BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

Department

of

Electrical and Electronics Engineering

COURSE STRUCTURE

AND

SYLLABUS FOR 1st and 2nd YEAR B.TECH.

BAPATLA ENGINEERING COLLEGE :: BAPATLA

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Vision of the Institute

To build centers of excellence, impart high quality education and instill high standards of ethics and professionalism through strategic efforts of our dedicated staff, which allows the college to effectively adapt to the ever-changing aspects of education.

To empower the faculty and students with the knowledge, skills and innovative thinking to facilitate discovery in numerous existing and yet to be discovered the fields of engineering, technology and inter-disciplinary endeavors.

Mission of the Institute

To impart the quality education at par with global standards to the students from all over India and in particular those from the local and rural areas.

To maintain high standards so as to make them technologically competent and ethically strong individuals who shall be able to improve the quality of life and economy of our country.

Vision of the Department

The Department of Electrical & Electronics Engineering will provide programs of the highest quality to produce globally competent technocrats who can address challenges of the millennium to achieve sustainable socio - economic development.

Mission of the Department

1. To provide quality teaching blended with practical skills.
2. To prepare the students ethically strong and technologically competent in the field of Electrical and Electronics Engineering.
3. To motivate the faculty and students in the direction of research and focus to fulfill social needs.

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PROGRAM OUTCOMES (PO'S)

Program Outcomes		Engineering Graduates will be able to
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, review 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 com plex 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 com prehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of 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

PROGRAM SPECIFIC OUTCOMES (PSO'S)

PSO1	The Electrical and Electronics Engineering graduates are capable of applying the Knowledge of mathematics and sciences in modern power industry.
PSO2	Analyse and design efficient systems to generate, transmit, distribute and utilize electrical energy to meet social needs using power electronic systems.
PSO3	Electrical Engineers are capable to apply principles of management and economics for providing better services to the society with the technical advancements in renewable and sustainable energy integration.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

PEO1	Have a strong foundation in the principles of Basic Sciences, Mathematics and Engineering to solve real world problems encountered in modern electrical engineering and pursue higher studies/placement/research.
PEO2	Have an integration of knowledge of various courses to design an innovative and cost effective product in the broader interests of the organization & society.
PEO3	Have an ability to lead and work in their profession with multidisciplinary approach, cooperative attitude, effective communication and interpersonal skills by participating in team oriented and open-ended activities.
PEO4	Have an ability to enhance in career development, adapt to changing professional and societal needs by engage in lifelong learning.

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Academic Regulations

Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the Batches admitted from the academic year 2020-21

B.Tech Regular Four Year Degree Programme

(Academic Regulations as amended in November 2021)

Preliminary Definitions and Nomenclature AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Acharya Nagarjuna University, Guntur).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., one odd and one even.

Branch: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Backlog Course: A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

Commission: Means University Grants Commission (UGC), New Delhi.

Choice Based Credit System: The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Certificate Course: It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Learning Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means Bapatla Engineering College, Bapatla, unless indicated otherwise by the context.

Massive Open Online Courses (MOOC): MOOCs inculcate the habit of self-learning. MOOCs would be additional choices in all the elective group courses.

Minor: Minors are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

Pre-requisite: A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, UG degree program: Bachelor of Technology (B.Tech).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a program.

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "BEC Regulations – R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally 90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

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University: Means Acharya Nagarjuna University, Guntur.

1. **Award of B.Tech. Degree**

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation. A lateral entry student pursues a course of study for not less than three academic years and in not more than six academic years

ii. Registers for 160 credits and secures all 160 credits. However, a lateral entry student registers for 121 credits and secures all the 121 credits from III semester to VIII semester of Regular B. Tech. program.

iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits

iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. A lateral entry student should complete the course within six academic years from the year of their admission, failing which his/her admission in B.Tech course stands cancelled

3. **Courses of study**

The following courses of study are offered at present as specializations for the B. Tech. course

S.No.	Title of the UG Programme	Abbreviation
1.	Civil Engineering	CE
2.	Computer Science & Engineering	CS
3.	Electrical & Electronics Engineering	EE
4.	Electronics & Communication Engineering	EC
5.	Electronics & Instrumentation Engineering	EI

6.	Information Technology	IT
7.	Mechanical Engineering	ME
8.	Cyber Security	CB
9.	Data Science	DS

4. Credits:

i. *Credit:* A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture) or two hours of practical work/field work per week.

ii. *Academic Year:* Two consecutive (one odd + one even) semesters constitute one academic year.

iii. *Choice Based Credit System (CBCS):* The CBCS provides choice for students to select from the prescribed courses.

iv. Each course in a semester is assigned certain number of credits based on following

Description	Periods/Week	Credits
Theory	03	03
Tutorial	01	01
Practical	03	1.5
Internship (At the end of IV & VI evaluated in V & VII resp.)	-	1.5/3.0
Project Work	-	12

5.Course Structure

Every course of the B.Tech program will be placed in one of the 8 categories with suggested credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits
1	Humanities and social science	Humanities and social science including Management courses	HS	10.5
2	Basic Sciences	Basic Science courses	BS	21
3	Engineering Science courses	Engineering Science Courses including workshop, drawing, basics of electrical / mechanical /	ES	24

		computer etc.		
4	Professional core	Professional core Courses	PC	51
5	Open Electives	Open Elective Courses- from other technical/ emerging and job oriented	OE	12
6	Professional Courses	Professional Elective Courses relevant to chosen specialization/ branch	PE	18
7	Project Work	Project Work, Seminar, Internship in industry elsewhere	PW	16.5
8	Mandatory courses	Environmental Studies, Induction training, Universal human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge (Non-Credit)	MC	0
9	Skill Oriented Courses	Skill Oriented Courses relevant to domain, interdisciplinary, communication skill, industry	SC	10
Total Credits				160

5. Weightage for course evaluation

6.1 Course Pattern

- The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

6.2 Evaluation Process

The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded.

The performance of a student in each course is assessed with alternate assessment methods, term examinations on a continuous basis during the semester called Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Internships carried out after IV Semester & VI Semester shall be evaluated for 100 marks each and the Internship along with Project Work carried out in VIII Semester shall be evaluated for 150 marks. For theory subjects, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination. For practical subjects, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination. For project work, the distribution shall be 50 marks for Internal Evaluation and 100 marks for the End-Examination / Viva-Voce. The distribution of marks between Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to be conducted at the end of the semester will be as follows:

Nature of the Course	**CIE**	**SEE**
Theory subjects	30	70
Drawing	30	70
Practical	30	70
Summer / Industrial / Research Internship	--	100
Project work	50	100

6.3 Continuous Internal Evaluation (CIE) in Theory subjects:

6.3.1 In each Semester there shall be two Term examinations and some ***Alternate Assessment Tools (AAT)*** like Home Assignment, Class Test, Problem Solving, Group Discussion, Quiz, Seminar and Field Study in every theory course. The Alternate Assessment Tools with detailed modality of evaluation for each course shall be finalized by the teacher concerned before beginning of the course. It will be reviewed and approved by the Department Committee.

The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, AATs and the calculation of marks for CIE in a theory course is given in the following table.

Particulars	**Term Exams (Max. 20 marks)**	**AAT (Max. 10 marks)**
Better Performed exam	75% of marks obtained	Continuous assessment by teacher as per the predetermined course delivery & assessment plan. (Minimum two & maximum four assessments). AAT marks shall be considered based on average of all tests conducted.
Other exam	25% of marks obtained	

A minimum of 15 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as qualified in that course and eligible to write the SEE of that course. If a student fails to obtain 15 marks in CIE, he can register for the course repetition as per the guidelines mentioned in 6.5.

6.3.2 Semester End Examination (SEE) in Theory and Design Course:

a) For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester for 70 marks, except where stated otherwise in the detailed Scheme of Instruction. Question paper setting shall be set by the teacher or teachers together in a multi section courses and to be verified as described in policy document.

b) A minimum of 25 (Approx. 35%) marks are to be secured exclusively in the Semester End Examination (SEE) of theory, design and/or drawing course. However a minimum 40 marks are to be secured in CIE & SEE together for the award of the grade and securing the credits in that course.

6.3.3 Continuous Internal Evaluation (CIE) in laboratory courses:

The evaluation for Laboratory course is based on CIE and SEE. The CIE for 30 marks comprises of 15 marks for day to day laboratory work, 5 marks for record submission and 10 marks for a laboratory examination at the end of the semester. In any semester, a minimum of 90% of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the internal lab teacher concerned and the Head of the Department concerned to be eligible to appear for the Final Examination in that laboratory course.

A minimum of 15 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as qualified in that lab course and eligible to write the SEE of that lab course. If a student fails to obtain 15 marks in CIE, he can register for the course repetition as per the guidelines mentioned in 6.5.

6.3.4 Semester End Examination (SEE) in laboratory courses:

a) For each laboratory course, the Semester End Examination (SEE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam

shall be for three hours. The SEE is for 70 marks which include 15 marks for write up, 35 marks for lab experiment/exercise, 15 marks for Viva-voce and 5 marks for general impression.

b) A minimum of 25 (Approx. 35%) marks are to be secured exclusively in the Semester End Examination (SEE) of laboratory course. However a minimum 40 marks are to be secured in CIE & SEE together for the award of the grade and securing the credits in that course.

6.3.5 Evaluation of Summer Internship and Industrial/Research Internship:

a) **Summer Internship at the end of IV semester and Industrial/Research Internship** at the end of VI carried out in industry are to be evaluated in V & VII semesters respectively based report and certificate provided by the industry. The report and certificate will be evaluated by the department committee for 100 marks. 50 marks shall be for the report and certificate and 50 marks based on seminars/presentation to the department committee by the student.

b) A minimum of 40 (40%) marks are to be secured exclusively to be declared as passed and securing the credits in the internships.

6.3.6 Evaluation of the Project

a) In case of the Project work, the evaluation shall be based on CIE and SEE. The CIE for 50 marks consists of a minimum of two Seminars / presentations for 20 marks and the Project Report submitted at the end of the semester which is evaluated for 30 marks.

b) A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in the Project Work and eligible to write the SEE in the Project Work.

c) SEE shall be evaluated in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal.

d) A minimum of 40 (40%) marks shall be obtained in SEE exclusively in order to be declared as passed in the Project and for the award of the grade.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Internal Evaluation (CIE), for any reason whatsoever, shall be deemed to have scored zero marks in the respective component and no provision for make-up shall be provided.

6.4 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

6.5 Course Repetition (Repeater course)

The students not qualified to write SEE in a course may register for the repeater courses through course repetition and summer semester. The students have to apply to the Principal through the respective HOD by paying prescribed fees.

Course repetition: A student can take up a maximum of two theory courses in a semester immediately after the semester end examinations of that particular semester in accordance with the guidelines recommended by the Academic Council. The students who are not taking regular semester courses may additionally register for one more theory course.

Summer semester: Further the students can register maximum three (theory + lab courses together) courses in the summer semester. Summer semester courses shall be of both even & odd semesters. Summer semester shall be conducted immediately after completion of even semester end examinations.

The HODs concerned have to allot a teacher related to that course to conduct class work. The minimum number of periods to be conducted should not be less than 75% of the total prescribed periods for that course. The classes will be conducted in the vacation period or in the weekends or in the afternoons as decided by the HOD concerned. Teacher has to evaluate the student for his performance in CIE as per the autonomous norms and the qualified students should appear for a semester end examination. The pass criteria in both CIE & SEE should be as per autonomous norms.

The documents for monitoring the candidates registered for course repetition are available with the Heads of the Departments and Exam Section.

There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.

6.6 There shall four be Open Electives / Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

The students shall be permitted to pursue up to a maximum of two elective courses (either Professional Elective Courses in clause 6.6 or Open Electives/ Job Oriented Courses in clause 6.7) under MOOCs (Massive Open Online Courses) offered by NPTEL and other reputed organizations as notified by the Department during the semester. Each of the Courses must be of minimum 8/12 weeks in duration. The student has to acquire a certificate for the concerned course from the agency during the semester only in order to earn the credits for that course.

6.7 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.

6.8 Minor in a discipline (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

a. i) Students who are desirous of pursuing their special interest areas other than the chosen

discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

ii) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

b. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE,CE,ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.

c. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BOS.

d. There shall be no limit on the number of programs offered under Minor. The University/Institution can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

e. The concerned BOS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.

f. A student shall be permitted to register for Minors program at the beginning of 4^{th} semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) upto the end of 2^{nd} semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4^{th} semester. If a student fails to acquire 8 SGPA upto 3^{rd} semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

g. A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

h. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BOS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

i. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without

any grades, the grade to be assigned as decided by the university/academic council.

j. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BOS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

k. A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BOS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

l. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

m. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

n. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

o. Minimum enrollment for a Minor course to be offered is 12

p. Students fulfilling the stipulated criterion can register for a Minor by paying a prescribed registration fee.

6.10 Honors degree in a discipline:

Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

a. A student shall be permitted to register for Honors program at the beginning of 4^{th} semester provided that the student must have acquired a minimum of 8.0 SGPA upto the end of 2 semester without any backlogs. In case of the declaration of the 3^{rd} semester results after the commencement of the 4^{th} semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

b. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.

c. In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

d. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.

e. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

f. The concerned BOS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.

g. Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the Annexure-2).

h. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the BOS/academic council.

i. The concerned BOS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

j. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

k. In case a student fails to meet the CGPA requirement for Degree with Honors at any point

after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

l. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

m. Minimum enrollment for the Honors to be offered is 12.

n. Students fulfilling the stipulated criterion can register for Honors by paying a prescribed registration fee.

6.11 National Service Scheme (NSS)/Yoga is compulsory for all the Undergraduate students. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Very Good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Un-satisfactory grade, he/she has to repeat the above activity in the subsequent years along with the next year students.

6.12 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 credits & 3 credits respectively. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty members. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

There shall be internal evaluation for 100 marks and there shall not be external evaluation. The Internal Evaluation shall be made by the departmental committee (Head of the Department and two senior faculty of the department) on the basis of the project report submitted by the student.

Completion of the internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship in the subsequent summer provided that the student doesn't pursue two summer internships in the same summer.

Community Service Project focussing on specific local issues shall be an alternative to the six weeks of summer Internship, whenever there is any emergency and when students cannot pursue their summer internships. The Community Service Project shall be for 6 weeks in duration which includes preliminary survey for 1 week, community awareness programs for one week, community immersion program in consonance with Government agencies for 3 weeks and a community exit report (a detailed report) for one week. The community service project shall be evaluated for 100 marks by the internal departmental committee comprising

Head of the Department and two senior faculty of the department. **However, the first priority shall be given to the internship.**

6.13 There shall also be a mandatory full internship in the final semester (VIII Semester) of the Programme along with the project work. The organization in which the student wishes to carry out the Internship need to be approved by Internal Department Committee comprising Head of the Department and two senior faculty. The faculty of the respective department monitors the student internship program along with project work. At the end of the semester, the candidate shall submit a certificate of internship and a project report. The project report and presentation shall be internally evaluated for 50 marks by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The Viva-Voce shall be conducted for 100 marks by a committee consisting of HOD, Project Supervisor and an External Examiner.

Completion of internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship along with project work for next six months.

6.14 There shall be five skill-oriented courses offered during III semester to VII semester. Out of the five skill courses, two shall be skill-oriented programs related to the domain and these two shall be completed in second year. Of the remaining three skill courses, one shall necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

The student can choose between a skill advanced course being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies which are duly approved by the Internal Department Committee. The credits assigned to the skill advanced course shall be awarded to the student upon producing the Course Completion Certificate from the agencies / professional bodies.

The Internal Department Committee comprising Head of Department and two senior faculty shall evaluate the grades / marks awarded for a course by external agencies and convert to the equivalent marks / grades.

7. Attendance Requirements:

- A student shall be eligible to appear for semester end examinations (SEE), if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical ground duly approved by the Principal.
- Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- Further the student must obtain a minimum of 50% attendance in each subject failing which; the student shall not be permitted to write the SEE of that subject. Student has to

register this subject through course repetition and satisfy the CIE qualification criteria of attendance and marks in the subsequent semesters.

- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.
- A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

8. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

8.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project, if he/she secures not less than 15 marks in CIE and 25 marks in SEE. In case of, internships, project work viva – voce, he/she should secure 40% of the total marks. For mandatory courses minimum 15 marks in CIE are to be secured.

8.2 B.Tech students: A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester.

One regular and one supplementary examination of II Semester.

One regular examination of III semester.

Lateral Entry students: A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular examination of III semester.

8.3 B.Tech students: A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and four supplementary examinations of I Semester.

One regular and three supplementary examinations of II Semester.

One regular and two supplementary examinations of III Semester.

One regular and one supplementary examinations of IV Semester.

One regular examination of V Semester.

Lateral entry students: A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied

up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and two supplementary examinations of III Semester.

One regular and one supplementary examinations of IV Semester.

One regular examination of V Semester.

And if a student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

8.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained. In case of lateral entry students, the number of credits is 121.

8.5 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

Lateral entry students who fail to earn 121 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

9. Course Pattern:

(i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

(ii) **With–holding of Results**

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

(iii) **Grading**

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade Points Assigned
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains 'Ab' in end examination.

For **mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

(i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\text{SGPA} = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i}$$

where, C_i is the number of credits of the i^{th} subject and GP_i is the grade point scored by the student in the i^{th} course.

(ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$\text{CGPA} = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j}$$

where "$SGPA_j$" is the SGPA of the j^{th} semester and TC_j is the total number of credits in that semester.

(iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

(iv) While computing the SGPA, the subjects in which the student is awarded Zero grade points will also be included.

(v) *Grade Point:* It is a numerical weight allotted to each letter grade on a 10-point scale.

(vi) *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

11. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he/she shall be placed in one of the following four classes.

Class Awarded	**CGPA Secured**
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

12. Gap Year

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

13. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they get readmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently re-joining.

14. Minimum Instruction Days

The minimum instruction days including exams for each semester shall be 90 days.

15. Medium of Instruction

The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations and project reports.

16. Rules of Discipline

(i) Use of mobile phones with camera, in the campus is strictly prohibited.
(ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.
(iii) Students shall not bring outsiders to the institution or hostels.
(iv) Students shall not steal, deface, damage or cause any loss to the institution property.
(v) Students shall not collect money either by request or coercion from others within the campus or hostels.
(vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the

original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.

(vii) Use of vehicles by the students inside the campus is prohibited.

(viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any material to be uploaded to social media sites need to be approved by Head of the Department concerned/Dean/Principal.

(x) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period

(xi) Dress Code

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girls students shall wear saree / chudidhar with dupatta

17. Punishments for Malpractice cases – Guidelines

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.No.	Nature of Malpractice/Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he 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 course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
2	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 course.
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical

		examinations and project work of that semester/year examinations.
4	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 other 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 course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses 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 shall be registered against them.

	any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The candidate 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 shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination

		including practicals and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall be reported to the college academic council for further action and award suitable punishment.	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

18.0ADDITIONAL ACADEMIC REGULATIONS:

18.1 Any attempt to impress upon the teachers, examiners, faculty and staff of Examinations, bribing for either marks or attendance will be treated as malpractice.

18.2 When a component of Continuous Internal Evaluation (CIE) or Semester End Examination (SEE) is cancelled as a penalty, he/she is awarded zero marks in that component.

19.0 AMENDMENTS TO REGULATIONS:

The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations and / or Syllabi, Academic schedules, Examination schedules, Examination pattern, Moderation to students, Special opportunity to complete degree beyond stipulated time and any other matter pertained that meets to the needs of the students, society and industry without any notice and the decision is final.

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

Department of Electrical and Electronics Engineering

Course Structure Summary

S.No	Category	Credits	% of Credits
1	Humanities & Social Science including Management Courses	10.5	6.5
2	Basic Science Courses	21	13.1
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	24	15
4	Professional Core Courses	51	31.9
5	Professional Elective Courses	15	9.4
6	Open Elective Courses/Job Oriented Courses	12	7.5
7	Project work, seminar, and internship in industry or elsewhere	16.5	10.3
8	Skill Oriented Courses	10	6.3
9	Mandatory Courses [Environmental Science, PEHV, Indian Constitution, Essence of Indian Traditional Knowledge etc]	-	-
Total		**160**	**100**

Semester Wise Credits Summary

Semester	Credits	With Honor Credits
Semester-I	16.5	16.5
Semester-II	22.5	22.5
Semester-III	21	21
Semester-IV	21	25
Semester-V	22.5	26.5
Semester-VI	21.5	25.5
Semester-VII	23	27
Semester-VIII	12	16
Total	**160**	**180**

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

First Year B.Tech (SEMESTER – I)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	S	P	Total	CIE	SEE	Total Marks	
20EE101/MA01	BS	Linear algebra and differential equations	3	0	1	0	4	30	70	100	3
20EE102/PH01	BS	Waves and Modern Physics	3	0	0	0	3	30	70	100	3
20EE103/EL01	HS	Communicative English	3	0	0	0	3	30	70	100	3
20EEL101/PHL01	BS	Physics Lab	0	0	0	3	3	30	70	100	1.5
20EEL102/ELL01	HS	English Communication skills Lab	0	0	0	3	3	30	70	100	1.5
20EEL103/MEL02	ES	Workshop Practice Lab	0	0	0	3	3	30	70	100	1.5
20EEL104/MEL01	ES	Engineering Graphics	1	0	0	4	5	30	70	100	3
20EE104/MC01	MC	Environmental Studies	2	0	0	0	2	30	0	30	0
INDUCTION PROGRAM		First Three Weeks (Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Familiarization to Dept./Branch & Innovations)									
TOTAL			**12**	**0**	**1**	**13**	**26**	**240**	**490**	**730**	**16.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical S: Self-study

BS: Basic Science courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory course

1 Hr. Lecture (L) per week - 1 credit
1 Hr. Practical (P) per week - 0.5 credits
1 Hr. Tutorial (T) per week - 1 credit
1 Hr. Self-study (S) per week - 0 credits
2 Hours Practical (Lab)/week - 1 credit

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

First Year B.Tech (SEMESTER – II)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE201/ MA02	BS	Numerical methods& Advanced Calculus	3	0	0	1	4	30	70	100	3
20EE202/ PH03	BS	Semiconductor Physics and Nano Materials	3	0	0	0	3	30	70	100	3
20EE203/ CY01	BS	Chemistry	3	0	0	0	3	30	70	100	3
20EE204/ CS01	ES	Programming for Problem Solving	3	0	0	1	4	30	70	100	3
20EE205	PC	Circuit Theory	3	0	0	1	4	30	70	100	3
20EE206/ CE03	ES	Engineering Mechanics	3	0	0	1	4	30	70	100	3
20EEL201 /CY L01	BS	Chemistry Lab	0	0	3	0	3	30	70	100	1.5
20EEL202	PC	Circuit Theory Lab	0	0	3	0	3	30	70	100	1.5
20EEL203 /CS L01	ES	Programming for Problem Solving Lab	0	0	3	0	3	30	70	100	1.5
NCC/NSS			0	0	3	0	3	0	0	0	0
TOTAL			**18**	**0**	**12**	**4**	**34**	**270**	**630**	**900**	**22.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory course

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Second Year B.Tech (SEMESTER – III)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE301/ MA03	BS	Probability and Statistics	3	0	0	1	4	30	70	100	3
20EE302	PC	Network Analysis	3	0	0	1	4	30	70	100	3
20EE303	PC	Electro Magnetic Fields	3	0	0	0	3	30	70	100	3
20EE304	PC	DC Machines and Transformers	3	0	0	1	4	30	70	100	3
20EE305/ EL02	HS	Technical English	2	0	0	0	2	30	70	100	2
20EEL301 / SO01	SO	Software Tools to Electrical Engineering	1	0	2	0	3	30	70	100	2
20EEL302	ES	Measurement and Instrumentation Lab	2	0	2	0	4	30	70	100	3
20EEL303 /IT01	ES	Data Structures and Algorithms Lab	1	0	2	0	3	30	70	100	2
20EE306/ MC02	MC	Professional Ethics and Human Values	2	0	0	0	2	30	0	30	0
NCC/NSS			0	0	3	0	3	0	0	0	0
TOTAL			**20**	**0**	**9**	**3**	**32**	**270**	**560**	**830**	**21**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory course PC: Professional Core Course SO: Skill Oriented Course

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Second Year B.Tech (SEMESTER – IV)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE401	PC	Analog Electronics	3	0	0	0	3	30	70	100	3
20EE402	PC	Digital Electronics	3	0	0	1	4	30	70	100	3
20EE403	PC	Induction Motors and Synchronous machines	3	0	0	1	4	30	70	100	3
20EE404	PC	Signals & Systems	3	0	0	1	4	30	70	100	3
20EE405	PC	Generation and Transmission	3	0	0	0	3	30	70	100	3
20EEL401/ SO02	SO	Python	1	0	2	0	3	30	70	100	2
20EEL402	PC	Analog and Digital Electronics Lab	0	0	3	0	3	30	70	100	1.5
20EEL403	PC	DC Machines and Transformers Lab	0	0	3	0	3	30	70	100	1.5
20EEL404/ ELL02	HS	Soft Skills Lab	0	0	2	0	2	30	70	100	1
Internship during summer (2 months)											
TOTAL			**16**	**0**	**10**	**3**	**29**	**270**	**630**	**900**	**21**
20EEM41_/ 20EEH41_	**Minor/Honor Course**		**3**	**1**	**0**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**19**	**1**	**10**	**3**	**33**	**300**	**700**	**1000**	**25**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory course PC: Professional Core Course SO: Skill Oriented Course

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Third Year B.Tech (SEMESTER – V)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Hours per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE501	ES	Micro Processor and Microcontroller	3	0	0	0	3	30	70	100	3
20EE502	PC	Power System Analysis	3	0	0	1	4	30	70	100	3
20EE503	PC	Control Systems	3	0	0	1	4	30	70	100	3
20EE504	PC	Power Electronics	3	0	0	1	4	30	70	100	3
20EE505/ PE_ _	PE	Professional Elective Course -I	3	0	0	0	3	30	70	100	3
20EEL501/ SO03	SO	Application of IOT in Electrical Engineering	1	0	2	0	3	30	70	100	2
20EEL502	ES	Micro Processor and Microcontroller Lab	0	0	2	0	2	30	70	100	1
20EEL503	PC	Induction Motors and Synchronous machines Lab	0	0	3	0	3	30	70	100	1.5
20EEL504	PC	Control Systems Lab	0	0	3	0	3	30	70	100	1.5
20EEL505/ INT01	INT	Internship	0	0	0	0	0	30	70	100	1.5
20EE506/ MC03	MC	Constitution of India	2	0	0	0	2	30	0	30	0
TOTAL			**18**	**0**	**10**	**3**	**31**	**330**	**700**	**1030**	**22.5**
20EEM52_/ 20EEH52_	**Minor/Honor Course**		**3**	**1**	**0**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**21**	**1**	**10**	**3**	**35**	**360**	**770**	**1130**	**26.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science Courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory Course PC: Professional Core Course SO: Skill Oriented Course PE: Professional Elective Courses JE: Job oriented elective courses

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Third Year B.Tech (SEMESTER – VI)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE601	PC	Power System Protection	3	0	0	0	3	30	70	100	3
20EE602/ PE_ _	PE	Professional Elective Course -II	3	0	0	0	3	30	70	100	3
20EE603/ PE_ _	PE	Professional Elective Course -III	3	0	0	0	3	30	70	100	3
20EE604/ JO_ _	JO	Job Oriented Elective - I	2	0	2	0	4	30	70	100	3
20EE605/ JO_ _	JO	Job Oriented Elective - II	2	0	2	0	4	30	70	100	3
20EEL601/ SO04	SO	Placement Training	1	0	2	0	3	30	70	100	2
20EEL602	PC	Power Electronics Lab	0	0	3	0	3	30	70	100	1.5
20EEL603	PC	Power Systems Lab	0	0	3	0	3	30	70	100	1.5
20EEL604	PC	Electronics Design Lab	0	0	3	0	3	30	70	100	1.5
20EE606/ MC04	MC	Indian Traditional Knowledge	2	0	0	0	2	30	0	30	0
Internship during summer (2 months)											
TOTAL			**16**	**0**	**15**	**0**	**31**	**300**	**630**	**930**	**21.5**
20EEM63_/ 20EEH63_	**Minor/Honor Course**		**3**	**1**	**0**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**19**	**1**	**15**	**0**	**35**	**330**	**700**	**1030**	**25.5**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science Courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory Course PC: Professional Core Course SO: Skill Oriented Course PE: Professional Elective Courses JE: Job oriented elective courses

BAPATLA ENGINEERING COLLEGE :: BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Fourth Year B.Tech (SEMESTER – VII)

for the Academic Year 2020-21

Code No.	Category code	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE701	PC	Power System Operation Control and Stability	3	0	0	1	4	30	70	100	3
20EE702/ PE_ _	PE	Professional Elective Course - IV	3	0	0	0	3	30	70	100	3
20EE703/ PE_ _	PE	Professional Elective Course - V	3	0	0	0	3	30	70	100	3
20EE704/ JO_ _	JO	Job Oriented Elective - III	2	0	2	0	4	30	70	100	3
20EE705/ JO_ _	JO	Job Oriented Elective - IV	2	0	2	0	4	30	70	100	3
20EE706	HS	Industrial Management & Entrepreneurship Development	3	0	0	0	3	30	70	100	3
20EEL701/SO05	SO	Industrial Automation	1	0	2	0	3	30	70	100	2
20EEL702/ INT02	INT	Internship						30	70	100	3
TOTAL			**17**	**0**	**6**	**1**	**24**	**240**	**560**	**800**	**23**
20EEM74_/20EEH74_			**3**	**1**	**0**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**20**	**1**	**6**	**1**	**28**	**270**	**630**	**900**	**27**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science Courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory Course PC: Professional Core Course SO: Skill Oriented Course PE: Professional Elective Courses JE: Job oriented elective courses

BAPATLA ENGINEERING COLLEGE :: BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electrical and Electronics Engineering

Fourth Year B.Tech (SEMESTER – VIII)

for the Academic Year 2020-21

Code No.	Category Code	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	S	Total	CIE	SEE	Total Marks	
20EE801/PW01	PW	Project Work	0	0	24	0	24	50	100	150	12
20EEM85_/ 20EEH85_	Minor/Honor Course (Through MOOC only)		0	0	0	0	0	0	0	0	2
20EEM85_/ 20EEH85_	Minor/Honor Course (Through MOOC only)		0	0	0	0	0	0	0	0	2
TOTAL			**0**	**0**	**24**	**0**	**24**	**50**	**100**	**150**	**16**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Self-study

BS: Basic Science Courses HS: Humanities and Social science ES: Engineering Science Courses

MC: Mandatory Course PC: Professional Core Course SO: Skill Oriented Course PE: Professional Elective Courses JE: Job oriented elective courses

Note: Any one course of Professional Elective courses is permitted to pursue through MOOC during four years of B.Tech course i.e., 3 credits shall be earned.

Professional Elective Courses (15 credits):

Professional Elective – I:
PE51: Electrical Power Distribution System
PE52: Renewable Energy Sources
PE53: Electrical Machine Design

Professional Elective – II & III:
PE61: Switched Mode Power Supply
PE62: Industrial Drives
PE63: HVDC & FACTS
PE64: Machine Modeling and Analysis
PE65: Digital Control Systems
PE66: Optimization Techniques

Professional Elective – IV & V:
PE71: High Voltage Engineering
PE72: Advanced Electrical Drives
PE73: Solar & Fuel cell Energy Systems
PE74: Smart Grid Technology and Applications
PE75: Adaptive Control Systems
PE76: AI Applications to Electrical Engineering

Job oriented/ Open elective courses (12 credits): Choose any two courses from POOL – 1 for sixth semester electives and any two courses from POOL – 2 for seventh semester electives.

POOL - 1:
JO61: Java programming
JO62: Data Analytics
JO63: Operations Research
JO64: Computer Applications in power systems
JO65: Solar PV and Wind Plant Design
JO66: Digital Signal Processing
JO67: English for Commutative Examination

POOL - 2:
JO71: Cyber Security
JO72: Analog VLSI
JO73: Embedded Systems
JO74: Power Quality
JO75: Digital Protection of Power System
JO76: Met heuristic Techniques to Electrical Engineering

Minor Courses (20 Credits): Courses offered to non EEE branch B.Tech., students for obtaining Minor degree in Electrical and Electronics Engineering.

Track I: Power Systems
1. Power Generation and Transmission
2. Power Quality
3. Smart Grid

Track II: Power Electronics
1. Principles of Power Electronics
2. Industrial Drives
3. Hybrid Electrical Vehicles

Track III: Control Systems
1. Signals and Systems
2. Linear Control System
3. Digital Control Systems

Track IV: Energy Systems
1. Energy Conservation & Audit
2. Utilization of Electrical Energy
3. Solar & Fuel cell Energy Systems

Honor Courses (20 Credits): Additional courses offered to B.Tech., EEE students to obtain Honors degree in Electrical and Electronics Engineering

S.NO	Course Title	Prerequisite Course
A	Power Systems Dynamics and Control	Induction motors and Synchronous Machines (20EE403)
B	Advanced Power System Protection	Power System Protection (20EE601)
C	Advanced Electrical Drives	Electrical Drives (20EE602/603)
D	Smart Grid Technology and Applications	Generation and Transmission (20EE405) and Power System Analysis (20EE502)
E	Non-Linear Control Systems	Control Systems (20EE503)
F	Adaptive Control Systems	Control Systems (20EE503)
G	Energy Storage Systems	None
H	Electrical and Hybrid Vehicles	Induction motors and Synchronous Machines (20EE403) and Power Electronics (20EE504)
I	Sensors and Actuators	None
J	Optimization Techniques	None
K	Machine Learning for Engineering Applications	Probability and Statistics (20EE301)
L	Big data Analytics for Smart Grid	Generation and Transmission (20EE405) and Power System Analysis (20EE502)
M	Extra High Voltage AC Transmission	PE77: High Voltage Engineering
N	Automotive Electrics	Measurements and Instrumentation
O	Block Chain Technology for Electrical Systems	Power systems-I and Power Systems-II

LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

I B.TECH – I SEMESTER (Code: 20EE101/MA01)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: None

Course Objectives: To make the students

CO1: To learn about solving a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors.

CO2: Identify the type of a given differential equation and select and apply the appropriate. Analytical technique for finding the solution of first order and higher order ordinary differential equations.

CO3: Create and analyse mathematical models using first and second order differential equations to solve application problems that arises in engineering.

CO4: To learn about solving linear Differential equations with constant coefficients with the given initial conditions using Laplace transform technique.

Course Learning Outcomes: By the end of the course the student will be able to

CLO1: Solve a system of linear simultaneous equations, finding the inverse of a given matrix and also its Eigen values and Eigen vectors.

CLO2: Apply the appropriate analytical technique for finding the solution of a first order ordinary differential equation and use these techniques to solve some real-life problems.

CLO3: Solve higher order linear differential equations with constant coefficients and apply them to solve the circuit problems

CLO4: Evaluate Laplace transform of a given function and apply Laplace transform techniques to solve linear differential equations with constant coefficients.

UNIT - I

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

UNIT - II

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0.

Applications of a first order Differential equations: Newton's law of cooling; Rate of decay of Radio-active materials.

[Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]

UNIT – III

Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits.

[Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5]

UNIT – IV

Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms.

[Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

NPTEL Course Links:

1. https://nptel.ac.in/courses/122/104/122104018/

CLO, PO and PSO Mapping:

LINEAR ALGEBRA AND ODE (20EE101/MA01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Solve a system of linear simultaneous equations, finding the inverse of a given matrix and also its Eigen values and Eigen vectors.	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO2	Apply the appropriate analytical technique for finding the solution of a first order ordinary differential equation and use these techniques to solve some real life problems.	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CLO3	Solve higher order linear differential equations with constant coefficients and apply them to solve the circuit problems	3	2	-	1	-	-	-	-	-	-	-	-	3	-	-
CLO4	Evaluate Laplace transform of a given function and apply Laplace transform techniques to solve linear differential equations with constant coefficients.	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-

WAVES AND MODERN PHYSICS

I B.TECH – I SEMESTER (CODE-20EE102/PH01)

(Common for ECE, EEE, EIE)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

COURSE OBJECTIVES

CO1: To familiarize the students in getting knowledge about modern optics and their Engineering applications.

CO2: To make aware of the students to obtain circuit knowledge regarding electrical, Electronics and Magnetism.

CO3: To make the students to understand the quantum theory and solving the various Physical problems using quantum mechanics.

CO4: To get the knowledge of various methods of analytical techniques for material testing.

Course Learning Outcomes: At the end of the course the students should be able to

CLO1: Learn about principle and working of different types of lasers and their applications.

CLO2: Know about principle, types of optical fibers of their importance in communication.

CLO3: Analyse the electromagnetic principles in electrical and electronic circuits and Maxwell's equations.

CLO4: Study about quantum mechanics and its applications.

CLO5: Read about properties and applications of ultrasonic's in various fields.

CLO6: Know about radio isotopes and their applications.

UNIT-I (ADVANCED OPTICS)

Lasers: Interaction of radiation with matter. Einstein co-efficients, Properties of laser, Population inversion, LASER principle, pumping schemes-Three level and four level laser, ypes of lasers: solid-state lasers (Ruby), gas lasers (He-Ne), Semiconductor lasers; applications of lasers in industry and medicine.

Fibre Optics: Importance of optical fibre, Structure and principle of optical fibre, acceptance angle and numerical aperture, Types of optical fibers based on modes and refractive index, V-number, losses associated with optical fibers, fibre optical communication, advantages of optical fiber.

UNIT-II (ELECTRO-MAGNETIC INDUCTION AND MAXWELL'S EQUATIONS)

Maxwell's equations in vacuum and conducting medium. Velocity of electromagnetic wave in vacuum. Electromagnetic oscillations in LC circuit, LCR series resonance in A.C circuit and resonant frequency, Quality factor. Concept of skin effect, Energy in an electromagnetic field; Flow of energy and Poynting vector. Principle of circulating charge and cyclotron, Hall Effect.

UNIT-III (MODERN PHYSICS)

Dual nature of light, Debroglie concept of matter waves, Davission- Germer experiment, Heisenberg uncertainty principle and applications (non existence of electron in nucleus and finite width of spectral lines), one dimensional time independent and dependent Schrodinger wave equation, physical significance of wave function, application of Schrödinger wave equation to particle in a one dimensional potential box, concept of quantum tunneling and construction and working of Scanning Tunneling Electron Microscope.

UNIT-IV (ANALYTICAL TECHNIQUES)

Ultrosonics: Properties of ultrasonic's, Production of ultrasonic waves by magneto striction andpiezo-electric method, Determination of velocity of ultrasonic wave in liquids by Ultrasonic interferometer. Medical applications, Ultrasonic Imaging technique (Doppler Ultrasound Imaging advantages and limitations), industrial applications, NDT : Pulse echo technique, Time of flight diffraction technique.

Nuclear Techniques: Radio isotopes and its applications (medical and Industrial), GM counter, Scintillation counter.

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TEXT BOOK:

1. M.V.Avadhanulu, P.G.Kshirsagar, "Engineering physics", S.Chand & Company Pvt. Ltd.

2. PalaniSwamy, "Engineering physics", Scitech publication

REFERENCE BOOKS:

1. Dr.P.srinivasaRao, Dr.K.Muralidhar, "Basic engineering physics" Himalaya Publication

2. Dr.P.SrinivasaRao, Dr.K.Muralidhar, "Applied physics" Himalaya publication

CLO, PO and PSO Mapping:

Waves and Modern Physics (20EE102/PH01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Learn about principle and working of different types of LASERS and their applications.	3	_	3	3	3	3	2	–	–	–	–	2	–	2	–
CLO2	Know about the principle, types of optical fibers and their importance in communication	3	_	3	3	3	3	2	–	–	–	–	2	–	–	1
CLO3	Analyze electromagnetic principles in electrical and electronic circuits and Maxwell's equations	3	3	2	2	2	3	–	–	–	–	–	3	–	–	–
CLO4	Study about quantum mechanics and its applications	3	3	–	2	2	2	–	–	–	–	–	3	–	2	–
CLO5	Read about properties and applications of ultrasonic's in various fields	3	–	3	3	3	3	–	–	–	–	–	2	–	–	–
CLO6	Know about radio isotopes and their applications	–	–	3	3	3	2	2	–	–	–	–	2	2	–	–

COMMUNICATIVE ENGLISH

I B.TECH – I SEMESTER (Code: 20EE103/EL01)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives : The course aims

CO1: To enhance the vocabulary competency of the students
CO2: To enable the students to demonstrate proficiency in the use of written English, including proper spelling, grammar, and punctuation
CO3: To introduce corrective measures to eliminate grammatical errors in speaking and writing
CO4: To enhance theoretical and conceptual understanding of the elements of grammar.
CO5: To Understand and apply the conventions of academic writing in English
CO6: To enhance the learners' ability of communicating accurately and fluently

Course Learning Outcomes: By the end of the course the student would be able to

CLO1: Build academic vocabulary to enrich their writing skills
CLO2: Make use of contextual clues to infer meanings of unfamiliar words from context
CLO3: Produce accurate grammatical sentences
CLO4: Skim for main idea(s) & scan for details
CLO5: Distinguish main ideas from specific details
CLO6: Identify author's purpose and tone
CLO7: Make inferences and predictions based on comprehension of a text
CLO8: Discuss and respond to content of the text in writing
CLO9: Produce coherent and unified paragraphs with adequate support and detail

UNIT-I

1.1 **Vocabulary Development**: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes
1.2 **Essential Grammar:** Prepositions, Conjunctions, Articles
1.3 **Basic Writing Skills**: Punctuation in writing
1.4 **Writing Practices**: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-II

2.1 **Vocabulary Development**: Synonyms and Antonyms
2.2 **Essential Grammar**: Concord, Modal Verbs, Common Errors
2.3 **Basic Writing Skills**: Using Phrases and clauses
2.4 **Writing Practices**: Hint Development, Essay Writing

UNIT III

3.1 **Vocabulary Development**: One word Substitutes
3.2 **Essential Grammar**: Tenses, Voices

3.3 **Basic Writing Skills**: Sentence structures (Simple, Complex, Compound)
3.4 **Writing Practices**: Note Making

UNIT IV

4.1 **Vocabulary Development**: Words often confused
4.2 **Essential Grammar**: Reported speech, Common Errors
4.3 **Basic Writing Skills**: Coherence in Writing: Jumbled Sentences
4.4 **Writing Practices**: Paraphrasing &Summarising

TEXT BOOKS/REFERENCE BOOKS:

1. Sanjay Kumar &PushpaLatha, "Communication Skills", Oxford University Press:2011.
2. Michael Swan, "Practical English Usage", Oxford University Press:1995.
3. F.T.Wood, "Remedial English Grammar", Macmillan:2007.
4. Liz Hamplyons& Ben Heasley, "Study Writing", Cambridge University Press:2006.

CLO, PO and PSO Mapping:

Communicative English (20EE103/EL01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	To Enhance the Vocabulary Competence of the Students	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1
CLO2	To enable the students to demonstrate proficiency in the use of written English including proper spelling ,grammar and punctuation	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1
CLO3	To introduce corrective measures to eliminate grammatical errors in speaking and writing	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	**1**
CLO4	To Understand and apply the conventions of academic writings in English	-	-	-	-	-	-	-	-	**2**	**3**	**2**	-	-	**2**	1
CLO5	To Enhance the Learners' ability of communicating accurately and fluently	-	-	-	-	-	-	-	-	**3**	**3**	**2**	-	-	**2**	1

PHYSICS LAB

I B.Tech– I Semester (Code: 20EEL101/PHL01)
(COMMON TO ALL BRANCHES)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				0

Course Objectives: To make the students

CO1: Realize the importance of electrical and magnetic laws.
CO2: Quantify the various physical parameters through optical principles.
CO3: Estimate the material parameters through stress and strain experiments.
CO4: Explore and operate the different optoelectronic devices.

Course Outcomes: Students will be able to

CLO1: Acknowledge the important aspects of earth magnetic field, realize the use of Maxwell's equations in various magnetic applications.
CLO2: Applications of basic principles of optics to estimate physical parameters.
CLO3: Realization of material properties and parameters.
CLO4: Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using
3. Stewart-Gee's apparatus.
4. Determination of thickness of thin wire using air wedge interference bands.
5. Determination of radius of curvature of a Plano convex lens using Newton's rings.
6. Determination of wavelengths of mercury spectrum using grating normal incidence method.
7. Determination of dispersive power of a given material of prism using prism minimum deviation method.
8. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
9. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
10. Verify the laws of transverse vibration of stretched string using sonometer.
11. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
12. Draw the load characteristic curves of a solar cell.
13. Determination of Hall coefficient of a semiconductor.
14. Determination of voltage and frequency of an A.C. signal using C.R.O.
15. Determination of Forbidden energy gap of Si &Ge.
16. Determination of wavelength of laser source using Diode laser.

Any three experiments are virtual

TEXT BOOK:

1. P.Srinivasarao & K.Muralidhar, "Engineering physics laboratory manual", Himalaya publications.

CLO, PO and PSO Mapping:

20EEL101/PHL01 -Physics Lab(Common to Civil, Mech,EEE &EIE)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Acknowledge the important aspects of earth magnetic field, realize the use of Maxwells equations in various magnetic applications	2	2		1											
CLO2	Applications of basic principles of optics to estimate physical parameters.	2	2	1												
CLO3	Realization of material properties and parameters.	2	2	1												
CLO4	Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications.	2	2	3		1										

ENGLISH COMMUNICATION SKILLS LAB

I B.TECH – I SEMESTER (Code: 20EEL102/ELL01)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				0

English Communication Skills (ECS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning

Course Objectives:

CO1: To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm

CO2: To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking

CO3: To improve students' fluency in English and neutralize their mother tongue

CO4: To make them use effective vocabulary both in formal and informal situations

Course Learning Outcomes:

The student would be able to

CLO1: Better understand the nuances of English language through audio- visual experience and group activities

CLO2: Develop neutralization of accent for intelligibility

CLO3: Build confidence to enhance their speaking skills

CLO4: Use effective vocabulary both in formal and informal situations

UNIT-I

1.1 Listening Skills; Importance – Purpose- Process- Types
1.2 Barriers to Listening
1.3 Strategies for Effective Listening

UNIT-II

2.1 Phonetics; Introduction to Consonant, Vowel and Diphthong sounds
2.2 Stress
2.3 Rhythm
2.4 Intonation

UNIT-III

3.1 Formal and Informal Situations

3.2 Expressions used in different situations
3.3 Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions & Advices-Expressing Opinions-Inviting People-Requesting-Seeking Permission-Giving Information- Giving Directions- Sympathizing- Convincing People- Complaining & Apologizing-Thanking Others- Shopping- Travelling- Conversational Gambits

UNIT-IV

4.1 JAM Session
4.2 Debates
4.3 Extempore

TEXT BOOKS/REFERENCE BOOKS:

1. Sanjay Kumar &PushpaLatha, "Communication Skills", Oxford University Press:2011.
2. J.D. O' Connor, "Better English Pronunciation", Cambridge University Press:1984
3. Jack C Richards, "New Interchange" (4rth Edition), Cambridge University Press:2015
4. Grant Taylor, "English Conversation Practice", McGraw Hill:2001

SOFTWARE:

1. Buzzers for conversations, New Interchange series
2. English in Mind series, Telephoning in English
3. Speech Solutions, A Course in Listening and Speaking

CLO, PO and PSO Mapping:

ENGLISH COMMUNICATION SKILLS LAB (20EEL102/ELL01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Better understand the nuances of English language through audio-visual experience and group activities	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1
CLO2	Develop neutralization of accent for intelligibility	-	-	-	-	-	-	-	-	2	3	2	2	2	1	1
CLO3	Build confidence to enhance their speaking skills	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1
CLO4	Use effective vocabulary both in formal and informal situations	-	-	-	-	-	-	-	-	3	3	2	2	2	1	1

WORKSHOP PRACTICE LAB

I B.TECH – I SEMESTER (Code: 20EEL103/MEL02)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				0

Prerequisites: None

Course Objectives: To make the students

CO1: To impart student knowledge on various hand tools for usage in engineering applications.
CO2: Be able to use analytical skills for the production of components.
CO3: Design and model different prototypes using carpentry, sheet metal and welding.
CO4: Make electrical connections for daily applications.
CO5: To make student aware of safety rules in working environments.

Course Learning Outcomes: At the end of the course the students should be able to

CLO1: Make half lap joint, Dovetail joint and Mortise &Tenon joint
CLO2: Produce Lap joint, Tee joint and Butt joint using Gas welding
CLO3: Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools
CLO4: Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring.

Syllabus:

1. Carpentry
   a. Half Lap joint
   b. Dovetail joint
   c. Mortise &Tenon joint
2. Welding using electric arc welding process/gas welding
   a. Lap joint
   b. Tee joint
   c. Butt joint
3. Sheet metal operations with hand tools
   a. Trapezoidal tray
   b. Funnel
   c. T-joint
4. House wiring
   a. To control one lamp by a single switch
   b. To control two lamps by a single switch
   c. Stair-case wiring

TEXT BOOKS:

1. P.Kannaiah and K.L.Narayana, “Workshop Manual”, SciTech Publishers, 2009.
2. K. Venkata Reddy, “Workshop Practice Manual”, BS Publications, 2008.

CLO, PO and PSO Mapping:

WORKSHOP PRACTICE LAB (20EEL103/MEL02)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Make half lap joint, Dovetail joint and Mortise &Tenon joint	2	3	2		2		2			1		2	1	2	3
CO2	Produce Lap joint, Tee joint and Butt joint using Gas welding	2	3	2		2		2			1		2	1	2	3
CO3	Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools	2	3	2		2		2			1		1	1	2	3
CO4	Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring			2		2		2			1		1			2

ENGINEERING GRAPHICS

I B.Tech – I Semester (Code: 20EEL104/MEL01)

Lectures	1	Tutorial	0	Practical	4	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				0

Prerequisites: None

Course Objectives: To make the students To learn

CO1: Clear picture about the importance of engineering graphics in the field of engineering
CO2: Drawing skills and impart students to follow Bureau of Indian Standards
CO3: An idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections
CO4: Imagination skills about orientation of points, lines, surfaces and solids
CO5: Basic drafting skills of Auto CAD

Course Learning Outcomes: By the end of the course the student will be able to

CLO1: Draw projections of points and projections of lines using Auto CAD
CLO2: Plot projections of surfaces like circle, square and rhombus
CLO3: Plot the Projections of solids like Prisms and pyramids
CLO4: Convert the of Orthographic views into isometric views of simple objects
CLO5: Generate the of pictorial views into orthographic views of simple castings

UNIT – I

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures

INTRODUCTION TO AUTOCAD:

Basics of sheet selection, Draw tools, Modify tools, dimensioning

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

UNIT II

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT – III

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones Inclined to one plane. .

UNIT –IV

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

TEXT BOOK:

1. Dhananjay M. Kulkarni, "Engineering Drawing with AutoCAD" PHI publication
2. N.D. Bhatt & V.M. Panchal, "Engineering Drawing", Charotar Publishing House.

REFERENCE BOOKS:

1. Dhananjay AJolhe, "Engineering Drawing" Tata McGraw hill publishers
2. Prof.K.L.Narayana& Prof. R.K.Kannaiah, "Engineering Drawing"

CLO, PO and PSO Mapping:

Engineering Graphics (20EE105/MEL01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Draw projections of points and projections of lines using Auto CAD	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CLO2	Plot projections of surfaces like circle, square and rhombus	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO3	Plot the Projections of solids like Prisms and pyramids	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO4	Convert the of Orthographic views into isometric views of simple objects	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CLO5	Generate the of pictorial views into orthographic views of simple castings	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-

ENVIRONMENTAL STUDIES

I B.TECH – I SEMESTER (Code: 20EE104/CE01)

Lectures	2	Tutorial	0	Practical	0	Self-study	0	Credits	2
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				0

Prerequisites: None

Course Objectives: The course aims

CO1: To develop an awareness, knowledge, and appreciation for the natural environment.
CO2: To understand different types of ecosystems exist in nature.
CO3: To know our biodiversity.
CO4: To understand different types of pollutants present in Environment.
CO5: To know the global environmental problems.

Course Learning Outcomes: By the end of the course the student will be able to

CLO1: Develop an appreciation for the local and natural history of the area.
CLO2: Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.
CLO3: Know how to manage the harmful pollutants.
CLO4: Gain the knowledge of Environment.
CLO5: Create awareness among the youth on environmental concerns important in the long-term interest of the society

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries). 6 periods

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT – II

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. **Forest**: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. **Water**: Uses, floods and drought, Dams - benefits and problems.

Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada Bachao Andolan case studies8 periods

Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.

UNIT – III

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermin composting.

Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act.

UNIT – IV

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment. Environmental Standards (ISO 14000, etc.)

Case Studies: Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare).

Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.

TEXT BOOKS:

1. Benny Joseph, "Environmental Studies", Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. JP Sharma, "Comprehensive environmental studies", Laxmi Publications.
3. ErachBharucha, "Text Book of environmental Studies"

REFERENCE BOOKS:

1. R.Rajagopalan, "Environmental studies", Oxford University Press.
2. Anjaneyulu Y, "Introduction to Environmental Science", B S Publications
3. Jr. G. Tyler Miller, "Environmental Science", 11th Edition – Thomson Series.

CLO PO and PSO Mapping:

ENVIRONMENTAL STUDIES (20CE01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Develop an appreciation for the local and natural history of the area.	-	-	-	1	-	2	3	-	-	1	-	2	-	-	-
CLO2	Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.	-	-	-	-	2	2	3	-	-	1	-	2	-	-	1
CLO3	Know how to manage the harmful pollutants.	-	-	-	-	-	-	3	-	-	1	1	2	1	-	-
CLO4	Gain the knowledge of Environment.	-	-	-	1	-	2	3	-	-	1	-	2	1	-	-
CLO5	Create awareness among the youth on environmental concerns important in the long-term interest of the society	-	-	-	-	-	2	3	2	-	1	-	2	-	-	1

NUMERICAL METHODS AND ADVANCED CALCULUS

I B.Tech –II Semester (Code: 20EE201/MA02)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: None

Course Objectives: To make the students

CO1: Solve algebraic, transcendental and system of linear equations with the help of numerical methods.

CO2: Apply the techniques of numerical integration whenever and where routine methods are not applicable and solve the first order ode numerically with the given initial condition using different methods.

CO3: Evaluate double and triple integrals and apply them to find areas and volumes.

CO4: Evaluate the line, surface and volume integrals and learn their inter-relations and applications.

Course Learning Outcomes: By the end of the course the student will be able to

CLO-1: Solve algebraic, transcendental and system of linear equations with the help of Numerical techniques.

CLO-2: Apply the techniques of numerical integration to evaluate real definite integrals, solve the first order ode numerically with the given initial condition.

CLO-3: Transform Cartesian coordinate system to cylindrical or spherical polar coordinate system, Evaluate double and triple integrals and apply them to find areas and volumes.

CLO-4: Understand the concepts scalar and vector fields, gradient, divergence and curl. Evaluate the line, surface and volume integrals and learn their inter-relations and applications.

UNIT - I

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi's iterative method, Gauss-Seidel iterative method.

[Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2]. [12 Hours]

UNIT - II

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton's interpolation formulae: Newton's forward interpolation formula, Newton's backward interpolation formula; Interpolation with unequal intervals; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical

integration; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Numerical solution of ODE's: Introduction; Picard's method; Euler's method; Runge-Kutta method.

[Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7]. [12 Hours]

UNIT – III

Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integrals, Change of variables.

[Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2; 7.7.2]. [12 Hours]

UNIT – IV

Vector calculus and its Applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem(without proof).

[Sections: 8.4; 8.5.1; 8.5.3; 8.6; 8.11; 8.12; 8.13; 8.14; 8.16] [12 Hours]

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

NPTEL Course Links:

1. NPTEL :: Mathematics - NOC:Numerical methods
2. NPTEL :: Mathematics - NOC:Integral and Vector Calculus

CLO, PO and PSO Mapping:

Numerical methods and advanced Calculus (20EE201/MA02)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Solve algebraic, transcendental and system of linear equations with the help of numerical	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CO2	Apply the techniques of numerical integration to evaluate real definite integrals, solve the first order ode numerically with the given initial condition.	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CO3	Transform Cartesian coordinate system to cylindrical or spherical polar coordinate system, Evaluate double and triple integrals and apply them to find areas and volumes.	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CO4	Understand the concepts scalar and vector fields, gradient, divergence and curl. Evaluate the line, surface and volume integrals and learn their inter-relations and applications.	3	3	-	1	-	-	-	-	-	-	-	-	3	-	-

SEMICONDUCTOR PHYSICS AND NANO MATERIALS

I B.Tech –II Semester CODE: 20EE202/PH03

(Common for CSE, IT, EEE &EIE)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives:

CO1: This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principles regarding electrical conduction.

CO2: This unit provides various properties of semiconductor materials and their importance in various device fabrications.

CO3: This unit aim to educate the student on various opto-electronic devices and their applications.

CO4: This unit provide information about the principles of processing, manufacturing and characterization of nano materials, nanostructures and their applications.

Course outcomes: At the end of the course the students should be able to

CLO1: Understand concepts of band structure of solids, concept of hole and effective mass of electron in semiconductors.

CLO2: Know the concept of Fermi level and various semiconductor junctions.

CLO3: Familiar with working principles of various opto-electronic devices and their applications.

CLO4: Understand importance of nano-materials and their characteristic properties.

UNIT –I

ELECTRONIC MATERILAS: Somerfield free electron theory, Fermi level and energy, density of states, Failure of free electron theory (Qualitative), Energy bands in solids, E-K diagrams, Direct and Indirect band gaps. Types of Electronic materials: Metals, Semi-conductors and Insulators, Occupation Probability, effective mass, Concept of hole.

UNIT – II

SEMICONDUCTORS: Introduction to semiconductors, intrinsic and extrinsic semiconductors, carrier concentrations, Fermi level and temperature dependence, Continuity equation, Diffusion and drift, P-N junction (V-I characteristics), Metal – Semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for opto- electronic devices.

UNIT-III

OPTO-ELECTRONIC DEVICES AND DISPLAY DEVICES: Photo voltaic effect, principle and working of LED, Applications of Photo diode, Solar cell, PIN & APD Diode, Liquid crystal display, Opto electric effect: Faraday Effect and Kerr effect.

UNIT-IV

NANO-MATERIALS: Introduction to nano technology, quantum confinement, surface to volume ratio, properties of nano materials, synthesis of nano-materials: CVD, sol-gel methods, laser ablation. Carbon nano tubes: types, properties, applications. Characterization of nano materials: XRD, SEM, applications of nano materials.

TEXT BOOKS:

1. Avadhanulu and Kshirsagar, "A text book of engineering physics", S.Chand& Co. (2013)
2. Dr.*P.Srinivasa Rao*. Dr.K.*Muralidhar, "*Applied physics",
3. Charles Kittel, "Introduction to solid state state physics", 8th edition
4. S.O. Pillai, "Solid state physics",

REFERENCE BOOKS:

1. B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, "Textbook on Nanoscience and Nanotechnology", Springer Science & Business Media, 2013.
2. Dr.*P.SrinivasaRao*. Dr.K.*Muralidhar. "*Basic Engineering Physics", Himalaya Publications, 2016

NPTEL COURSE LINKS:

1. NPTEL :: Physics - Fundamental concepts of semiconductors
2. NPTEL :: Metallurgy and Material Science - NOC:Fundamentals of electronic materials and devices
3. NPTEL :: Metallurgy and Material Science - Optoelectronic Materials and Devices

CLO, PO and PSO Mapping:

SEMICONDUCTOR PHYSICS AND NANO MATERIALS (20EE202/PH03)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	The students able to understand the concepts of band structure of solids, concept of hole and effective mass of electron in semiconductors.	3	3	-	2	-	-	-	-	-	-	-	3	-	2	3
CLO2	Students were able to know the concept of fermi level and various semiconductors junctions	3	3	-	2	-	-	-	-	-	-	-	3	-	-	3
CLO3	Students were able to familiar with working principles of various optoelectronic devices and their applications	3	-	3	3	2	2	3	-	-	-	-	3	-	-	3
CLO4	The students able to understand the importance of nano materials and their characteristic properties	3	3	2	2	2	-	-	-	-	-	-	3	-	2	3

ENGINEERING CHEMISTRY

(Common to all branches)

I B.Tech –II Semester (Code: 20EE203 /CY01)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

PREREQUISITES: None

COURSE OBJECTIVES: The student should be conversant:

CO1: With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.
CO2: To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.
CO3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics.
CO4: With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

COURSE OUTCOME: By the end of the course the student will be able to

CLO1: Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
CLO2: Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.
CLO3: Have the capacity of applying energy sources efficiently and economically for various needs.
CLO4: Design economically and new methods of organic synthesis and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.

UNIT -I

Water Chemistry

Introduction: water quality parameters

Characteristics: Alkalinity, Hardness - Estimation & simple numerical problems,

Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;

Internal conditioning- phosphate, calgon and carbonate methods.

External conditioning - Ion exchange process & Zeolite proess WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration. Disinfection methods: Chlorination, ozonization and UV treatment. Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT- II

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.

Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion.

Corrosion control – Cathodic protection, and electro plating (Au)& electoless Ni plating.

UNIT- III

Fuels: Classification of fuels; Calorific value of fuels (lower, higher)

Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking,

Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti-knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages

Gaseous fuels: CNG and LPG, Flue gas analysis – Orsat apparatus.

UNIT- IV

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markwnikoff's rules) , elimination (E_1& E_2), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)

Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications**.** Plastics: Thermo plasts and thermosetting plastics, Bskelite and PVC.

Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co-β-hydroxyvalerate (PHBV), applications.

TEXT BOOKS:

1. P.C. Jain and Monica Jain, "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi 17th edition (2017).
2. SeshiChawla, "Engineering Chemistry"DhanpatRai Pub, Co LTD, New Delhi 13th edition, 2013.

REFERENCES:

1 Essential Of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012.

2 Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

3 Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

CLO, PO and PSO Mapping:

ENGINEERING CHEMISTRY (20EE203 /CY01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Develop innovative methods to produce soft water for industrial use and able to solve the industrial problems	3	3	1	-	-	2	3	-	-	-	-	3	3	-	-
CLO2	the students will be familiar with applications of polymers in domestic and engineering areas & the most recent surface characterization techniques	3	3	2	-	-	2	2	-	-	-	-	3	3	3	2
CLO3	Have the capacity of classifying fuels, their calorific value determination and applying energy sources efficiently and economically for various needs.	3	3	0	-	-	2	3	-	-	-	-	3	3	3	2
CLO4	Explain features, classification, applications of newer class materials like smart materials, refrocteries, abbrasives, lubriants and composite materials etc.	3	3	2	-	-	2	1	-	-	-	-	2	2	-	-

PROGRAMMING FOR PROBLEM SOLVING

(Common for all branches except Civil Engineering)

I B.Tech –II Semester (Code: 20EE204/CS01)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: BASIC MATHEMATICS

Course Objectives: To make the students

CO1: Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetic rules.

CO2: Develop problem-solving skills to translate 'English' described problems into programs written using C language.

CO3: Use Conditional Branching, Looping, and Functions.

CO4: Manipulate variables and types to change the problem state, including numeric, character, array, and pointer types, as well as the use of structures and unions, File.

Course Learning Outcomes: At the end of the course the students should be able to

1. Choose the right data representation formats based on the requirements of the problem.
2. Analyse a given problem and develop an algorithm to solve the problem.
3. Explain the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
4. Write the program on a computer, edit, compile, debug, correct, recompile and run it.

UNIT- I

Overview of C, Constants, Variables and Data Types, Operators and Expressions, Managing I/O Operations. Decision Making and Branching.

Programming Exercises for Unit I:C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its upper case.

UNIT -II

Decision Making and Looping, Arrays, Character Arrays and Strings.

Programming Exercises for Unit II: To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number. To print graphic patterns of symbols and numbers. To find the length of a string, compare strings, reverse a string, copy a

string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.

UNIT- III

User-defined Functions, Structures and Unions, Pointers

Programming Exercises for Unit - III: Functions - Recursive functions to find factorial & GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using array of pointers

UNIT -IV

File Management in C, Dynamic Memory Allocation, Preprocessor

Programming Exercises for Unit - IV: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments. Copy the contents of one file to another file. Allocating memory to variables dynamically.

TEXT BOOK:

1. E.Balaguruswamy, “Programming in ANSI C, Fifth Edition,.

REFERENCE BOOKS:

1. Kernighan BW and Dennis Ritchie M, “C programming language”, 2nded, Prentice Hall, .
2. Yashavant P. Kanetkar, “Let us C”, BPB Publications, .
3. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata Mcgraw-Hill, .
4. Ashok N.Kamthane, “Programming in C”, PEARSON 2nd Edition, .

NPTEL COURSE LINKS:

1. NPTEL :: Computer Science and Engineering - NOC:Problem Solving through Programming in C
2. NPTEL :: Computer Science and Engineering - NOC:Introduction to programming in C

CLO, PO and PSO Mapping:

PROBLEM SOLVING USING PROGRAMMING (20EE204/CS01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Choose the right data representation formats based on the requirements of the problem	3	2	2		-	-	-	-	-	-	-	-		3	2
CO2	Analyse a given problem and develop an algorithm to solve the problem.	2	3	2		-	-	-	-	-	-	-	-		2	1
CO3	Explain the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.	2	2	1		-	-	-	-	-	-	-	-		2	2
CO4	Write the program on a computer, edit, compile, debug, correct, recompile and run it.	2	1	2		-	-	-	-	-	-	-	-		2	1

CIRCUIT THEORY

I B.Tech –II Semester (Code: 20EE205)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Mathematics, Basic Physics

Course Objectives: To make the students

CO1: Understand about basic Laws in circuits, circuit elements and sources and their characteristics.

CO2: Understand fundamental concepts of alternating current and voltages, power triangle and power factor.

CO3: Analyze circuits with different DC and AC sources.

CO4: Gain knowledge about statement and application of various theorems.

CO5: Understand concept of resonance in series and parallel circuits.

Course Outcomes: By the end of the course the student will be able to

CLO1: Explain about basic Laws, circuit elements and sources and their characteristics.

CLO2: Draw phasor diagrams, phase relations in elements and power triangle.

CLO3: Solve problems involving with different AC and DC sources in electrical circuits.

CLO4: Synthesis the circuits with various theorems.

CLO5: Demonstrate the series and parallel resonance circuits.

UNIT – I

CIRCUIT ELEMENTS: Basic definition of the unit of Charge, Voltage, Current, Power and Energy, Circuit concept, various circuit elements, Energy stored in Inductors and Capacitors, Kirchhoff's laws,

SOURCES: Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division, series / parallel combination of elements, Star-Delta transformation, Instantaneous, Peak, Average and RMS values of various waveforms, Crest factor, Form factor. Concept of phase and phase difference in sinusoidal waveforms, Phase relation in pure resistor, Inductor and capacitor, Impedance diagram, phasor diagram, series and parallel circuits, compound Circuits, Computation of active, reactive and complex powers, power triangle, power factor.

UNIT – II

STEADY STATE ANALYSIS: Mesh and Nodal analysis of DC circuits with and without dependent sources, Mesh and Nodal analysis of AC circuits, Analysis of RL, RC, RLC series and parallel circuits with pulse and impulse excitations.

UNIT – III

NETWORK THEOREMS: Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegen's and Millman's theorems to both DC (with and without dependent) and AC circuits

UNIT – IV

RESONANCE: Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance, Locus diagrams for series and parallel circuits.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 8th Edition,TMH, 2012.
2. M E Vanvalkenburg, "Network Analysis", 3rd Edition, PHI, 2006.
3. C L Wadhwa, "Network analysis and synthesis", New Age International, 2nd Edition, 2006.

REFERENCE BOOKS:

1. C K Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 5th Edition, 2016.
2. Abhijit chakrabarti, "Circuit theory analysis and synthesis" Dhanapatrai & co (p) Ltd, 2018.
3. A Sudhakar and Shyam Mohan SP, "Circuits and Networks: Analysis and Synthesis", 4th Edition, TMH, 2010.
4. J A Edminister, "Electric circuits", Schaum outline series.

NPTEL COURSE LINKS:

1. NPTEL :: Electrical Engineering - NOC:Network Analysis, https://nptel.ac.in/courses/108/105/108105159
2. NPTEL :: Electrical Engineering - NOC:Basic Electric Circuits, https://nptel.ac.in/courses/108/104/108104139/
3. NPTEL :: Electrical Engineering - NOC:Basic Electrical Circuits, https://nptel.ac.in/courses/108/106/108106172/

CLO, PO and PSO Mapping:

	CIRCUIT THEORY (20EE205)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Explain about basic Laws, circuit elements and sources and their characteristics.	3	-	-	-	-	-	-	-	-	-	-	-	2	2	-
CLO2	Draw phasor diagrams, phase relations in elements and power triangle.	3	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CLO3	Solve problems involving with different AC and DC sources in electrical circuits.	3	2	-	-	-	-	-	-	-	-	-	-	3	3	-
CLO4	Synthesis the circuits with various theorems.	3	2	-	2	-	-	-	-	-	-	-	-	3	3	-
CLO5	Demonstrate the series and parallel resonance circuits.	3	2	-	2	-	-	-	-	-	-	-	-	2	3	-

ENGINEERING MECHANICS

I B.Tech –II Semester (Code: 20EE206/CE02)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics

Course Objectives: To learn

CO1: The concepts Force systems, free body diagrams, resultant of forces and equations of equilibrium, Supports and support reaction sand calculation of Centroid

CO2: The Concept of moment of inertia of plane figures, Laws and applications of friction

CO3: The Analysis of the truss and determination of axial forces by Method of Joints

CO4: Motion of a body and their relationships and application of D Alembert's principle in rectilinear and curvilinear motions

CO5: About Mass moment of inertia of material bodies, Plane motion of a body about a fixed axis

Course Learning Outcomes: Students will be able to

CLO-1: Construct free body diagrams and use appropriate equilibrium equations, Calculate unknown forces in a plane by resolution of force and equilibrium equations

CLO-2: Locate Centroid of composite figures and determine moment of plane figures

CLO-3: Analyze the systems with friction

CLO-4: Determine the axial forces in the members of determinate truss. Calculation of acceleration, velocity and displacement and forces

CLO-5: Determine moment of inertia of material bodies, Calculation of angular displacement, velocity and angular acceleration of rotational bodies.

UNIT – I

Concurrent Forces in a Plane

Principles of statics – composition and resolution of forces – equilibrium of concurrent forces in a plane –Method of moments.

Parallel Forces in a Plane

Two parallel forces – general case of parallel forces in a plane – center of parallel forces – Centroids of composite plane figures and curves.

UNIT – II

Moments of Inertia of Plane Figures

Moment of inertia of a plane figure with respect to an axis in its plane – Moment of Inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem.

Friction

Characteristics of friction – problems involving dry friction, ladder friction and wedge friction.

UNIT – III

Rectilinear Translation

Kinematics of rectilinear motion – principles of dynamics – Differential equations of rectilinear motion D'Alembertsprinciple .

Curvilinear Translation

Kinematics of curvilinear motion – Differential equations of curvilinear motion – D'Alembert's principle.

UNIT – IV

Moments of Inertia of Material Bodies

Moment of inertia of rigid body – Moment of inertia of a lamina – Moments of inertia of three – dimensionalbodies.

Rotation of a Rigid Body about a Fixed Axis

Kinematics of rotation – Equation of motion for a rigid body rotating about a fixed axis – D'Alembert's principle.

TEXT BOOKS:

1. S. Timoshenko and D. H. Young, "Engineering mechanics" Mc Graw-Hill International edition (For concepts and symbolic problems)
2. R. C. Hibbeler and Ashok Gupta, "Engineering mechanics statics and dynamics", Pearson (For numerical problems using S.I. system ofunits)

REFERENCE BOOKS:

1. Beer and Johnston, "Vector mechanics for engineers statics and dynamics" Tata Mc Graw-Hill publishing company, NewDelhi
2. A. K. Tayal, "Engineering mechanics statics and dynamics" Umesh publication, Delhi (For numerical problems using S.I. system of units)

NPTEL COURSE LINKS:

1. NPTEL :: Mechanical Engineering - NOC:Engineering Mechanics
2. NPTEL :: Basic courses-Sem 1 and 2 - Engineering Mechanics

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CLO, PO and PSO Mapping:

Engineering Mechanics (20EE206/CE02)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Construct free body diagrams and use appropriate equilibrium equations, Calculate unknown forces in a plane by resolution of force and equilibrium equations.	1	1	1	1	1	-	-	-	-	-	-	-	3	3	3
CLO2	Locate Centroid of composite figures and determine moment of plane figures.	1	1	1	1	3	-	-	-	-	-	-	-	3	3	3
CLO3	Analyze the systems with friction	1	1	1	3	3	-	-	-	-	-	-	-	3	3	3
CLO4	Determine the axial forces in the members of determinate truss. Calculation of acceleration, velocity and displacement and forces.	1	1	1	1	-	-	-	-	--	-	-	-	3	3	3
CLO5	Determine moment of inertia of material bodies, Calculation of angular displacement, velocity and angular acceleration of rotational bodies.	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-

ENGINEERING CHEMISTRY LAB
(Common to all branches)

I B.Tech –II Semester (Code: 20EEL201/CYL01)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Nil

Course Objectives: To make the students

CO1: The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.

CO2: To determine the percentage purity of washing soda bleaching powder and given salt.

CO3: The measurement of quality parameters of water to check its suitability for domestic and industrial purpose

CO4: To estimate the characteristic properties of oil for its use at various level.

CO5: To synthesize the Soap, Resin and Aromatic Ester followed by their applications.

CO6: The use and utility of some instruments like P^H meter, Conductometer and Potentiometer for various applications.

Course Outcomes: Students will be able to

CLO1: Familiar with fundamental basics of Chemistry lab.

CLO2: Ability to estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.

CLO3: Gain the knowledge regarding the quality parameters of water like salinity, hardness, alkalinity etc.

CLO4: Able to analyse the given oil for saphonification and iodine value.

CLO5: Ability to prepare high polymers and soap.

CLO6: Ability to understand the estimation of quality parameters by instrumentation technics.

LIST OF EXPERIMENTS

1. **Introduction to Chemistry Lab** (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).

2. **Volumetric Analysis:**
   a. Estimation of Washing Soda.
   b. Estimation of Active Chlorine Content in Bleaching Powder
   c. Estimation of Mohr's salt by permanganometry.

d. Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. **Analysis of Water:**
   a. Determination of Alkalinity of Tap water.
   b. Determination of Total Hardness of ground water sample by EDTA method
   c. Determination of Salinity of water sample
4. **Estimation of properties of oil**:
   a. Estimation of Acid Value
   b. Estimation of Saponification value
5. **Preparations:**
   a. Preparation of Soap
   b. Preparation of Urea-formaldehyde resin
   c. Preparation of Phenyl benzoate
6. **Demonstration Experiments (Any two of the following):**
   a. Determination of $p^H$of given sample.
   b. Determination of conductivity of given sample by conduct meter.
   c. Potentiometric Determination of Iron.

TEXT BOOKS (for Chemistry 1 and 2):

1. K.Mukkanti, Etal, "Practical Engineering Chemistry" B.S. Publications, Hyderabad, 2009.
2. Vogel, "Inorganic quantitative analysis", 5^{th} edition, Longman group Ltd. London, 1979.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel.
2. A text book on experiments and calculations- Engineering Chemistry. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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CLO, PO and PSO Mapping:

Engineering Chemistry Lab (20EEL201/CYL01)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Familiar with fundamental basics of Chemistry lab	2												2		
CLO2	Ability to estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.	2	2	2	2		2						1			
CLO3	Gain the knowledge regarding the quality parameters of water like salinity, hardness, alkalinity etc.	2	2	2	2		2						1	1		
CLO4	Able to analyse the given oil for saphonification and iodine value.	2	2	2	2								1			
CLO5	Ability to prepare high polymers and soap.	2			2								1	2	1	
CLO6	Ability to understand the estimation of quality parameters by instrumentation technics.	2	2	2	2								1	2	1	

CIRCUIT THEORY LAB

I B.Tech –II Semester (Code: 20EEL202)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Pre-requisites: Circuit theory, Mathematics

Course Objectives: To make the students

CO1: Understand and verify basic Kirchhoff's laws in circuits.

CO2: Understand and verify fundamental theorems of circuit theory.

CO3: Able to determine the parameters of a given choke coil.

CO4: Understand the locus diagrams of series RL, RC circuits.

CO5: Understand and verify fundamental theorems of circuit theory using software.

Course outcomes: At the end of the course the students should be able to

CLO1: Gain knowledge about basic Kirchhoff's laws in circuits.

CLO2: Verify fundamental theorems of circuit theory.

CLO3: Analyze the parameters of a given choke coil.

CLO4: Draw the locus diagrams of series RL,RC circuits.

CLO5: Verify fundamental theorems of circuit theory using software.

LIST OF EXPERIMENTS

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Verification of Reciprocity theorem
6. Verification of Maximum Power Transfer theorem
7. Parameters of Choke coil
8. Measurement of low and medium resistance using volt ampere method
9. Locus diagram of RL series circuit
10. Locus diagram of RC series circuit
11. Steady state analysis of RL, RC and RLC series circuits using software
12. Verification of Superposition theorem using software
13. Verification of Thevenin's and Norton's theorem using software
14. Verification of Maximum Power Transfer theorem DC and AC circuits using software
15. Locus diagram of RL and RC series circuit using software

Note: Minimum 10 experiments should be carried out.

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CLO, PO and PSO Mapping:

Circuit Theory Lab (20EEL202)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Gain knowledge about basic Kirchhoff's laws in circuits.	3	3	3	1									3		
CLO2	Verify fundamental theorems of circuit theory.	3	3	2	1									3	2	
CLO3	Analyze the parameters of a given choke coil.	3	2	1	2									2	3	
CLO4	Draw the locus diagrams of series RL,RC circuits.	3	3	2	3									2	2	
CLO5	Verify fundamental theorems of circuit theory using software.	3	2	3	3									3	2	

PROGRAMMING FOR PROBLEM SOLVING LAB

I B.Tech –II Semester (Code: 20EEL203/CSL01)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Mathematics

Course Objectives: To make the students

CO1: Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetic rules.

CO2: Develop problem-solving skills to translate "English" described problems into programs written using C language.

CO3: Use Conditional Branching, Looping, and Functions.

CO4: Apply pointers for parameter passing, referencing and differencing and linking data structures.

CO5: Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes: Students will be able to

CLO1: Identify the right data representation formats for the given problem.

CLO2: Use appropriate conditional/iterative statements to solve the problems.

CLO3: Apply the concepts of user defined functions and recursion to support reusability

CLO4: Design an application using the concepts of array, pointer, structure, and file management to solve real world problem.

LIST OF PROGRAMMES:

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if-else statement).

Domestic Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 200	0.50 per unit	
201 – 400	100 plus	0.65 per unit
401 – 600	230 plus	0.80 per unit
601 and above	390 plus	1.00 per unit
Commercial Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 100	0.50 per unit	
101 – 200	50 plus	0.6 per unit
201 – 300	100 plus	0.70 per unit
301 and above	200 plus	1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $1 + x^2/2! + x^4 / 4! + \ldots$up to ten terms
   b) $x + x^3/3! + x^5/5! + \ldots$ up to ten terms
3. Write a C program to check whether the given numberis
   a) Prime ornot.
   b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
   a) Mean
   b) Mode
   c) Median
   d) Variance.
5. WriteaCprogramtoreadalistofnumbersandperformthefollowingoperations
   a) Print the list.
   b) Delete duplicates from the list.
   c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message "Element not found in the List".

7. Write a C program to read two matrices and compute their sum and product.

8. Write a C program to read list of student names and perform the following operations
a) To print the list of names.
b) To sort them in ascending order.
c) To print the list after sorting.

9. Write a C program that consists of recursive functions to

a) Find factorial of a given number
b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.

10. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message "required copies not in stock" is displayed. Write a program for the above in structures with suitable functions.

11. Write a C program to read a data file of students' records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

12. Write a C program to read a file as command line argument and count the given word frequency in a file

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CLO, PO and PSO Mapping:

Programming for problem solving Lab (20EEL203/CSL01)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the right data representation formats for the given problem.	3	3	3		2								2	-	-
CO2	Use appropriate conditional/iterative statements to solve the problems	3	3	3		2								2	-	-
CO3	Apply the concepts of user defined functions and recursion	3	3	3		2								2	-	-
CO4	Design an application using the concepts of array, pointer, structure, and file management to solve real world problem.	3	3	3		2								2	-	-

PROBABILITY AND STATISTICS

Common to All Branches

II B.Tech-III Semester (Code: 20EE301/MA03)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment			30	Semester End Examination (3 Hours)					70

Course Objectives:

CO1: Understand various continuous probability density functions and apply them to various problems in science and engineering.

CO2: Estimate the point and interval estimators of the mean, variance and proportion for the given sample data and apply Z-test, t-test to various real life problems.

.CO3: Apply various sample tests like $\chi 2$ -test and F test for decision making regarding the population based on sample data to different realistic problems.

CO4: Compute the level of correlation, the linear relationship for the given bivariate data and the best fit curve to the given data by the method of least squares. Also perform multiple regression analysis to the regression model arising in the field of engineering.

Course Outcomes:

Upon the successful completion of the course, the student will be able to:

1. Apply various continuous probability distributions to solve the complex problems that will arise in engineering applications.
2. Understand the terms sample, population, null hypothesis, alterative hypothesis and perform statistical analysis related to a single population and draw appropriate conclusions about the population parameter.
3. Perform statistical analysis related to a single population or two populations and draw appropriate conclusions about the parameters of the populations.
4. Fit a least squares curve/plane to the given data points. Compute the correlation coefficient between the values of two random variables. Apply the technique of one way ANOVA to the given statistical data and draw conclusions.

UNIT – I

Probability Densities: Continuous Random Variables, The Normal Distribution, The Normal Approximation to the Binomial Distribution, The Uniform Distribution, The Gamma Distribution, The Beta Distribution, The Weibull distribution, Joint Distributions - Discrete and Continuous.

(Sections 5.1, 5.2, 5.3, 5.5, 5.7, 5.8, 5.9, 5.10 of the Text Book) [12 Hours]

UNIT – II

Sampling Distributions: Populations and Samples, The sampling distribution of the mean (σ known), The sampling distribution of the mean (σ unknown), The sampling distribution of the variance.
Inferences Concerning a Mean: Point estimation, Interval estimation, Tests of Hypotheses, Null Hypotheses and Tests of hypotheses, Hypothesis concerning one mean.

(Sections 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 7.4, 7.5, 7.6 of the Text Book) [12 Hours]

UNIT-III

Comparing Two Treatments: Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Matched pairs comparisons.
Inferences Concerning Variances: The estimation of variances, Hypotheses concerning one variance, Hypotheses concerning two variances.

(Sections 8.2, 8.3, 8.4, 9.1, 9.2, 9.3 of the Text Book) [12 Hours]

UNIT –IV

Inferences Concerning Proportions: Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions.
Regression Analysis: The method of least squares, Curvilinear regression, Multiple regression, Correlation.

(10.1, 10.2, 10.3, 11.1, 11.3, 11.4, 11.6 of the Text Book) [12 Hours]

TEXT BOOKS:

1. Miller & Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 8th Edition, PHI.
2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3rdedition, Wiley.

REFERENCE BOOKS:

1. R.E Walpole, R.H. Myers & S.L. Myers 'Probability & Statistics for Engineers and Scientists', 6th Edition, PHI.
2. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor, 11th Edition, Sultan Chand & Sons.
3. MurrayR Spiegel, John J.Schiller, R. Alu Srinivasa, 'Probability & Statistics', Schaum's outline series.
4. K.V.S.Sarma ,' Statistics Made Simple – Do it yourself on PC', Prentice Hall India, Second Edition, 2015.

NPTEL COURSE LINKS:

1. NPTEL :: Mathematics - NOC:Probability and Statistics
2. NPTEL :: Mathematics - Probability and Statistics
3. NPTEL :: Mathematics - NOC:Introduction to probability and Statistics

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CLO, PO and PSO Mapping:

Probability and Statistics (20EE301/MA03)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Apply various continuous probability distributions to solve the complex problems tha will arise in engineering applications.	2	2		2									1		
CLO2	Understand the terms sample, population, null hypothesis, alterative hypothesis and perform statistical analysis related to a single population and draw appropriate conclusions about the population parameter.	3	2		2									2		
CLO3	Perform statistical analysis related to a single population or two populations and draw appropriate conclusions about the parameters of the populations.	3	2		3									2		
CLO4	Fit a least squares curve/plane to the given data points. Compute the correlation coefficient between the values of two random variables. Apply the technique of one way ANOVA to the given statistical data and draw conclusions.	2	2		3									2		

NETWORK ANALYSIS

II B.Tech – III Semester (Code: 20EE302)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Mathematics

Course Objectives: To make the students

CO1: Infer and evaluate transient response, Steady state response for single phase systems.

CO2: Analyze the circuits using Laplace Transforms.

CO3: Understand the concepts of three-phase systems and its analysis.

CO4: Know about the concepts of two-port network parameters and network functions.

CO5: Understand the behaviour of coupled circuits.

CO6: Construct passive filters using constant K and M derived methods.

Course Outcomes: Students will be able to

CLO1: Analyze transient response, Steady state response for single phase systems.

CLO2: Explain the circuits using Laplace Transforms.

CLO3: Analyze three-phase circuits in the sinusoidal steady-state.

CLO4: Evaluate two-port network parameters, network functions.

CLO5: Analyze coupled circuits and its behavior.

CLO6: Design passive filters using constant K and M derived methods.

UNIT – I

Solution of First and Second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, RLC circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response for DC and AC excitations.

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, Frequency response (magnitude and phase plots).

UNIT – II

Poly Phase Systems: Advantages of 3-phase systems, generation of 3-phase voltages, phase sequence, star & delta connections, interconnection of 3-phase sources and loads, voltage, current & power in star & delta connected systems, analysis of 3-phase balanced circuit,

measurement of 3-phase power, 2 wattmeter method. Analysis of 3-phase unbalanced systems, star / delta transformation method, application of KVL and Mill man's method.

UNIT-III

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, interrelation of two port network, interconnections of two port networks, image parameters, Two-Port bridged – T, Ladder and Lattice networks. transformed network with initial conditions. Transfer function representation. Poles and Zeros - Network functions for the one port and two port - Poles and Zeros of network functions - Restrictions on pole and zero locations for driving point functions and transfer functions - Time domain behavior from the pole zero plot..

UNIT-IV

Coupled Circuits: Defining self and mutual inductance, coefficient of coupling, dot convention, Development of circuit equations in time domain and frequency domain, solution of coupled circuits, series and parallel connections of two coupled coils, tuned circuit analysis (single and double tuned)

Filters: Low pass, high pass, band pass & band reject filters - frequency response, constant K – and M derived – filters.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 8th Edition,TMH, 2013.
2. M.E.Vanvalkenburg, "Network Analysis", 3rd Edition, PHI, 2006.
3. A Sudhakar and Shyam Mohan SP, "Circuits and Networks: Analysis and Synthesis", 5th Edition, TMH, 2017.

REFERENCE BOOKS:

1. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 5th Edition, 2016.
2. Abhijit Chakrabarti, "Circuit theory analysis and synthesis" Dhanapatrai & co(p) Ltd, 2018.
3. C. L Wadhwa, "Network analysis and synthesis", New Age International, 2nd Edition, 2006.
4. J. A Edminister, "Electric circuits", Schaum outline series,.

NPTEL COURSE LINKS:

1. **NPTEL :: Electrical Engineering - NOC:Network Analysis**
2. **NPTEL :: Electrical Engineering - NOC:Basic Electrical Circuits**
3. **NPTEL :: Electrical Engineering - NOC:Basic Electric Circuits**

CLO, PO and PSO Mapping:

NETWORK ANALYSIS (20EE302)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Analyze transient response, Steady state response for single phase systems.	3	-	-	2	-	-	-	-	-	-	-	-	3	-	-
CLO2	Explain the circuits using Laplace Transforms.	3	-	2	2	-	-	-	-	-	-	-	-	3	-	-
CLO3	Analyze three-phase circuits in the sinusoidal steady-state.	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CLO4	Evaluate two-port network parameters, network functions.	3	3	2	2	-	-	-	-	-	-	-	-	2	1	-
CLO5	Analyze coupled circuits and its behavior.	3	3	2	2	-	-	-	-	-	-	-	-	2	-	-
CLO6	Design passive filters using constant K and M derived methods.	3	3	3	2	-	-	-	-	-	-	-	-	2	-	-

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ELECTROMAGNETIC FIELDS

II B.Tech – IV Semester (Code: 20EE303)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics, Basic Mathematics

Course Objectives: To make the students

CO1: Acquire knowledge in Electromagnetic field theory
CO2: Provide a solid foundation in Electrostatics such as Dipole, Capacitance
CO3: Attain familiarity in Boundary conditions and Magnetic field
CO4: Understand the relation between field theory and circuit theory
CO5: Identify the electromagnetic wave propagation in medium

Course Learning Outcomes: Students will be able to

CLO1: Describe the fundamentals in Electromagnetic field theory
CLO2: Explain basics in Electrostatics such as Dipole, Capacitance
CLO3: Distinguish electric and magnetic properties of material media and Familiarity in Boundary conditions and Magnetic field
CLO4: Analyze three dimensional vector differential and integral concepts to solve real life electromagnetic field problems
CLO5: Describe the electromagnetic wave propagation in medium

UNIT – I

Electrostatics I: Introduction to Rectangular, Cylindrical and Spherical Coordinate systems. The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Gauss's law , Applications of Gauss law, Divergence, Maxwell's First equation (Electrostatics), Energy expended in moving a point charge in an electric field, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient.

UNIT – II

Electrostatics II: Electric field intensity due to dipole and Energy density in electrostatic field. The nature of dielectric materials, boundary conditions for perfect dielectric materials .Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson's and Lap lace's equations, Examples of the solution of Laplace's equation. Current and current density, continuity of current, conductor properties and boundary conditions

UNIT – III

Steady Magnetic Field: Biot- Savart Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials. Magnetic Forces and Materials: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

UNIT – IV

Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current, Maxwell's equations in point form, integral form.

Concept of Uniform Plane Wave: Wave propagation in free space, dielectrics. Poynting theorem and wave power. Propagation in good conductors: skin effect. Reflection of uniform plane waves at normal incidence.

TEXT BOOKS:

1. W H Hayt, J A Buck , "Engineering Electromagnetics", 7th Edition TMH, 2006.
2. Mathew NO Sadiku, "Elements of Electromagnetics", Oxford University Press, 2003.
3. G S N Raju, "Electromagnetic Field Theory and transmission lines", 1st Edition, Pearson Education India, 2005.

REFERENCE BOOKS:

1. Joseph A Edminister, "Theory and Problems of Electromagnetics", 2nd Edition, Schaum's Outline Series, Mc-Graw Hill International, 1993
2. EC Jordan and KG Balmain, "Electromagnetic Waves and Radiating Systems", PHI 2003

NPTEL COURSE LINKS:

1. Electrical Engineering - NOC:Electromagnetic theory - NPTEL **https://nptel.ac.in/courses/108/104/108104087/**
2. Electrical Engineering - Electromagnetic Fields - NPTEL **https://nptel.ac.in/courses/108/106/108106073/**

CLO, PO and PSO Mapping:

ELECTROMAGNETIC FIELDS (20EE303)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Describe the fundamentals in Electromagnetic field theory	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-
CLO2	Explain basics in Electrostatics such as Dipole, Capacitance	3	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CLO3	Distinguish electric and magnetic properties of material media and Familiarity in Boundary conditions and Magnetic field	3	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CLO4	Analyze three dimensional vector differential and integral concepts to solve real life electromagnetic field problems	2	2	1	-	-	-	-	-	-	-	-	-	3	2	-
CLO5	Describe the electromagnetic wave propagation in medium	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-

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DC MACHINES AND TRANSFORMERS

II B.Tech – III Semester (Code: 20EE304)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics, Basic Mathematics

Course objectives: To make the students

CO1: Understand the concept of magnetic circuits and electromagnetic force and torque.
CO2: Know the construction of dc generators and its characteristics.
CO3: Understand the speed control techniques and testing methods of dc motor.
CO4: Know the construction and operation of single and three phase Transformers.

Course Learning Outcomes: At the end of this course, students will be able to

CLO1: Explain the concepts of magnetic circuits.
CLO2: Describe the operation of dc generators and its characteristics.
CLO3: Analyze the speed control techniques and testing methods of dc motors.
CLO4: Analyze construction and operation of single and three phase Transformers.

UNIT-I

Magnetic Fields and Magnetic circuits: Review of magnetic circuits-MMF, flux, reluctance, inductance; review of Ampere law and Biot- Savarts law. Visualization of magnetic fields produced by a bar magnet and a current carrying coil-through air and through a combination of iron and air.

Electromagnetic force and torque: B-H curve of magnetic materials; energy stored in magnetic circuit; Field energy and mechanical force-mechanical energy-Multiple excited magnetic field systems-Forces /Torques in systems with permanent magnets. Examples of galvanometer coil-relay contact-lifting magnet-rotating element with eccentricity or saliency.

UNIT-II

DC Generators: Basic construction of a DC machine-Principle and operation of DC Generator-Types of windings- Types of field excitations-EMF equation-Armature reaction- commutation-Characteristics of all types of DC Generators-Applications of DC Generators- Parallel operation of DC Generators.

UNIT-III

DC Motors: Principle and operation of DC motor-Torque equation of DC motor-characteristics of all types of DC motors-starters and their design-speed control-Losses-Swinburne's test, load testing and back-to-back testing of DC machines.

UNIT-IV

Single phase Transformers: Principle, Construction and operation of single-phase transformer, equivalent circuit, phasor diagrams. Voltage Regulation, losses and efficiency. Testing's-OC and SC test, back-to back test, Separation of hysteresis and eddy current losses. **Three phase transformers:** Construction, types of connection and their comparative features. Parallel operation. Auto- transformers. Magnetizing current, effect of non-linear B- H curve of magnetic core material. Scott connection, tap changing transformers. Cooling of transformers.

TEXT BOOKS:

1. P.S.Bhimbra, "Electric Machinery", ,Khanna Publications, 7th edition, 2011.
2. I.J.Nagrath&D.P.Kotari, "Electric Machines", Tata Mc Graw-Hill Publication, 3rd edition, 2002.

REFERENCES BOOKS:

1. A.E. Fitzgerald and C.Kingsley, "ElectricMachimery", New York, McGraw Hill Education, 2013.
2. A.E.Clayton and N.N. Hancock, "Performance and design of DC Machimes", CBS Publishers, 2004.
3. M.G.Say,"Performance and design of AC machines", CBS Publishers, 2002.
4. Clayton & Hancock, "Performance and design of DC Machines", BPB Publishers.

NPTELCOURSE LINKS:

1. NPTEL :: Electrical Engineering - NOC:Electrical Machines - I, https://nptel.ac.in/courses/108/105/108105155/
2. NPTEL :: Electrical Engineering - Electrical Machines -I, https://nptel.ac.in/courses/108/105/108105017/

CLO, PO and PSO Mapping:

Electrical Machines – I (20EE304)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Explain the concepts of magnetic circuits.	3	-	2	1	-	-	-	-	-	-	-	-	3	-	-
CLO2	Describe the operation of dc generators and its characteristics.	3	-	2	1	-	-	-	-	-	-	-	-	3	2	-
CLO3	Analyze the speed control techniques and testing methods of dc motors.	3	-	2	1	-	-	-	-	-	-	-	-	3	-	2
CLO4	Analyze construction and operation of single and three phase Transformers.	3	2	2	1	-	-	-	-	-	-	-	-	3	-	-

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TECHNICAL ENGLISH

II B.Tech – III Semester (Code: 20EE305/EL02)

Lectures	2	Tutorial	0	Practical	0	Self-study	0	Credits	2
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: NIL

Course Objectives: The course aims

CO1: At enhancing the vocabulary competency of the students
CO2: To introduce corrective measures to eliminate grammatical errors in speaking and writing
CO3: To learn writing as a process, including various invention heuristics (such as Brainstorming), gathering evidence, considering audience, drafting, revising, editing, and proofreading
CO4: Use grammatical, stylistic, and mechanical formats and conventions appropriate for a variety of purposes
CO5: Produce coherent, organized, readable prose for a variety of rhetorical situations

Course Outcomes: By the end of the course the student would be able to

CLO1: Make use of contextual clues to infer meanings of unfamiliar words from context
CLO2: Understand how to apply technical information and knowledge in practical documents for a variety of purposes
CLO3: Use grammatical, stylistic, and mechanical formats and conventions appropriate to various audiences and disciplines
CLO4: Build confidence to participate actively in writing activities (individually and in collaboration) that model effective technical communication in the workplace

UNIT-I

1.1 Vocabulary Development: Familiarizing Idioms & Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing & Email Writing

UNIT-II

2.1 Vocabulary Development: Analogous words
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The

Future: Predicting & Proposing

2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-III

3.1 Vocabulary Development: Abbreviations& Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival & Adverbial groups
3.3 Language Development: Transco ding (Channel conversion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-IV

4.1 Vocabulary Development: Corporate vocabulary
4.2 Grammar for Academic Writing: Inversions & Emphasis
4.3 Language Development: Reading Comprehension
4.4 Technical Writing: Resume Preparation

REFERENCE BOOKS:

1. Sanjay Kumar & Pushpa Latha, “Communication Skills”, Oxford University Press:2011.
2. “Technical Communication Principles and Practice”, Oxford University Press:2014.
3. Michael Vince, “Advanced Language Practice”, Mac Milan Publishers:2003.
4. Edgar Thorpe & Showick, “Objective English”, (Third Edition), Pearson Education:2009.
5. Angela Downing & Philip Locke, “English Grammar: A University Course”, (Second Edition Rout ledge Taylor & Francis Group: 2016.

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CLO, PO and PSO Mapping:

Technical English (20EE305/EL02)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Make use of contextual clues to infer meanings of unfamiliar words from context	-	-	-	-	-	-	-	-	3	3	2	-	-	-	-
CLO2	Understand how to apply technical information and knowledge in practical documents for a variety of purposes	-	-	-	-	-	-	-	-	3	3	2	-	-	-	-
CLO3	Use grammatical, stylistic, and mechanical formats and conventions appropriate to various audiences and disciplines	-	-	-	-	-	-	-	2	3	3	2	-	-	-	-
CLO4	Build confidence to participate actively in writing activities (individually and in collaboration) that model effective technical communication in the workplace	-	-	-	-	-	-	-	2	3	3	2	-	-	-	-

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SOFTWARE TOOL TO ELECTRICAL ENGINEERING

II B.Tech – III Semester (Code: 20EEL307/SO01)

Lectures	1	Tutorial	0	Practical	2	Self-study	0	Credits	2
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives: This course enables the students to

CO1: Create awareness about MATLAB software and basic mathematical function and MATRIX operations representation
CO2: Learn the fundamental of M-file script and Simulink writing concepts and Plot function
CO3: Understand the basics of SCILAB Software with programming
CO4: Develop the Input and Output Functions with graphic applications using SCILAB

Course Learning Outcomes (COs): By the end of the course the student would be able to

CLO1: Explain awareness about MATLAB software and basic mathematical function and MATRIX operations representation
CLO2: Write the code in MATLAB Script files and Simulink for solving the problems
CLO3: Develop modelling and design of engineering systems using SCILAB
CLO4: Solve and analyze the problems with the Input and Output Functions with graphic applications using SCILAB

UNIT-I

Introduction to MATLAB software-The MATLAB Environment, Basic commands, Assigning variables, Operations with variables, Data files and Data Types-Character and string, Arrays and vectors, Column vectors, Row vectors,

Basic Mathematics- Arithmetic operations, Operators and special characters, logical operators, solving arithmetic equations, Matrix Operations-Finding transpose, determinant and inverse Solving matrix; Other operations -Trigonometric functions, Complex numbers, fractions Real numbers, Complex numbers.

UNIT-II

M files- Working with script tools, Writing Script file, executing script files, The MATLAB Editor, saving m files; Loops and Conditional Statements- Control Flow onditional Control if, else, switch Loop Control for, while, continue, break Program Termination return; Functions- Writing user defined functions, built in Function, Function calling, Return Value.

MATLAB Simulink-Introduction of Simulink, Simulink Environment & Interface, Study of Library, Circuit Oriented Design, Equation Oriented Design, Model, Subsystem Design.

UNIT-III

Introduction to SCILAB software- Scilab Objects -Matrix Construction and Manipulation, Strings, Boolean Matrices, Polynomial Matrices, Sparse Matrices, Lists, Functions.

SCILAB Programming –Branching, Iterations, Scilab Functions, Debugging Programs,

UNIT-IV

Input and Output Functions-Display of Variables, Formatted Input and Output, Input Output in Binary Mode

SCILAB Graphics- Basic Graphing, Graphics Objects, Graphic Tour, Basic Graphics Functions, Mathematical functions-continuous linear system,

List of Experiments:

1. Tapping some Array Operations on Marks earned by students
2. Find first 10 terms of Fibonacci series.
3. Find factorial of a number n
4. Find the Rank, transpose, inverse of the given matrix.
5. Create a script file for two or more polynomial functions.
6. Solving System of Equations in MATLAB and scilab.
7. Compute the solution of differential equations.
7. Find the solution of linear equations using Gauss and Gauss Seidel.

8. Find the solution of nonlinear equations using Bisection method and Newton – Raphson
9. Implements bisection method for finding a root f(x) = 0 using SCILAB
10. Find the solution of nonlinear equations using Newton –Raphson method.
11. Find a least-squares fit of the model of given quadratic equation using SCILAB.
12. Find Numerical Integration using trapezoidal rule using Scilab.
13. Draw the plot for Eleven data samples in the interval $0 \leq x \leq 1$ of the function $y=2\cos(6x+0.5)$ using SCILAB.
14. Find the solution of Ordinary differential equations using SCILAB.
15. Draw the 3D plots using basic techniques using SCILAB

TEXT BOOKS:

1. StephenJ. Chapman "MATLAB Programming for Engineers"4th Edition, Cengage Learning, 2014.
2. Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukha "Modeling and Simulation in Scilab/Scicos, Springer, second edition ,2010.
3. S. Nagar, "Introduction to Scilab For Engineers and Scientists", 1st Edition, Apress, 2017.

REFENCE BOOKS:

1. Shawna Lockhart, Eric Tilleson, Introduction to Programming with MATLAB, SDC publications, 2019.
2. Introduction to Scilab, consortium Scilab

ONLINE COURSE LINKS:

1. Matlab Programming for Numerical Computation - Course (nptel.ac.in)
2. Scientific Computing using Matlab - Course (nptel.ac.in)
3. Numerical computing for Engineers-Scilab –scilab.org
4. https://spoken-tutorial.org(nptel.ac.in)

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CO-PO Mapping

20EEL301/SO01: Software Tools to Electrical Engineering		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	POll	PO12	PSO1	PSO2	PSO3
CLO1	Explain awareness about MATLAB software and basic mathematical function and MATRIX operations representation	1	1	1		2								1		
CLO2	Write the code in MATLAB Script files and Simulink for solving the problems		1	1		2							1	1		
CLO3	Develop modelling and design of engineering systems using SCILAB	2	2	1	1	1							1	1		
CLO4	Solve and analyze the problems with the Input and Output Functions with graphic applications using SCILAB	2	2	1	1	1							1	2		

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MEASUREMENT AND INSTRUMENTATION LAB

II B.Tech – III Semester (Code: 20EEL302)

Lectures	1	Tutorial	0	Practical	2	Self-study	0	Credits	2
Continuous Internal Assessment			30	Semester End Examination (3 Hours)					70

Prerequisites: Mathematics, Basic Electrical Engineering.

Course Objectives: To make the students

CO1: To learn about characteristics of measuring instruments.
CO2: To have an adequate knowledge in Calibration of measuring instruments.
CO3: To have an adequate knowledge in errors in Bridges.
CO4: To have an adequate knowledge in Sensors and Transducers.

Course Learning Outcomes: Students will be able to

CLO1: Learn about various measurement devices, their characteristics, their operation and their limitations.

CLO2: Analyze the dynamic response and the calibration of few instruments.

CLO3: Design and validate DC and AC bridges.

CLO4: Understand the Function of Various types of Sensors and Transducers.

Lectures/Demonstrations:

1. **Concepts relating to measurements:** True value, Absolute error, Accuracy, Precision, Resolution, Drift, Hysteresis, Dead band, Sensitivity.
2. **Instruments:** Classification of Instruments – Construction and principle of Permanent magnet moving coil – Moving iron – Extension range – Energy meter.
3. **Bridges:** Measurement of R, L & C by using DC Bridges – AC Bridges.
4. **Transducers and thermal actuators:** Principle of operation of various types of Transducers and thermal actuators.
5. **Sensors:** Principle of operation of various types of Sensors and its usage to measure various electrical quantities.

List of Experiments

1) Measurement of a batch of resistors and estimating statistical parameters.
2) Measurement of Medium resistance using Wheatstone bridge.
3) Measurement of Inductance using an Anderson's bridge technique as well as LCR meter.
4) Measurement of Capacitance using Schering bridge technique as well as LCR meter.
5) Measurement of Low Resistance using Kelvin's double bridge.
6) Measurement of High resistance and Insulation resistance using Megger.
7) Measurement of dielectric strength of oil using oil testing kit.
8) Calibration of 1-phase energy meter using direct loading/ Phantom loading method.
9) Current Measurement using CT.

10) Current Measurement using Hall Sensor.
11) Study of the characteristics of Capacitor Level Sensor for Level Measurement of a Liquid in a Tank.
12) Study of the characteristics of a Piezo resistive Sensor for Pressure Measurement of a Liquid in a Tank Tracing of BH Curve using CRO.
13) Study of the characteristics of Resistance Temperature Detector (RTD)
14) Study of the characteristics of a Thermistor
15) Study of the characteristics of a Thermocouple
16) Study of the characteristics of a Photo reflective sensor for Speed Measurement
17) Study of the characteristics of Linear and Rotary Potentiometer

Note: Minimum 10 experiments should be carried.

CLO PO and PSO mapping:

Measurements and Instrumentation Laboratory (20EEL302)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CLO1	Learn about characteristics of measuring instruments.	3	2	3	-	-	-	-	-	1	-	-	-	3	2	-	-
CLO2	Analyze the dynamic response and the calibration of few instruments	3	2	2	-	-	-	-	-	1	-	-	-	3	2	-	-
CLO3	Design and validate DC and AC bridges	3	1	-	-	-	-	-	-	1	-	-	-	3	1	-	-
CLO4	To have an adequate knowledge in Sensors and Transducers	3	2	3	-	-	-	-	-	1	-	-	-	3	3	-	-

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DATA STRUCTURES AND ALGORITHMS LAB

II B.Tech – III Semester (Code: 20EEL3037ITL01)

Lectures	1	Tutorial	0	Practical	2	Self-study	0	Credits	2
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Problem Solving with Programming.

Course Objectives: To make the students

CO1: To impart the basic concepts of data structures and algorithms.

CO2: To understand concepts about searching and sorting techniques

CO3: To understand basic concepts about stacks, queues, lists, trees and graphs.

CO4: To enable them to write algorithms for solving problems with the help of fundamental data structures.

Course Outcomes: Students will be able to

CLO1: Implement ADT's of different types of linked lists and applications.

CLO2: Implement stack and queue ADT's using arrays and their applications.

CLO3: Construct and implement different tree algorithms.

CLO4: Implement various hashing techniques and Graph traversal methods.

UNIT - I

Introduction: Importance of Data Structures, Classification of Data Structures.

Stacks and Queues: Stack ADT and its operations, Stack Applications: Evaluation of Postfix.Queue ADT, Operations on Queue ADT.

UNIT - II

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion , Deletion from linked list. Double Linked List-Operations.

SortingsTechniques : Quick sort, Merge Sort.

UNIT - III

Trees: Preliminaries, Binary Trees, Expression trees, The Search Tree ADT-implementations.

UNIT - IV

Graphs: Basic Terminologies and Representations, Graph search and traversal algorithms: BFS and DFS.

LIST OF EXPERIMENTS:

1. Write a program to perform the following operations on Array List.
   a) Creation b) Insertion c) Deletion d) Search e) Display.
2. Write a program to implement the following
   a) stack using array b) queue using array
3. Write a program to implement the following using stack.
   a) infix to postfix conversion b) postfix evaluation
4. Write a program to implement circular queue and perform the following
   a) enqueue b) dequeue
5. Write a program to perform the following operations on Single Linked List.
   a) Creation b) Insertion c) Deletion d) Search e) Display
6. Write a program to perform the following operations on Circular Single Linked List.
   a) Creation b) Insertion c) Deletion d) Search e) Display
7. Write a program to perform the following operations on Doubly Linked List.
   a) Creation b) Insertion c) Deletion d) Search e) Display
8. Write a program to implement the following sorting techniques
   a) Quick Sort b) Merge Sort c) Shell Sort
9. Write a program to demonstrate Binary Expression tree.
10. Write a program to create Binary tree and display their traversals.

NPTEL COURSE LINKS:

1. NPTEL :: Computer Science and Engineering - NOC:Programming, Data Structures and Algorithms
2. NPTEL :: Computer Science and Engineering - Data Structures And Algorithms

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CLO PO and PSO mapping:

Data Structures and Algorithms Lab (20EEL303/ITL01)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Implement ADT's of different types of linked lists and applications.	2	3	2										3	2	
CO2	Implement stack and queue ADT's using arrays and their applications.	3	3	3										3	2	
CO3	Construct and implement different tree algorithms.	1	3	2										2	1	
CO4	Implement various hashing techniques and Graph traversal methods.	1	2	3										2	1	

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INDIAN TRADITIONAL KNOWLEDGE

B.Tech – V Semester (Code: 20EE306/20MC02)

Lectures	3	Tutorial	0	Practical	0	Self-study	0	Credits	0
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: NIL

Course Outline: This Course is to facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

Course Objectives:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian traditional knowledge systems connecting society and nature.

2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

3. The course focuses on introduction to Indian knowledge system, Indian perspective of modern scientific world-view and basic principles of yoga and holistic healthcare system.

Course Learning Outcomes:

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

1. Understand the concept of Indian Traditional knowledge and its importance
2. Compare the Indian traditional knowledge Systems with Other Global systems. .
3. Understand the concept of yoga and its correlations to science.
4. Study various case studies related to traditional knowledge.

UNIT I

Basic Structure of Indian Knowledge System (i) वेद, (ii) उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्वेद, स्थापत्य आदि) (iii) वेदांग (शिक्षा, कल्प, निरुत, व्याकरण, ज्योतिष छंद), (iv) उपाइग (धर्म शास्त्र, मीमांसा, पुराण, तर्कशास्त्र)

UNIT II

Modern Science and Indian Knowledge System 8 Periods

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and

social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge Vs indigenous knowledge, traditional knowledge Vs western knowledge , traditional knowledge Vs formal knowledge –

UNIT III

Yoga and Holistic Health care 8 Periods

Science of Yoga , Yoga as a tool for healthy Life style , 8 limbs of Yoga (Yama , Niyama , Aasana , Pranayama , Pratyahara , Dharana , Dhyana , Samadhi).

UNIT IV

Case Studies 8 periods

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment.

TEXT BOOKS:

1. V. Sivaramakrishna (Ed.), "Cultural Heritage of India-Course material", Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
2. Swami jitatmanand, "Modern Physics and Vedant, Bharatiya Vidya Bhavan Fritzof Capra", Tao of Physics.Fritzof Capra, The wave of life.
3. V N Jha(Eng. Trans.), "Tarkasangraha of Annam Bhatta", International Chinmay Foundation, Velliarnad, Amaku, am.
4. "Yoga Sutra of Patanjali", Ramakrishna Mission, Kolkatta.
5. G N Jha, (ENG. Trans.), Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasam, Delhi, 2016.
6. R N Jha, Science of consciousness Psychotherapy and yoga practices, Vidyanidhiprakasham, Delhi, 2016.
8. P R Sharma (English translation), Shodashang Hridayam.

REFERENCE BOOKS:

1. Basanta Kumar Mohanta and Vipin Kumar Singh, "Traditional Knowledge System and Technology in India", Pratibha Prakashan 2012.
2. Amit Jha, "Traditional Knowledge System in India" Atlantic publishers, 2002.

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CLO PO and PSO mapping:

Indian traditional knowledge (20EE306/20MC02)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the concept of Indian Traditional knowledge and its importance	-	-	-	-	-	2	2	1	-	-	-	1	-	-	-
CO2	Compare the Indian traditional knowledge Systems with Other Global systems	-	-	-	-	-	2	2	-	-	-	-	1	-	-	-
CO3	Understand the concept of yoga and its correlations to science.	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-
CO4	Study various case studies related to traditional knowledge	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-

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ANALOG ELECTRONICS

II B.Tech – III Semester (Code: 20EE401)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics

Course Objectives: To make the students

CO1: Understand formation of PN junction Diode and applications of diode like Rectifiers, clippers and clampers.

CO2: Understand the design and working of BJT / FET amplifiers.

CO3: Analyze different feedback and oscillating circuits.

CO4: Understand about basics of Differential, Multi-stage and operational amplifiers**.**

CO5: Gain knowledge about Linear and Nonlinear applications of Op-amp.

Course Learning Outcomes: Students will be able to

CLO1: Explain the formation of PN junction Diode and applications of diode like Rectifiers, clippers and clampers.

CLO2: Design and working of BJT / FET amplifiers.

CLO3: Analyze different feedback and oscillating circuits

CLO4: Explain about basics of Differential, Multi-stage and operational amplifiers.

CLO5: Describe about Linear and Nonlinear applications of Op-amp.

UNIT – I

Diode circuits: Open-circuited P-N Junction, Current Components in a p-n diode, I-V characteristics, temperature Dependence of the I-V characteristic, Zener Diode.
Rectifiers: Half wave, full wave and Bridge Rectifiers without filter and with inductor filter capacitor filter, L section & Π- section filters.
Clippers, Clampers: Positive and negative clippers - Positive and negative clampers.

UNIT – II

BJT circuits: NPN & PNP junction transistors, Transistor current components, CB Configuration, CE Configurations, CC configuration, BJT as a switch, BJT as an amplifier, BJT biasing circuits, Small signal equivalent circuits.
FET circuits: JFET, Pinch-off Voltage , volt-ampere characteristics, MOSFET structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier, FET small signal model, CS / CD / CG configurations at low frequencies.

UNIT – III

Feedback Amplifiers: Feedback concept, Transfer Gain with Feedback, Negative feedback amplifiers and their characteristics.

Oscillators: Barkhausen criterion for sinusoidal oscillators, RC phase shift oscillator using BJT, General Form of Oscillator, Wien Bridge, Hartley, Colpitt's oscillators using BJT. **Differential, Multi-stage and operational amplifiers:** Differential amplifier, multi-stage amplifiers, internal structure of an operational amplifier, deal op-amp, non-idealities in an op- amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT – IV

Linear applications of Op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, instrumentation amplifier, integrator, differentiator, Voltage to current and current to voltage conversion.

Nonlinear applications of Op-amp: Basic comparator , Zero-crossing detector , Schmitt Trigger, Square-wave and triangular-wave generators, Absolute value output circuit, Peak detector , Sample and hold circuit, Precision rectifier.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, "Integrated Electronics Analog and Digital Circuits and Systems", 2nd Edition,TMH, 2002.
2. Robert L Boylested and Louis Nashelsky , "Electronic Devices and Circuit Theory", 8th Edition, PHI, 2003.
3. Rama Kant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, PHI/ Pearson Education, 2003.

REFERENCE BOOKS:

1. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, "Electronic Devices and Circuits", 6th Edition, Pearson Education, 2004.
2. David A Bell, "Electronic Devices and Circuits", 4th Edition, PHI, 2003.
3. D.Roy and Choudhury, ShailB.Jain, "Linear Integrated Circuits", 2nd Edition, New Age International, 2003.

NPTEL COURSE LINKS:

1. NPTEL :: Electrical Engineering - NOC:Analog Electronic Circuits, https://nptel.ac.in/courses/108/102/108102112/
2. NPTEL :: Electrical Engineering - ANALOG ELECTRONIC CIRCUITS, https://nptel.ac.in/courses/108/102/108102095/

CLO, PO and PSO Mapping:

Analog Electronics (20EE401)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Explain the formation of PN junction Diode and applications of diode like Rectifiers, clippers and clampers.	3	-	2	-	2	-	-	-	-	-	-	-	3	1	2
CLO2	Design and working of BJT / FET amplifiers.	3	-	2	-	-	-	-	-	-	-	-	-	3	1	2
CLO3	Analyze different feedback and oscillating circuits	3	-		-	2	-	-	-	-	-	-	-	3	2	2
CLO4	Explain about basics of Differential, Multi-stage and operational amplifiers.	3	2	-	-	2	-	-	-	-	-	-	-	2	1	2
CLO5	Describe about Linear and Nonlinear applications of Op-amp.	3	2	-	-	2	-	-	-	-	-	-	-	2	1	2

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DIGITAL ELECTRONICS
II B.Tech – IV Semester (Code: 20EE402)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics, Basic Mathematics

Course Objectives: In this course students are able to

CO1: Have a thorough understanding of the fundamental concepts and techniques used in digital electronics, and Number conversions.

CO2: Understand Boolean Algebra and able to minimize boolean expressions by applying boolean algebra, K-Map method and Tabulation Method with "don't care" conditions.

CO3: Analyze and design various combinational logic circuits.

CO4: Use basic flip-flops SR, JK, D and T; analyze and design synchronous sequential circuits.

CO5: Have a understanding of the fundamental concepts about various terms and circuits of A/D and D/A converters

CO6: Understand Registers and Counters and Memories and design Programmable Logic Devices.

Learning Outcomes: After the completion of this course the students are expected to be able to:

CLO1: Describe fundamental concepts and techniques used in digital electronics, and able to perform Number conversions, Complements; able to describe various Boolean algebraic rules and laws.

CLO2: Simplify Boolean function using Boolean algebraic rules and laws, K-Map and Tabulation Method.

CLO3: Analyze and design of various Combinational logic circuits.

CLO4: Analyze functionalities of Latches and Flip-Flops; able to Analyze and design of Sequential logic circuits.

CLO5: Explain about various terms of A/D and D/A converters

CLO6: Analyze and design of Registers, Counters, types of memories and PLD's.

UNIT-I

Fundamentals of Digital Systems and Logic families: Digital signals, digital Circuits, A N D , OR, NOT, NAND, NOR a n d Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, Octal, hexa decimal number, binary arithmetic, one's and two's complements arithmetic, codes: Excess-3 and gray code, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, don't care conditions, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, Multiplexer, De-Multiplexer, digital comparator, parity checker/ generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III

Sequential circuits and systems : A1-bitmemory,thecircuit properties of Bi stable latch, the clocked SR flip flop, J-K, T and D- type flip flops, applications of flip flops, shift registers, applications of shift registers, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, applications of counters.

UNIT-IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, sample and Hold Circuit, a n a l o g t o digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage of frequency and voltage to time conversion, specifications of A/D converters.

Semi-conductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, r ead only memory (ROM), read and write memory (RAM), ROM as a PLD, Programmable logic array, Programmable array logic.

TEXT BOOKS:

1. R.P. Jain, "Modern Digital Electronics", Mc Graw Hill India, 4th edition, 2012.
2. M. Morris Mano, "Digital logic and Computer design", Pearson India, 6th edition, 2018.
3. A.Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

REFERENCE BOOKS:

1. Anil K. Maini, "Digital Electronics: Principles and Integrated Circuits", Wiley, 2007.
2. S.S. Bhatti Rahul Malhotra, "A Textbook of Digital Electronics", I K International Publishing House, 2011.

NPTEL COURSE LINKS:

1. NPTEL :: Electrical Engineering - NOC:Digital Electronic Circuits, https://nptel.ac.in/courses/108/105/108105132/
2. NPTEL :: Electrical Engineering - NOC:Digital Circuits, https://nptel.ac.in/courses/108/105/108105113/

CLO, PO and PSO Mapping:

	Digital Electronics (20EE402)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Describe fundamental concepts and techniques used in digital electronics, and able to perform Number conversions, Complements; able to describe various Boolean algebraic rules and laws.	3	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CLO2	Simplify Boolean function using Boolean algebraic rules and laws, K-Map and Tabulation Method.	3	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CLO3	Analyze and design of various Combinational logic circuits.	3	2	3	-	-	-	-	-	-	-	-	-	3	1	-
CLO4	Analyze functionalities of Latches and Flip-Flops; able to Analyze and design of Sequential logic circuits.	3	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CLO5	Explain about various terms of A/D and D/A converters	3	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CLO6	Analyze and design of Registers, Counters, types of memories and PLD's.	3	2	3	-	-	-	-	-	-	-	-	-	3	1	-

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INDUCTION MOTORS AND SYNCHRONOUS MACHINES

II B.Tech – IV Semester (Code: 20EE403)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics, Basic Mathematics

Course objectives: To make the students

CO1: Understand the construction, operation and performance of three phase induction machines.

CO2: Gain knowledge about construction, operation and application of single phase induction machines.

CO3: Understand the construction, operation and performance of Alternators

CO4: Gain knowledge about construction, operation and performance of synchronous motors.

Course Learning Outcomes: At the end of this course, students will be able to

CLO1: Demonstrate construction, operation and performance of three phase induction machines.

CLO2: Explain construction, operation and application of single phase induction machines.

CLO3: Analyze operation and performance of Alternators

CLO4: Analyze operation and performance of synchronous motors.

UNIT-I

Induction machines: Construction-Types (squirrel cage and slip ring)-rotating magnetic field in two phase & three phase systems-Torque equation-torque slip characteristics-equivalent circuit-phasor diagram-losses and efficiency- circle diagrams-starting methods and speed control-Induction generator.

UNIT-II

Single- phase Induction motors: Constructional features-double revolving field theory-equivalent circuit-determination of parameters-split phase-capacitor start and run-shaded pole motors-characteristics and their applications.

UNIT-III

Synchronous Generators: Construction-EMF equation with winding factors-equivalent circuit and phasor diagram-armature reaction-synchronous impedance-voltage regulation-methods of determining regulation –EMF and ZPF methods-salient pole machine-two reaction theory-power angle characteristics-parallel operation of alternators-synchronization of alternators.

UNIT-IV

Synchronous Motors: Theory of operation-starting methods-phasor diagrams-variation of current and power factor with excitation-Power circles-V and inverted V curves-hunting and its prevention-synchronous condenser and its applications.

TEXT BOOKS:

1. P.S.Bimbhra," Electrical Machinery", Khanna Publishers,2011.
2. I.J.Nagrath and D.P.Kothari,"Electric Machines", McGraw Hill Education,2010.

REFERENCES BOOKS:

1. A.E. Fitzgerald and C.Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M.G.Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A.S.Langsdorf, "Alternating current machines", McGraw Hill Education,1984.
4. P.C.Sen,"Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

NPTEL COURSE LINKS:

1. NPTEL :: Electrical Engineering - Electrical Machines II, https://nptel.ac.in/courses/108/106/108106072/
2. NPTEL :: Electrical Engineering - NOC:Electrical Machines - II, https://nptel.ac.in/courses/108/105/108105131/

CLO, PO and PSO Mapping:

Electrical Machines – II (18EE403)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Demonstrate construction, operation and performance of three phase induction machines.	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CO2	Explain construction, operation and application of single phase induction machines.	3	3	2	3	-	-	-	-	-	-	-	-	3	2	-
CO3	Analyze operation and performance of Alternators	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CO4	Analyze operation and performance of synchronous motors.	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-

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SIGNALS AND SYSTEMS

II B.Tech – IV Semester (Code: 20EE404)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Prerequisites: Basic Physics, Basic Mathematics

Course objectives: To make the students

CO1: Understand the concepts of continuous time and discrete time systems.

CO2: Gain knowledge about LTI systems

CO3: Know about the concepts of systems in frequency domain.

CO4: Understand sampling theorem and its implications.

Course Learning Outcomes: At the end of this course, students will be able to

CLO1: Explain the concepts of continuous time and discrete time systems.

CLO2: Analyze the behavior of continuous and discrete time LTI systems.

CLO3: Analyze systems in frequency domain.

CLO4: Demonstrate sampling theorem and its implications.

UNIT-I

INTRODUCTION TO SIGNALS AND SYSTEMS: Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.

UNIT-II

BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS: Impulse response and step response, convolution, input-output behavior with a periodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations .State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.

UNIT-III

FOURIER AND Z - TRANSFORMS: Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete- Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.

UNIT-IV

SAMPLING AND RECONSTRUCTION: The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

TEXT BOOKS:

1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and Systems", Prentice Hall India, 2007.
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2007.
3. H. P. Hsu, "Signals and Systems" , Schaum's series, McGraw Hill Education, 3rd Edition 2013.

REFERENCE BOOKS:

1. S. Haykin and B. V. Veen, " Signals and Systems", John Wiley and Sons, 2nd Edition, 2007.
2. A. V. Oppenheim and R. W. Schafer, "Discrete-Time Signal Processing", Prentice Hall, 3rd Edition, 2014.
3. M. J. Robert "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.
4. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 3rd Edition, 2017.

NPTEL COURSE LINKS:

1. NPTEL :: Electrical Engineering - NOC:Signals and Systems, https://nptel.ac.in/courses/108/106/108106163/
2. NPTEL :: Electronics & Communication Engineering - Signals and Systems, https://nptel.ac.in/courses/117/101/117101055/

CLO, PO and PSO Mapping:

SIGNALS AND SYSTEMS (20EE404)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Explain the concepts of continuous time and discrete time systems.	3	3	2	2	1	-	-	-	-	-	-	-	3	2	-
CLO2	Analyze the behavior of continuous and discrete time LTI systems.	3	3	1	2	-	-	-	-	-	-	-	-	3	2	-
CLO3	Analyze systems in frequency domain.	3	3	1	2	-	-	-	-	-	-	-	-	3	2	-
CLO4	Demonstrate sampling theorem and its implications.	3	3	2	-	1	-	-	-	-	-	-	-	3	2	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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GENERATION AND TRANSMISSION

II B.Tech-IV Semester (20EE406)

Lectures	3	Tutorial	0	Practical	0	Self-study	1	Credits	3
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives: To make the students

CO1: Understand the economical aspects and choice of power stations and units
CO2: Understand the significance of conventional and non-conventional energy resources and their operation
CO3: Calculate transmission line parameters.
CO4: Discuss the theory and mechanical design of transmission lines and introduce various types of insulators and their testing.

Course Learning Outcomes: Students will be able to
CLO1: Explain the economical aspects and choice of power stations and units
CLO2: Analyze the significance of conventional and non-conventional energy resources and their operation.
CLO3: Analyze the performance of short, medium and long transmission lines and identify the transmission system which requires minimum volume of conductor materials.
CLO4: Classify the types of insulators, testing of insulators and calculation of string efficiency.

Course Syllabus:

UNIT – I

Economical Aspects: Economics of generation - factors affecting cost of generation - Definitions: load factor – diversity factor – plant use factor - reduction of cost by inter connected stations. Power factor considerations – causes of low power factor – methods of improving power factor – phase advancing and generation of reactive KVAR – most economical power factor for constant KW load and constant KVA type loads. Tariff: Characteristics of Tariff – types of Tariff.

Choice of power stations and units: Types of power stations – choice of generation - size of generator units – load duration curve – effect of variable load on plant operation and design.

UNIT-II

Thermal Power: Block Diagram of Thermal Power Station (TPS), Brief Description of Thermal Power system Components
Hydro Power: Selection of Site, Classification, Layout, Description of Main Components.
Nuclear Power: Nuclear Fission and Chain Reaction-Principle of Operation of Nuclear Reactor.- Description of Main Components.

Solar Power Generation: Role and Potential of Solar Energy Options, Principles of Solar Radiation, Solar Energy Collectors, Different Methods of Energy Storage – PV Cell- V-I Characteristics.
Wind Power Generation: Role and potential of Wind Energy Options, Horizontal and Vertical Axis Wind Mills- Performance Characteristics-Pitch & Yaw Controls – Economic Aspects.

UNIT-III

Transmission Line Parameters: Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition. 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, single and double circuit lines.

Modeling of Transmission Lines: Classification of Transmission Lines - Short, medium and long line and their model - representations - Nominal-T, Nominal-Pie and A, B, C, D Constants. Mathematical Solutions to estimate regulation and efficiency of all types of lines- Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations – Representation of Long lines – Equivalent T and Equivalent – π, Numerical Problems. – Surge Impedance and surge Impedance loading - wavelengths and Velocity of propagation – Ferranti effect, Charging current, Need of Shunt Compensation.

UNIT-IV:

Insulators, Corona: Types of Insulators- String efficiency and Methods for improvement– Voltage Distribution, Calculation of string efficiency- Capacitance grading and Static shielding. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.
Mechanical Design of Lines: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor - Stringing chart and sag template and its applications.

TEXT BOOKS:

1. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
2. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.
3. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, 6th Edition, 2010, Reprint 2014.

REFERENCE BOOKS:

1. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND & COMPANY LTD., New Delhi 2004.
4. Wind Electrical Systems by S. N. Bhadra, D. Kastha& S. Banerjee – Oxford University Press, 2013.
5. Power System Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill Education

(India) Pvt. Ltd., 2nd Edition, 2008, 23rd Reprint 2015.

NPTEL Course Links:

1. **NPTEL :: Electrical Engineering - Power System Generation, Transmission and Distribution (Encapsulated from earlier Video), https://nptel.ac.in/courses/108/102/108102047/**
2. **NPTEL :: Electrical Engineering - NOC:Power System Engineering, https://nptel.ac.in/courses/108/105/108105104/**
3. **NPTEL :: Introduction to power system analysis, https://nptel.ac.in/courses/108/105/108105067/**

CLO, PO and PSO Mapping:

Power Systems- I (20EE406)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CLO1	Explain the economic aspects and choice of power stations and units	2	2	1	1	-	-	-	-	-	-	-	-	2	1	1
CLO2	Analyze the significance of conventional and non-conventional energy resources and their operation.	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-
CLO3	Analyze the performance of short, medium and long transmission lines and identify the transmission system which requires minimum volume of Conductor materials.	3	3	3	-	-	-	2	-	-	-	-	-	3	2	-
CLO4	Classify the types of insulators, testing of insulators and calculation of string efficiency.	2	2	2	-	-	-	2	-	-	-	-	-	3	2	2

PYTHON

II B.Tech – IV Semester (Code: 20EEL401/SO̅02/IT02)

Lectures	1	Tutorial	0	Practical	2	Self-study	0	Credits	2
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives:

The course aims

CO1: to enable the students to identify the syntax and semantics of Python.

CO2: to enable students to write python scripts for solving real time problems.

CO3: to enhance the object oriented programming skills of the students.

Course Learning Outcomes:

After completing the course the students would be able to

CLO1 : write programs using basic Python constructs

CLO2: write programs using sequences in Python

CLO3: write programs using object oriented programming concepts

CLO4: write programs that handle exceptional conditions

UNIT I

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.
Conditional execution: Boolean expressions, logical operators, conditional execution, alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, shortcircuit evaluation of logical expressions.
Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.
Functions: function calls, builtin functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

UNIT II

Strings: A string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.
Files I/O: persistence, opening files, text files and lines, reading files, searching through a file,

letting the user choose the file name, using try except and open, writing files. **Lists:** a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments. **Dictionaries:** dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.

Tuples: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignment with dictionaries, the most common words, using tuples as keys in dictionaries, sequences.

UNIT III

Object Oriented Programming: Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem: Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances, Inheritance.

UNIT IV

Exception Handling: Errors and Exceptions(From Web References text 1).

LIST OF EXPERIMENTS

1. Write a script to print some Pythagorean triples.
2. Write a script that demonstrates string handling capabilities of Python.
3. Write a script that demonstrates associated arrays support in Python.
4. Write a script to print Fibonacci numbers up to and including the first command line argument.
5. Write a simple script that reads from a file detail of students in a section and finds top ten meritorious students in the section.
6. Write a script to Implement Stack.
7. Write a script to Implement Queue.

Textbooks

1. Charles R Severance. Python for Everybody: Exploring Data in Python 3. 4 2016. ISBN 978 1530051120. doi: https://www.py4e.com/book.

2. Ljubomir Perkovic. Introduction to Computing Using Python: An Application Development Focus. Wiley, 2 edition, 8 2015. ISBN 9781118890943.

3. Guido van Rossum and Jr Fred L. Drake. Python Tutorial. Python Software Foundation. doi: https: //docs.python.org/3/.

References

1. Kenneth A. Lambert. Fundamentals of Python: First Programs. Cengage, 2nd edition, 2019. ISBN 9781337560092

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CLO, PO and PSO Mapping:

PYTHON (20EE406/SO02/IT02)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	write programs using basic Python construct															
CO2	write programs using sequences in Python															
CO3	write programs using object oriented programming concepts															
CO4	write programs that handle exceptional conditions															

ANALOG AND DIGITAL ELECTRONICS LAB

II B.Tech – IV Semester (Code: 20EEL402)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives: To make the students

CO1: To analyse the characteristics of Diodes, Transistors and FET in different biasing conditions.

CO2: To design feedback amplifiers, oscillators using transistors and wave form generating using op-amp.

CO3: To design and verify different types of logic gates using universal gates, combinational logic circuits and code converters.

CO4: To design multiplexers, demultiplexers and counter circuits using logic gates.

CO5: To design and test applications of 555 timer circuits and D/A converters.

Course Learning Outcomes: Students will be able to

CLO1: Analyse the characteristics of Diodes, Transistors and FET in different biasing conditions.

CLO2: Design feedback amplifiers, oscillators using transistors and wave form generating using op-amp. amplifiers.

CLO3: Design different types of logic gates using universal gates, combinational logic circuits and code converters.

CLO4: Understand the design methods of multiplexers, demultiplexers and counter circuits using logic gates.

CLO5: Design and test applications of 555 timer circuits and D/A converters

LIST OF EXPERIMENTS

1. Characteristics of PN Junction and Zener diode
2. Characteristics of Transistor in Common Emitter configuration
3. Verification of Transistor Self Bias Circuit
4. Characteristics of Junction Field Effect Transistor
5. Design of voltage shunt feedback amplifier.

6. Design of RC phase shift oscillator.
7. Waveform generation using OP-AMP
8. Realization of Logic Gates using Discrete Components & Universal Building Blocks.
9. Design of Combinational Logic Circuits like half-adder, Full adder, Half-subtractor and Full-subtractor
10. Design of Code converters.
11. Design of 4X1 Multiplexer and 1x4 Demultiplexer.
12. Realization of RS-JK & D flip-flop using logic gates.
13. Design of Synchronous Counter, Mod Counter, Up counter, Down counter and Up/Down counter using Flip Flops.
14. Design and testing of mono stable and astable Multivibrators using 555 timers.
15. Design a 4-bit R-2R ladder type of digital to analog converter.

Note: Minimum 10 experiments should be conducted.

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CLO, PO and PSO Mapping:

Analog and digital Electronics lab (20EEL402)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	Analyse the characteristics of Diodes, Transistors and FET in different biasing conditions.	2	2	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CLO2	Design feedback amplifiers, oscillators using transistors and wave form generating using op-amp.	2	2	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CLO3	Design and verify different types of logic gates using universal gates, combinational logic circuits and code converters.	2	2	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CLO4	Design multiplexers, demultiplexers and counter circuits using logic gates.	2	2	1	1	-	-	-	-	-	-	-		1	2	-	-
CLO5	To design and test applications of 555 timer circuits and D/A converters.	2	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-

DC MACHINES & TRANSFORMERS LAB

II B.Tech – IV Semester (Code: 20EEL403)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

Course Objectives: To make the students

CO1: To develop experimental setups for studying the performance and operation of DC Generators and DC motors

CO2: To perform Direct and Indirect tests of various DC motors.

CO3: Acquire hands on experience of conducting various tests on Transformers and obtaining their Performance indices using standard analytical as well as graphical methods.

CO4: To develop experimental setups for studying the performance and operation Of Transformers.

Course Learning Outcomes:

Students will be able to

CLO1: Analyze the performance characteristics of DC Generators.

CLO2: Asses the performance of the given DC motors

CLO3: Understand and explain the principle of operation and performance of transformer.

CLO4: Calculate load of transformer for a given application and then select the suitable specification of electrical machine

LIST OF EXPERIMENTS

1. Open circuit characteristics of separately excited / self-excited D.C shunt generator
2. Load test on D.C Shunt Generator
3. Load test on D.C series generator
4. Load test on D.C Compound Generator
5. Brake test on D.C Shunt Motor
6. Speed control of DC Shunt motor
7. Swinburne's Test on a D.C Shunt Machine.
8. Retardation test on D.C. Machine.
9. Field test on two identical DC series machine
10. Hopkinson's test on Two Identical D.C Machines

11. OC & SC tests on single - phase transformer
12. Load test on single - phase transformer
13. Scott Connection of Transformers
14. Parallel Operation of Two Single - Phase Transformers
15. Sumpner's test on Two single-phase Transformers
16. Separation of losses in single – phase transformer

Note: Minimum 10 experiments should be carried out.

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CLO PO and PSO mapping:

DC Machines & Transformers lab (20EE403)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Analyze the performance characteristics of DC Generators.	2	2	1	1	-	-	-	-	-	-	-	-	1	3	-
CLO2	Asses the performance of the given DC motors	2	3	1	1	-	-	-	-	-	-	-	-	1	2	-
CLO3	Understand and explain the principle of operation of transformers	1	2	2	1	-	-	-	-	-	-	-	-	2	2	-
CLO4	Know the performance of Transformers	2	1	2	1	-	-	-	-	-	-	-		1	2	-

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SOFT SKILLS LAB

II B.Tech – IV Semester (Code: 20EE404/EEL02)

Lectures	0	Tutorial	0	Practical	3	Self-study	0	Credits	1.5
Continuous Internal Assessment				30	Semester End Examination (3 Hours)				70

UNIT-I

1. Body Language & Identity Management

a. Facial Expressions – Kinesics - Occulesics
b. Haptics - Proxemics
c. Para Linguistics
d. Appearance
e. Identity Management Communication

2. Emotional Intelligence & Life Skills

a. Self Awareness through Johari Window and SWOC analysis
b. Self Motivation
c. Empathy
d. Assertiveness & Managing Stress
e. Positive Attitude
f. Time Management
g. Goal Setting: Short term, Long Term, Vision, Mission.

3. Business Presentations

a. Preparing effective Presentations Power Point Presentations
b. Power Point Presentations
c. Using Visual Aids
d. Mock Presentations

4. Employability Skills

a. Group Discussion
b. Team Building and Leadership Qualities
c. Interview Skills

Reference Books:

- Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016
- The Definitive Book of Body Language, Allan & Barbara. Pease International:2004
- Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998
- English for Jobseekers, Lina Mukhopadhyay. Cambridge University Press:2013
- The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

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CLO PO and PSO mapping:

Soft Skills Lab (20EEL404/ELL02)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	Use appropriate body language in social and professional contexts	-	-	-	-	-	-	-	1	2	3	1	2	2	1	1
CLO2	Demonstrate different strategies in presenting themselves in professional contexts.	-	-	-	-	-	-	-	1	1	3	1	2	2	1	1
CLO3	Analyze and develop their own strategies of facing the interviews successfully.	-	-	-	-	-	-	-	1	1	3	1	2	2	1	1
CLO4	Develop team coordinating skills as well leadership qualities	-	-	-	-	-	-	-	1	3	3	1	3	2	1	1

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