structures languages, Hashing, tree structures representation of scope information. Block structures and non-block structure storage allocation: static, Runtime stack and heap storage allocation, **Code optimization:** Consideration for Optimization, Scope of Optimization, localoptimization, loop optimization, frequency reduction, folding, DAG representation.

Module 5:

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Object code generation**:** Object code forms, machine dependent code optimization, registerallocation and assignment generic code generation algorithms, DAG for register allocation.

Text Books

1. Principles of compiler design -A.V. Aho .J.D.Ullman; Pearson Education.
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"reill
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

Web Resources:

1. https://www.tutorialspoint.com/compiler_design/compiler_design_tutorial.pdf 2.

https://nptel.ac.in/courses/106/105/106105190/

3. https://www.slideshare.net/IffatAnjum/lecture-01-introduction-to-compiler

4. https://www.pdfdrive.com/compiler-principles-techniques-and-tools-e6708003.html

5. https://www.alljntuworld.in/download/compiler-design-cd-materials-notes/

Course Outcomes

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

CO1. Design a Lexical Analyser.

CO2. Compare different types of parsing techniques

CO3. Implement the concepts of Semantic analysis and type checking

CO4. Apply different code optimization techniques.

CO5. Drive a target code using different code generation techniques.

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	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	**3.0**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **L3262**	**DATABASE SYSTEMS LAB**	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Nil

Experiment – 1.

E-R Model: Analyze the Problem with the entities which identify data persisted in the databasewhich 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 courseJ . B . I n s t i t u t e o f E n g i n e e r i n g a n d T e c h n o l o g y Page 84 taught by I. Teacher.
3. Find the names of all classes that either meet in room R128 or have 5 or more Studentenrolled.
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 thatthey 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 greaterthan 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. CASE STUDY E-R MODEL: GENERAL HOSPITAL

Course Outcomes:
Students will be able to:

CO1. Acquire the underlying concepts of database technologies

CO2. Design and implement a database schema for a given problem- domain

CO3. Apply Normalization to a database.

CO4. Populate and query a database using SQL DML/DDL commands.

CO5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

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	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**	-	-	-	-	-	**2**	**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-II Sem			
Course Code: **L3201**	**LIFE SKILLS AND PROFESSIONAL SKILLS LAB**	L	T	P	D
Credits: 2	(COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM& MIE)	**0**	**0**	**4**	**0**

Pre-Requisites: Nil

Module 1:

Self-Introduction and Practice Session-Importance of Communication Skills-Advance communication skills needed for effective communication-Self-assessment and self-awareness with required tools and Activity based approach.

Module 2:

Empathy Practice Sessions & Role-plays -Assertive Behavior-Emotional Intelligence-Conflict Resolution and Anger Management

Module 3:

Social skills and how to handle criticism-Social Interaction Skills – Role-plays- Diversity &Social Responsibility- Positive Attitude- Power of Positive Energy

Module 4:

Leadership-Traits & skill-Activities – Case Studies-Assessments - Team Building skills –Activities –Case studies on Interaction with industry people.

Module 5:

Thinking Out-of-the Box – Case-study & Activity Based- Creativity & Innovation- Developing a Vision & Action-plan - Thinking Skills – Various Types of Thinking - Power of Questioning Skills– Practice Sessions & Role plays

Reference Books :

1. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
2. Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles andPractice. Third Edition, New Delhi: UP., 2015.
3. Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.

E-Resources:

1. https://www.youtube.com/watch?v=JIdPnUFr36g&ab_channel=LearnEnglishLab
2. https://www.youtube.com/watch?v=xrEq1UujOo&ab_channel=LearnEnglishLab
3. https://www.youtube.com/watch?v=srn5jgr9TZo&ab_channel=SimerjeetSingh
4. https://www.youtube.com/watch?v=LgUCyWhJf6s&ab_channel=TheSchoolofLife
5. https://www.youtube.com/watch?v=BsVq5R_F6RA&ab_channel=watchwellcast
6. https://www.youtube.com/watch?v=czh4rmk75jc&ab_channel=WaysToGrow

Course Outcomes

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

CO1. Recognize importance of self-awareness and assessment.

CO2. Translate the needs of others and themselves. **CO3**. Practice being social and possess ppositive energy. **CO4**. Employ leadership Traits and skills in day to day life

CO5. Understand the importance of Thinking- out- of - the-Box.

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	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Average	-	-	-	-	-	-	-	-	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 ECM III Year-II Sem			
Course Code: **L32M1**	**ARTIFICIAL INTELLIGENCE**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1:

Unit-I:

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem SolvingAgents.

Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-FirstSearch, Depth-firstwithIterativeDeepening),HeuristicSearch(HillClimbing,GenericBest- First,A*),Constraint Satisfaction (Backtracking, Local Search).

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, Bays Theorem.

Module 3:

Unit-I:

Advanced Knowledge Representation and Reasoning: Knowledge RepresentationIssues, 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 ProblemSolving, 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

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition,2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex ProblemSolving, 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/view4. https://nptel.ac.in/courses/106/105/106105077/

Course Outcomes

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

CO1 Identify the AI based problems

CO2. Apply AI techniques for representing the basic problem

CO3. Apply Advanced AI techniques to solve the problem. **CO4**.

Analyze Learning and explain various learning techniques.**CO5.**

Discuss and use of expert system.

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	-	-	-	-	-	-	-	-	-	-	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**

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: **L32T1**	**EMPLOYABILITY SKILLS**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1:

Unit-I: Listening skills

The Listening Process, Hearing and Listening, Types of Listening-Superficial Listening-Appreciative Listening-Focused Listening-Evaluative Listening- Attentive Listening-Empathetic Listening, Listening with a purpose, Barriers to Listening-Physical Barriers-Psychological Barriers-LinguisticBarriers-Cultural Barriers.

Unit-II: Improving Listening Comprehension

Listening comprehension-Effective Listening Strategies- Listening in Conversational Interaction-Listening to structured talks, Team Listening

Module 2:

Unit-I: Speaking Skills

The Speech process-The Message-The Audience- The Speech Style-Encoding-Feedback Conversations and Oral Skills- Body Language-Types of Conversations: Formal and Informal-Strategies for Good Conversation, Improving Fluency and Self-expression- Articulation, good pronunciation-Voice quality- Accent and Intonation Speaking Techniques-Body Language-Eye Contact-Facial Expression-Gesture- Posture and Body Movements

Unit-II: Speaking Techniques

Techniques to Develop Effective Word Accent- Word Stress, Using Correct Stress -Patterns – Developing Voice Quality-Rhythm in Corrected speech and developing correct tone

Module 3:

Unit-I: Writing Skills and Business Etiquettes:

Effective Resume writing, Letter writing skills

Unit-II: Business Etiquettes

Personal Grooming &Behavioral Etiquettes – Event Based Learning Activity, -Facial - Introduction & Role-plays. Personal Values, Developing Values, Cultivating Habits – Real-life cases, Activities

Reference Books:

1. Rizvi, Ashraf M. Effective Technical communication, New Delhi: Tata McGraw-Hill, 2005.
2. Influencer: The new science of leading change by Joseph Grenny, Kerry Patterson, David Maxfield, Ron McMillan and Al Switzler. Skill with people by Les Gibli

E- Resources

1. https://www.youtube.com/watch?v=Bhf35YngKl4&ab_channel=DanielAlly
2. https://www.youtube.com/watch?v=gHGN6hs2gZY&ab_channel=AJ%26Smart
3. https://www.youtube.com/watch?v=_r0VX-aU_T8&ab_channel=Sprouts.
4. https://www.youtube.com/watch?v=aKGm3nprVA0&t=465s&ab_channel=DreamsAroundThe World
5. https://www.youtube.com/watch?v=JXXHqM6RzZQ&ab_channel=SmartDraw
6. https://www.youtube.com/watch?v=Zi4SvpAFRmY&t=309s&ab_channel=CommunicationCoac hAlexLyon
7. https://www.youtube.com/watch?v=LgUCyWhJf6s&ab_channel=TheSchoolofLife
8. https://www.youtube.com/watch?v=BsVq5R_F6RA&ab_channel=watchwellcast
9. https://www.youtube.com/watch?v=czh4rmk75jc&ab_channel=WaysToGrow

Course Outcomes

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

CO1 Practice listening and probing any problem.

CO2. Understand the importance of reading skills.

CO3. Understand how to speak effectively

CO4 Write essays and letter using proper vocabulary.

CO5. Practice creativity in day to day life

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	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Average	-	-	-	-	-	-	-	-	**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 ECM IV Year-I Sem			
Course Code: **L415C**	**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.

Module 1:

Unit-I: Basic Tags of HTML, Introduction HTML5, new HTML5 Form input Types. Cascading Style Sheets

Unit-II: Introduction to JavaScript: declaring variables, functions, event handlers (on Click, on submit etc.) Form validation

Module 2:

Unit-I: Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.

Unit-II: Introduction to web service solution stacks XAMPP: Introduction to content Management Systems Joomla, word press.

Module 3:

Unit-I: Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, Deploying Servlet, Servlet API, Reading Servlet parameters..

Unit-II: Reading initialization parameters, handling Http Request & Responses. Session tracking, cookies. Connecting to a database using JDBC

Module 4:

Unit-I: Introduction to JSP: The anatomy of a JSP page, JSP processing, Declarations, Directives, Expressions, code snippets, implicit objects.

Unit-II: Using beans in JSP pages. Using cookies for session tracking. Connecting to database in JSP.

Module 5:

Unit-I : Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions,Constants.

Unit-II: 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.html
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**	**3.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.4**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L414C**	**EMBEDDED SYSTEMS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Microcontrollers and Microprocessors

Module 1:

Unit-I: Embedded Computing:

Introduction, complex systems and microprocessor The embedded system design process, formalisms for system design, design examples.

Module 2:

Unit-I: The 8051 Architecture:

Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Unit-II: Basic Assembly Language Programming Concepts: The assembly language Programming process, programming tools and techniques, programming the 8051. Data transferand 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 memoryand 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 softwareinto 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 organizationand instruction level parallelism, networked embedded systems

Unit-II:

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, Elsevier, 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 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**	**PSO 1**	**PS O2**
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 ECM IV Year-I Sem			
Course Code: **L416C**	**LINUX PROGRAMMING**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Knowledge in C language and Unix Commands.

Module 1:

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 and records, scripts, operation, patterns, actions, functions, using system commands in awk.

Module 2:

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 3:

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 4:

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 5:

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 India Edition.

2. Linux System Programming, Robert Love, O'Reilly, SPD. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.

E-Resources

1. https://www.oreilly.com/library/view/advanced-linux-programming/0735710430/
2. https://richard.esplins.org/static/downloads/linux_book.pdf
3. https://bookauthority.org/books/best-linux-and-unix-systems-programming-books
4. https://www.guru99.com/best-linux-books-beginners.html

Course Outcomes

After completion of this course the student is able to

CO1. Analyze all the Linux utilities, and implement shell scripting.

CO2. Express pipes and redirection, Linux environment, traps, signals, filter parameters, filter options and Regular Expressions.

CO3. Describe the basic Linux process structure and the Linux file system.

CO4. Define Inter-process Communication using pipes, shared memory, semaphores and Messages.

CO5. Design various client server applications using TCP or UDP protocols.

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**	**PSO2**
CO1	-	-	2	-	-	-	-	-	1	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	2	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Average	-	-	**2.5**	-	**3**	-	-	**2**	-	**2.5**	-	-	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L417E**	**CELLULAR AND MOBILE COMMUNICATIONS** (PROFESSIONAL ELECTIVE – IV)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Knowledge of Analog and Digital Communication
2. Basic Knowledge of Wireless Communication**.**

Module 1: Introduction to Cellular Mobile Radio Systems [12L]

Unit-I: [7L]

Limitations of conventional mobile telephone systems, Basic Cellular Mobile System, First, second, third and fourth generation cellular wireless systems, introduction to 5^{th} and 6^{th} generation of mobile communication, comparison and differences. Uniqueness of mobile radio Environment-Long term fading, Factors influencing short term fading.

Unit-II: [5L]

Parameters of mobile multipath Fading-Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small scale fading.

Module 2: Fundamentals of Cellular Radio System Design [12L]

Unit-I: [7L]

Concept of frequency reuse, Co-channel interference, Co-channel Interference reduction factor, Desired C/I from a normal case in a Omni directional antenna system, system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems- Cell splitting, Sectoring, Microcell zone concept.

Unit-II: [5L]

Design of antenna system and measurement of real time co-channel interference, Antenna parameters and their effects, Diversity Techniques-Space diversity, Polarization diversity, Frequency diversity, Time diversity. Adjacent channel interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components, UHF TV interference.

Module 3: Cell Coverage for Signal and Traffic [10L]

Unit-I: [5L]

Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope.

Unit-II: [5L]

General formula for mobile propagation over water and flat open area, Near and long distance propagation, Path loss from a point to point prediction model in different conditions, Lee Mode and merits of Lee model.

Module 4: Cell Site and Mobile Antennas [10L]

Unit-I: [5L] Application of smart antennas in cellular communication, Sum and difference patterns and antenna synthesis, Coverage-Omni directional antennas.

Unit-II: [5L]

Interference reduction- directional antennas for interference reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

Module 5: Name of the Module [10L]

Unit-I: [5L]

Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization, Overlaid cells, Non fixed channel assignment.

Unit-II: [5L]
Handoff initiation, Types of handoff, delaying handoff, Advantages of handoff, Power difference handoff, forced handoff, Mobile assisted and soft handoff. Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

Reference Books

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Ed., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Education, 2005.
3. Wireless communications theory and techniques, Asrar U. H .Sheikh, Springer, 2004.

E-Resources

1. https://nptel.ac.in/courses/106/106/106106167/
2. https://nptel.ac.in/courses/117/104/117104099/

Course Outcomes

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

CO1. Understand Basic Cellular System with fading and non-fading environment.
CO2. Design and Analyse the cellular radio system based on cell coverage and signal traffic.
CO3. Describe the concept of frequency reuse to increase the cellular capacity.
CO4. Demonstrate and apply different mobile antenna in Hilly, Flat terrain etc.
CO5. Apply channel assignment and Handoff mechanisms in cellular system.

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**	**PSO2**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	1	2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	1	2	2	1	-	-	-	-	-	-	-	-	-	1
CO4	2	2	2	2	-	-	-	-	-	-	-	-	-	2
CO5	1	2	2	1	1	-	-	-	-	-	-	-	-	2
Average	**1.6**	**2.2**	**1.6**	**1.2**	**0.2**	**1**	-	-	-	-	-	-	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L414K**	**SATELLITE COMMUNICATION (PROFESSIONAL ELECTIVE -IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Analog and Digital communication

Module 1: SATELLITE ORBITS [10L]Unit-I: [6L]

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication.

Unit-II: [4L]

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity of a satellite, concepts of Solar day and Sidereal day.

Module 2: SPACE SEGMENT [9L]

Unit-I: [5L]

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion,

Unit-II: [4L]

Communication Payload and supporting subsystems, Telemetry, Tracking and command-Transponders-The Antenna Subsystem.

Module 3: SATELLITE LINK DESIGN [8L]

Unit-I: [4L]

Basic link analysis, Interference analysis, Rain induced attenuation and interference,

Unit-II: [4L]

Ionosphere characteristics, Link Design with and without frequency reuse.

Module 4: SATELLITE ACCESS AND CODING METHODS [10L]

Unit-I: [5L]

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast,

Unit-II: [5L]

multiple access: FDMA, TDMA, CDMA, DAMA Assignment Methods, compression – encryption, Coding Schemes.

Module 5: SATELLITE APPLICATIONS [9L]

Unit-I: [5L]

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System.

Unit-II: [4L]

GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

Text Books

1. Dennis Roddy, —Satellite Communication‖, 4th Edition, Mc Graw Hill International, 2006.
2. Timothy, Pratt, Charles, W. Bostain, Jeremy E.Allnutt,"SatelliteCommunication‖,2nd Edition, Wiley Publications, 2002

Reference Books

1. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, —Satellite Communication Systems Engineering‖, Prentice Hall/Pearson, 2007.
2. N.Agarwal, —Design of Geosynchronous Space Craft‖, Prentice Hall, 1986.

Bruce R. Elbert, —The Satellite Communication Applications‖ , Hand Book, Artech House Bostan London, 1997.

E-Resources

1. https://www.coursera.org/learn/satellite-communications.
2. https://www.intelsat.com/resources/tools/satellite-101.
3. https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-ec14/
4. http://www.digimat.in/nptel/courses/video/117105131/L19.html

Course Outcomes

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

CO1. Understand the historical background, basic concepts and frequency allocations for satellite Communication.

CO2 Illustrate the basic concepts of Orbital mechanics and state aspects related to sub-systems in a satellite.

CO3.Study the typical phenomena in satellite communication and mathematical analysis

CO4. Acquire knowledge about modulation and multiple access schemes.

CO5. Acquire knowledge about modulation and multiple access schemes.

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**	**PS O2**
CO1	2	2	1	-	-	-	-	-	3	3	-	2	-	-
CO2	3	2	2	1	-	-	-	-	3	3	-	2	-	-
CO3	3	3	3	3	-	-	-	-	3	3	-	2	-	-
CO4	3	2	1	-	-	-	-	-	3	3	-	2	-	-
CO5	2	1	2	-	-	-	-	-	3	3	-	2	-	-
Average	**2.6**	**2**	**1.8**	**0.8**	**0.01**	**1**	**-**	**-**	**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 ECM IV Year-I Sem			
Course Code: **L417F**	**FIBER OPTIC COMMUNICATION** (PROFESSIONAL ELECTIVE - IV)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Electromagnetic Fields and waves. Analog and Digital communications

Module 1: [10L]

Unit-I: Overview of optical fiber communication **[6L]**

The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture Step Index fibers, Graded Index fibers.

Unit-II: Single mode fibers **[4L]**

Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber Material and its Fabrication Techniques

Module 2: [9L]

Unit-I: Signal distortion in optical fibers **[5L]**

- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity determination, Group delay, Attenuation Measurements Techniques,

Unit-II: Types of Dispersion **[4L]**

-Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening.

Module 3: [8L]

Unit-I: Optical sources **[4L]**

- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product.

Unit-II: Laser Diodes**[4L]**

- Basic concepts, Classifications, Semiconductor injection Laser: Modes, Threshold conditions, External quantum efficiency

Module 4: [10L]

Unit-I: Source to fiber power launching **[5L]**

- Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling. Optical detectors- Physical principles of PIN and APD, Detector response time

Unit-II: Optical receiver operation**[5L]**

- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers

Module 5: [9L]

Unit-I: Link Design**[5L]**

: Point to Point Links, Power Penalties, Error control, Multichannel Transmission Techniques,

Unit-II: [4L]

WDM concepts and component overview, OTDR and optical Power meter

Text Books

1. John M. Senior, "Optical Fiber Communications", PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 2008.

Reference Books

1. Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.
2. Joseph C. Plais, "Fiber Optic Communication", Pearson Education, 4th Ed, 2004.

Course Outcomes

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

CO1. .Explain the different modes of propagation in an optical fiber.

CO2. Classify the construction and characteristics of optical sources and detectors.

CO3. Discuss optical networks and their non-linear effects.

CO4. Examine the losses and propagation characteristics of an optical signal

CO5. Analyze system performance of optical communication 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**	**PSO 1**	**PSO2**
CO1	2	2	1	-	-	-	-	-	-	1	-	3	2	2
CO2	2	2	1	1	-	-	-	-	-	1	-	3	2	2
CO3	2	2	1	1	-	-	-	-	-	1	-	3	2	2
CO4	2	1	1	2	-	-	-	-	-	1	-	3	2	2
CO5	1	1	1	2	-	-	-	-	-	1	-	3	3	2
Average	**2**	**2**	1	**1**	**-**	**-**	**-**	**-**	**-**	1	**-**	3	**2**	**2**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L417H**	**INTERNET OF THINGS** (PROFESSINAL ELECTIVE -V)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1:

Unit-I: Introduction to Internet of Things:

Definition and Characteristics of IoT, Physical Design of IoT –IoT Protocols, IoT communication models, IoT Communication APIs.

Unit II: IoT enabled Technologies:

Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

Module 2:

Unit-I: IoT and M2M:

Software defined networks, network function virtualization, difference between SDN and NFV for IoT

Unit-II: Basics of IoT System:

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER**.**

Module 3:

Unit-I: INTRODUCTION TO PYTHON

Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling.

Unit-II: Python packages:

JSON, XML, HTTPLib, URLLib, SMTPLib.

Module 5

Unit I: Python program with Raspberry PI-2:

Python program with Raspberry PI with focus of interfacing external gadgets.

Unit II:

Controlling output, reading input from pins.

Text Books

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes

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

CO1. Understand the basic building blocks of IoT.

CO2. Analyze the difference between M2M and IoT along with IoT system Management

CO3. Extend the knowledge in Logical Design of IoT System using Python.

CO4. Acquire knowledge about IoT Physical Devices and End points

CO5. Identify the IoT Physical Servers and cloud offerings..

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. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L141K**	**DEEP LEARNING** (PROFESSINAL ELECTIVE - V)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Probability Statistics, linear algebra. Machine learning

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:
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, CNN in Python

Module–4:

Deep Neural Net:
Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and selfregulation in nature. Understanding Existence as Co- existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Module-5:

Practical areas of Deep Learning :
Classical Supervised Tasks with Deep Learning, Image Denoising, Semantic Segmentation, Object Detection, Generative Modelling with Deep Learning,
Variational Autoencoder, Generative Adversarial Network, Object recognition with Python.

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

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

CO1. Identify tools of machine learning and deep learning, appropriate to any problems.

CO2. Apply optimization techniques to improve the quality of various learning solutions.

CO3. Apply and investigate, neural network for complete learning problems.

CO4. Deploy deep learning methods in the area of multidimensional and sequential inputs.

CO5. Investigate the scope of implementation of various deep learning techniques in any real world problem.

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	3
CO2	-	2	2	1	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	2	1	-	-	-	-	-	-	-	-	1	2
CO5	2	1	2	2	-	-	-	-	-	-	-	-	2	2
Average	**2.3**	**2.3**	**2.0**	**1.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.2**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L415K**	**SOFTWARE ENGINEERING** (PROFESSIONAL ELECTIVE-V)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic of mathematics and Basics of Computer

Module 1:

Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, legacy software, Software myths.

A Generic view of process: Software engineering- A layered TECHNOLOGY, a process framework, 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, Specialized process models, The Unified process.

Module 2:

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, Behavioural models, Data models, Object models, structured methods.

Module 3:

Design Engineering:

Design process and Design quality, Design concepts, the design model, pattern based software design**.**

Creating an architectural design: Software architecture, Data design, Introduction to UML, Importance of modeling, Principle of modeling, Concepts of modeling and architecture.

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:

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, Frame work for Product metrics, 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-I: Risk management :

Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Unit-II: 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, sixth edition McGraw Hill International Edition.
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education.

Refer nce Books

1. The Unified Modeling Language, User Guide by Grady Booch, JamesRambaugh, 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

E-Resources

1. https://onlinecourses.nptel.ac.in/noc20_cs68/preview
2. https://lecturenotes.in/subject/104/software-engineering-se
3. https://www2.cs.siu.edu/~mengxia/Courses%20PPT/435/435ppt.html

Course Outcomes

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

CO1. Compare and analyse the different Process models

CO2. Analyse the Requirement Engineering process and System Modeling.

CO3. Apply the systematic procedure for Software design and deployment.

CO4. Compare the various testing and maintenance methods.

CO5. Evaluate Projects with various Quality standards.

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	-	-	-	-	3
CO2	3	3	-	-	-	-	-	-	2	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	2	-	-	3	-	3
CO4	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	2	-	-	-	-	3
Average	**2.8**	**2.4**	-	-	-	-	-	-	**2.0**	-	-	**3.0**	-	**2.6**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L4165**	**LINUX PROGRAMMING LAB**	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Computer Organization, Computer Networks, C Programming, etc…

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 processesusing named pipe.

Experiment 14. Write a C program to create a message queue with read and write permissions towrite 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 m emory.

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	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**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: **L41M7**	**IOT ARCHITECTURE & PROTOCALS**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites:

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

Module 1: Basic Concepts

Unit-I: Overview

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

Unit-II: 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

Unit-I: Process Concepts

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

Unit-II: 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

Unit-I: Main Memory

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

Unit-II: Virtual Memory

Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4: Storage Management

Unit-I: 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, Efficiencyand Performance, Recovery

Unit-II: Mass-Storage Structure

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

Module 5: Security and Protection

Unit-I: Security

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

Unit-II: 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

Reference Books

E-Resources

Course Outcomes

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

CO1.

CO2.

CO3.

CO4.

CO5..

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

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AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-II Sem			
Course Code: **L42DB**	**BIG DATA ANALYTICS** (PROFESSIONAL ELECTIVE – VI)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Knowledge of Linux Commands, Java Programming and SQL knowledge is required.

Module 1:

UNIT I: Introduction to Big Data:
Types of Digital Data, what is big data, History of Data Management; Characteristics of Data, Evolution of Big Data, Structuring Big Data; Elements of Big Data; Challenges with Big Data; Why Big Data; Traditional Business Intelligence (BI) versus Big Data.

UNIT II: Introduction to 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 Big Data; Why is Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; BASE; Few Top Analytics Tools.

Module 2:

UNIT I: Understanding Analytics and Big Data:
Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

UNIT II: Analytical Approach and Tools to Analyze Data:
Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools

Module 3:

UNIT I: 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

UNIT II: Introduction of HDFS:
Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, 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:

UNIT I: 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;

UNIT II: HDFS (Hadoop Distributed File System):
HDFS Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN

Module 5:

UNIT I: 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 onTweets;

UNIT II: Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications forMobile Analytics; Introducing Mobile Analytics Tools

Text Books

1. BIG DATA, Black Book™, Dreamtech Press, 2015 Edition.
2. 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-Wesley It 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

www.upgrad.com/Big-Data

3. https://www.javatpoint.com/what-is-big-data
4. 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 Know the basics of Big Data and its environment

CO2: Achieve the knowledge of Big Data analytics Tools and its Approaches

CO3: Define MapReduce 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	-	-	-	-	-	-	2	-	-	-	3	2	-	-
CO2	-	-	-	-	3	-	-	-	-	-		3	-	-
CO3	3	-	-	-	3	-	-	-	-	-	2	3	-	-
CO4	-	2	-	3	-	-	-	-	-	-	2	-	2	2
CO5	-	3	-	2	2	-	-	-	-	-	-	-	-	3
Average	3	2.5	-	2.5	2.6	-	-	-	-	-	2.3	2.6	2	2.5

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ECM IV Year – II Sem			
Course Code: **L426A**	**STORAGE AREA NETWORKS** (PROFESSIONAL ELECTIVE – VI)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Information Retrieval System,
2. Computer Networks,
3. Cloud Computing

Module 1:

UNIT-1: Introduction to Storage Technology:

Review data creation and the amount of data being created and understand the value of datato a business, challenges in data storage and data management, Solutions available for data storage.

UNIT-2: Storage system environment:

Core elements of a data center infrastructure, role of each element in supporting businessactivities.

Module 2:

UNIT-1: Storage Systems Architecture:

Hardware and software components of the host environment, Key protocols and concepts used byeach 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.

UNIT-2: 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 3:

UNIT-1: Introduction to Networked Storage:

Evolution of networked storage, Architecture, components, and topologies of FC-

UNIT-2: SAN, NAS, and IP-SAN:

Benefits of the different networked storage options understand the need for long-term archiving solutions and describe how CAS fulfils the need, understand the appropriateness of the different networked storage options for different application environments.

Module 4: Storage Management

UNIT-1: Introduction to Business Continuity:

Information Availability & Monitoring & Managing Data center 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.

UNIT-2: 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 5: Security and Protection

UNIT-1: Securing the Storage Infrastructure:

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain.

UNIT-2: 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.

E-Resources

1. https://nptel.ac.in/courses/106/108/106108058/
2. https://nptel.ac.in/content/storage2/courses/106108058/lec%2007.pdf

Course Outcomes

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

CO1. Describe about Information availability and Business continuity.

CO2. Describe the backup/recovery topologies.

CO3. Describe local replication and remote replication technologies and their operation.

CO4. Describe processes and technologies for identifying, analyzing,and mitigating security risks instorage infrastructure.

CO5. Demonstrate effective oral and writing communication skills necessary to be effective and tocompete at global business environment.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO 6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	1	2	-	-	-	1	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	1	-	-	-	-	-	-	-	-
CO3	1	-	2	-	-	1	-	-	-	-	-	-	-	-
CO4	1	3	-	-	-	1	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	1	-	-	-	3	-	-	-	-
Average	**1.2**	**2.5**	**2**	-	-	**1**	-	-	-	**3**	-	-	-	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ECM IV Year – II Sem			
Course Code: **L425D**	**ANDROID APPLICATION DEVELOPMENT** (PROFESSIONAL ELECTIVE-VI)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Programming language JAVA**,** Knowledge on SQL, Knowledge on XML

Module 1:

Introduction to Android Operating System: Android OS design and Features–Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components : Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Module 2:

Android User Interface: Measurements–Device and pixel density independent measuringunits Layouts–Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling: Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity,adding, removing and replacing fragments with fragment transactions, interfacing betweenfragments and Activities, Multi-screen Activities.

Module 3:

Intents and Broadcasts: Intent–Using intents to launch Activities, explicitly starting newActivity, Implicit Intents, passing data to Intents, getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intentfilters, finding and using Intents received within an Activity, Notifications – Creating andDisplaying notifications, Displaying Toasts

Module 4:

Persistent Storage: Files–Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Database: Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using contentProviders (insert, delete, retrieve and update)

Module 5:

Advanced Topics: Alarms–Creating and using alarms Using Internet Resources – Connecting tointernet resource,
Using download manager

Location Based Services –Finding Current Location and showing location on the Map, updatinglocation

Text Books

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013.

Reference Books

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

E-Resources

1.https://developer.android.com/guide/webapps
2.https://www.developerdrive.com/best-android-development-tools-resources/
3.https://developer.android.com/guide
4. https://techbeacon.com/app-dev-testing/ultimate-android-development-guide-50-beginner-expert-resources.

Course Outcomes

At the end of the course, the student will be able to: **CO1**.Describe

Android platform, Architecture and features. **CO2**.Design User Interface

and develop activity for Android App.

CO3.Use Intent, Broadcast receivers and Internet services in Android App.

CO4.Design and implement Database Application and Content providers.

CO5.Use multimedia, camera and Location based services in Android App.

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	1	3	1	-	-	-	-	-	-	-	1	-	-
CO2	2	2	2	1	2	-	-	-	-	-	-	1	2	1
CO3	1	2	2	1	2	-	-	-	-	-	-	1	-	-
CO4	2	2	2	2	2	-	-	-	-	-	-	1	2	1
CO5	1	2	2	1	2	-	-	-	-	-	-	1	1	1
Average	**1**	**1**	**3**	**1**	-	-	-	-	-	-	-	**1**	-	-

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. Traversesurveying –introduction, chain, and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustmentof 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 safetyrequirements of resistive structures, fire resistive properties of buildingmaterials, fire exit requirements, force and acceleration on building due toearthquake, building response characteristics, building drift

Module 5: Unit-1: Water Supply, Sanitary and Electrical Works inBuilding:

Introduction, water supply system, water supply layout of a building, housedrainage, traps, electrical works in building.

Unit-2: Highway Engineering:

Introduction, historical background of road or highway, classification ofroads, pavements androads, traffic control mechanism.

Text Books :

1. "Elements of Civil Engineering" by Mimi Das Saikia, Bhargab Mohan Dasand Madan MohanDas, 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, ArunkumarJain16th Edition Publisher: Laxmi Publication Delhi.

Reference Books

1. "Surveying Theory and Practice" by James M Anderson and Edward MMikhail 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 IV Year- II 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 lessand connection-oriented network services.

Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunnelling andPacket 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 ConnectionRelease, 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, CRCPublications.

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 amongmultiple 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 transportlayer.

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 learningalgorithms
3. To understand the deep learning architectures.
4. To understand the methods of solving real life problems using the machinelearning 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 Machinesand 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 learningtechniques of machine learning and classification methods for solving real worldproblems.

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, Springer2006
3. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: Anintroduction", 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, ShelterIsland, 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 machinelearning technique.
5. Prioritize the various Machine Learning algorithms.

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&DSIII 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 AnalyticsUnit 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, BoxPlots, Pivot Table, Correlation Statistics, ANOVA

Module IV: Model DevelopmentUnit 1:

Introduction to Regression, Simple and Multiple Regression, Model Evaluationusing Visualization

Unit 2:

Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measuresfor In-sample Evaluation, Prediction and Decision Making.

Module V: Model EvaluationUnit 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 GridSearch.

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 DataAnalytics", 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 DataVisualization

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 usedin 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, SingleSide 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 ofPhase 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 andnoise 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, AsynchronousMultiplexing.

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 foroptimum 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, 20threprint, 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 andMasoudSalehi, PHS, 2nded.2004.

E-Resources

1. https://nptel.ac.in/courses/Nanoelectronics/ IITMadras/ab1011/102/1111102111/

Course Outcomes

At the end of the course, the student will be able to:
CO1. **Illustrate** the main concepts of analog and digital communicationsystems.
CO2. **Analyze** the AM and FM modulator/demodulator
CO3. **Explain**, discuss, and compare different binary digital modulationtechniques.
CO4. **Distinguish** different types of noise and explain the effects of noise oncommunication 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: L1OF3	**FUNDAMENTALS OF DIGITAL LOGIC DESIGN**	L	T	P	D
Credits: **3**	**(Open Elective -I)**	**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 fundamentalconcepts used in the design of digital systems.
2. Understand common forms of number representation in digital electroniccircuits 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 analyzesequential 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 Booleanalgebra 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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: EEE III Year-I Sem			
Course Code: **L31OG**	**Energy Engineering (OPEN ELECTIVE-I)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

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 geothermalresources, 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., Thirdedition, 1999.
2. Non-conventional energy resources by B.H.Khan, TMH, 2006.
3. Desai,AV, "Energy Demand: Analysis, Management and Conservation", WileyEastern 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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:IT III Year - I Sem			
Course Code: **L31OH**	(Open Elective-I) **Open Source Software's**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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, PublicDomain. History of free software, Proprietary Vs Open-Source Licensing Model,use of Open- Source Software, FOSS does not mean no cost. History: BSD, TheFree 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 andLicensing.
CO 2: Recognize the applications, benefits and features of Open-SourceTechnologies
CO 3: Gain knowledge to start, manage open-source projects

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ME III Year - I Sem			
Course Code: **L31OI**	**AUTOMOTIVE TECHNOLOGY** (Open Elective-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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.

Unit-1: Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle,types of fuel cells, fuel cell

Module 3:

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. Hybridelectric vehicles - Concepts, types of hybrid drive train architecture, merits anddemerits.

Module 4:

Unit-1: Telematics Systems: Global positioning system, geographical information systems,navigation system.

Unit-2: Comfort Systems: Automotive vision system, active suspensionsystem, 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
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 andhybrid-electric vehicles

CO4: Apply the use of intelligent vehicle technologies like navigation inautomobiles

CO5: Aware of safety, security and regulations

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	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
Average	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 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 shaftsinking

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 andsurface mining methods.

Module 3

Drilling: Types of drills, drilling methods, electric, pneumatic, and hydraulicdrills, 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: Mechanismof 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, 7thEd, 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 ageinternational, 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 ofshafts

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year-I Sem			
Course Code: **L31OK**	Open Elective-I **Entrepreneurship for Micro, Small and Medium Enterprises**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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, HimalayaPublishing House, 2003.
2. Poornima M Charanthimath, Entrepreneurship Development SmallBusiness Enterprises, Pearson, 2006.
3. Paul Burns & Jim Dew Hunt, Small Business Entrepreneurship, PalgraveMacmillan publishers, 2010.
4. Suman Kalyan Chaudhury, Micro Small and Medium Enterprises in IndiaHardcover, 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 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 equalintervals - 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 - ModifiedEuler's method - Fourth order Runge-Kutta method for solving first orderequations - 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 andPoisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensionalwave 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, TataMcGraw Hill, 5 th Edition, New Delhi, 2007.

Reference Books

1. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, NarosaPublications, 5th Edition, 2015.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill NewDelhi,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 differentialequations

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	-	-
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 III Year- I Sem			
Course Code: L31OM	**NANOMATERIALS (Open Elective-I)**	L	T	P	D
Credits: **3**	**(**COMMON TO: All branches**)**	**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.

M**odule–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, 1stEdition, 2003
2.C Dupas, P Houdy, M Lahmani, Nanoscience: "Nanotechnologies and Nanophysics", 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 ofNano materials.
3. Apply basic knowledge on the properties and applications of few nanomaterials.
4. Understand different thermal methods of synthesis of nano materials and tolearn 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 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-industrialapplications.

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 goodrefractory-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-originof 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, DhanpatRai 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, 2ndEdition 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, SciTechpublications(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 phaserule 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 inCivil Engineering works.
4. Acquire the knowledge about properties and applications of glass, ceramicsand refractories.
5. Understand the relationships between macroscopic material properties andmicroscopic structures.

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech III Year – I Sem			
Course Code: L31OO	TECHNICAL WRITING SKILLS (COMMON TO ALL)	L	T	P	D
Credits :3		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-planninga letter and cover letter.

Resume writing: Introduction-Resume design- parts of a Resume-ResumeStyles 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: TataMcGraw-Hill., 2005.
3. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
4. Cooper, Donald R. Pamela S Schindler. Business Research Methods. NewDelhi: 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 andparagraphs.
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**	**PO 10**	**PO 11**	**PO 12**	**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:														

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year-II Sem			
Course Code: **L31OP**	**Indian Constitution** (COMMON TO: All branches)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Evolution of the Indian Constitution

1909 Act, 1919 Act end 1935 Act. Constituent Assemtily Composition andFunctions Fundamentals features of the Indian Constitution.

Module 2: Union Government

Executive: President. Prime Minister, Council of MinisterExecutive:
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 Statecouncil. NITI Ayog Finance Commission of India

Module 5: Statutory Institutions.

Elections-Election Commission of India, National Human Rights CommissionNational 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. NewDelhi

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 financialresources 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 ademocratic way

OPEN ELECTIVE-II

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CE III Year-II Sem			
Course Code: **L32OA**	**CONSTRUCTION MANAGEMENT, CONTRACTSAND VALUATION (OE-II)**	L	T	P	D
Credits: 3		**3**	**1**	**0**	**0**

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 techniquesfor project management – role of project managers.

Module 2: Unit-I: Project management plan and objectives

Programming – scheduling – project organization – organization and project team – role ofcommunication 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	-

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32OB**	**Principles of Operating Systems (Open Elective -II)**	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 the basic concepts and functions of computer operating systems.
2. Apply the concurrency control among the operating system programsexecution.
3. Demonstrate the techniques used to manage the memory during programexecution.
4. Explain the various storage management methods and functions of operatingsystems.
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 andAvoidance, Recovery from Deadlock.

Module 3:

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

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

Module 4:

Mass-Storage Structure: Overview, Disk Structure, Disk Attachment, DiskScheduling, 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, 7thEdition, Prentice Hall.

Reference Books

1. Principles of Operating Systems-Naresh Chauhan, Oxford HigherEducation.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems-Andrew S Tanenbaum, 2nd EditionPearson, 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 andit's components.
CO2: Apply different algorithms and methods to achieve concurrency among theoperating system programs.
CO3: Analyse the memory management techniques used in the execution ofoperating system programs.
CO4: Implement the suitable methods to improve the efficiency of storagemanagement devices.
CO5: Apply suitable algorithms to ensure the security of computer system.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&ML III Year / II Sem			
Course Code: L320C	INTRODUCTION TO PREDICTIVE ANALYTICS (Open Elective II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

Data mining, Machine Learning

Course objectives:

The student will:

1. Know the basics of predictive analytics and summarize Data, Categorize Models, andtechniques
2. Know about the Decision tree, Support Vector Machine for Data Classification
3. Describe Methods such as Naïve Bayes Markov Model, Linear Regression, NeuralNetworks 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 Visualizationtools.

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 similaritiesin 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 predictthe 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 tosolve all your data analysis problems, Pack Publisher, 2nd Edition, 2015.
2. Aurelien,"Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'ReillyPublisher, 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, NeuralNetworks 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 BusinessAnalytics and Fundamentals of R Programming

MODULE 1: **Introduction Business AnalyticsUnit 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 toInsight and from Business.

MODULE 2: **Intelligence to Business AnalyticsUnit 1:**

Intelligence to Business Analytics- Descriptive, Predictive and PrescriptiveAnalytics - Introduction to R programs-Running R programs.

Unit 2:

Mastering Fundamental R concepts -How to diagnose and correct syntaxerrors-

MODULE 3: **Data Sets &VariablesUnit 1:**

Getting familiar with R data sets- Creating R data sets- Reading data files intoR - 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, HierarchicalVisualization Techniques.

Unit 2: Visualizing Complex Data and Relations, Charts, Plots, Maps, Diagramsand 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, CengageLearning,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 involvedand 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 andsolve problem
4. Calculate and interpret numerous statistical values and appreciate theirvalue to the business Manager

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **L32OE**	**Basics of IC Technology** (Open Elective)	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

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, CzochralskiGrowth, 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 Epitaxyand 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, Chemicalequilibrium 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	-
Average	**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, interfacingkeyboard, Display, D/A and A/D converter.

Unit-II: Interfacing with advanced devices

Memory Interfacing to 8086, Interrupt Structure of 8086, Vector InterruptTable, 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 Timersand 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 anddesign-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=PL0E131A78ABFBFDD0At 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.

Basic concept of hybrid traction – Introduction to various hybrid drive train topologies – power flow

Module 2: Hybrid traction [8L]

control in hybrid drive – train Topologies-Fuel efficiencyanalysis.

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 energystorage 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.

1. Iqbal Husain, "Electric and Hybrid Electric Vehicles", CRC Press, 2011..

Text Books

2. Wei Liu, "Hybrid Electric Vehicle System Modeling and Control", SecondEdition, WILEY,
3. Sira – Raminez ,R.SilvaOrtigoza, control Design techniques in powerelectronics Devices, Springer.
4. Siew – Chong tan, Yuk-Ming lai Chi Kong Tse, "Sliding mode control ofswitching 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. ApplythebasicconceptsofbatteriesandMotorsinthedesignofElectricandHybridVehicles.

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IT III Year-II Sem			
Course Code:L32OH	**Distributed Systems (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 representationand marshalling, Multicast communication, Network virtualization: Overlay networks.

Unit IV: Remote Invocation:

Introduction, Request-reply protocols, Remote procedure call, Remote methodinvocation. 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 tocomponents.

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 andother distributed systems are based.

CO 2: Apply different approaches for supporting distributed applications.

CO3: Analyze the role of middleware technologies in designing Distributedsystems

CO 4: Analyze the sharing of data in distributed environment using variousdistributed algorithms

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: MEIII Year - II Sem			
Course Code: **L32OI**	**FUNDAMENTALS OF OPERATIONS RESEARCH** (Open Elective - II)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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, unbalancedtransportation 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 timeswith 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 pathproblem – 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, 4thEdition, 2009.
3. A.C.S Kumar, "Operations Research (Quantitative Analysis for Businessdecision)", Yesdee, 2015.

Reference Books

1. Maurice Saseini, Arhur Yaspanand and Lawrence Friedman, "*OperationsResearch: Methods and Problems",* Literary Licensing Publisher, 2013
2. A. M. Natarajan, P. Bala Subramani and A. Tamilarasi "*OperationsResearch*" Pearson Education, 4th *Edition*, 2009.
3. Wagner H. M, "*Principles of Operations Research",* PHI Publications, 2ndEdition, 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 overallgain and determine the number of each item to be produced / procured, and the optimal product mix, within the framework of constraints in anyorganization

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 situationsinvolving 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 servicefacility cost and apply the Dynamic Programming model to practical problems like finding the shortest path for a salesman, optimal solutionto a linear programming problem.

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	-	-	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 withrippers, 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, andslope stabilization

Module 5

Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environmentdue to surface mining

Text Books

1. D.J. Deshmukh, Elements of Mining Technology, Vol 1, Central Techno, 7thEdition, 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 forthe 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 workand 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, ownershiprights 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 trademark 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 getthe 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 byVinod 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 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]

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, TataMcGraw Hill, 5th 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 2.

Reference Books

1. Morton K.W., Mayers, D.F., "Numerical Solutions of Partial DifferentialEquations", 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 PartialDifferential

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 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	-	-
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 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, PBCbased LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

Module- 5: Solar cell Physics[9L]

Single, poly and amorphous silicon, GaAs, CdS, Cu2S, 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, 8threvised 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", Noyespublishers,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/SpecialRelativityNotes. 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 ofphysicsand 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 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 andTop-down approach with examples-sol-gel method-solvothermal andhydrothermal routes, Chemical Vapor Deposition and precipitation methods.

Module 2: Properties of Nano materials [10L]

Nanomaterials-Electronic properties, Energy bands and gaps in semiconductors, Fermi Surfaces-Optical Properties-Fluorescence, Photoluminescence,Electroluminescence.Magneticproperties-mechanical properties-thermal properties.

Module 3: 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 4: 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 TiO2 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_Nano-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.

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech III Year – II Sem			
Course Code: L32OO	TEAMWORK AND TEAM BUILDING (COMMON TO ALL)	L	T	P	D
Credits: 3		3	0	0	0

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 andsolving 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, andempowering 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 Outcomes (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 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 Sanskritliterature, 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 MedievalIndia, 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 81-7450494- 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 EngineeringUnit-I:

Road User Characteristics, Vehicular Characteristics, Applications of TrafficControl Devices,Traffic signs, Road Marking.

Module 2: Introduction to Road SafetyUnit-I:

Accident Situation in India, International Comparison of Accident Data,
Standard Definitions by IRC, Collection of Accident Data, Collision andCondition Diagrams.

Module 3: Statistical Methods and Analysis of Accident DataUnit-I:

Methods in Analysis of accident Data, Regression Method, Poisson
Distribution, Chi- SquaredDistribution, Statistical Comparisons, Black SpotIdentification & 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 MeasuresUnit-I

Accident prevention by better planning, Accident prevention by better design ofroads, 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, KhannaPublications 9thEdition (2017).
2. 'Principles of Transportation Engineering'' by Partha Chakroborty &AmineshDas; Prentice Hallof India, 2nd edition (October 2017).

Reference Books

1. Fundamentals of Traffic Engineering, Richardo G Sigua Road Safety byNCHRP.

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 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	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

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: L32OR	**Introduction to Java Programming (Open Elective -III)**	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. 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, parameterpassing, 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 betweenclasses 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 subclasses.

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, lifecycle 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, Pearsoneducation.

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 EventHandling

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: Common III Year II Sem			
Course Code: L320S	INTRODUCTION TO NEURAL NETWORKS (Open Elective III)	L	T	P	D
Credits: 3		3	0	0	0

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 itsapplications.
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, BiologicalNeuron, 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", PearsonEducation, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networksusing 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 IV Year-I 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 & ElectronicHealth Record
Unit I: Introduction to Health care data sources and basic analytics, advanced data analytics, Applications and practical systems for health care, resources forhealth care data analytics,
Unit II: Electronics Health Records, Components of EHR, Coding System ofEHR, Benefits of EHR-Barrier to Adopting EHR Challenges-Phenotyping Algorithms, Conclusion.

Module II: Biomedical image modalities and Mining of Sensor Data inHealth 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 andchallenges, 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 correlationanalysis.
Unit II: introduction genomic data generation, methods and standards forgenomic 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 clinicaltext & 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 textmining, conclusions.

Module V: Social media and analytics for health care and Advanced data analytics for health care Unit I: Introduction to social media analysisfor 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, survival 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 toHealthcare 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 implementingmathematical 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 MATLABfor 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 engineeringproblems.
CO4. Utilize computer skills to enhance learning and performance in otherengineering and science courses.
CO5. acquire knowledge of Advanced Matlab programming methods andSimulink.

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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 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 andcommunication systems used in mechatronics system development.

Module 1:

Unit-I: Introduction

Basics of Measurement – Classification of errors – Error analysis – Static anddynamic characteristics of transducers.

Unit-II: Performance measures of sensors

Classification of sensors – Sensor calibration techniques – Sensor Output SignalTypes.

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, RadiationSensors - 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", TataMcGraw-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" 2ndedition, 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 timeapplications.

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	-	-	-	-	-	-	-	-	-	-
Average	2.4	2	2.5	2.67	-	-	-	-	-	-	-	-	-	-

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: **L32OX**	**Non-Conventional Energy Sources (OPEN ELECTIVE - III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives:

This course will enable students:

1. To elucidate the fundamentals of various energy sources and future energyrequirement.
2. To impart a thorough knowledge about the application of solar energy.
3. To inculcate the students on feasibility and limitations of wind EnergySystems.
4. To analyse the principle and operation of Biomass energy.
5. To analyse the principle and operation of ocean energy and it's potential inindia.

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, safetysystem.

Energy from Bio Mass: Various fuels, Conversion technologies, Aerobic digestionand anaerobic digestion,

Module 4: Bio-Mass [9L]

Community biogas plant, comparebiomass and biogas.

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. Tidaland wave energy: Potential and conversion techniques.

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 andEmerging Technologies", PHI, 2009.
2. "F. C. Treble", Generating Electricity from Sun, Pergamon Press, 1st Edition1991
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, NewDelhi, 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 technologiesfor energy conversion.

CO 3. Understand Wind energy conversion and devices available for it.

CO 4. Understand Biomass conversion technologies, Geo thermal resources andenergy 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, varioustypes 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, WileyPublications, 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: MEIII 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: Serialmanipulator & 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**	**PSO1**	**PSO2**
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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year-II Sem			
Course Code: **L32O1**	**BASIC MINING GEOLOGY**	L	T	P	D
Credits: **3**	**(OPEN ELECTIVE – III)**	**3**	**0**	**0**	**0**

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. Definitionof faults, folds and joints and their types, Unconformities, and its kinds.

Module 3

Ground Water: Introduction, Hydrological Cycle, origin and occurrence ofgroundwater, 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. Occurrenceand 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. LimitedCalcutta.

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 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 SocialNetworking

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, BlogMarketing, 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 – Acustomer 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 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	-	-
Average	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 III Year-II Sem			
Course Code: L32O4	**NDT and VACUUM TECHNOLOGY (Open Elective-III)**	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, 1stEdition, 2014.
2. John. F. O'Hanlon, "A User's guide to Vacuum technology", Wiley, 3rdEdition, 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.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year-II Sem			
Course Code: **L32ON**	**Chemistry for Engineers (**COMMON TO: All branches)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Synthesis of Nano materials [8L]

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] Properties of 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_Nano-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.

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech III Year – II Sem			
Course Code: L32O6	TECHNICAL COMMUNICATION SKILLS (COMMON TO ALL)	L	T	P	D
Credits: 3		3	0	0	0

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 oflanguage.

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-Principlesand 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 Outcomes (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 kinternational 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 Sinternational publication, 3rd addition oct 2014.
2. "Environment Impact Assessment" by Anjaneyulu, B S Publication, 2ndaddition 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 andassessment.
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

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: L41OB	**INTRODUCTION TO PYTHON PROGRAMMING (Open Elective -IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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, Pythoninput/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 controlstatements (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 froma 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 LanguageSecond Edition, Mark Summerfield, Addison-Wesley 2010
2. Object-Oriented Programming in Python, Michael H, Goldwasser, DavidLetscher, 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 requirementsof 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 typesand choose the right one.
CO4. Identify and write the functions, programs required for accessing files.
CO5. Demonstrates how to achieve reusability using inheritance, interfaces.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&MLIV Year-I Sem			
Course Code: L410C	INTRODUCTION TO DEEP LEARNING (Open Elective IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Probability Statistics, linear algebra. Machine learning.

Course Objectives:

The Student will:

1. Get introduced to various learning techniques of machine learning andunderstand differences between machine learning and deep learning
2. Understand and analyse optimization techniques and improvements inlearning methods
3. Appreciate, understand and apply neural networks as tools for completelearning problems
4. Investigate and deploy/club multi-layer neural networks for learning relatedto images, text and speech sequences.
5. Appreciate, understand and implement Deep learning in real world practicalproblems

Module 1:

Introduction to Deep Learning

Introduction to Deep Learning, Brief History of Deep Learning, AI, MachineLearning 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, LSTMNetworks.

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, Datasetsand 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 anyproblems
2. Apply optimization techniques to improve the quality of various learningsolutions.
3. Apply and investigate, neural network for complete learning problems.
4. Implement deep learning methods in the area of multidimensional andsequential inputs.
5. Investigate the scope of implementation of various deep learning techniques inany real world problem

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: AI&DSIV Year – I Sem			
Course Code: L410D	OPEN ELECTIVE – IV FUNDAMENTALS OF BIG DATA	L	T	P	D
Credits: 3		3	0	0	0

Course Objectives:

1. The purpose of this course is to provide the students with the knowledge ofBig Data Analytics principles and techniques.
2. This course is also designed to give an exposure of the frontiers of Big DataAnalytics

MODULE-I: Introduction to Big Data and Big Data AnalyticsUnit 1:

Introduction to Big Data: Big Data and its Importance, Four V's of BigData, Structring Big Data

Unit 2:

Drivers for Big Data, Introduction to Big Data Analytics, Classification ofAnalytics, Big Data Analytics applications

MODULE- II: Big Data Technologies Unit 1:

Big Data Technologies: Hadoop's Parallel World, Data discovery, Open sourcetechnology 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 - DataSerialization.

MODULE- IV: Hadoop Architecture & HDFS ArchitectureUnit 1:

Hadoop Architecture: Hadoop: RDBMS Vs Hadoop, Hadoop Overview, Hadoopdistributors, 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 ofHBase in Big Data processing, HIVE, PIG.

MODULE- V: Data Analytics & Social Media AnalyticsUnit 1:

Data Analytics with R Machine Learning: Introduction, Supervised Learning,Unsupervised Learning.

Unit 2:

Collaborative Filtering, Social Media Analytics, Mobile Analytics, Big DataAnalytics 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, AmbigaDhiraj, 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, ArvindSathi, 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 Streamswith 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 Dataand 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 andMining.

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-IV)**	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, surroundsound. 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, pictureresolution. Composite video signal: horizontal and vertical sync details, scanningsequence.

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: workingprinciples, 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 BaliS.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**	**PS O1**	**PS O2**
CO1	-	-	2	2	3	-	-	-	-	-	-	-	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	-	3	3	-	-	-	-	-	-	-	-	2	-
Average	2.3	2	2.5	2.5	3	-	-	-	-	-	-	-	2	-

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM IV Year-I Sem			
Course Code: L41OF	**INTRODUCTION TO EMBEDDED SYSTEMS (Open Elective-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 uniquedesign problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advancedarchitectures.

Module 1:

Unit-I: Embedded Computing

Introduction, complex systems and microprocessor, the embedded systemdesign 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, gettingembedded 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 levelparallelism.

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, CengageLearning, 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, CMPpublishers, 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 dataCommunication, 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
Average	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- magneticcircuit 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 – Constructionalfeatures, 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 Universitypress, 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 publishingcompany, 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_NPTEL_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, characteristicsand control of PMBLDC motor.
CO 2. Understand the construction, operation performance characteristics ofPMSM and its power controllers.
CO 3. Understand the construction, operation and control of SRM drive and itspower controllers.
CO 4. Understand the construction, operation, characteristics and control ofstepper motor.
CO 5. Understand the operation & characteristics of other special electricalmachines.

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	1	3	3	3	-	-	-	-	-	-	-	-	3	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Average	1.8	2.2	3	3	-	-	-	-	-	-	-	-	3	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: L41OG	**Object Oriented Analysis and Design(OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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, ActivityDiagrams

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 ModelingLanguage User Guide, Pearson Education**.**

Course Outcomes: After the completion of the course, students should beable to:

CO 1: Select the basic elements of modeling such as Things, Relationships andDiagrams depending on the views of UML Architecture and SDLC.

CO 2. Apply basic and Advanced Structural Modeling Concepts for designingreal time applications.

CO 3. Design Class and Object Diagrams that represent Static Aspects of aSoftware 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 SoftwareSystems.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year-I Sem			
Course Code: **L41OJ**	**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 onenvironment & 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 againstfiredamp 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 environmentand sustainable mining

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech MBA IV Year-I Sem			
Course Code: **L41OK**	**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 tobe adopted by the corporate.

UNIT-I:

Introduction: Meaning - Evolution – Nature and Characteristics of Rural Market – Understanding theIndian Rural Economy –Rural Marketing Models
– Rural Marketing Vs Urban Marketing – Parametersdifferentiating Urban &Rural Market - Differences in consumer behavior in Rural and Urban market.

UNIT-II:

Rural Market Research: Sources of Information- Factors influencing ruralconsumers 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, roleof 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 forRural Market – Rural Market Product Life Cycle – Objectives behind newproduct 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 – Strategiesof 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: Textand 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, andstrategies, 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-FinancialAnalysis- 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 processbenefits of EIA- limitations of EIA-Environmental Clearance for Civil EngineeringProjects.

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 andEnergy 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 WileyHoboken, New Jersey).
2. "Non-Conventional Energy resources" by Chauhan, D S Sreevasthava, S K(New AgeInternational Publishers, New Delhi).
3. "Alternative Building Materials and Technologies" by Jagadeesh, K S, ReddyVenkatta 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 ofSustainable 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 auditingmethodology
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 consideringthe EnergyConservation Measures.
5. Discuss the building codes, relevant legislation governing the consumption ofresources

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_Design_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- ConvNetsVisualized.

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 Stoptraining?- Wasserstein GAN

Module 4:

Semi Supervised GAN:

What is Semi Supervised GAN?- Architecture- Training Process- TrainingObjectives- 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, JakubLangr, 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 GANsystem.
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&DSIV 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 CloudEnvironments, 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**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE IV Year-II Sem			
Course Code: **L420E**	**Principles of Sensors and their Application (OE-05)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 sensorintegration.
3. Explore the applications of physical, chemical, and biological sensors indifferent domains.
4. Learn about smart sensors, IoT, and their integration in sensor networks.
5. Develop skills in sensor data processing, fusion, and application-specificalgorithms.

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 compensationtechniques

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 straingauges

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: CO2 sensors, humidity sensors, and particulate matter sensors; Biomedical sensors: ECG, EEG, and pulse oximetrysensors.

Module 4: Smart Sensors and Internet of Things (IoT)[10L]

Unit-I: [5L]

Introduction to smart sensors: Features, architecture, and applications; Sensornetworks: Wireless sensor networks, ad-hoc networks, and protocols; IoT andsensor 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 activitymonitoring; 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 ontheir sensing principles and characteristics.
CO2. Design sensor interfaces and signal conditioning circuits to enhance theaccuracy and reliability of sensor measurements.
CO3. Analyze and evaluate the performance of physical, chemical, andbiological sensors in real-world scenarios.
CO4. Develop solutions using smart sensors, IoT, and sensor networks formonitoring 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**	**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 ECMIV Year-II Sem			
Course Code: **L42OF**	**INTRODUCTION TO ELECTRONICS INSTRUMENTATION (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 waveformGenerator, 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.

Unit-I:

Module 5:

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, PearsonEducation - 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 TMHReprint.
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 basicworking 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**	**PSO1**	**PSO2**
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	-
Average	2.2	2	2	2	-	-	-	-	-	-	-	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 EEE IV Year-II Sem			
Course Code: L42OG	**Instrumentation (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 frequencymeter-digital phase angle meter.

Module 3: Wave Analyzers and Spectrum Analyzers

Unit 1 [5L]

c Analyzers, Total Harmonic distortion.

Unit 2 [5L]

Spectrum analyzers, Basic spectrum analyzers, spectral displays, vectorimpedance 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, AngularVelocity, 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 andInstrumentation", 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 andInstrumentation", 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	-
Average	2.2	-	2.2	2.4	-	-	2	-	-	-	-	-	2.6	-

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-II Sem			
Course Code: **L42OH**	**Cyber Laws and Ethics (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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 ChallengesConcerning 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 andImplications, Computer Generated Evidence and their Admissibility, JudicialInterpretation of Computer related Evidence.

Text Book:

1. Dr Pramod Kr.Singh, "Laws on Cyber Crimes [Along with IT Act and RelevantRules]" 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 wellas Human Rights.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year-II Sem			
Course Code:	**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 rockand rock mass.
2. To acquaint with pre-mining stresses in rock and various methods of rockstress determination, its importance in mining applications.
3. To get idea about various engineering properties of rocks and soil; rockmass classification and soil classification methods
4. To get idea about instrumentation and monitoring systems used in surfaceand underground mine excavation stability.
5. To know about various ground improvement techniques and methods forsafe 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, Estimatingin 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 androck mass.

2. Learn about pre-mining stresses in rock and various methods of rock stressdetermination, its importance in mining applications.

3. Understand various engineering properties of rocks and soil; rock massclassification and soil classification methods.

4. Learn about instrumentation and monitoring systems used in surface andunderground mine excavation stability.

5. Learn about various ground improvement techniques and methods for safe mining operations.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech MBAIV Year-II Sem			
Course Code: **L42OK**	**CUSTOMER RELATIONSHIP MANAGEMENT (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective: To understand the importance of Customer RelationshipManagement in Business.

UNIT-I:

Introduction to CRM: Concepts, Evolution, Need, understanding goals andobjectives 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 – CustomerProfile 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 Customeracquisition –Customer Retention and Development – Strategies for CustomerRetention, 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 eCRM- DataWarehousing – 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.