ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS 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 ANDTECHNOLOGY
(UGCAUTONOMOUS)
BhaskarNagar,Yenkapally(V),Moinabad (M),Hyderabad –500075,Telangana, India

DEPARTMENT - VISION AND MISSION

VISION:

To be a Center for State-of-the Art Learning and Research in the Area of Electrical and Electronics Engineering, where the Stakeholders could Explore, Experiment and Exhibit their Expertise with an Industrial Outlook.

MISSION:

M1: To **equip** the student with advanced learning skills in the field of Electrical and Electronics Engineering as well as the professional skills necessary to face the challenges of the future.

M2: To **engineer** the student to engage in research activities leading to innovative applications of technology for the benefit of society.

M3: To **enable** the student with the qualities of leadership and social responsibility.

The Program Educational Objectives (PEOs) of Electrical and Electronics Engineering Department are as follows**:**

Table 1.2.1. Program Educational Objectives (PEOs)

PEO No.	Program Educational Objectives Statements (PEOs)
PEO1	To create an excellent academic learning environment by providing awareness on lifelong learning, apply the technical knowledge in the field of Electrical and Electronics Engineering to pursue higher studies or in their professional career.
PEO2	To demonstrate technical knowledge to analyze, design, develop, optimize, and implement complex electrical systems, gain multidisciplinary knowledge through projects and industrial training, providing a sustainable competitive edge in R&D and meeting industrial needs in the field of Electrical and Electronics Engineering.
PEO3	To possess professional and ethical attitudes with effective communication skills, entrepreneurial thinking and an ability to relate engineering issues to the broader social context. Also, develop requisite skills to excel in their chosen profession with an awareness of contemporary issues and the need for life -long learning.

PROGRAMME OUTCOMES (POs)

After the completion of Electrical and Electronics Engineering Program, the students will be able to have the following Program Outcomes:

Table B.2.1.1.1 Details of Programme Outcomes

PO	Programme Outcomes (POs)
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 the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	**Conduct investigations of Complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the 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 the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and Teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary 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, give and receive clear instructions.
PO11	**Project Management and Finance**: Demonstrate knowledge and understanding of the 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.

PSO (Programme Specific Outcomes):

Table B.2.1.1.2 Details of Programme Specific Outcomes

PSO	Programme Specific Outcomes
PSO1	**Modeling and Analysis –** An ability to mathematically model and analyse the performance of Electrical Machines, Power Electronic systems, Control & Instrumentation systems, Electrical Power systems.
PSO2	**Design and Development –** An ability to Design the hardware and software requirements for the Development of Electric drives & Control, Conventional & Renewable Energy and Automation.

JBIET Academic Regulations - R22

Applicable to

B.Tech Regular Four Year Degree Programme

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

&

B.Tech (Lateral Entry Scheme)

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

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

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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 second year second semester	Regular course of study of second year first semester.
2	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 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 year second semester	Regular course of study of third year first semester.
4	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 42 credits out of 84 credits i.e., 50% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester

13.0 Massive Open Online Courses (MOOCs)

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

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

13.2 Mandatory Massive Open Online Courses (MOOCs)

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

14.0 Awarding Grace Marks

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

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

The Description of class change is given below:

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

Note: Grace marks cannot be added to internal marks.

15.0 Internal improvement examination

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

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

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

16.0 Award of Degree

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

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

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

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

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

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

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

16.5 Award of Class

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

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

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

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

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

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

17.0 Transitory Regulations:

The transitory guidelines are applicable to the students

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

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

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

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

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

18.0. Grading Procedure

18.1 Grades will be awarded to indicate the performance of students in each Theory subject, Laboratory / Practical, Seminar, Industry Oriented Mini Project, and Project

Stage - I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade is given.

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

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

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

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

18.3 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of Credit Points (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.
	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already

3.	answer book or additional sheet, during or after the examination.	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 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	In case of students of the college, they is expelled from examination halls and cancellation of their performance in that subject and all 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.

	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	
6.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The student is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
7.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.

8.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
9.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year
10.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.

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

ANNEXURE-I

J.B.INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC Autonomous)

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

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

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

1. Objectives

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

- To expand the domain knowledge of the students laterally and vertically to cope up with Education 4.0.
- To enhance the employability of undergraduate students as per Industry 4.0

standards.

- To provide an opportunity to students to pursue their higher studies in wider range ofspecializations.

2. Academic Regulations for B. Tech. Honours degree

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

6) Guidelines for courses selected under MOOCs platform :

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

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

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

d) Only Pass-grade/marks or above shall be considered for inclusion of

grades in the Honours grade memo.

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

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

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

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

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

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

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

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

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 by the 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 be considered.

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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ANNEXURE-II

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 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-disciplinary areas in addition to their own branch of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrust areas 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. degree course & 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 Minors program, 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 by the 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 be considered.

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-EEE
B. Tech Course Structure		

I Year I Semester
(3 weeks mandatory induction Program at the start of 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.	**L110D**	Engineering Chemistry	3	0	0	3	BS	Y	**Chemistry**
3.	**L112A**	Basic Electrical and Electronics Engineering	3	1	0	4	ES	Y	**EEE& ECE**
4.	**L1103**	Chemistry Lab	0	0	2	1	BS	Y	**Chemistry**
5.	**L1121**	Basic Electrical and Electronics Engineering Lab	0	0	4	2	ES	Y	**EEE**
6.	**L1131**	Engineering Drawing	1	0	4	3	ES	Y	**ME**
7.	**L1133**	Engineering Workshop/Manufacturing Practices	1	0	4	3	ES	Y	**ME**
8.	**L11M1**	Functional English	2	0	0	0	AC	Y	**English**
Total			**13**	**2**	**14**	**20**			

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.	**L120B**	English	3	0	0	3	HS	Y	**English**
3.	**L120C**	Applied Physics	3	0	0	3	BS	Y	**Physics**
4.	**L125A**	Programming for Problem Solving	3	1	0	4	ES	Y	**CSE**
5.	**L1202**	Physics Lab	0	0	2	1	BS	Y	**Physics**
6.	**L1201**	English Language and Communication Skills Lab	0	0	2	1	HS	Y	**English**
7.	**L1251**	Programming for Problem Solving Lab	0	0	4	2	ES	Y	**CSE**
8.	**L12M2**	Human Values and Professional Ethics	2	0	0	0	AC	Y	**MBA**
Total			**14**	**2**	**8**	**18**			

II Year I Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	**L210B**	**Integral Transforms**	3	0	0	3	BS	Y	**Maths**
2.	**L212A**	Electrical Circuit Analysis	3	0	0	3	PC	N	**EEE**
3.	**L212B**	Electrical Machines – I	3	0	0	3	PC	N	**EEE**
4.	**L212C**	Power Systems-I	3	0	0	3	PC	N	**EEE**
5.	**L212D**	Electromagnetic Fields	3	0	0	3	PC	N	**EEE**
6.	**L2121**	Electrical Circuits & Simulation Lab	0	0	4	2	PC	N	**EEE**
7.	**L2122**	Electrical Machines Lab – I	0	0	4	2	PC	N	**EEE**
8.	**L2123**	Internship - I	0	0	2	1	PW	Y	**EEE**
9.	**L21M1**	Gender Sensitization	2	0	0	0	MC	Y	**English**
Total			**17**	**0**	**10**	**20**			

II Year II Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	**L220A**	Complex Variables and Special Functions	3	1	0	4	BS	Y	**Maths**
2.	**L222A**	Digital Electronics	3	0	0	3	ES	Y	**ECE**
3.	**L222B**	Electrical Machines-II	3	1	0	4	PC	N	**EEE**
4.	**L222C**	Control Systems	3	1	0	4	PC	N	**EEE**
5.	**L222D**	Power Systems-II	3	1	0	4	PC	N	**EEE**
6.	**L2221**	Digital Electronics Lab	0	0	2	1	ES	Y	**ECE**
7.	**L2222**	Control Systems Lab	0	0	4	2	PC	N	**EEE**
8.	**L22M2**	Environmental Science	2	0	0	0	MC	Y	**Civil**
Total			**17**	**3**	**6**	**22**			

III Year I Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L31EA	Business Economics & Financial Analysis	3	1	0	4	HS	Y	**MBA**
2.	L312A	Electrical Machines – III	3	0	0	3	PC	N	**EEE**
3.	L312B	Power Electronics	3	0	0	3	PC	N	**EEE**
4.	BTEEEE1	PROFESSIONAL ELECTIVE - I	3	0	0	3	PE	N	**EEE**
5.	BTEEE01	OPEN ELECTIVE – I	3	0	0	3	OE	Y	**EEE**
6.	L3121	Electrical Machines Lab – II	0	0	3	1.5	PC	N	**EEE**
7.	L3122	Power Electronics Lab	0	0	3	1.5	PC	N	**EEE**
8.	L3123	Internship-II	0	0	2	1	PW	Y	**EEE**
9.	L31M1	Artificial Intelligence	2	0	0	0	MC	Y	**CSE**
10.	L31T1	Employability Skills	2	0	0	0	AC	Y	**English**
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.	L322A	Computer Aided Power System Analysis	3	0	0	3	PC	N	**EEE**
2.	L322B	Switch Gear and Protection	3	0	0	3	PC	N	**EEE**
3.	BTEEEE2	PROFESSIONAL ELECTIVE – II	3	0	0	3	PE	N	**EEE**
4.	BTEEEE3	PROFESSIONAL ELECTIVE – III	3	0	0	3	PE	N	**EEE**
5.	BTEEE02	OPEN ELECTIVE – II	3	0	0	3	OE	Y	**EEE**

6.	BTEEE03	OPEN ELECTIVE – III	3	0	0	3	OE	Y	**EEE**
7.	L3221	Power Systems & Simulation Lab	0	0	4	2	PC	N	**EEE**
8.	L3201	Life Skills & Professional Skills Lab	0	0	4	2	HS	Y	**English**
9.	L32M2	Cyber Security	2	0	0	0	MC	Y	**IT**
10.	L32T2	Foundations of Entrepreneurship	2	0	0	0	AC	Y	**MBA**
Total			**22**	**0**	**8**	**22**			

IV Year I Semester

S. No	Code	Course Title	L	T	P/D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L412A	Electrical Measurements	3	0	0	3	PC	N	**EEE**
2.	L414D	Microprocessors and Applications	3	0	0	3	PC	N	**ECE**
3.	BTEEEE5	PROFESSIONAL ELECTIVE – V(MANDATORY MOOC)	3	0	0	3	PE	N	**EEE**
4.	BTEEE04	OPEN ELECTIVE – IV	3	0	0	3	OE	Y	**EEE**
5.	BTEEEE4	PROFESSIONAL ELECTIVE – IV	3	0	0	3	PE	N	**EEE**
6.	L4121	Electrical Measurements Lab	0	0	4	2	PC	N	**EEE**
7.	L4122	Microprocessors and Applications Lab	0	0	4	2	PC	N	**ECE**
8.	L4123	Mini Project	0	0	4	2	PW	Y	**EEE**
9.	L4124	Project Stage-I	0	0	4	2	PW	Y	**EEE**
10.	L41M3	Electrical Safety and Safety Management	2	0	0	0	MC	N	**EEE**
Total			**15**	**0**	**16**	**23**			

IV Year II Semester

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	BTEEEE6	PROFESSIONAL ELECTIVE – VI	3	0	0	3	PE	N	**EEE**
2.	BTEEE05	OPEN ELECTIVE – V	3	0	0	3	OE	Y	**EEE**
3.	L4221	Seminar	0	0	2	1	PW	Y	**EEE**
4.	L4222	Project Stage-II	0	0	16	8	PW	Y	**EEE**
Total			**6**	**0**	**18**	**15**			

Grand Total Credits: 160

PROFESSIONAL ELECTIVE – I

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L312E	Power Quality	3	0	0	3	PE	N	**EEE**
2.	L312F	Modern Control Theory	3	0	0	3	PE	N	**EEE**
3.	L312G	Digital Control Systems	3	0	0	3	PE	N	**EEE**

PROFESSIONAL ELECTIVE – II

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L322E	Analysis of Power Converters	3	0	0	3	PE	N	**EEE**
2.	L322F	Power Semiconductor Drives	3	0	0	3	PE	N	**EEE**
3.	L322G	Flexible AC Transmission systems	3	0	0	3	PE	N	**EEE**

PROFESSIONAL ELECTIVE – III

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L322H	Power System Operation and Control	3	0	0	3	PE	N	**EEE**
2.	L322I	Electrical Machine Design	3	0	0	3	PE	N	**EEE**
3.	L322J	Advanced Control Systems	3	0	0	3	PE	N	**EEE**

PROFESSIONAL ELECTIVE – IV

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L412E	EHV AC Transmission	3	0	0	3	PE	N	**EEE**
2.	L412F	High Voltage Engineering	3	0	0	3	PE	N	**EEE**
3.	L412G	Utilization of Electrical Energy	3	0	0	3	PE	N	**EEE**

PROFESSIONAL ELECTIVE – V (Mandatory MOOC)

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L412H	**MOOC I**	3	0	0	3	PE	N	**EEE**
2.	L412I	**MOOC II**	3	0	0	3	PE	N	**EEE**
3.	L412J	**MOOC III**	3	0	0	3	PE	N	**EEE**

PROFESSIONAL ELECTIVE – VI

S. No	Code	Course Title	L	T	P / D	Credits	Category	common Subject (Y/N)	Approving BOS
1.	L422A	Power Electronics for Renewable Energy Systems	3	0	0	3	PE	N	**EEE**
2.	L422B	HVDC Transmission	3	0	0	3	PE	N	**EEE**
3.	L422C	Restructured Power Systems	3	0	0	3	PE	N	**EEE**

OPEN ELECTIVE - I

S. No	Code	Course Title	L	T	P / D	Credits	Category	Approving BOS
1.	L31OA	Elements of CIVIL Engineering	3	0	0	3	OE	CE
2.	L31OB	Fundamentals of Database Management Systems	3	0	0	3	OE	CSE
3.	L31OC	Introduction to Machine Learning	3	0	0	3	OE	AI&ML
4.	L31OD	Introduction to Data Science	3	0	0	3	OE	AI&DS
5.	L31OE	Principles of Communications	3	0	0	3	OE	ECE
6.	L31OF	Fundamentals of Digital Logic Design	3	0	0	3	OE	ECM
7.	L31OG	Energy Engineering	3	0	0	3	OE	EEE
8.	L31OH	Open Source Software's	3	0	0	3	OE	IT
9.	L31OI	Automotive Technology	3	0	0	3	OE	MECH
10.	L31OJ	Introduction to Mining Technology	3	0	0	3	OE	MINING
11.	L31OK	Entrepreneurship for Micro, Small and Medium Enterprises	3	0	0	3	OE	MBA
12.	L31OL	Numerical solutions of ODE	3	0	0	3	OE	Maths
13.	L31OM	Nano materials	3	0	0	3	OE	Physics

14.	L31ON	Chemistry of Engineering materials	3	0	0	3	OE	Chemistry
15.	L31OO	Technical writing skills	3	0	0	3	OE	English
16.	L31OP	Indian Constitution	3	0	0	3	OE	English

OPEN ELECTIVE - II

S. No	Code	Course Title	L	T	P / D	Credits	Category	Approving BOS
1.	L32OA	Construction Management, Contracts and valuation	3	0	0	3	OE	CE
2.	L32OB	Principles of Operating Systems	3	0	0	3	OE	CSE
3.	L32OC	Introduction to Predictive Analytics	3	0	0	3	OE	AI&ML
4.	L32OD	Business Data Analytics	3	0	0	3	OE	AI&DS
5.	L32OE	Basics of IC Technology	3	0	0	3	OE	ECE
6.	L32OF	Introduction to Micro Processor and Micro Controllers	3	0	0	3	OE	ECM
7.	L32OG	Hybrid Electric Vehicles	3	0	0	3	OE	EEE
8.	L32OH	Distributed Systems	3	0	0	3	OE	IT
9.	L32OI	Fundamentals of Operations Research	3	0	0	3	OE	MECH
10.	L32OJ	Introduction to Surface Mining	3	0	0	3	OE	MINING
11.	L32OK	Intellectual Property Rights	3	0	0	3	OE	MBA
12.	L32OL	Numerical solutions of PDE	3	0	0	3	OE	Maths
13.	L32OM	Advanced physics for Engineers	3	0	0	3	OE	Physics
14.	L32ON	Green Chemistry	3	0	0	3	OE	Chemistry
15.	L32OO	Teamwork and Team Building	3	0	0	3	OE	English
16.	L32OP	Essence of Indian Traditional Knowledge	3	0	0	3	OE	English

OPEN ELECTIVE - III

S. No	Code	Course Title	L	T	P / D	Credits	Category	Approving BOS
1.	L32OQ	Road Safety Engineering	3	0	0	3	OE	CE
2.	L32OR	Introduction to Java Programming	3	0	0	3	OE	CSE
3.	L32OS	Introduction to Neural Networks	3	0	0	3	OE	AI&ML
4.	L32OT	Introduction to Data Science for Health Care	3	0	0	3	OE	AI&DS
5.	L32OU	MATLAB Programming Language	3	0	0	3	OE	ECE
6.	L32OV	Introduction to Sensors and Actuators	3	0	0	3	OE	ECM
7.	L32OX	Non-Conventional Energy Sources	3	0	0	3	OE	EEE
8.	L32OY	Soft Computing	3	0	0	3	OE	IT
9.	L32OZ	Basics of Robotics	3	0	0	3	OE	MECH
10.	L32O1	Basic Mining Geology	3	0	0	3	OE	MINING
11.	L32O2	Digital Marketing	3	0	0	3	OE	MBA
12.	L32O3	Number Theory and Cryptography	3	0	0	3	OE	Maths
13.	L32O4	NDT and Vaccum Technology	3	0	0	3	OE	Physics
14.	L32O5	Nano Technology	3	0	0	3	OE	Chemistry
15.	L32O6	Technical communication skills	3	0	0	3	OE	English

OPEN ELECTIVE - IV

S. No	Code	Course Title	L	T	P / D	Credits	Category	Approving BOS
1.	L41OA	Environmental Impact Assessment	3	0	0	3	OE	CE

2.	L41OB	Introduction to Python Programming	3	0	0	3	OE	CSE
3.	L41OC	Introduction to Deep Learning	3	0	0	3	OE	AI&ML
4.	L41OD	Introduction to Big data	3	0	0	3	OE	AI&DS
5.	L41OE	Consumer Electronics	3	0	0	3	OE	ECE
6.	L41OF	Introduction to Embedded Systems	3	0	0	3	OE	ECM
7.	L41OG	Special Electrical Machines	3	0	0	3	OE	EEE
8.	L41OH	Object Oriented Analysis and Design	3	0	0	3	OE	IT
9.	L41OI	Digital Manufacturing	3	0	0	3	OE	MECH
10.	L41OJ	Basics of MINE Environment	3	0	0	3	OE	MINING
11.	L41OK	Rural Marketing	3	0	0	3	OE	MBA

OPEN ELECTIVE - V

S. No	Code	Course Title	L	T	P / D	Credits	Category	Approving BOS
1.	L42OA	Energy Audit & Green buildings	3	0	0	3	OE	CE
2.	L42OB	Introduction to Big Data Analytics	3	0	0	3	OE	CSE
3.	L42OC	Introduction to Generative Adversarial Networks	3	0	0	3	OE	AI&ML
4.	L42OD	Introduction to Cloud Computing	3	0	0	3	OE	AI&DS
5.	L42OE	Principles of Sensors and their Application	3	0	0	3	OE	ECE
6.	L42OF	Introduction to Electronic Instrumentation	3	0	0	3	OE	ECM
7.	L42OG	Instrumentation	3	0	0	3	OE	EEE
8.	L42OH	Cyber Laws & Ethics	3	0	0	3	OE	IT
9.	L42OI	Renewable Energy Systems	3	0	0	3	OE	MECH
10.	L42OJ	Fundamentals to Rock Mechanics	3	0	0	3	OE	MINING

11.	L42OK	Customer Relationship management	3	0	0	3	OE	MBA

I Year I Semester
AY: 2022-23

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: L110D	**ENGINEERING CHEMISTRY** (COMMON TO: AIML, CE, ME, ECE, EEE and MIE)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

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

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

Module 2: Water and Its Treatment [10L]

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

Module 3: Electrochemistry and Corrosion [12L]

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

Module 4: Chemical Fuels [8L]

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

Module 5: Polymers and Nanomaterials[12L]

Polymers [8L]
Definition – Types of polymerization – addition and condensation polymerization with examples. Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC, Nylon-6, 6 and Bakelite. Conducting Polymers-conduction in polyacetylene.
Nanomaterials[4L]

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

Text Books

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

Reference Books

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

E-Resources

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

Course Outcomes

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

CO1. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals.
CO2. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
CO3. Understand and interpret the important fundamental concepts of electrochemical procedures related to corrosion and its control.

CO4. Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.
CO5. Identify & recognize the role of polymers and Nanomaterials in everyday life.

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

Pre-Requisites:

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

Differential equations of first order and first degree ,Exact differential equation, Linear and Bernoulli differential equation.

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

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

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

Module 3: Sequences and Fourier series [10L]

Definition of a Sequence, limit, Convergent, Divergent and Oscillatory sequences.

Series, Convergent, Divergent and Oscillatory Series, Series of positive terms,P-test, Comparison test, Alternating series, Leibnitz test, Absolute and Conditionally Convergence.

Determination of Fourier coefficients, Fourier series of even and odd functions, Fourier series in an arbitrary interval, even and odd periodic continuation, Half-range Fourier sine and cosine expansions.

Module 4: Calculus and Improper integrals[9L]

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's mean value Theorem, Taylor's Series

Definition of Improper Integrals, Beta functions, Properties of beta functions, Gamma functions, Properties of Gamma functions, Relation between the Gamma and Beta functions, evaluation of improper integrals using Beta and Gamma functions.

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

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

Text Books

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

Reference Books

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

E-Resources

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

Course Outcomes

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

CO1.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)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	3	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 EEE I Year-I Sem			
Course Code: L112A	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to AIML, ECE & EEE)**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Physics

Module 1: DC and AC Circuits [10L]

Unit-I: DC Circuits [6L]

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

Unit-II: AC Circuits [4L]

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

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

Unit-I: DC Electrical Machines [5L]

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

Unit-II: AC Electrical Machines [4L]

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

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

Unit-I: Measuring Instruments [4L]

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

Unit-II: Electrical Installation [4L]

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

Module 4: Diodes and Applications [12L]

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

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

Module 5: Transistor Characteristics [12L]

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

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

Text Books

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

Reference Books

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

E-Resources

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

Course Outcomes

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

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

CO 2. Describe the construction and operation of electrical machines.

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

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

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 EEE I Year-I Sem			
Course Code: L1133	**Engineering Workshop/Manufacturing Practices**	L	T	P	D
Credits: **3**		**1**	**0**	**4**	**0**

Pre-Requisites: Basic knowledge about tools and different trades

List of experiments (Any 10-12 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.
11. To make a Square rod and S- hook from a given round rod

Demonstration

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 equipment used in fitting, carpentry, sheet metal, machine shop, welding and smithy.

CO3. Understand the basics of removal of material from work piece surface to attain specific shape.

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)													
	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	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 EEE I Year-I Sem			
Course Code: L1131	**ENGINEERING DRAWING**	L	T	P	D
Credits: **3**		**1**	**0**	**4**	**0**

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 both Principle Planes.

Unit-III: [3L]

Projections of Planes in first quadrant and inclined to both Principle Planes for Regular Geometrical 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 Compound Solids; 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)													
	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	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 I Year-I Sem			
Course Code: L1103	**CHEMISTRY LAB** (COMMON TO: AIML, CE, ME, ECE, EEE and MIE)	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 complex metric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Fe^{2+} in Mohr's salt using permanganomerty.
5. Estimation of ferrous iron by dichrometry.

Instrumental methods of Analysis:

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

Determination of Physico-Chemical Properties:

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

Synthesis of Nanomaterials, Polymers and drug molecules:

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

Text Books

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

Course Outcomes

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

1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
2. Calculate the concentration and amount of various substances using instrumental techniques.
3. Synthesize the engineering materials like nanomaterials, polymers and drug molecules.
4. Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.
5. Determine the partition coefficient of organic compound in two immiscible liquids.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE I Year-I Sem			
Course Code: L1121	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**	L	T	P	D
Credits: **2**	**(Common to AIML, ECE & EEE)**	**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:

1. Analyze DC Circuits using basic Laws.
2. Determine the impedance and current of RL, RC and RLC series circuits.
   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 I Year-I Sem			
Course Code: L11M1	**FUNCTIONAL ENGISH** (Audit Course-I) 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

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

Course Outcomes

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

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.
CO3. Learn the transformation of sentences and use them effectively.
CO4. Understand making small sentences and use them in daily colloquial situation.
CO5. Learn the useful communication expression and use them in day-to-day life.

CO-PO/PSO Mapping

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

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

I Year II Semester
AY: 2022-23

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: L120B	**ENGLISH** (Common to CE,EEE,ME,ECE,MIE & AIML)	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=APq-WBs4xyvTdVhFoCE_EIk0ydf4s65pmw%3A1650947439347&ei=b3VnYo7lFJqf4-EP9fqTIA&ved=0ahUKEwjO2Ki98rD3AhWazzgGHXX9BAQQ4dUDCA4&uact=5&oq=Continuous+Transformation-+Azim+Premji+&gs_lcp=Cgdnd3Mtd2l6EAMyBQghEKABMgUIIRCgATIFCCEQoAFKBAhBGABKBAhGGABQAFgAYLs1aAFwAXgAgAHyAYgB8gGSAQMyLTGYAQCgAQKgAQHAAQE&sclient=gws-wiz
4. https://www.britannica.com/biography/Steve-Jobs
5. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
6. https://www.learngrammar.net/english-grammar

Course Outcomes

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

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**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 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 formusing Linear Transformation and OrthogonalTransformations.

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: Findingareas and volumes, centre of gravity.

Module 4: vector differential calculus [8L]

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

Module 5: Vector integral calculus [8L]

Line, surface and volume integrals.

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

Text Books

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

Reference Books

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

E-Resources

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

Course Outcomes

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

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

CO5. Convert line integrals to surface integrals and surface integrals to volume integrals.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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 I Year-II Sem			
Course Code: L120C	**APPLIED PHYSICS (COMMON TO EEE, ECE, CSE, IT, ECM,CSE(AI&ML),CSE(DS), AI&ML&AI&DS)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Physics.

Module-1: Quantum Mechanics [9L]

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

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

Band Theory of Solids: Free electron theory, Density of energy states, Quantum theory of free electron, Bloch's theorem, Kronig-Penny model (Qualitative treatment), E-K diagram, Effective mass of electrons, origin of energy bands, Classification of materials on the basis of energy bands.

Semiconductors: Intrinsic and extrinsic semiconductors, Carrier concentration, Dependence of Fermi level on carrier concentration and temperature, Hall effect.

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

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

Module–4: Lasers & Fiber Optics [9L]

Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient of A &B, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fiber Optics: Principle and construction of an optical fiber, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), Losses in optical fibers, Optical fiber communication system with block diagram and Applications of 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. Avadhanulu, Dr. P.G. Kshirsagar – Chand.

Reference Books

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

4. P.K.Palanisamy, "Engineering Physics", Scitech Publications, Fourth edition.

E-Resources

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

Course Outcomes

After completion of this course the student is able to

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

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

3. Identify the semiconductors for engineering applications.

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

5. Formulate and solve the engineering problems on electromagnetism and dielectrics.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE I Year-II Sem			
Course Code: L125A	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The Student will:

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

Module 1:

INTRODUCTION TO PROGRAMMING:

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Module 2:

ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures.

Preprocessor: Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

Module 3:

POINTERS AND FILE HANDLING IN C:

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

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

Module 4:

FUNCTION AND DYNAMIC MEMORY ALLOCATION:

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

libraries.

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

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

Module 5:

INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques),Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of 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'sOutline of Programming with C,McGraw-Hill

E - Resources:

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

Course outcomes:

The student will be able to:

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

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

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	-	-	-	-	-	-	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**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: L1202	**PHYSICS LAB**	L	T	P	D
Credits: **1**	**(**COMMON TO: All branches**)**	**0**	**0**	**2**	**0**

Pre-Requisites: Intermediate basic concepts.

List of Experiments:

1:Energy gap of P-N junction diode

To determine the energy gap of a semiconductor diode.

2. Solar Cell:

To study the V-I Characteristics of solar cell.

3. Light emitting diode and Laser Diode:

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

4. Optical fiber:

Determination of Numerical Aperture of an optical fibre.

5. Hall effect:

To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect

To determine work function of a given material.

7. LASER

To study the Wave length of LASER Source.

8. Dielectric Constant

To determine the Dielectric constant of the given material.

9. LCR Circuit

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

10. R-C Circuit

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

11.Melde's Experiment

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

12. Torsional Pendulum

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

13.Newton's Rings

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

14.Diffraction Grating

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

15.Sonometer

To determine the frequency of AC Supply sonometer.

Note: Any 10 experiments are to be performed.

Text Books

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

Course Outcomes

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

1. Learn the experimental concepts on in LED, Electric and Electronics materials.
2. Get the knowledge of fundamentals of Semiconductor physics.
3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of waves, oscillations and optics.
5. Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: L1201	**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB** (Common to CE,EEE,ME,ECE,MIE & AIML)	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:
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.

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)-Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:
Group Discussion skills-mock GDs

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; Prepared for JNTUH; 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**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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 EEE I Year-II Sem			
Course Code: L1251	PROGRAMMING FOR PROBLEM SOLVING LAB	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The student will:

1. Work with an IDE to create, edit, compile, run and debug programs

2. Analyse the various steps in program development.

3. Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.

4. Develop modular, reusable, and readable C Programs using the concepts like functions, arrays etc.

5. Write programs using the Dynamic Memory Allocation concept, files

Lab Experiments:

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

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

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

Case Studies:

1. Implement Hotel Management system in C with the following requirements.

Requirements:

-Provide the information on reserving rooms, book an event, check the features

- Give the login for both admin and user for proper login validation

-Add/View/Edit/Delete user records

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

Course Outcomes:

The student will be able to:

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

CO-PO/PSO Mapping Chart

(3/2/1 indicates strength of correlation)

3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	-	-	-	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**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE I Year-II Sem			
Course Code: L12M2	**AUDIT COURSE – II (HUMAN VALUES AND PROFESSIONAL ETHICS)**	L	T	P	D
Credits: **0**	**(CE, ECE, EEE, ME, MIE, AIML)**	**0**	**0**	**2**	**0**

Objectives: This introductory course input is intended

- To help the students appreciate the essential complementarity between 'VALUES'and'SKILLS'toensuresustainedhappinessandprosperitywhicharethecoreaspirationsofallhumanbeings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding interms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UnitI:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and processforValue Education. Self Exploration–what is it? - its content and process; 'NaturalAcceptance' and Experiential Validation- as the mechanism for selfexploration.ContinuousHappinessandProsperity-AlookatbasicHumanAspirations.Rightunderstanding, Relationship and Physical Facilities-the basic requirements forfulfillmentofaspirationsofevery human being withtheircorrectpriority.
Understanding Happiness and Prosperity correctly- A critical appraisal of thecurrent scenario. Method to fulfill the above human aspirations: understandingandlivinginharmonyatvariouslevels.

UnitII:

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'- Sukhand Suvidha.
Understanding the Body as an instrument of 'I' (I being the doer, seer andenjoyer). Understanding the characteristics and activities of 'I' andharmony in 'I'.Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity indetail. Programs to ensure Sanyamand Swasthya.

UnitIII:

UnderstandingHarmonyintheFamilyandSociety-HarmonyinHuman

- Human Relationship : Understanding harmony in the Family- the basic unit ofhuman interaction. Understanding values in human-human relationship; meaningof Nyaya and program for its fulfillment to ensure Ubhay-tripti; **Trust (Vishwas)andRespect(Samman)asthefoundationalvaluesofrelationship.**
Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman,Difference between respect and differentiation; the other salient values in relationship. Understanding theharmony inthe society(societybeing an extensionof family):Samadhan,Samridhi,Abhay, Sah-astitva as comprehensive Human Goals. Visualizing auniversal harmonious order in society- Undivided Society (Akhand

Samaj),UniversalOrder(SarvabhaumVyawastha)-fromfamilytoworldfamily!

UnitIV:

UnderstandingHarmony inthe Nature andExistence - Whole existence as Co-existence: UnderstandingtheharmonyintheNature.Interconnectednessandmutual fulfillment among the four orders of nature-recyclability and self-regulation in nature. Understanding Existence as Co- existence (Sah-astitva) ofmutuallyinteractingunitsinall-pervasivespace.Holisticperceptionofharmonyatalllevelsofexistence.

UnitV:

Implicationsof theaboveHolisticUnderstandingof HarmonyonProfessional Ethics : Natural acceptance of human values. DefinitivenessofEthical Human Conduct. Basis for Humanistic Education, HumanisticConstitutionandHumanisticUniversalOrder.Competenceinprofessionalethics:

Ability toutilize the professional competence foraugmentinguniversalhumanorder,Abilitytoidentifythescopeandcharacteristicsofpeople-friendlyandeco-friendly productionsystems, Ability to identify and develop appropriatetechnologiesandmanagementpatternsforaboveproductionsystems.

Case studies of typical holistic technologies, management models and productionsystems.Strategy for transition from the present statetoUniversalHumanOrder:Atthe level of individual: as socially and ecologically responsible engineers,technologists andmanagers At the level of society: as mutually enrichinginstitutionsandorganizations

TEXTBOOKS

RRGaur,RSangal,GPBagaria,2009,AFoundationCourseinHumanValuesandProfessionalEthics.

Prof.KVSubbaRaju,2013,SuccessSecretsforEngineeringStudents,SmartStudentPublications,3rd Edition.

REFERENCEBOOKS

IvanIllich,1974,Energy&Equity,TheTrinityPress,Worcester,andHarperCollins,USA

E.F.Schumacher,1973,SmallisBeautiful:astudyof economicsasifpeoplemattered,Blond&Briggs,Britain.

ANagraj,1998,JeevanVidyaekParichay,DivyaPathSansthan,Amarkantak.

SussanGeorge,1976,HowtheOtherHalfDies,PenguinPress.Reprinted1986,1991

PLDhar,RRGaur,1990,ScienceandHumanism,CommonwealthPurblishers.

A.N.Tripathy,2003,HumanValues,NewAgeInternationalPublishers.

SubhasPalekar,2000,HowtopracticeNaturalFarming, Pracheen(Vaidik)KrishiTantraShodh,Amravati.

DonellaH. Meadows,DennisL.Meadows,Jorgen Randers,William

W.BehrensIII,1972,LimitstoGrowth–ClubofRome'sreport,UniverseBooks.

E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers,OxfordUniversityPress

MGovindrajran,SNatrajan&V.S.SenthilKumar,EngineeringEthichs(includingHumanValues),Eastern EconomyEdition,PrenticeHallofIndiaLtd.

RelevantCDs, Movies,Documentaries&OtherLiterature:

Value Education website, http://www.uptu.ac.inStoryofStuff,http://www.storyofstuff.com
Al Gore, An Inconvenient Truth, Paramount Classics, USACharlieChaplin,ModernTimes,UnitedArtists,USA
IITDelhi,ModernTechnology–theUntoldStory

II Year I Semester
AY: 2022-23

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: L220A	**INTEGRAL TRANSFORMS (Common to EEE &ECE)**	L	T	P	D
Credits:**3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1:Introduction **[8L]**

Basic Introduction of the course using precise examples like periodic functions, signal propagation, solving mathematical models corresponding to Electrical Circuits.

Module 2: Laplace Transforms **[12L]**

Laplace Transform (LT) – Definition, linearity property of LT, Existence Theorem, First and Second Translation theorems. Change of scale property. LT of derivatives, LTs: multiplication by t and division by t,Initial and Final Value theorems.

Inverse Laplace Transforms: Definition , standard forms,first and second shifting theorems. Change of scale property, Use of partial fractions, Multiplication by powers of S, division by S. Inverse transform of derivatives. Heavisideexpansion theorem. Inverse Laplace Transform of integrals, definition of convolution, Convolution theorem.

Module 3: Fourier Transforms **[10L]**

Fourier Transforms ,Fourier integral formula, Inverse Theorem for Fourier Transform, Fourier Sine Transform, Inverse formula for Fourier Sine Transform, Fourier Cosine Transform, Inverse formula for Fourier Cosine Transform, linearity property, change of scale property, shifting property, Modulation Theorem

Module 4: Z-Transforms **[9L]**

Definition and properties of Z-Transform, Standard functions of Z-Transform, Unit step Function. Unit Impulse function, Initial value Theorem and Final value Theorem, Inverse Z-Transform, Partial fraction method, Difference Equation using Z-Transforms.

Module 5: Henkel Transforms **[9L]**

Henkel Transforms,Henkel Transform of the derivatives of a function, Application

of Henkel Transforms in boundary value problems, The finite Henkel Transform.

Text Books

1. A.R.Vashista, Dr. R.K.Gupta, Integral transforms - Krishna Prakasham Mandir urray
2. .R.Spiegel, Theory and problems of Laplace transforms - Shamus Outline Series Tata Mac Grawhill

Reference Books

1. Brian Daries, Integral Transforms & their applications - Springers
2. L Debnath , D Bhatta, Integral Transforms & their Applications – Chapman & Hall/CRC

3. Chorafas, Integral Transforms & their Applications

E-Resources

1. https://nptel.ac.in/content/storage2/courses/112104158/lecture8.pdf
2. https://tutorial.math.lamar.edu/classes/de/inversetransforms.aspx
3. http://www.thefouriertransform.com/

4. http://dsp-book.narod.ru/TAH/ch06.pdf
5. https://www.henkel-adhesives.com/in/en.html

Course Outcomes

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

CO1. Understand the concepts of integral transform
CO2. Determine Laplace transform of a function and understand the fundamental properties and apply Laplace transform in solving ODEs.
CO3. Determine Fourier and inverse Fourier transform of a function and understand the fundamental properties and apply Fourier transform in solving ODEs.
CO4. Apply the Z transforms techniques to solve second-order ordinary difference equations.
CO5. Apply the Henkel transform in the infinite 2-dimensional plane

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	3	2	3	-	-	-	-	-	-	-	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 EEE II Year-I Sem			
Course Code: L212A	**ELECTRICAL CIRCUIT ANALYSIS**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Electrical Engineering

Module 1: INTRODUCTION OF A.C. CIRCUITS & A.C. NETWORK THEOREMS [10L]

Unit-I: [6L]

Sinusoidal steady state analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power.

Unit-II: [4L]

Network Theorems: Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources, Node and Mesh Analysis, Concept of duality and dual networks.

Module 2: TRANSIENT RESPONSE ANALYSIS [9L]

Solution of First and second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits. Initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response in case of step, impulse & Sinusoidal inputs.

Module 3: THREE-PHASE CIRCUITS & COUPLED CIRCUITS [9L]

Unit-I: [5L]

Three-phase circuits: Star and delta connections, three-phase three wire and three phase four-wire systems, Analysis of balanced and unbalanced star and delta connected loads, Power in three-phase circuits. Measurement of power by two wattmeter method for balanced and Unbalanced load, Numerical problems.

Unit-II: [4L]

Coupled Circuits: Mutual coupled circuits, Dot convention in coupled circuits, Ideal Transformer.

Module 4: LAPLACE TRANSFORMS FOR ELECTRICAL CIRCUITS [10L]

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation, Poles and Zeros, Frequency response (magnitude and phase plots), series and parallel resonances.

Module 5: TWO PORT NETWORK PARAMETERS [9L]

Two Port Network and Network Functions: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters. Transmission Parameters and hybrid parameters, interconnections of two port networks.

Text Books

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013**.**
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
3. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.

Reference Books

1. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
2. A.Chakrabarti, "Circuit Theory (Analysis and Synthesis)"-Dhanpat Rai & Co.,2013
3. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

E-Resources

1. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic
2. https://www.allaboutcircuits.com
3. https://sites.google.com/site/eeenotes2u/courses/network-analysis

4. https://www.sciencedirect.com/topics/engineering/circuit-theory
5. https://www.electronics-tutorials.ws/
6. http://dl.booktolearn.com/ebooks2/engineering/electrical/9781119284932_Introduction_to_Electrica l_Circuit_Analysis_71f7.pdf
7. https://www.electrical4u.com/electrical-engineering-articles/circuit-theory/

Course Outcomes

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

CO 1. Apply Network Theorems for solving AC circuit equations.

CO 2. Evaluate first and second order networks.

CO 3. Analyse three-phase and mutually coupled circuits.

CO 4. Practice Laplace transforms on electrical circuits.

CO 5. Develop two port Network parameters for electrical circuits.

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**	**3**	**3**
CO2	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO5	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
Average	**3**	**3**	**2**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**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 EEE II Year-I Sem			
Course Code: L212B	ELECTRICAL MACHINES – I	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Electrical Engineering

Module 1: ELECTROMECHANICAL ENERGY CONVERSION [8L]

Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems, Torque Expression.

Module 2: D.C. GENERATORS [14L]

Construction & Operation D.C. Generators – Principle of operation – Action of commutator - constructional features – DC Armature Windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation**.** Classification of Dc Generators- Self Excited, Separately Excited. Open Circuit Characteristics, Critical Resistance & Speed. Causes of Failure Of Self Excitation & Their Remedies – Problems.

Module 3: ARMATURE REACTION IN D.C. GENERATOR [10L]

Armature reaction –Effects –Distribution Of Field MMF & Armature MMF– Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. Generator Characteristics-Power Stages-Losses-Efficiency-Parallel Operation-Problem.

Module 4: D.C. MOTORS [14L]

D.C Motors – Principle of operation – Back E.M.F. - VOLTAGE &Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Condition For Maximum Mechanical Power Developed. Power Stages. Efficiency –Condition for Maximum Efficiency-Problems.

Module 5: SPEED CONTROL OF D.C. MOTORS [12L]

Speed control of D.C. Motors: Armature voltage and field flux control methods. Ward- Leonard system. Principle of 3 point and 4 point starters – protective devices. Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne‘s test – Hopkinson‘s test – Field‘s test – Retardation test – separation ofstray losses in a d.c. motor test.

Text Books

1. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw HillEducation, 2013.
2. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBSPublishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

Reference Books

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
3. B L Theraja and A K Theraja, "A Text Book on Electrical Technology" Vol-2,S Chand Publications

E-Resources

1. https://nptel.ac.in/courses/108/105/108105155/
2. https://nptel.ac.in/courses/108/105/108105017/
3. https://nptel.ac.in/courses/108/102/108102146/

Course Outcomes

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

CO 1. Recollect magnetic field and magnetic circuit.

CO 2. Explain the construction and operation of DC Machine.

CO 3. Derive the EMF equation, Torque equation, Armature circuit equation for motoring and generation.

CO 4. Demonstrate the various characteristics of DC Machines.
CO 5. Summarize the speed control methods OF DC MOTOR.

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**	**2**	-	**1**	-	-	-	-	-	-	**1**	
CO2	**3**	**2**	**3**	**1**	-	**1**	-	-	-	-	-	-	-	**2**
CO3	**3**	**3**	**3**	**2**	-	**2**	-	-	-	-	-	-	-	**2**
CO4	**3**	**2**	**1**	**1**	-	**1**	-	-	-	-	-	-	-	**2**
CO5	**3**	**2**	**1**	**2**	-	**1**	-	-	-	-	-	-	**2**	-
Average	**3**	**2**	**1.8**	**1.6**	-	**1.2**	-	-	-	-	-	-	**0.6**	**1.2**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE II Year-I Sem			
Course Code: L212C	POWER SYSTEMS – I	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Electrical Engineering

Module 1: Power Stations Thermal [10L]

Unit-I: [6L]

Power Stations

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components: -Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

Hydel Power Stations- Schematic Arrangement, Brief description of Hydraulic Structures, Water turbines.

Unit-II: [4L]

Nuclear Power Stations- Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants, Radiation hazards- Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations- Principle of Operation and Components (Block Diagram Approach Only).

Module 2: D.C. & A.C Distribution Systems [9L]

Unit-I: [5L]

D.C Distribution Systems - Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage, Drop Calculations (Numerical Problems in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal voltages) and Ring Main Distributor.

Unit-II: [4L]

A.C Distribution Systems - Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to related load voltages.

Module 3: Air Insulated Substation (AIS) & Gas Insulated (GIS) Substation [8L]

Unit-I: [4L]

Classification of Substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.

Bus Bar Arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Unit-II: [4L]

Gas Insulated Substations (GIS)-Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Comparison of Air insulated substations and Gas insulated substations.

Module 4: Power Factor [10L]

Unit-I: [5L]

Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors - Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems.

Unit-II: [5L]

Voltage Control- Dependency of Voltage on Reactive Power flow. - Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

Module 5: Economic Aspects of Power Generation & Tariff [9L]

Unit-I: [5L]

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Unit-II: [4L]

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs.

Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three-part, and power factor tariff methods and Numerical Problems.

Text Books

1. A.Chakrabarthi, M.L.Soni, P.V.Gupta and M.I Soni, Dhanpath Rai and Sons "A Text Book on Power System Engineering."
2. C.L.Wadhwa, New Age International, "Generation, Distribution and Utilization of Electrical Energy"
3. V.K.Mehta and Rohit Mehta, S.Chand Company Pvt. Ltd , "Principles of Power Systems".
4. J.B.Gupta, S.K.Kataria& Sons. "A course in Power Systems"

Reference Books

1. R.K. Rajput, "A Text book of Power system Engineering," Laxmi Publications (P) Limited.
2. S.N.Singh', "EIectrical Power Generation,Transmission and Distribution," PHI.
3. C.L.Wadhawa "Eletrical Power Systems" New Age International (P) Limited, Publishers.
4. Dr. B.R. Gupta,"Generation of Electrical Energy," S. Chand Publications

E-Resources

1. https://www.mechanicaltutorial.com/power-system-objective-type-questions-and-answers
2. https://lecturenotes.in/subject/471/power-system-1-ps-1

Course Outcomes

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

CO 1. Understand the concepts of generating stations, substations, tariff systems.

CO 2. Apply concepts in distribution systems to solve problems.

CO 3. Analyze economics of power generation and Power factor correction.

CO 4. Evaluate the power tariff methods.

CO 5. Know the importance of Power factor improvement and voltage control.

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**	-	-	-	-	-	-	-	**3**	**2**
CO2	**3**	**3**	**2**	**2**	**2**	-	-	-	-	-	-	-	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**2**	-	-	-	-	-	-	-	**3**	-
CO4	**3**	**3**		**2**	**2**	-	-	-	-	-	-	-	**2**	-
CO5	**3**	**3**	**3**	**3**	**1**	-	-	-	-	-	-	-	**2**	-
Average	**3**	**2.8**	**1.8**	**2.4**	**1.8**	-	-	-	-	-	-	-	**2.6**	**0.8**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE II Year-I Sem			
Course Code: L212D	ELECTROMAGNETIC FIELDS	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Semiconductor Physiscs

Module 1: ELECTROSTATIC FIELD [10L]

Introduction - Coulomb's law – Electric field intensity – electric fields due to point, line, surface and volume charge distributions – Electric flux density – Gauss law – Electric potential – potentialgradient – Divergence and divergence theorem – Poisson's and Laplace equations.

Module 2: ELECTROSTATIC APPLICATIONS [9L]

Field due to dipoles – dipole moment – Current and current density – Conductors and Dielectrics - Boundary conditions – capacitance – Dielectric interface – Capacitance of system of conductors – Dielectric constant and Dielectric strength - Energy stored in capacitor – Energy density.

Module 3: STEADY ELECTRO-MAGENTIC FIELDS [8L]

Introduction – Biot - Savart Law – Ampere's Circuital Law – Applications – Curl – Stoke's theorem – Magnetic flux – Magnetic flux density – The Scalar and Vector magnetic potentials – Force on a moving charge and current elements – Force and Torque on closed circuit.

Module 4: MAGNETO STATICS AND APPLICATIONS [10L]

Introduction to magnetic materials – Magnetization and Permeability – Magnetic boundaryconditions – Magnetic circuit – Potential energy and forces on Magnetic materials – Inductance and mutual inductance – Inductance of solenoids, toroids, and transmission lines – Faraday's Law – Time varying magnetic field.

Module 5: ELECTROMAGNETIC FIELDS AND WAVE PROPAGATION [9L]

Conduction current and Displacement current – Maxwell's equation in point and integral forms – Wave propagation in free space – Wave propagation in Dielectrics – Power and the Poynting Vector - Propagation in good conductors – Wave polarization.

Text Books

1. William Hayt," Engineering Electromagnetics", McGraw Hill, New york, 7th edition,2005.
2. K.A.Gangadhar, "Field theory", Khanna publishers, New Delhi, 15th edition,2004.

Reference Books

1. David K Cheng, "Field and Wave Electromagnetics", Pearson Education, 2nd edition,2004.
2. John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition,1999.
3. N. NarayanaRao, "Elements of Engg. Electro Magnetics", Prentice Hall of India, 6rd
4. Edition, 2008.
5. T.V.S. Arun Murthy, "Electromagnetic Fields", S.Chand, 2008.
6. David J Griffiths, "Introduction to Electrodynamics, PHI, 3rd edition, 2008.

E-Resources

1. https://nptel.ac.in/content/storage2/courses/108105053/pdf/(TB)(EMF)%20((EE)NPTEL).pdf
2. https://nptel.ac.in/content/storage2/courses/108105053/pdf/(TB)(EMF)%20((EE)NPTEL).pdf

Course Outcomes

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

CO 1. Understand the basic mathematical concepts related to electromagnetic vector fields.

CO 2. Summarize the concepts of electrostatic fields, electrical potential, energy density and theirapplications.

CO 3. Explain the concepts of Magneto static fields, magnetic flux density, vector potential and itsapplications.

CO 4. Explain the concepts of different methods of E.M.F generation and Maxwell's equations.

CO 5. Understand the concepts of Electromagnetic waves and characterizing parameters.

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**	**3**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**2**	**3**	**-**	**-**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**3**
CO3	**3**	**2**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	**3**	**2**	**3**	**-**	**-**	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**2**
Average	**3**	**2.4**	**2.4**	**-**	**-**	**2.8**	**2.8**	**2.8**	**-**	**-**	**-**	**-**	**-**	**2.4**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: L2121	ELECTRICAL CIRCUITS & SIMULATION LAB	L	T	P	D
Credits: 2		0	0	4	0

Pre-Requisites: Basic Electrical Engineering Lab

Total ten experiments to be conducted from the list of following experiments.

1. Verification of Mesh and Nodal analysis.
2. Verification of Super Position theorem.
3. Verification of Thevenin's & Norton's theorem.
4. Verification of Maximum Power Transfer theorem.
5. Verification of Reciprocity theorem.
6. Verification of Compensation theorem.
7. Verification of Milliman's theorem.
8. Determination of transient response of current in RL and RC circuits.
9. Determination of self, mutual inductances and coefficient of coupling.
10. Frequency response of Series and Parallel resonance circuits.
11. Determination of Z and Y parameters.
12. Determination Transmission and hybrid parameters.

Course Outcomes:

The student will be able to:

1. Impart hands on experience in verification of circuit laws and theorems
2. Use different meters and instruments for the measurement of common electrical quantities
3. Apply the theorem statements concepts in the design of electrical circuits
4. Measure the network parameters in any electrical circuit
5. Make use of simulation packages for simple programs circuit design methods

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	
	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	-	2	-	-	-	2	-	-	-	2	3
CO2	3	3	3	-	3	-	-	-	2	-	-	-	2	2
CO3	3	2	3	-	2	-	-	-	2	-	-	-	2	3
CO4	3	3	3	-	3	-	-	-	2	-	-	-	2	2
CO5	3	3	3	-	2	-	-	-	2	-	-	-	2	3
Average	3	2.8	3	-	2.4	-	-	-	2	-	-	-	2	2.6

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: L2122	ELECTRICAL MACHINES LAB – I	L	T	P	D
Credits: 2		0	0	4	0

Pre-Requisites: Basic Electrical Engineering Lab

Total ten experiments to be conducted from the list of following experiments.

1. Magnetization characteristics of DC shunt generator. Determination of critical fieldresistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Brake test on DC shunt motor. Determination of performance curves.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.
9. Fields test on DC series machines. Determination of efficiency.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.

Course Outcomes:

The Student will be able to

1. Understand the familiarity with the types of DC machines and their basic characteristics.
2. Study the methods to predetermine the efficiency of DC machines.
3. Knowledge of methods and measuring devices for determination of variouscharacteristics and parameters of DC machines.
4. Understand the operation of DC machines in load sharing.
5. Demonstrate the ability to work effectively in groups to troubleshoot and analyze DC machines

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	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	2	-	3	-	-	-	-	-	-	2	-
CO2	3	2	1	3	-	2	-	-	-	-	-	-	-	2
CO3	3	2	3	2	-	2	-	-	-	-	-	-	3	-
CO4	3	2	3	3	-	2	-	-	-	-	-	-	-	2
CO5	2	3	1	1	-	1	-	-	-	-	-	-	2	-
Average	2.8	2.2	1.8	2.2	-	2	-	-	-	-	-	-	1.4	0.8

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: L21M1	**GENDER SENSITIZATION** (Mandatory Course) COMMON TO: ALL	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1:UNDERSTANDING GENDER[6L]

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

Module 2: GENDER AND BIOLOGY[6L]

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

Module 3: GENDER AND LABOUR[6L]

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

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

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

Module 5ISSUES OF VIOLENCE-II[6L]

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

Text Books

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

Reference Books

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

E-Resources

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

Course Outcomes

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

CO1. develop a better understanding of important issues related to gender in contemporary India.

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

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

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

CO5. be better equipped to work and live together as equals.

CO-PO/PSO Mapping

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

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

II Year II Semester
AY: 2022-23

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: L210B	**Complex Variables and Special Functions (COMMON TO: EEE & ECE)**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module –I Special functions- Bessel function-Legendre function: [9L]

Bessel functions, Recurrence relations, properties. Generating function and orthogonal properties, Legendre polynomials, recurrence relations, Rodrigue's formula,

Module 2: Functions of Complex Variables [10L]

Functions of a complex variable, Continuity, Differentiability, Analyticity, Singular point, Cauchy-Riemann equations in Cartesian and polar coordinates, Harmonic and conjugate harmonic functions, Milne-Thompson method. Analyticity of Exponential, trigonometric, hyperbolic functions and their properties.

Module 3: Complex Integration and Power Series [9L]

Line integral, evaluation along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula, generalized integral formula (with proofs).

Radius of convergence, Expansion in Taylor's series, Maclaurin's series and Laurent series.

Module 4: Contour Integration [10L]

Singular point, types of singularity, Residues Evaluation of residues by using Laurent's series & Residue theorem.

Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$, (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$

Module 5: Conformal Mapping [10L]

Transformation by e^z, lnz, z^2, z^n (n positive integer), Sinz, cosz, z + a/z, translation, rotation, inversion and bilinear transformation , fixed point , properties of cross ratio , invariance of circles , determination of bilinear transformation mapping three given points.

Text Books

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publications, 2017
2. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.
3. R.V. Churchill, Complex variables and its applications, McGraw Hill, 2009.

Reference Books.

1. W.W. Bell, Special Functions for Scientists and Engineers, Dover Publications, 2004
2. Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition, 2008. 4

E-Resources

1. **http://scipp.ucsc.edu/~dine/ph212/212_special_functions_lecture.pdf**
2. **https://nptel.ac.in/courses/111/107/111107056/**
3. **https://www.math.arizona.edu/~faris/methodsweb/complex.pdf**
4. **https://www.researchgate.net/publication/256194654_Conformal_mappings_and_spaces_of_analytic_functions**
5. **https://www.youtube.com/watch?v=ZaaeInBsRfo**

Course Outcomes

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

CO1. Learn and use properties of Bessel's and Legendre functions.
CO2. Understand the concept of Analytic functions.

CO3. Use power series and solve the ordinary differential equations.
CO4. Understand the use of complex variables and evaluation of real integrals.
CO5. Convert complicated regions to simpler regions using the conformal mapping.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	2	-	-
Average	3	2	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 II Year-II Sem			
Course Code: L222A	DIGITAL ELECTRONICS (EEE)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: Digital Fundamentals [9L]

Unit-I: Number Systems [6L]

Analogue Versus Digital, Binary, Octal, Decimal and Hexa decimal Number systems and their conversions. Number Representation in Binary- Sign bit Magnitude, 1's and 2's Complement. Floating Point Numbers- Range of Numbers and Precision, Number formats.

Unit-II: Binary Codes [3L]

BCD, Excess-3, Gray code and their Conversions with binary. Parity bit, Hamming code.

Module 2: Name of the Module [9L]

Unit-I: Basic Digital Circuits [4L]

Logic gates, Universal gates, Boolean Algebra - Fundamental Postulates, Properties and Boolean theorems, Switching Functions - Sum of products and product of sums, Canonical/ Standard forms, Minterms and Maxterms.

Unit-II: Minimization of Switching Functions [5L]

Karnaugh Map Method- Two, Three, Four and Five variable, don't care combinations, Quine Mc-cluskey Tabular Method, Prime –Implicant chart, Simplification rules.

Module 3: Combinational Logic Design [8L]

Unit-I: Arithmetic Circuits [4L]

Basic Building Blocks-Adders, Subtractors, BCD Adder, Serial adder, parallel adder, magnitude comparator

Unit-II: Multiplexers and Demultiplexers[4L]

Multiplexer, Demultiplexer /Decoders, Encoder, Priority Encoder

Module 4: Sequential Circuits [10L]

Unit-I: Synchronous Sequential Circuits [6L]

Flip-Flops- SR, JK, D, T, Master-Slave JK FF operation, Excitation tables, Flip flop conversions, counters design.

Unit-II: Finite State Machines [4L]

Classification, Design – Moore/Mealy models, Capabilities and Limitations of FSMs.

Module 5: Memories and Programmable Logic [7L]

Unit-I: Memory organization [4L]

ROM, PROM, EPROM, EEPROM, Internal Structure and operation of RAM- Static and Dynamic

Unit-II: Programmable Logic Devices [3L]

Realization of Switching functions using PLD's-ROM, PLA and PAL

Text Books

3. Switching & Finite Automata theory – Zvi Kohavi, 2 ed., TMH.
4. Digital Design – Morris Mano, 3 ed., 2006, PHI.

Reference Books

6. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.

7. An Engineering Approach to Digital Design – Fletcher, PHI.
8. Digital Electronics, Principles, Practices and Applications-Anil k Maini- Wiley, 2007

E-Resources

1. http://www.inf.fu-berlin.de/lehre/WS00/19504-V/Chapter1.pdf
2. https://nptel.ac.in/courses/108/105/108105113/

Course Outcomes

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

CO1. Understand conversions of Number systems and Number formats

CO2. Apply fundamental postulates and methods for Minimization of Switching Functions

CO3. Design Combinational logic circuits

CO4. Design Sequential circuits with Mealy and Moore models

CO5. Understand Memory operations and design using PLDs.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-	3	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-	3	-
CO5	3	1	3	-	-	-	-	-	-	-	-	-	3	-
Average	**2**	**1.6**	**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 EEE II Year-II Sem			
Course Code: L222B	ELECTRICAL MACHINES-II	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Electrical Machines - I

Module 1: Transformers (Part-I) [11L]

Transformer principle-Need of Transformer-construction-types of transformers-EMF equation- core losses- Ideal Transformer, practical transformer on No-load-phasor diagram- Excitation phenomenon, practical Transformer on load-phasor diagrams Equivalent circuit - Inrush currents.

Module 2: Transformers (Part-II) [17L]

Voltage Regulation-Dependency of voltage Regulation on load power factor-losses Efficiency- Condition for maximum efficiency- Testing of Transformers- Polarity Test - OC Test-SC Test- Sumpner's Test - Auto transformer- Power and Distribution Transformers differences-All day efficiency.

Module 3: Parallel Operation and Three Phase Transformers [9L]

Parallel operation – conditions - problems - construction of three phase transformer Poly-phase connections Y/Y, Y/Δ, Δ /Y, Δ / Δ and open Δ, Zig-Zag Connections -Third harmonics in phase voltages-three winding transformers- Scott connection - On load tap changer, OFF load tap changer - cooling of a transformer.

Module 4: Poly Phase Induction Motors (Part-I) [10L]

Three phase induction motors - construction – Types of rotors – Rotating Magnetic field – Principle of operation – Slip – Rotor frequency – Rotor Equivalent Circuit – Rotor Input – Mechanical Power developed- Complete equivalent circuit –Phasor 76 diagrams at starting and running conditions – Losses and power flow –Efficiency Torque Equation – Starting and maximum torque – Torque Slip Characteristics – Deep bar and double cage rotors.

Module 5: Poly Phase Induction Motors (Part-II) [10L]

Circle diagram: No load and Blocked rotor tests-Performance Analysis from circle diagram – starting of Induction motors – Different Starters – Speed control – Control from stator and rotor sides – Crawling and cogging -Induction Generator.

Text Books

1. P.S.Bhimbra**, "Electrical machines"**, Khanna Publishers.
2. A.E. Fritzgerald, C.Kingsley and S.Umans**, "Electric machinery"**, Mc Graw Hill Companies, 5th edition.
3. B L Theraja and A K Theraja, "A Text Book on Electrical Technology" Vol-2, S Chand Publications.

Reference Books

1. M.G.Say **"Performance and Design** of AC Machines" BPB Publishers
2. Langsdorf **"Theory of Alternating Current Machinery"** Tata McGraw-Hill Companies, 2nd edition.
3. I.J.Nagrath and D.P.Kothari **, "Electric Machines"**,Tata Mc Graw Hill, 7th Edition.2005.

E-Resources

1. https://nptel.ac.in/courses/108/106/108106072/
2. https://nptel.ac.in/courses/108/105/108105131/
3. https://nptel.ac.in/courses/108/102/108102146/

Course Outcomes

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

CO 1. Analyze the performance of a transformer under different operating conditions and recognize the various losses & drops inside a transformer and discuss about transformer.

CO 2. Evaluate the performance of single-phase transformer by estimating its efficiency, regulation.

CO 3. Apply parallel operation of single-phase and three-phase transformers to meet the maximum

demand.

CO 4. Describe the working principle of induction motors based on basic theories of electromagnetic induction and analyze the motor from its speed-time characteristics.

CO 5. Analyze the performance by Constructing circle diagram of an induction motor.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	**3**	**2**	**1**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	
CO2	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**3**	**2**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	
CO4	**3**	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**2**	**3**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Average	**2.8**	**2.2**	**1.8**	**2.2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1. 4**	**0. 8**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE II Year-II Sem			
Course Code: L222C	**CONTROL SYSTEMS**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Electrical Circuit Analysis

Module 1: INTRODUCTION [10L]

Introduction to control systems – Control theory concepts - Open loop and feedback control systems-Different examples of control systems-Mathematics modeling of control systems - Translational and rotational mechanical systems– Analysis of control systems using Laplace transforms-Block diagram reduction techniques – Signal flow graphs reduction using Mason's gain formula.

Module 2: TIME RESPONSE ANALYSIS [9L]

Standard test signals, Analysis of transient and steady state behavior of control systems – Time response of first order and higher order systems –Time domain specifications, steady state response-steady state error and error constants –effects of proportional derivative, proportional integral systems.

Module 3: STABILITY & ROOT LOCUS TECHNIQUES [8L]

Concept of Stability-Routh-Hurwitz Criterion-Relative Stability analysis-Root-Locus technique. Construction of Root-loci-Effects of adding poles and zeros to G(s)H(s) on the root loci.

Module 4: STABILITY ANALYSIS IN FREQUENCY DOMAIN [10L]

Frequency domain specifications- Relationship between time and frequency response-Bode diagrams-Determination of frequency domain specifications and transfer function from the Bode diagram- Phase and Gain margin- stability analysis from Bode plots- Polar plots- Nyquist plots and applications of Nyquist criterion to find the stability.

Module 5: STATE SPACE ANALYSIS OF LINEAR CONTINUOUS SYSTEMS [9L]

Concepts of state- state variables and state vector-derivative of state model from transfer function-Derivative of transfer function from state model- diagonalization- Eigen values and Eigen Vectors-solving the time invariant state equations- state transition matrix and its properties- Controllability and Observability.

Text Books

1. I.J.Nagrath and M.Gopal, "Control systems Engineering", 5th edition, New Age International (P) Limited, New Delhi, 2007.
2. A. Anand Kumar , "Control Systems" , 2nd edition, PHI Learning Private Limited
3. A. NagoorKani, "Control Systems", RBA Publications, 2006

Reference Books

1. K. Ogata, "Modern control engineering", Pearson Education, 4th edition, 2004.
2. Richard C. Dorf and Robert H. Bishop , "Modern Control Systems," Pearson Education, 2021
3. B. C. Kuo, "Automatic Control System" Prentice Hall, 1995

E-Resources

1. https://nptel.ac.in/courses/107/106/107106081/
2. https://ocw.mit.edu/courses/mechanical-engineering/2-04a-systems-and-controls-spring-2013/lecture-notes-labs/

Course Outcomes

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

CO 1. Summarize the basic elements and structures of feedback control systems.
CO 2. Evaluate the time response, steady state response, errors of control systems.
CO 3. Analyze stability of control systems using time domain specifications.
CO 4. Develop frequency response plots to analyze control systems
CO 5. Apply State Space Analysis for linear time invariant control systems and test controllability and observability of control systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O 2**
CO1	**3**	**2**	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO2	**3**	**3**		**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**
CO3	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**
CO4	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**
CO5	**3**	**2**		**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Average	**3**	**2.6**	**2. 5**	**2. 6**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2.8**	**-**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE II Year-II Sem			
Course Code: L222D	POWER SYSTEMS – II	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Power System -I

Module 1: TRANSMISSION LINE PARAMETERS [10L]

Unit-I: [6L]

Types of conductors, Calculation of resistance for solid conductors, Calculation of inductance for single and three phase transmission lines, concept of GMR and GMD, symmetrical and asymmetrical conductor configuration with and without transposition - Skin and Proximity effects - Numerical Problems.

Unit-II: [4L]

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase transmission lines,
- Numerical Problems.

Module 2: PERFORMANCE OF TRANSMISSION LINES [9L]

Development of equivalent circuits for short, medium and long lines - efficiency and regulation. Attenuation constant and phase constant - surge impedance loading - Surge Impedance and SIL, Wave Length and Velocity of Propagation of Waves (numerical problems).

Module 3: CORONA, TRANSMISSION LINE INSULATORS, SAG AND TENSION CALCULATIONS [8L]

Unit-I: [4L]

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power-loss, Radio Interference - Numerical Problems.
Types of Insulators, String efficiency and Methods of improvement- Capacitance grading and Static Shielding - Numerical Problems.

Unit-II: [4L]

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Module 4: UNDERGROUND CABLES [10L]

Unit-I: [5L]

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems.

Unit-II: [5L]

Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

Module 5: RECENT TRENDS IN TRANSMISSION [9L]

Design of rural distribution, planning and design of town electrification schemes – comparison of EHVAC & HVDC system – economic distance for HVDC – terminal equipment for HVDC systems – description of DC transmission system – planning advantages- interconnection ofHVDC & AC systems – Introduction to FACTS technology.

Text Books

1. V.K. Mehta and Rohit Mehta, "Principles of Power System", S.Chand Publishers, Fourth Revised Edition, 2008.
2. **S**.N.Singh, 'Electric Power Generation , Transmission and Distribution', Prentice Hall of IndiaPvt.Ltd, New Delhi, 2008.
3. B.R.Gupta,' Power System Analysis and Design', S.Chand, New Delhi, Fifth Edition 2005-08.
4. R.K.Rajput, 'Power System Engineering' Laxmi Publications (P) Ltd, New Delhi, 2006.

Reference Books

1. D.P.Kothari, I.J.Nagarath, 'Power System Engineering' Tata Mc Graw -Hill Publishing Company limited, New Delhi, 2007.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
3. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission' Pearson Education, 2007.
4. Hadi Saadat, 'Power System Analysis, 'PSA Publishing; Third Edition, 2010.

E-Resources

1. https://www.sanfoundry.com/power-systems-multiple-choice-questions-answers/
2. https://lecturenotes.in/subject/471/power-system-2-ps-2

Course Outcomes

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

CO 1. Ability to compute line parameters for different configurations.

CO 2. Ability to model transmission line and to determine the performance of line.

CO 3. Ability to do mechanical design of transmission line.

CO 4. Ability to choose various insulators and cables for transmission line.

CO 5. Ability to understand structure of recent trends in transmission.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO3**	**PO4**	**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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO2	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO4	**3**	**3**		**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	**3**	**3**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Average	**3**	**2.8**	**1.8**	**2.4**	**1.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.6**	**0.8**

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE II Year-II Sem			
Course Code: L2221	DIGITAL ELECTRONICS LAB	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Nil

List of Experiments:

1. To study basic logic gates and verify truth tables of: AND, OR, NOT, NAND, NOR, EX-OR, EXNOR for 2 Inputs.
2. Verify truth tables of AND, OR, NOT using NAND and NOR gates
3. To realize SOP, POS expressions.
4. To realize Half Adder/Subtractor and Full Adder/ Subtractor circuits using NAND,NOR gates and verify the truth tables
5. To study BCD to Excess-3 and vice-versa and verify truth table
6. To study binary to gray and gray to binary converter using gates and verify truth tables.
7. To design and implement encoder and decoder using logic gates and study of corresponding ICs.
8. To design and verify truth table of 4 to 1 multiplexer and 1 to 4 demultiplexer and study of corresponding ICs.
9. Realize 2 bit comparator using gates and 4 bit Comparator IC.
10. Design and construct basic flip flops RS, JK, D and T using gates and verify truth table.
11. Design and construct JK Master-Slave Flip-Flop using gates
12. Realize Asynchronous divide by 4 and Decade counter
13. Realize synchronous Decade Up/Down Counter.
14. Realize RAM (16X4) - Perform read and write operations.

Course Outcomes

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

CO1. Learn the basics of gates and design simple logic circuits
CO2. Design different combinational circuits and verify their functionalities.
CO3. Design sequential circuits

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech EEE I Year-I Sem			
Course Code: L2222	CONTROL SYSTEMS LAB	L	T	P	D
Credits: 2		0	0	4	0

Pre-Requisites: Control Systems

Total ten experiments to be conducted from part A & part B
PART A:
Any Eight of the following experiments are to be conducted:

1. Time response of Second order system.
2. Characteristics of Synchro.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor.
5. Transfer function of DC motor.
6. Effect of P, PD, PI, PID Controller on a second order systems.
7. Lag and lead compensation – Magnitude and phase plot.
8. Transfer function of DC generator.
9. Temperature controller using PID controller.
10. Characteristics of Magnetic amplifiers.
11. Characteristics of AC servo motor.

PART B:
Any two simulation experiments are to be conducted:

1. Simulation of Op-Amp based Integrator and Differentiator circuits.
2. Simulation of Linear system (Time domain analysis, Error analysis).
3. Simulation of Stability (Bode, Root Locus, Nyquist) of Linear Time Invariant system.
4. Simulation of State space model for classical transfer function and verification.

Course Outcomes:
The students will be able to:

1. Make use of simulation packages for simple control system programs.
2. Analyze the stability analysis using root locus and bode plots.
3. Determine the transfer function of DC motor/generator.
4. Design the lead and lag compensators and Discuss the performance of servomotor and PID controller.
5. Illustrate the characteristics of synchros.

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	3	3	3	-	-	-	2	-	-	-	3	-
CO2	3	3	2	3	-	-	-	-	2	3	-	-	2	-
CO3	2	3	3	3	-	-	-	-	2	-	-	-	2	-
CO4	2	3	3	3	3	-	-	-	2	-	-	-	3	-
CO5	2	3	3	3	-	-	-	-	2	-	-	-	2	-
Average	2.2	2.8	2.8	3	3	-	-	-	2	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 EEE II Year-II Sem			
Course Code: L22M2	**Environmental Science (Mandatory Course – II)**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: Nil.

Module 1:

Unit-I: Ecosystem and Natural Resources

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

Module 2:

Unit-I: Global Environmental Problems and Global Efforts

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

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

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

Module 3:

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

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

Unit-2: Towards Sustainable Future:

Concept of Sustainable Development, Threats to Sustainability, Strategies for 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)

Reference Books:

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

E-Resources

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

Course Outcomes:

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

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

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO2	-	-	-	-	-	3	3	-	-	-	-	2	1	1
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO4	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO5	-	-	-	-	-	3	3	-	-	-	-	2	2	1
Average	1.8	1.8	1.2	1.2	-	1.2	1.8	-	-	-	-	1.4	1.8	1