

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(AUTONOMOUS)

Accredited by National Board of Accreditation (NBA) & NAAC 'A' GRADE

SYLLABUS BOOK

FOR

B.TECH

ELECTRICAL AND ELECTRONICS ENGINEERING

R20 REGULATIONS



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TEEGALA KRISHNA REDDY ENGINEERING COLLEGE (Autonomous)

ACADEMIC REGULATIONS FOR B.TECH R20 (REGULATIONS)

APPLICABLE FOR REGULAR STUDENTS OF B.TECH. WITH EFFECT FROM THE ACADEMIC YEAR 2020.

- 1.0 Under-Graduate Degree Program in Engineering & Technology (UGP in E & T)**
- 1.1** Teegala Krishna Reddy Engineering College (TKREC) offers a VIII- Semesters (4-years) **Bachelor of Technology (B.Tech.)** degree Program, under the Choice Based Credit System (CBCS) at its Autonomous College with effect from the academic year 2020- 21 in the various branches of Engineering which college offers:
- 2.0 Eligibility for Admission**
- 2.1** Seats for each Program in the college are classified into CATEGORY-A (70% of intake),CATEGORY-B (30% of intake) and CATEGORY-C (10% of intake through Lateral Entry in III semester).
- 2.2** Admission to the CATEGORY-A (70% of Intake) is made either on the basis of the merit rank obtained by the qualified candidate in the entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the Telangana State council for Higher Education, subject to reservations prescribed by the government from time to time.
- 2.3** The college fills CATEGORY-B (30% of Intake) as per the guidelines of the competent authority.
- 2.4** CATEGORY-C (10% of intake) are Lateral Entry students who are admitted into the third semester directly based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) in accordance with the instructions received from the convener, ECET and the competent authority.
- 2.5** The medium of instruction for the entire under graduate Program in E & T will only be in English.
- 2.6** It is mandatory that every student follows the undertaking and abides by the rules of Teegala Krishna Reddy Engineering College.
- 3.0 B. Tech. Program structure**
- 3.1** A student after securing admission is required to pursue the under graduate Program in B.Tech for a minimum period of eight semesters, (four academic years) and a maximum period of eight academic years starting from the date of commencement of

the first semester, failing which the student shall forfeit the seat in the B.Tech course. **Each student should secure 160 credits (with CGPA \geq 5.0) for the completion of Undergraduate Program and award of B.Tech. Degree.**

B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years. **The student shall register for 123 credits and secure 123 credits with CGPA \geq 5 from II year to IV year B.Tech program (LES) for the award of B.Tech. Degree.** The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).

3.2 Definitions/descriptions specified by **UGC/AICTE** are adopted appropriately for various terms and abbreviations used in these academic regulations/norms are listed below.

3.2.1 Semester scheme

Each under graduate program constitutes eight semesters (four academic years). Each academic year is divided into two semesters, maximum of 22 weeks and minimum of 18 weeks (\geq 90 instructional days) each. In each semester, students are subjected to “Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE)”. The Choice Based Semester System (CBSS) is implemented as prescribed by the UGC and the curriculum/course structure is followed as suggested by AICTE on time to time.

3.2.2 Credit Courses

All subjects/courses are to be registered by the student in a semester to earn credits which are assigned to each subject/course in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure which is on the following general pattern.

- One credit for one Period/hour per week per semester for theory/lecture (L) courses.
- Half credit for one Period/hour per week per semester for laboratory/practical (P).

Courses like Environmental Science, Professional Ethics, Gender Sensitization lab, other social context courses, CRT and student activities like NCC/NSO, NSS are identified as mandatory courses. **These courses do not carry any credits.**

3.2.3 The structure of the Under Graduate Engineering Program:

S.NO.	CATEGORY	Suggested breakup of credits (Total 160)
01	Humanities and Social sciences including Management	9*
02	Basic Sciences	25*
03	Engineering Sciences courses including Workshop, Drawing, basics of Electrical/Mechanical/Computer etc.	18*
04	Professional Core Courses	66*
05	Professional Elective Courses relevant to chosen specialization/branch	18*
06	Open Electives-Electives from other technical and/or emerging subjects	9*
07	Project work, Seminar and Internship in Industry or elsewhere	15*
08	Mandatory courses [Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non- credit)
	Total	160*

* Variation is allowed as per the need of the respective disciplines.

3.2.4 Subject Code Classification

The subject codes of various branches in TKREC Regulations are formulated using the following Procedure

Regulation, Branch, Semester, Classification, S.No.

Regulation	20,21, 22,, and so on
UG Branch	Corresponding branch code like CE, EEetc
Semester	I,II,III,IV,V,VI,VII,VIII
Classification	HS-Humanities and Sciences, BS-Basic Sciences, ES-Engineering Sciences, PC- Professional Core, PE- Professional Elective, OE-Open Elective, PW-Project Work
S.No.	1 to 9

4.0 Course registration

- 4.1 An adviser /counselor or mentor from the faculty shall be assigned to a group of 20 students, who instructs the students regarding the Under Graduate Program, its course structure and curriculum, choice/option for subjects/courses, which is based on their competence, progress, pre-requisites and interest.
- 4.2 The academic section of the college invites 'registration forms' from students before the commencement of the semester through 'on-line registration' ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be **completed before the commencement of the SEEs (Semester End Examinations) of the 'preceding semester', and for 1st semester students the online registration requests shall be completed four weeks from the date of admission.**
- 4.3 A student can apply for on-line registration, only after obtaining the written approval from the faculty adviser/counselor or mentor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, faculty adviser/counselor or mentor and the student.
- 4.4 A student should register for all the courses offered to him in that particular semester not exceeding nine subjects/courses, excluding the Mandatory Courses.
- 4.5 If the student submits ambiguous choices or multiple options during on-line registration for the subject /course under a given/specified course group/category as listed in the course structure, then the Head of the Department will allot a subject/course without considering the submission.
- 4.6 Subject/course options exercised through on-line registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/course that has already been listed for registration by the Head of the Department in a semester cannot be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to select an alternate choice either for a new subject (subject to offering of such subject), or another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and within a time-framed schedule, in the **first week** after commencement of the class-work for that semester.
- 4.7 **Open electives:** The students have to choose three/four open electives (OE-I), (OE-II) (OE- III), (OE-IV) depending upon the curriculum. The student cannot opt for open elective subjects offered by their own (parent) department. The student can choose an open elective subject from the list of subjects offered by any other department of the same college. Once, a subject is chosen under the open elective category it cannot be opted again.

4.8 Professional electives: Students have to choose six professional electives (PE-I, PE-II, PE-III, PE-IV, PE-V, PE-VI). However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 The class strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60+ 1/3 of the strength of the section).

5.3 More than **one faculty member** may offer the **same subject** (lab/practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice by the students will be based on – ‘**first come first serve** basis and the CGPA criterion’ (i.e. the primary shall be on on-line entry from the student for registration in that semester, and the focus that follows, if needed, will be on the CGPA of the student)

5.4 If more entries for registration of a subject comes into picture, then the concerned Head of the Department shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections.**

5.5 An Elective Course is offered to the students if and only if there is a minimum of 1/3 strength of the sanctioned intake registers for that course.

6.0 Attendance requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate in all the subjects/courses including days of internal examinations (excluding attendance in mandatory courses like Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC and NSS, subjects related to social context and CRT) for that semester.

6.2 For Mandatory Courses a ‘Satisfactory Participation’ report shall be issued to those students from the authorities concerned only after securing $\geq 65\%$ attendance in such a course.

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid grounds, like natural calamity, medical emergency, any sudden demise of close family members based on the students representation with supporting evidence/certificates.

6.4 A stipulated fee shall be paid to condone the shortage of attendance.

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

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

6.7 The students who are detained due to lack of attendance should seek re-admission into that semester as and when offered, and re-register all the courses offered in that semester.

6.8 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class, until completion of the VIII semester, even on payment of the requisite fees.

7.0 Academic requirements

The following academic requirements have to be satisfied; **in addition to the attendance**, requirements mentioned in item no **6**.

7.1 A student shall be deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each subject/course, and has secured not less than **35% marks (26 out of 75)** in the semester end examination, and a minimum of **40%** of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together in terms of letter grades. This implies securing ‘C’ grade or above in that subject/course.

7.2 Promotion Rules:

S.No	Promotion	Conditions to be fulfilled
1.	I Semester to II Semester	Regular course of study of I semester by satisfying attendance requirements.
2.	II Semester to III Semester	Regular course of study of II Semester, by satisfying attendance requirements. Must have secured at least 50% credits up to from the offered credits from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	III Semester to IV Semester	Regular course of study of III semester, by satisfying attendance requirements.
4.	IV Semester to V Semester	Regular course of study of IV semester, by satisfying attendance requirements, and must have secured at least credits i.e., 60% credits up to IV semester from the offered credits (rounding to near low value) from all the relevant regular and supplementary examinations, whether the students takes those examinations or not
5.	V Semester to VI Semester	Regular course of study of V Semester, by satisfying attendance requirements.

6	VI Semester to VII Semester	Regular course study of VI semester, by satisfying attendance requirements. Must have secured at least 60% credits (rounding to near lower value) up to VI Semester from the offered credits from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	VII Semester to VIII Semester	Regular course of study of VII Semester, by satisfying attendance requirements.

Promotion Rules for Lateral Entry Students

S.No.	Promotion	Conditions to be fulfilled
01	III Semester to IV Semester	Regular course of study of Second Year first semester, by satisfying attendance requirements.
02	IV Semester to V Semester	Regular course of study of IV Semester by satisfying attendance requirements and a minimum of 50 % of credits (rounding to the near lower value) from the offered credits, from one regular and one supplementary examinations of III semester, irrespective of the candidate takes the examination or not.
03	V Semester to VI Semester	Regular course of study of V Semester by satisfying attendance requirements.
04	VI semester to VII Semester	Regular course of study of VI Semester by satisfying academic requirements and a minimum of 60% of credits (rounding to the near low value) from the offered credits, from two regular and two supplementary examinations of III Semester; two regular and one supplementary examinations of IV Semester; one regular and one Supplementary examination of V Semester.
05	VII Semester to VIII Semester	Regular course of study of VII semester by satisfying the academic requirements.

- 7.3** A student shall register for subjects covering 160 credits as specified and listed in the course structure, fulfill all the attendance and academic requirements for 160 credits, 'earn all 160 credits' by securing SGPA ≥ 5.0 (in each semester) and CGPA (at the end of each successive semester ≥ 5.0) to successfully complete the Under Graduate Program.
- 7.4** A student eligible to appear in the end semester examination for any subject/course, but absent from it or failed (there by failing to secure 'c' grade or above) may reappear for that subject/course in the supplementary examination as and when conducted. In such cases, the CIE assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating the performance in that subject.

7.5 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements.** The academic regulations under which the student has been readmitted shall be applicable. However, no grade allotments or SGPA/CGPA calculations will be done for the entire semester in which the student has been detained.

7.6 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which the student has been re-admitted shall be applicable to him.

8.0 Evaluation – Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including Practical) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End Examination).

8.2 For theory subjects, during a semester there shall be two mid-term examinations and average of two internal examinations will be taken as the final marks for CIE. Each mid-term examination consists of only descriptive paper carrying 20 marks with the time duration of 1hour 20 minutes. The remaining 5 marks will be evaluated by the assignment given by the concerned faculty. The syllabus for the first mid examination shall be first 2.5 units. The second mid examination covers remaining 2.5 units of syllabus. **The total marks secured by the student for the whole CIE (Continuous Internal Evaluation) will be the average of two mid-terms.** If any student is absent from / would like to seek improvement in any subject of a mid-term examination, a computer based test will be conducted for him/her by the examination branch of the college, which will be scheduled after completion of both mid-term examinations.

The details of CIE exam question paper are as follows

- The pattern of Mid-term exam for CIE consists of 4 questions and no choice will be given.
- Each question carries 5 marks.
- There will be a CBT (Computer Based Test) for the students who are absent and secured less than 14 marks in the continuous internal evaluation. The CBT will be conducted before the announcement of the results of semester-end exams.
- The question bank for the CBT should cover entire syllabus of the corresponding course.

The details of the pattern of the end semester question paper are as follows

- The end semester examinations will be conducted for 75 marks.
- The question paper consists of two parts namely **Part- A** and **Part-B**.
- Part-A consists of 10 questions. Each question carries 2.5 marks each and no choice will be given. Two questions are from one unit and all the five units should be covered.
- Part-B consists of five questions (number from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. For each question, there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The details of evaluation of end semester exam are as follows

- Double evaluation of the answer scripts is followed.
- The average of the two evaluations shall be considered as final marks.
- If the difference of two valuations is more than or equal to 15 marks, third evaluation shall be recommended.
- If any difference appeared in the marks after the third valuation also, average of two evaluations will be considered whose difference is minimum, as final marks.

The details of challenging valuation of end semester exam are as follows

- There shall not be any recounting or re-valuation for all subjects as the double valuation was adopted. But, the students will be given a chance to apply for challenging valuation for all the theory Subjects (no Practical/lab subjects) within one week from the date of declaration of results.
- Whenever the students apply for challenge valuation of answer scripts of semester end examinations, the students should submit their applications (through the HOD) within one week from the date of declaration of the results to the Examination Branch by paying Rs.10,000 (Rupees Ten Thousand only) per subject, in the form of Demand Draft, Drawn in Favor of “TKREC AUTONOMOUS”. Any application received after the due date of submission for Challenge valuation, shall not be accepted under any circumstances.

On receipt of the DD

The answer script of the applied subject will be shown to the candidate to verify whether it belongs to him or not and the script will be evaluated by the senior faculty of the college appointed by the Controller of examinations. If there is any change in marks (Equal or above 15% of the maximum marks) the new marks will be awarded to the student. Otherwise, there will be no change in old marks. If the change in marks (Equal or above 15% of the maximum marks) occurs, an amount of Rs.9,000/- will be refunded to the student. Otherwise, the student will forfeit the total amount which he/she paid.

- 8.3** For practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for end semester practical examinations. The duration for both Internal and External Practical Examination is 3 hours. For 25 marks of Internal Evaluation of practical subjects, day-to-day evaluation in laboratory is done for 10 marks and internal practical examination will be assessed for 15 marks. The concerned laboratory subject teacher (Internal Examiner) will conduct the internal practical examination only. The external practical examination will have 2 examiners, one is the external examiner and the other is the internal examiner. The controller of examinations of the college will appoint the external examiner with the consultation of the chief superintendent of examinations from the three names given by the concerned department.
- 8.4** For the subjects that include design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing and estimation), the distribution shall be 25 marks for continuous internal evaluation (10 marks for day-to-day evaluation and 15 marks for internal examination) and 75 marks for semester end examination. **There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.**
- 8.5** (i) For subjects like **Engineering Graphics/Engineering Drawing**, the SEE shall consist of five questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- (ii) For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A, 1 out of 2 questions from Unit – I for 30 Marks, (ii) Part – B, 1 out of 2 questions from Unit – II for 15 Marks, (iii) Part – C, 3 out of 5 questions from Units – III, IV, V for 30 Marks.
- (iii) For subjects **Structural Engineering – I & II (RCC & STEEL)**, the SEE will be conducted for 75 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 60 marks. Part – A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6)
- 8.6** The student has to undergo a comprehensive MCQ TEST/ Seminar/ Internship/ industry oriented mini project/Project Work offered to him by their respective departments and subsequently should satisfy the requirements for completion to acquire the required credits.
- 8.7** There shall be an Internship in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation for 15 days. The Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be

evaluated for 100 internal marks. The committee consists of Head of the Department, supervisor of the Internship and a senior faculty member of the department.

- 8.8** There shall be an Industrial Oriented Mini Project in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation for one month. Industrial Oriented Mini Project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project.
- 8.9** There shall be a seminar presentation in IV year I semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.
- 8.10** There shall be a comprehensive MCQ exam in IV year I semester. For the comprehensive MCQ exam covers the core subjects which are related to Graduate Aptitude Test in Engineering. It shall be evaluated by the departmental coordinator nominated by Head of the Department. The comprehensive MCQ exam shall be evaluated for 100 internal marks and consists of 50 MCQs. The student has to secure 40% of 100 marks i.e.40 marks. If any student is absent or failed in the comprehensive MCQ exam then he/she can appear for next supplementary exam like other end semester examinations.
- 8.11** UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.
- (i) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such ‘one re-appearance’ evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(ii) For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, the controller of examination will nominate an external examiner with the consultation of the chief superintendent from the list of experts in the relevant branch submitted by the concerned department. A student who has failed may re-appear once for the above evaluation in the current semester, when it is scheduled again; if student fails in such ‘one re-appearance’ evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(iii) Procedure for opting the MOOCs

- If any student got an opportunity to do the final year project as an internship in any reputed company (Approved by the departmental committee), the student can opt for MOOCs which are equivalent to the elective courses offered in VIII semester.
- The MOOCs should be approved by the concerned BOS.
- The selected MOOCs duration should be minimum of 12 weeks.
- A student is eligible to secure up to 12 credits only through MOOCs.

8.12 The laboratory marks, sessional marks, and the end examination marks awarded by the college are subject to scrutiny and scaling, if necessary, by a committee, constituted in this regard, with a university representative/under the guidance of the Director of Evaluation of the affiliating university. The recommendations of the committee are final and binding. The laboratory records, internal examination scripts and external examination scripts, shall be preserved as per the rules for two consecutive academic years if the respective subjects are cleared, and shall be produced before the committee as and when required, till preserved.

8.13 For mandatory courses related to Environmental Science, Constitution of India, Intellectual Property Rights, Gender Sensitization lab and Campus recruitment training a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. **These marks should also be uploaded along with the internal marks of other subjects**

8.14 For all non-credit courses and mandatory courses, no marks or letter grade is allotted.

9.0 Grading Procedure

- 9.1 Marks will be awarded to the student to indicate the performance in each theory subject, laboratory/ practical's, seminar, project stage I and project stage II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item no. 8 above, a corresponding letter grade shall be given.
- 9.2 As measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE/JNTUH guidelines) and corresponding percentage of marks shall be followed.

% of marks secured in a subject/course	Letter Grade	GradePoints
90% to 100%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

** Awarding of Letter Grade will be done for the benefit of the student.

- 9.3 A student obtaining 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain same as those obtained earlier.
- 9.4 A student who has not appeared for an examination in any subject 'Ab' grade will be allocated in that subject, and the student shall be considered as 'failed'. The student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.
- 9.5 A letter grade will not indicate any specific percentage of marks, but states only the range of marks he/she has obtained.
- 9.6 A student earns Grade Point (GP) in each subject/course, based on the Grade Point the letter grade is awarded for that subject/course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/course.

Credit points (CP) = grade points (GP) x Credits for a course

9.7 The student passes the subject/course only when **GP ≥ 5 ('C' grade or above)**

9.8 The semester grade point average (SGPA) is calculated by dividing the sum of credit points ($\sum CP$) secured from all subjects/course registered in a semester, by the total number of credits registered during the semester. SGPA is rounded off to **two decimal places**. SGPA is thus calculated as

$$\text{SGPA} = \{\sum_{i=1}^N C_i G_i\} / \{\sum_{i=1}^N C_i\} \dots \text{For each semester,}$$

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

9.9 The cumulative grade point average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses in **all semesters**, and the total number of credits registered in **all** the semesters. CGPA is rounded to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$\{\sum_{j=1}^M C_j G_j\} / \{\sum_{j=1}^M C_j \text{ for all semester registered}\} \text{ (i.e., up to and inclusive of S semesters, } S \geq 2),$$

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

Illustration of calculation of SGPA

Course/subject	Credits	Grade points	Letter Grade	Credit Points
Course1	3	8	A	3 x 8 = 24
Course2	3	10	O	3 x 10 = 30
Course3	3	5	C	3 x 5 = 15
Course4	3	6	B	3 x 6 = 18
Course5	3	9	A+	3 x 9 = 27
Course6	1.5	7	B+	1.5 x 7 = 10.5
	16.5			124.5

$$\text{SGPA} = 124.5/16.5 = 7.55$$

Illustration of calculation of CGPA:

Course/subject	Credits	Letter Grade	Grade points	Credit Points
I year I semester				
Course1	4	A	8	4 x 8 = 32
Course2	4	O	10	4 x 10 = 40
Course3	4	C	5	4 x 5 = 20
Course4	3	B	6	3 x 6 = 18
Course5	3	A+	9	3 x 9 = 27
Course6	3	B+	7	3 x 7 = 21
I year II semester				
Course7	4	B	6	4 x 7 = 28
Course8	4	O	10	4 x 10 = 40
Course3	4	C	5	4 x 5 = 20
Course4	3	B	6	3 x 6 = 18
Course5	3	A+	9	3 x 9 = 27
Course6	1.5	B+	7	1.5 x 7 = 10.5
	Total Credits = 38.5			Total Credit Points = 301.5

$$\text{CGPA} = 301.5/38.5 = 7.83$$

- 9.10** For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off**’ values of CGPAs will be used.
- 9.11** For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/courses (securing **F grade**) will also be taken into account, and the credits of such subjects/courses will be included in the multiplications and summations. After passing the failed subjects (s), newly secured grade points will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration for calculation of CGPA and SGPA.
- 10.0 Passing standards**
- 10.1** A student shall be declared successful or ‘passed’ in a semester, if the student secures a $\text{GP} \geq 5$ (‘C’ grade or above) in every subject/course in that semester (i.e. when student gets an $\text{SGPA} \geq 5.00$ at the end of that particular semester); also a student shall be declared successful or ‘passed’ in the entire under graduate Program, only when he/she gets a $\text{CGPA} \geq 5.00$ for the award of the degree as required.
- 10.2** After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (Course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

$$\% \text{ of marks} = (\text{CGPA}-0.5) \times 10$$

12.0 Award of degree

12.1 A student who registers for all the specified subjects/courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified**' for the award of the B.Tech degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with the final CGPA (at the end of the under graduate Program) ≥ 8.00 , and fulfilling the following condition will be awarded '**first class with distinction**'; **should have secured a final (at the end of the undergraduate Program) CGPA ≥ 8.00** , for each year of course study.

- Students with final CGPA (at the end of the under graduate Program) ≥ 6.50 but < 8.00 , shall be placed in '**first class**'.
- Students with final CGPA (at the end of the under graduate Program) ≥ 5.50 but < 6.50 , shall be placed in '**second class**'.
- Students with final CGPA (at the end of the under graduate Program) ≥ 5.00 but < 5.50 , and all other students who qualify for the award of degree (as per 12.1) with **final CGPA ≥ 5.00 but < 5.50** , shall be placed in '**pass class**'.
- A student with final CGPA (at the end of the under graduate Program) < 5.00 , **will not be eligible** for the award of the degree.

12.4 Student who secures **SGPA ≥ 8.00** consistently in all semesters will be eligible to compete for the awards of '**rank**' and '**gold medal**'.

13.0 Withholding of results

13.1 If the student has not paid the fees to the college at any stage, has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory Regulations

- 14.1** A student, who has discontinued for any reason, is liable to completely pay his balance annual fees, up to discontinued year.
- 14.2** A student who is detained due to lack of credits or lack of attendance has to follow the existing regulations of the year in which he/she is re-admitted, with additional/substitute subjects if necessary.

15.0 Students Transfers

- 15.1** There shall be no branch transfers after the completion of the admission process.
- 15.2** There shall be no transfers from one branch to another branch within the constituent colleges and units of the affiliating university (JNTUH).
- 15.3** The students seeking transfer under the ceiling admission category to this college from any of the JNTUH affiliated Autonomous colleges or from various other Universities/institutions (National Importance, Autonomous) have to pass the failed subjects which are equivalent to the subjects of Teegala Krishna Reddy Engineering College and also pass the subjects of Teegala Krishna Reddy Engineering College which the students have not studied at the earlier institution/university. Further, though the students have passed some of the subjects at the earlier institution/university, if the same subjects are being offered in different semesters of Teegala Krishna Reddy Engineering College, the students have to study those subjects in Teegala Krishna Reddy Engineering College in spite of the fact that those subjects are repeated.
- 15.4** The students transferred from other Universities/institutions to Teegala Krishna Reddy Engineering College, shall be provided a chance of writing online internal examination **for the failed subjects/and or subjects not studied** as per the equivalences recommended in the clearance letter issued by the university/institution, at the end of the semester as per the prescribed schedule by the college examination cell.

16.0 Scope

- 16.1** The academic regulations should be read as whole, for the purpose of any interpretation.
- 16.2** In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Governing Body of Teegala Krishna Reddy Engineering College is final.
- 16.3** The college may change or amend the academic regulations, course structure or syllabi, at any time, and the changes or amendments made shall be applicable to all students with effect from the date of notification by the college authorities.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	Punishment
	<i>If the Student</i>	
1. (a)	Possesses or carries accessible in the examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester. The hall ticket of the candidate should be cancelled.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from the examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical and project work) already appeared

		and shall not be allowed to appear for examinations of the remaining subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the imposter is an outsider, he will be handed over to the police and a case will be registered against him.
4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk-out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.

	signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.
9.	Indulges in any malpractice or improper conduct mentioned in clause 6 to 8 and is not a student for the particular examination or not a person connected with the college.	Student of the college expulsion from the examination hall and cancellation of the Performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that

		semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Is detected copying on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the PRINCIPAL/DIRECTOR for further action to award suitable punishment.	

INSTITUTE VISION AND MISSION

VISION

Imparting Knowledge and instilling skills to the aspiring students in the field of Engineering, Technology, Science and Management to face the emerging challenges of the society.

MISSION

- Encouraging scholarly activities that transfer knowledge in the areas of Engineering, Technology, Science and Management.
- Ensuring students of all ability levels are well trained to meet the needs of education and their future endeavors.
- Inculcating human values and ethics into the education system for the all-round development of the students.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

VISION AND MISSION

VISION

Imparting knowledge and Engineering skills to the aspiring students in the field of Electrical and Electronics Engineering, and to face the emerging challenges of the society.

MISSION

- Encouraging scholarly activities that transfer knowledge in the areas of Electrical and Electronics Engineering.
- Encourage the students and train them to meet the needs of education and their future endeavors.
- Inculcating human values and ethics into the education system for the all-round development of the students.

PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO 1 Students will have strong foundation in the basic principles of sciences, Mathematics, Electrical and Electronics Engineering to analyze and design and create eco-friendly products and solutions for real life problems.

PEO 2 Students will be better employable and achieve success in their chosen areas of Electrical and Electronics Engineering and related field.

PEO 3 Students will be successful engineers with necessary professional skills, effective oral, written communication and team building activities in multi-disciplinary areas with right attitude and Ethics.

PROGRAM OUTCOMES (PO's):

During the course of study, students will be possessing:

PO 1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. 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.

PO 3. 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.

PO 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. 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.

PO 6. 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.

PO 7. 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.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11. 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.

PO 12. 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)

1. Students will be able to demonstrate an ability to analyze, design and provide engineering solutions in the areas related to Electrical Drives, Electrical Machines, Power Electronics, Control Systems and Power Systems.
2. Students of EEE are able to develop and design the electrical and electronic circuits using simulation software's such as PSpice, MATLAB and will be able to utilize the techniques and participate to succeed in competitive examinations like GATE, TOFEL, GRE and GMAT etc.

COURSE STRUCTURE (2020-21)

B Tech I - Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20MA1BS01	BS	Mathematics-I	3	1	0	4
02	20CH1BS02	BS	Engineering Chemistry	3	1	0	4
03	20EE1ES03	ES	Basic Electrical Engineering	3	0	0	3
04	20ME1ES04	ES	Engineering Workshop	1	0	3	2.5
05	20EN1HS05	HS	English	2	0	0	2
06	20CH1BS06	BS	Engineering Chemistry Lab	0	0	3	1.5
07	20EN1HS07	HS	English Language and Communication Skills Lab	0	0	2	1
08	20EE1ES08	ES	Basic Electrical Engineering Lab	0	0	2	1
09			Induction Program				
Total Credits				12	2	10	19

B Tech II - Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20MA2BS01	BS	Mathematic-II	3	1	0	4
02	20AP2BS02	BS	Applied Physics	3	1	0	4
03	20CS2ES03	ES	Programming for Problem Solving	3	1	0	4
04	20ME2ES04	ES	Engineering Graphics	1	0	4	3
05	20AP2BS05	BS	Applied Physics Lab	0	0	3	1.5
06	20CS2ES06	ES	Programming for Problem Solving Lab	0	0	3	1.5
07	20ES2ES07	ES	Environmental Science	3	0	0	0
Total Credits				13	3	10	18

B Tech III - Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20EE3 PC 01	PC	Analog electronics	3	0	0	3
02	20EE3 PC 02	PC	Electrical circuit analysis	3	1	0	4
03	20EE3 PC 03	PC	Electrical machines -1	3	1	0	4
04	20EE3 PC 04	PC	Electromagnetic fields	3	1	0	4
05	20EE3 ES 05	ES	Engineering mechanics	3	0	0	3
06	20EE3 PC 06	PC	Analog electronics lab	0	0	2	1
07	20EE3 PC 07	PC	Electrical circuits lab	0	0	2	1
08	20EE3 PC 08	PC	Electrical machines lab-1	0	0	2	1
09	20EE3MC09	MC	Professional & Engineering Ethics	2	0	0	0
10	20EE3HS10	HS	Qualitative Analysis - 1	2	0	0	0
Total				19	3	06	21

B Tech IV - Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20EE4 PC 01	PC	Power Electronics	3	1	0	4
02	20EE4 PC 02	PC	Digital electronics	3	0	0	3
03	20EE4 PC 03	PC	Electrical machines -II	3	1	0	4
04	20EE4BS04	BS	Numerical Methods & Complex Variables	3	1	0	4
05	20EE4 PC 05	PC	Power system-I	3	0	0	3
06	20EE4 PC 06	PC	Power Electronics lab	0	0	2	1
07	20EE4 PC 07	PC	Digital electronics lab	0	0	2	1
08	20EE4 PC 08	PC	Electrical machines lab -II	0	0	2	1
09	20EE4MC09	MC	Gender Sensitization Lab	0	0	2	0
10	20EE4HS10	HS	Qualitative Analysis - 2	2	0	0	0
Total				17	3	8	21

B Tech V Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20EE5PC01	PC	Control Systems	3	1	0	4
02	20EE5 PC02	PC	Power system II	3	0	0	3
03	20EE5 PC03	PC	Measurements and Instrumentation	3	0	0	3
04	20EE5MS04	MS	Business Economics and financial analysis	3	0	0	3
05		PE	Professional Elective -1	3	0	0	3
06	20EE5HS05	HS	Advanced communication skills lab	0	0	2	1
07	20EE5 PC06	PC	Measurements and Instruments lab	0	0	2	1
08	20EE5 PC07	PC	Control Systems lab	0	0	2	1
09	20EE5 PC08	PC	Power system simulation lab	0	0	2	1
10	20EE5MS 09	MS	Intellectual property Rights	3	0	0	0
11	20EE5HS 10	MC	Personality Development & Soft skills	2	0	0	0
12	20EE5 PC11	PC	Summer internship	0	0	0	1
Total				20	3	8	21

B Tech VI Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01	20EE6 PC 01	PC	Power system operation and control	3	0	0	3
02	20EE6PC02	PC	Microprocessor and Microcontrollers	3	0	0	3
03	20EE6 PC 03	PC	Power system protection	3	0	0	3
04	20EE6 PC 04	PC	Power Semiconductor Drives	3	0	0	3
05		OE	Open Elective-I	3	0	0	3
06		PE	Professional Elective -II	3	0	0	3
07	20EE6 PC 05	PC	Microprocessor and Microcontrollers lab	0	0	2	1
08	20EE6 PC 06	PC	Power system lab	0	0	2	1
09	20EE6 PC 07	PC	Electrical Workshop Lab	0	0	2	1
10	20EE6HS08	HS	Basic Technical Training (BTT)	3	0	0	0
Total				21	0	6	21

B Tech VII Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01		OE	Open Elective -II	3	0	0	3
02		PE	Professional Elective -III	3	0	0	3
03		PE	Professional Elective-IV	3	0	0	3
04	20EE7MS01	MS	Fundamentals of Management for Engineers	3	0	0	3
05	20EE7 PC 02	PC	Signals & Systems	3	0	0	3
06	20EE7 PC 03	PC	Signals & Systems Lab	0	0	3	1
07	20EE7 PC 04	PC	Industry Oriented Mini Project	0	0	4	2
08	20EE7 PC 05	PC	Seminar	0	0	2	1
09	20EE7 PC 06	PC	Comprehensive test	0	0	0	1
10	20EE7 PC 07	PC	Project Stage - I	0	0	6	3
11	20EE7HS08	HS	Advance Technical Training (ATT)	3	0	0	0
Total				18	0	15	23

B Tech VIII Semester (R20)

S. No	Subject Code	Category	Subject Name	Hours per Week			Credits
				L	T	P	
01		OE	Open Elective-III	3	0	0	3
02		PE	Professional Elective -V	3	0	0	3
03		PE	Professional Elective -VI	3	0	0	3
04	20EE8PC01	PC	Project Stage - II	0	0	14	7
Total				9	0	14	16

Professional Elective – I

S. No	Subject Code	Subject Name
01	20EE5PE11	Modern Power Electronics
02	20EE5 PE 12	High Voltage Engineering
03	20EE5 PE 13	Electrical Machine Design
04	20EE5 PE 14	Internet of Things

Professional Elective – II

S. No	Subject Code	Subject Name
01	20EE6 PE 11	Smart Grid Technologies
02	20EE6 PE 12	Utilization of Electrical Power
03	20EE6 PE 13	Special Machines
04	20EE6 PE 14	Computer Organization

Professional Elective – III

S. No	Subject Code	Subject Name
01	20EE7 PE11	Switched Mode Power Conversion
02	20EE7 PE12	Renewable energy sources
03	20EE7 PE13	Digital Control systems
04	20EE7 PE14	Embedded Systems

Professional Elective – IV

S. No	Subject Code	Subject Name
01	20EE7 PE21	HVDC & FACTS
02	20EE7 PE22	Optimization Techniques
03	20EE7 PE23	Industrial Electrical systems
04	20EE7 PE24	VLSI Design

Professional Elective – V

S. No	Subject Code	Subject Name
01	20EE8 PE11	Advanced Electric Drives
02	20EE8 PE12	Deregulated Power System
03	20EE8 PE13	AI Techniques in Electrical Engineering
04	20EE8 PE14	Basics in Nano Science and Technology

Professional Elective – VI

S. No	Subject Code	Subject Name
01	20EE8 PE21	Electrical & Hybrid Vehicles
02	20EE8 PE22	Electrical Distribution Systems
03	20EE8 PE23	Control systems Design
04	20EE8 PE24	Digital Signal Processing

Professional Electives – 4 Threads

S.NO	Thread 1: Power Electronics	Thread 2: Power Systems	Thread 3: Machines and Control Systems	Thread 4: Computer and Electronics
1	Modern Power Electronics	High Voltage Engineering	Electrical Machine Design	Internet of Things
2	Smart Grid Technologies	Utilization of Electrical Power	Special Machines	Computer Organization
3	Switched Mode Power Conversion	Renewable energy sources	Digital Control systems	Embedded Systems
4	HVDC & FACTS	Optimization Techniques	Industrial Electrical systems	VLSI Design
5	Advanced Electric Drives	Deregulated Power System	AI Techniques in Electrical Engineering	Basics in Nano Science and Technology
6	Electrical & Hybrid Vehicles	Electrical Distribution Systems	Control systems Design	Digital Signal Processing

Open Elective – I

S. No	Subject Code	Subject Name
01	20EE6OE11	Renewable energy sources
02	20EE6OE12	Electrical Engineering materials

Open Elective – II

S. No	Subject Code	Subject Name
01	20EE7 OE 21	Design of Electrical Systems
02	20EE7 OE 22	Energy Storage Systems

Open Elective – III

S. No	Subject Code	Subject Name
01	20EE8 OE 31	Utilization of Electrical Energy
02	20EE8 OE 32	Energy conservation and Audit

MATHEMATICS – I
(Common for CE, CSE, IT, EEE, ECE)

Course: B.Tech Semester: I

L T P C

Course Code: 20MA1BS01

3 1 0 4

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the System of linearequations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical Problems.
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative.
- Finding maxima and minima of function of two and three variables.

Course outcomes: After learning the contents of this paper the student must be able to

- Represent the matrix form of a set of linear equations and to analyse the solution of the System of equations.
- Reduce the quadratic form to canonical form.
- Analyse the nature of sequence and series.
- Apply the mean value theorems.
- Find the extreme values of functions of two variables with / without constraints.

Unit-I

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method. **System of linear equations:** solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

Unit-II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation. Eigen values and Eigenvectors and their properties. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

Unit-III

Sequences & Series: Sequence: Definition of a Sequence, limit, Convergent, Divergent and Oscillatory sequences. **Series:** Convergent, Divergent and Oscillatory Series, Series of positive terms. Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's root test, logarithmic test. **Alternating series:** Leibnitz test; Alternating Convergent series: Absolute and Conditional Convergence.

Unit-IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). **Improper Integral:** Definitions of Beta and Gamma functions and their applications.

Unit-V

Multivariable calculus: Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem, Total derivative. **Jacobian:** Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES

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

ENGINEERING CHEMISTRY

Course: B.Tech Semester: I

L T P C

3 1 0 4

Course Code: 20CH1BS02

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
- To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes:

At the end of the course, the students will gain:

- The knowledge of atomic and molecular orbitals, band theory related to conductivity of materials.
- To understand the basic properties of water and its usage in domestic and industrial purposes.
- The knowledge of electrochemistry and Corrosion which are essential for the engineers in industry.
- To understand the Organic reaction mechanisms and getting a basic concept of common drugs viz. Paracetamol and Aspirin.
- The required skills to get clear concepts in basic spectroscopic methods and their application for engineering materials.

Unit-1: Molecular structure and Theories of Bonding

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N₂, O₂ and NO molecules. Bond order.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Factors affecting in magnitude of splitting. Magnetic and colour properties.

Band structure of solids and effect of doping on conductance. N-doping, P-doping.

Unit-2: Water and its treatment

Introduction – hardness of water – Causes of hardness . Types of hardness: temporary and permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonation. Boiler feed water – Boiler troubles Scale, Sludge, Priming, Foaming and Caustic embrittlement. Treatment. Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water. Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

Unit-3: Electrochemistry and corrosion

Electrochemical cells – electrode potential, standard electrode potential, types of electrodes – Calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary(Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Causes and effects of corrosion – Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of electro chemical corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings –Methods of coating- Hot dipping, cementation – Hot dipping- Galvanization and Tinning. Electroless plating of Copper.

Unit-4: Stereochemistry, Reaction Mechanism and synthesis of drug molecules

Representation of 3-dimensional structures, Isomers-Structural and stereoisomers, Enantiomers, diastereomers, symmetry and chirality. optical activity Absolute configuration. Conformational analysis of n- butane.

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO₄ and CrO₃.

Reduction reactions: Reduction of carbonyl compounds using LiAlH₄ & NaBH₄. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Unit-5: Spectroscopic techniques and applications:

Principles of electronic spectroscopy: Beer's Lamberts law, numerical problems. Types of electronic excitations. Applications of uv-visible spectroscopy. IR Spectroscopy: Principle, modes of vibrations, selection rules, Force constant, some common organic Functional groups wave no. regions (C-H, NH, OH, -COOH, C=O, C≡N, C=C and C≡C) Applications of IR Spectroscopy, H NMR (NMR Spectroscopy) Principle of NMR spectroscopy Chemical shift, chemical shifts of some common organic protons. Introduction to MRI.

TEXT BOOKS:

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing company (P)Ltd. New Delhi.

REFERENCE BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
3. University Chemistry, by B.H. Mahan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
5. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E. Schore, 5th Edition.

BASIC ELECTRICAL ENGINEERING

(common for EEE,CSE & IT)

Course : B.Tech Semester - I
Course Code: 20EE1ES03

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the basics of electrical circuits and its components
- To understand DC circuits and AC single phase & three phase circuits.
- To introduce the concept of power, power factor.
- To study and understand the different types of magnetic circuits i.e. DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations and power factor improvement methods.

Course outcomes:

- To analyze and solve electrical circuits using basic network laws and theorems.
- To understand and analyze basic Electric AC Circuits and effect of resonance.
- To study the working and operation of Transformers and its applications.
- To study the working principles of Electrical Machines of both AC and DC
- To introduce components of Components of LT Switch gear and installations.

Unit-I D.C. Circuits

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

Unit-II A.C. Circuits

Representation of sinusoidal wave forms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III Transformers

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Unit-IV Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Unit-V Electrical Installations

Components of LT Switch gear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXTBOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

REFERENCES:

1. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall, India, 1989.
4. Circuit Theory Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai & Co, 2016.

ENGINEERING WORKSHOP

Course: B.Tech Semester - I
Course Code: 20ME1ES04

L T P C
1 0 3 2.5

Course Objectives:

- To study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at workplace.
- To explain the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

- i. Carpentry–(T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- ii. Fitting–(V-Fit, Dovetail Fit & Semi-circular fit)
- iii. Tin-Smithy– (Square Tin, Rectangular Tray & Conical Funnel)
- iv. Foundry–(Preparation of Green Sand Mould using Single Piece and Split Pattern)
- v. Welding Practice–(Arc Welding & Gas Welding)
- vi. House-wiring–(Parallel & Series , Two-way Switch and Tube Light)
- vii. Black Smithy– (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice/B.L. Juneja /Cengage
2. Workshop Manual/ K.Venugopal /Anuradha.

REFERENCE BOOKS:

1. Workshop Manual- P.Kannaiah /K. L.Narayana/SciTech
2. Workshop Manual/VenkatReddy /BSP

ENGLISH

Course: B.Tech. Semester I
Course Code: 20EN1HS05

L T P C
2 0 0 2

Course Objectives:

The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes:

Students should be able to

- Use English Language effectively in spoken and written communication.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
- Prepare themselves to interact in English in their future carriers.

Unit-I

The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph -Creating Coherence-Organizing Principles of Paragraphs in Documents.

Unit-II

Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

Unit-III

Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press. Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

Unit-IV

What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication. Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

Unit-V

How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXTBOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCES:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I–III. CIEFL, Hyderabad. Oxford University Press.
7. Raju, Yadava B, B T Sujatha & C, Murali Krishna. English for Better Performance, Orient Blackswan, Pvt.,Ltd, 2014

ENGINEERING CHEMISTRY LAB

Course: B.Tech

Semester: I

L T P C

0 0 3 1.5

Course Code: 20CH1BS06

Course Objectives: The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as a function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:

- An ability to gain knowledge about different types of qualitative and quantitative estimation.
- An ability to analyze the quality of water by determining its chemical parameters.
- To acquire the skill for the preparation of common drugs like Paracetamol and Aspirin.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity of lubricants.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Estimation of Fe^{+2} by Dichrometry.
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO_4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. egortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a give liquid using stalagmometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water.

References

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

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course: B. Tech. Semester I

L T P C

Course Code: 20EN1HS07

0 0 2 1

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews

Course Outcomes:

- Better understanding of nuances of English language through audio- visual experience and group activities.
- Neutralization of accent for intelligibility by overcoming mother tongue influence.
- Develop the skill of using appropriate language in various speaking contexts.
- Understand how to use language to make formal presentations.
- Speaking skills with clarity and confidence which in turn enhances their interpersonal skills.

Exercise – ICALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings –Taking Leave – Introducing Oneself and Others.

Exercise – IICALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

TEXTBOOKS:

1. ELCS Lab Manual

(The course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech. First English)

REFERENCES:

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2 nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP Marks, J. 2009. English Pronunciation in Use. Eleme
7. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
8. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan) Cambridge: CUP

BASIC ELECTRICAL ENGINEERING LAB (common for EEE,CSE & IT)

Course : B. Tech **Semester - I**
Course Code: 20EE1ES08

L	T	P	C
0	0	2	1

Course Objectives:

- To analyze and understand behavior given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To determine, measure and know the relation between basic electrical quantities.
- To analyze the performance characteristics of DC and AC electrical machines

Course outcomes:

- Get a clear cut understanding about basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the response electrical circuits under resonance condition.
- Understand the measurement, calculation and relation between the basic electrical parameters
- To perform and understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

MATHEMATICS – II
(Common for CE, CSE, IT, EEE, ECE)

Course: B.Tech.

Semester: II

L T P C

Course Code: 20MA2BS01

3 1 0 4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, Surface and volume integrals.

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify and solve different types of ordinary differential equations of first order.
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Evaluate the multiple integrals and apply the concept to find areas, volumes
- Evaluate the centre of mass and gravity for cubes, sphere and rectangular parallelepiped.
- Evaluate the line, surface and volume integrals and converting them from one to another.

Unit-I

First Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations. **Applications:** Newton's law of cooling, Law of natural growth and decay. **Equations not of first degree:** equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit-II

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients. Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $xV(x)$. Method of variation of parameters. **Equations reducible to linear ODE with constant coefficients:** Legendre's equation, Cauchy-Euler equation.

Unit-III

Multiple Integrals: Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form). **Evaluation of Triple Integrals:** Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

Unit-IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

Unit-V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishers.
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

APPLIED PHYSICS

(COMMON TO ECE, CSE, EEE, IT)

Course: B.Tech

Semester: II

L T P C

3 1 0 4

Course Code: 20AP2BS02

Course Objectives: To learn

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: After learning the contents of the syllabus

- The student gain knowledge on fundamentals of modern physics and quantum mechanics, and utilize the knowledge in various applications
- The student can able to learn fundamentals of Semiconductor physics, enable to apply to various systems like communications, photo cells and so on.
- The students understand concepts of optoelectronic devices and apply their knowledge in applications like LED, Solar cell.
- The students will learn the new advancement in engineering field like lasers and fiber optics and their applications
- The student can learn basics of Electromagnetism and various magnetic properties and their applications in engineering.

Unit - I: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box

Unit - II: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

Unit - III: Optoelectronics

Radioactive and non-radioactive recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics

Unit - IV: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres

Unit - V: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectric. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials

TEXT BOOKS:

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

REFERENCES:

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

PROGRAMMING FOR PROBLEM SOLVING

(COMMON TO ECE, CSE, EEE, IT)

Course: B.Tech Semester: II

L T P C

Course Code: 20CS2ES03

3 1 0 4

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

Unit - I:

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

Unit - II:

Arrays, Strings, Structures and Pointers: Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays
Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures.

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

Unit - III:

Preprocessor and File handling in C:Pre-processor: Commonly used Pre-processor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Unit - IV:

Function and Dynamic Memory Allocation: Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit - V:

Introduction to Algorithms: Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

ENGINEERING GRAPHICS (Common for EEE,CSE & IT)

Course : B. Tech	Semester - II	L	T	P	C
Course Code: 20ME2ES04		1	0	4	3

Course objectives: The objectives of the course are:

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

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

- Draw lines, curves and show dimensions as per BIS standards.
- Find the position of an object in any one of the four quadrants with respect to observer, object and the reference planes and to construct the projections for points, lines and planes.
- Apply the principles of Projections to the Solids and also draw their Sectional Views and true shape of sections.
- Grasp the Knowledge and draw the development of surfaces and Intersections in real time situations.
- Develop and visualize isometric and orthographic views of the objects.

Unit- I

Introduction to engineering drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloids and Hypocycloid, Scales–Plain & Diagonal

Unit-II

Ortho graphic projections: Principles of Ortho graphic Projections–Conventions–Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

Unit-III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid, Cone–Auxiliary views–Sections of Sphere

Unit-IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of–Prism vs Prism-Cylinder Vs Cylinder

Unit– V

Isometric projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions

TEXTBOOKS:

1. Engineering Drawing N.D.Bhatt /Charotar
2. Engineering Drawing/N. S.Parthasarathy and VelaMurali/Oxford

REFERENCEBOOKS:

1. Engineering Drawing/Basant Agrawal and Mc Agrawal /McGrawHill
2. Engineering Drawing/M.B.Shah, B.C.Rane/Pearson.
3. Computer Aided Engineering Drawing–K BalaveeraReddy –CBS Publishers

APPLIED PHYSICS LAB

Course: B.Tech

Semester: II

L T P C

0 0 3 1.5

Course Code: 20AP2BS05

Course Outcomes:

- The student will be able to learn about the energy gap of semiconductor and working of solar cell.
- The student can able to study the characteristics of LED and variation of magnetic field with electric field.
- The student can compare the theory of Hall effect and correlate with experiment to determine Hallcoefficient.
- Student will be able to draw the LASER characteristics and able to find the losses in the optical fibre cables.
- Student will understand the usage of basic electronic components like resistor, capacitor, and inductor and can use them for engineering applications.

List of Experiments:

1. Energy gap of P-N junction diode:To determine the energy gap of a semiconductor diode.
2. Solar Cell:To study the V-I Characteristics of solar cell.
3. Light emitting diode:Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee’s experiment:Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect:To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect:To determine work function of a given material.
7. LASER:To study the characteristics of LASER sources.
8. Optical fibre:To determine the bending losses of Optical fibres.
9. LCR Circuit:To determine the Quality factor of LCR Circuit.
10. R-C Circuit:To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed.

REFERENCES:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
2. Engineering physics practicals by Dr.B. Srinivasa Rao, V.K.V. Krishna.K.S.Rudramamba

PROGRAMMING FOR PROBLEM SOLVING LAB

(Common for EEE, CSE & IT)

Course : B. Tech	Semester - II	L	T	P	C
Course Code: 20CS2ES06		0	0	3	1.5

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

- a. Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
- b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

- a. Write a program for fiend the max and min from the three numbers.
- b. Write the program for the simple, compound interest.
- c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

- d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
 - 5 x 1 = 5
 - 5 x 2 = 10
 - 5 x 3 = 15
- e. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

- a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8m/s^2)).
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
- c. Write a program that finds if a given number is a prime number
- d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- f. Write a C program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
- g. Write a C program to find the roots of a Quadratic equation.
- h. Write a C program to calculate the following, where x is a fractional value. $1 - \frac{x}{2} + \frac{x^2}{4} - \frac{x^3}{6}$
- i. Write a C program to read in two numbers, x and n , and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program compute $1 + 5 + 25 + 125$.

Arrays and Pointers and Functions:

- a. Write a C program to find the minimum, maximum and average in an array of integers.
- b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
- c. Write a C program that uses functions to perform the following:
 - i. Addition of Two Matrices
 - ii. Multiplication of Two Matrices
 - iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
- d. Write C programs that use both recursive and non-recursive functions
 - i. To find the factorial of a given integer.
 - ii. To find the GCD (greatest common divisor) of two given integers.
 - iii. To find x^n
- e. Write a program for reading elements using pointer into array and display the values using array.
- f. Write a program for display values reverse order from array using pointer.
- g. Write a program through pointer variable to sum of n elements from array.

Sorting and Searching:

- a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
- b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
- c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- d. Write a C program that sorts the given array of integers using selection sort in descending order
- e. Write a C program that sorts the given array of integers using insertion sort in ascending order
- f. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

- i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
- iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- iv. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
- v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

ENVIRONMENTAL SCIENCE

Course: B.Tech

Semester: II

L T P C

3 0 0 0

Course Code: 20ES2MC07

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development.

The students should be able to:

- Develop an understanding of ecological perspective and the value of the environment.
- Understand the significance of various natural resources and its management.
- Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
- Identify different types of pollution and their control measures, Discover effective methods of waste management and come out with best possible solutions.
- Raise awareness about environmental laws and sustainable development.

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visits

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity ; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Waste water Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC- GoI Initiatives

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. NewDelhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P.Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, new age international publishers.
5. Text book of Environmental Science and Technology- Dr. M.Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

ANALOG ELECTRONICS

Course : B.Tech

Semester - III

L T P C

Course Code: 20EE3 PC 01

3 0 0 3

Pre-requisite: Electronic Devices and Circuits

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Know the characteristics utilization of various components.
- Understand the small frequency analysis of transistors techniques
- Design and analyze various large signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- A thorough understanding, functioning of OP-AMP, designs OP-AMP based circuits with linear integrated circuits.

UNIT-I

Diode Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC Configurations, Analysis and Design of small signal Low Frequency Single stage BJT Amplifiers

UNIT-II

JFET Amplifiers: Analysis of JFET Amplifiers, Analysis of CS,CD,CG,JFET Amplifiers, Comparison of performance with BJT Amplifiers.

MOSFET Circuits: MOSFET small signal Equivalent circuits - gain, input and output impedances, small-signal model of common-source, Common-gate and common-drain amplifiers.

UNIT-III

Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers , Power amplifiers –Class A, Class B, Class C

UNIT-IV

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers –Effect of Feedback on Amplifier characteristics Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations–Simple problems.

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V

Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular- wave generators.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition
2. Op-Amps & Linear ICs–Ramakanth A. Gayakwad, PHI, 2003.

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version-Thomas L.Floyd 2015, Pearson.
2. J.Millman and A.Grabel, "Microelectronics", McGraw Hill Education, 1988.
3. P.Horowitz and W.Hill, "The Art of Electronics", Cambridge University Press, 1989.
4. P.R.Gray, R.G.Meyer and S.Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

ELECTRICAL CIRCUIT ANALYSIS

Course: B.Tech

Semester: III

L T P C

Course Code:20EE3PC02

3 1 0 4

Course outcomes:

After the end of this course, students will demonstrate the ability to

- Apply network theorems for the analysis of electrical circuits.
- Understand the Concept of duality and dual networks.
- Obtain the transient and steady-state response of electrical circuits with DC and AC Excitations.
- Analyze circuits in the sinusoidal steady-state(single-phase and three-phase).
- Analyze electrical circuits using Laplace Transforms.
- Analyze two port circuit behaviors.

Unit-I

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

Unit-II

Solution of First and Second order Networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C 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.

Unit-III

Sinusoidal Steady State Analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer

Unit-IV

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, and transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots), series and parallel resonances

Unit-V

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, inter connections of two port networks

TEXTBOOKS:

1. S. Sivanagaraju , G. Kishor and C. Srinivasa Rao “Electrical Circuit Analysis” ,CeneageLearning India Pvt Ltd, 2009
2. M. E. VanValkenburg, “Network Analysis”,PrenticeHall,2006.
3. D.Roy Choudhury, “Networks and Systems”, New Age International Publications,1998

REFERENCES:

1. W.H.Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, Mc Graw Hill Education, 2013.
2. C. K. Alexander and M.N.O.Sadiku, “Electric Circuits”, Mc Graw Hill Education, 2004.
3. K. V. V. Murthy and M.S.Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.
4. A Sudhakar and Shyammohan S Palli, “Circuits and Networks Analysis and Synthesis, 5e McGraw Hill Education, 1999

ELECTRICAL MACHINES-I

Course: B.Tech semester III

L	T	P	C
3	1	0	4

Course Code:20EE3PC03

Prerequisite: Basic Electrical Engineering

Course Objectives:

To study and understand different types of DC generators, Motors and Transformers, their construction, operation and applications.

- To analyze performance aspects of various testing methods.

Course Outcomes: After the end of this course, students will demonstrate the ability to

- Identify different parts of a DC machine & understand its operation
- Carry out different testing methods to predetermine the efficiency of DC machines
- Understand different excitation and starting methods of DC machines
- Control the voltage and speed of a DC machines
- Analyze single phase and three phase transformers circuits.
- Distinguish the performance of Transformers.

Unit-I

Generators: Principle of operation – Action of commutator – constructional features – armature winding – lap and wave winding – simplex and multiplex winding – use of laminated armature – E.M.F Equation. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage methods of improving commutation. Methods of Excitation separately excited and self-excited generators – build-up of E.M.F-critical field resistance and critical speed - causes for failure to self-excite and remedial measures. Load characteristics of shunt, series and compound generators.

Unit-II

D.C Motors: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of D.C.Motors - Armature voltage and field flux control methods. Motor starters (3-point and 4-point starters) Testing of D.C. machines - Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

Unit-III

Testing of DC Machines: Methods of Testing – direct, indirect and regenerative testing – Brake test Swinburne's test – Hopkinson's test – Field's test – separation of stray losses in a d.c.motor test.

Unit-IV

Single Phase Transformers: Types - constructional details-minimization of hysteresis and eddy current losses-EMF equation – operation on no load and on load - phasor diagrams Equivalent circuit-losses and efficiency – regulation- All day efficiency-effect of variations of frequency & supply voltage on iron losses.

Unit-V

Testing of Transformers and Poly-Phase Transformers: OC and SC tests - Sumpner's test predetermination of efficiency and regulation – separation of losses test- parallel operation with equal and unequal voltage ratios- autotransformers-equivalent circuit- comparison with two winding transformers. Poly-phase transformers – Poly-phase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ

TEXTBOOKS:

1. A.E.Fitzgerald and C.Kingsley, "Electric Machinery", New York, Mc Graw Hill Education, 2013.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

REFERENCEBOOKS:

1. M.G.Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. A.E.Clayton and N.N.Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. I. J. Nagrath and D. P.Kothari, "Electric Machines", McGraw-Hill Education, 2010.

ELECTRO MAGNETIC FIELDS

Course: B.Tech Semester: III
Course Code: 20EE3PC04

L	T	P	C
3	1	0	4

Course Objectives:

- To introduce the concepts of electric field and magnetic field.
- Boundary conditions of conductors & dielectrics.
- Applications of electric and magnetic fields in the development of the theory for power transmission lines and electrical machines.

Course outcomes: At the end of the course, students will demonstrate the ability

- To understand the basic laws of electromagnetism.
- To obtain the electric and magnetic fields for simple configurations under static conditions.
- To analyze time varying electric and magnetic fields.
- To understand Maxwell's equation in different forms and different media.
- To understand the propagation of EM waves.

UNIT - I

Static Electric Field: Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT - II

Conductors, Dielectrics and Capacitance: Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation.

UNIT - III

Static Magnetic Fields and Magnetic Forces: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self- inductance and mutual inductance.

UNIT - IV

Time Varying Fields and Maxwell's Equations: Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces.

UNIT - V

Electromagnetic Waves: Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogeneous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXTBOOKS:

1. M. N. O. Sadiku, "Elements of Electro magnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electro magnetics", MC-Graw Hill Education, 2012.
3. Roald K. Wangsness "Electromagnetic Fields" John Wiley & Sons Publication, 2007 (2nd ed.)

REFERENCES:

1. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India,2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans,1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication,1980.
4. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill,1968.
5. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press,1966.
6. B. D. Popovic, "Introductory Engineering Electromagnetic s", Addison-Wesley Educational Publishers, International Edition,1971.
7. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.

ENGINEERING MECHANICS

Course: B.Tech Semester: III
Course Code: 20EE3ES05

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to:

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

UNIT-I:

Introduction to engineering mechanics – Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant-Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

UNIT-II:

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack.

Centroid and centre of gravity: Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; centre of gravity of bodies, Centre of Gravity and its implications. – Theorem of Pappus.

UNIT-III:

Area moments of inertia: introduction-definition of moment of inertia -polar moment of inertia, transfer theorem for moment of inertia, mass moment of inertia: radius of gyration Moment of inertia of standard sections and composite sections, transfer formula for product of inertia.

UNIT-IV:

Review of particle dynamics – Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-V:

Kinetics of rigid bodies – Basic terms, general principles in dynamics; Types of motion, motion in curved path- work, energy and power, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle, principle of conservation of Work Energy and its application in plane motion of connected bodies; Kinetics of rigid body in rotation, translation-work done

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:

1. Timoshenko S. and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.

ANALOG ELECTRONICS LAB

Course: B.Tech **Semester: III**
Course Code: 20EE3PC06

L	T	P	C
0	0	2	1

Course Outcomes: After Completion of this lab the student is able to

- Identify relevant information to supplement to the Analog Electronic Circuit EC (EE) 301 course.
- Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.
- Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions.
- Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.
- Practice different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with &without filters
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Inverting and Non-inverting Amplifiers using Op Amps.
7. Adder and Subtractor using Op Amp.
8. Integrator Circuit using IC741.
9. Differentiator circuit using Op Amp.
10. RC Phase shift Oscillator
11. Colpitts Oscillator Design
12. Hartley Oscillators Design
13. Class A power amplifier
14. Class B power amplifier

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Millimeters
5. Electronic Components

ELECTRICAL CIRCUITS LAB

Course: B.Tech Semester: III
Course Code: 20EE3PC07

L T P C
0 0 2 1

Course outcomes: After Completion of this lab the student is able to

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems
- Analyze the Two port parameters
- Evaluate the time response and locus diagrams of first order electrical circuits
- Understand the measurement of Active and Reactive power for three phase balanced loads

The following experiments are required to be conducted as compulsory experiments

1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition, Reciprocity and Maximum Power Transfer theorems
3. Locus Diagrams of RL and RC Series Circuits
4. Series and Parallel Resonance
5. Time response of first order RC/RL network for periodic non-sinusoidal inputs–Time constant and Steady state error determination.
6. Two port network parameters–Z–Y parameters, Analytical verification.
7. Two port network parameters–A,B,C,D & Hybrid parameters, Analytical verification
8. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Co-efficient of Coupling.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

9. Verification of compensation & Milliman's theorems
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
11. Determination of form factor of non-sinusoidal waveform
12. Measurement of Active Power for Star and Delta connected balanced loads
13. Measurement of Reactive Power for Star and Delta connected balanced loads

TEXT BOOKS:

1. S.Sivanagaraju , G. Kishor and C. Srinivasa Rao "Electrical Circuit Analysis", Cengage Learning India Pvt Ltd, 2009
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
3. D.Roy Choudhury, "Networks and Systems", New Age International Publications, 1998

REFERENCES:

1. W.H.Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", Mc-Graw Hill Education, 2013.
2. C. K. Alexander and M.N.O.Sadiku, "Electric Circuits", McGrawHill Education, 2004.
3. K. V. V. Murthy and M.S.Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.
4. A Sudhakar and Shyamohan S Palli, "Circuits and Networks Analysis and Synthesis, 5e" McGraw Hill Education, 1999

ELECTRICAL MACHINES LAB-I

Course: B.Tech **Semester:** III

Course Code: 20EE3PC08

L T P C

0 0 2 1

Pre requisite: Electrical Machines-I

Course Objectives:

- To expose the students to the operation of DC Generator
- To expose the students to the operation of DC Motor.
- To examine the self-excitation in DC generators.

Course Outcomes: After completion of this lab the student is able to

- Start and control the Different DC Machines.
- Assess the performance of different machines using different testing methods
- Identify different conditions required to be satisfied for self- excitation of DC Generators.
- Separate iron losses of DC machines into different components
- Identify various parts of electrical DC machines

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator(Determinationofcriticalfieldresistanceandcriticalspeed)
2. Load test on DC shunt generator(Determination of characteristics)
3. Load test on DC series generator(Determination of characteristics)
4. Load test on DC compound generator (Determination of characteristics.
5. Hopkinson’s test on DC shunt machines(Predetermination of efficiency)
6. Fields test on DC series machines(Determination of efficiency)
7. Swinburne’s test and speed control of DC shunt motor(Predetermination of efficiencies)
8. Brake test on DC compound motor(Determination of performance curves)

In addition to the above eight experiments, at least any two of the experiments from the following list arerequired to be conducted:

9. Brake test on DC shunt motor(Determination of performance curves)
10. Retardation test on DC shunt motor(Determination of losses at rated speed)
11. Separation of losses in DC shunt motor.

TEXTBOOKS:

1. A.E.Fitzgerald and C.Kingsley, "Electric Machinery", New York, Mc-Graw Hill Education, 2013.
2. P.S.Bimbhra, "Electrical Machinery", Khanna Publishers,2011

REFERENCEBOOKS:

1. M.G.Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. A.E.Clayton and N.N.Hancock, "Performance and design of DC machines" , CBS Publishers,2004
3. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

PROFESSIONAL & ENGINEERING ETHICS

Course B.Tech Semester - III
Course Code: 20EE3MC09

L T P C
2 0 0 0

Course Objective: To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.

Course Outcome:

- Understanding basic purpose of profession, professional ethics and various moral and social issue
- Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer
- Acquiring knowledge of various roles of Engineer In applying ethical principles at various professional levels
- Professional Ethical values and contemporary issues
- Excelling in competitive and challenging environment to contribute to industrial growth.

Unit-I

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

Unit-II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

Unit-III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse..

Unit-IV

Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing

Unit-V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXTBOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
2. Business Ethics concepts and cases: Manuel G Velasquez, 6e, PHI 2008

QUANTITATIVE ANALYSIS-I
(Common for CE, EEE, ECE, CSE, IT)

Course: B.Tech.

Semester: III

L	T	P	C
2	0	0	0

Course Code: 20EE3HS10

Course Objectives: The Students learn

- To improve the problem solving skills.
- To enhance the employability skills among students to meet out the corporate expectations.
- To enhance the student's interest towards industry expectations.
- To prepare students for the campus recruitment program.
- To produce the most competitive man power to fit in all scenario of the job market.

Course Outcomes: The Students able

- To Understand and Practice Simplifications.
- To Understand and Practice the Problems on Ages.
- To Understand and Practice the Quadratic Equations.
- To Understand and Practice arrangement and selection in their daily life.
- To Understand and Practice commercial mathematics.

Unit-I

Numbers, H.C.F & L.C.M. of Numbers, Decimal Fractions & Simplifications.

Unit-II

Square Roots & Cube Roots, Problems on Ages, Pipes & Cistern.

Unit-III

Average, Time & Distance, Time & Work, Logarithm, Set Theory, Progressions, Quadratic Equations and Surds.

Unit-IV

Permutation & Combination, Probability, Co-ordinate Geometry, Inequalities, Functions, Alligation & Mixtures, Number System.

Unit-V

Partnership, Profit & Loss, Simple & Compound Interest, Percentage, Ratio & Proportion, Mensuration 2D & 3D.

TEXT BOOKS

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Logical Reasoning.

REFERENCES

1. Arun Sharma, Teach Yourself Quantitative Aptitude.
2. Rajesh Verma, Fast Track Objective Arithmetic.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude For Competitive Examination.
4. Abhijit Gupta, Quantitative Aptitude for all Competitive Exam

POWER ELECTRONICS

Course B.Tech Semester - IV

L T P C

Course Code: 20EE5PC01

4 1 0 4

Prerequisite: Electronic circuits

Course Objectives:

- To Design/develop suitable power converter for efficient control or conversion of power in drive applications
- To Design / develop suitable power converter for efficient transmission and utilization of power in power system applications

Course outcomes: After completion of this course the student is able to

- Choose the appropriate converter for various applications
- Design the power converters suitable for particular applications
- Develop the novel control methodologies for better performance.
- Design of Inverter circuit.
- Understand the role of power electronics play in the improvement of energy usage efficiency.

Unit-I

Power Semi-Conductor Devices and Commutation Circuits: Thyristors - Silicon Controlled Rectifiers (SCR's) – BJT Power MOSFET - Power IGBT and their characteristics and other thyristors - Basic theory of operation of SCR -Static characteristics – Turn-on and Turn-off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points. Two transistor analogy of SCR - R, RC, UJT firing circuits - Series and parallel connections of SCRs Snubber circuit details – Specifications and Ratings of SCR, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

Unit-II

Single Phase Half Wave Controlled Converters: Phase control technique - Single phase Line commutated converters -Half wave controlled converters with Resistive, RL load and RLE load - Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode - Numerical problem Single Phase Fully Controlled Converters: Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load - Derivation of average load voltage and current – Line commutated inverters, semi-converters, active and Reactive power inputs to the converters, Effect of source inductance – Expressions of load voltage and current - Numerical problems Three Phase Line Commutated Converters: Three phase converters - Three pulse and six pulse converters and bridge connections with R, RL load voltage and current with R and RL load and RLE loads - Semi Converters, Effect of Source inductance–Dual converters Wave forms - Numerical Problems

Unit-III

AC Voltage Controllers: AC voltage controllers – Single phase two SCR's in anti-parallel with R and RL loads , modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor- wave forms , Numerical problems- Single phase and three phase cyclo-converters (principle of operation only)

Unit-IV

Choppers: Choppers – Time ratio control and Current limit control strategies – Step down choppers- Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression. Morgan’s chopper – Jones chopper - Oscillation choppers (Principle of operation only) - waveforms — AC Chopper – Problems

Unit-V

Inverters: Inverters – Single phase inverter – Basic series inverter, parallel Capacitor inverter, bridge inverter – Waveforms,. Simple bridge inverters, Voltage control techniques for inverters- Pulse width modulation techniques – Numerical problems.

TEXTBOOKS:

1. M. D. Singh & K. B. Kanchandhani, “Power Electronics”, Tata Mc Graw – Hill Publishing Company, 1998.
2. “M. H. Rashid”, “Power Electronics : Circuits, Devices and Applications”, Prentice Hall of India, 2nd edition, 1998
3. “V. R. Murthy”, “Power Electronics”, Oxford University Press, 1st Edition 2005.
4. P.S. Bimbhra , “Power Electronics”, Khanna Publishers, 1st Edition 1997.

REFERENCES:

1. VedamSubramanyam, “Power Electronics”, New Age International (P) Limited, Publishers, 2nd Edition 2008.
2. Philip T. Krein, “Elements of Power Electronics”, Oxford University Press, 1997.
3. M. S. Jamil Asghar, “Power Electronics”, PHI Private Limited, 2004.
4. P. C. Sen, “Power Electronics”, Tata McGraw-Hill Publishing, 2001.
5. John G. Kassakian, Martin, F. Schlect, Geroge C. Varghese, “Principles of Power Electronics”, Pearson Education, 1st Edition 2010
6. J.S Chitode , “Power Electronics”, Technical Publications .

DIGITAL ELECTRONICS

Course B.Tech Semester - IV
Course Code: 20EE5PC02

L	T	P	C
3	0	0	3

Pre-requisite: Analog Electronics

Course Outcomes: Upon completing this course, the student will be able to

- Understand working of logic families and logic gates.
- Design and implement Combinational logic circuits.
- Design and implement Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Use PLDs to implement the given logical problem.

UNIT-I

Fundamentals of Digital Systems: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems binary, signed binary, octal, hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

Logic Families: 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 and simplification of logic functions using K-map, minimization of logic functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial ladder, ALU, elementary ALU design, popular MSI chips, 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: A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J, K, T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, applications of counters.

UNIT-IV

A/D and D/A Converters: Digital to analog converters: weighted resistor D/A converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to 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, example of A/D converter ICs.

UNIT-V

Semiconductor Memories and Programmable Logic Devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge coupled device memory (CCD), commonly used memory chips, ROM, PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDs), Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. R.P.Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M.M.Mano, "Digital logic and Computer design", Pearson Education India, 2016

REFERENCE BOOKS:

1. A.Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

ELECTRICAL MACHINES-II

Course: B.Tech Semester: IV

L T P C

Course Code: 20EE4PC03

3 1 0 4

Prerequisite: Basic Electrical Engineering, Electrical Machines-I

Course Objectives;

- To deal with the detailed analysis of poly-phase induction motors & Alternators
- To understand operation, construction and types of single-phase motors and their applications in household appliances and control systems.
- To introduce the concept of parallel operation of alternators
- To introduce the concept of regulation and its Calculations
- Gain Knowledge about the special machines.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the concepts of rotating magnetic fields.
- Understand the operation of induction machines.
- Construction, Principle of operation, Characteristics & Regulation of Synchronous Generator
- Able to understand the operation of synchronous motors and its salient features.
- Understand the principle of operation and applications of single phase motors and special motors

UNIT – I:

Poly-Phase Induction Machines: Constructional details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor atstandstill and during operation.

UNIT – II:

Characteristics of Induction Machines: Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging -.No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations.

Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT – III:

Synchronous Machines: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics. Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT – IV:

Parallel Operation of Synchronous Machines: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's.

Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed .- hunting and its suppression – Methods of starting synchronous induction motor.

UNIT – V:

Single Phase & Special Machines: Single phase induction motor – Constructional features-Double revolving field theory split-phase motors – shaded pole motor

Text 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.

Reference books:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
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.
5. U.A Bakshi &M.V.Bakshi" Electrical Machines-II", Technical Publications, 2007
6. U.A Bakshi&M.V.Bakshi" Electrical Machines-III", Technical Publications, 2009
7. Electric mechanics – III (Synchronous and single phase machines), S. Kamakshaiah, Right Publishers
8. Principles of Electrical Machines, V.K.Mehta, Rohit Mehta,S.Chand Publishers.

NUMERICAL METHODS AND COMPLEX VARIABLES
(Common to ECE & EEE)

Course: B.Tech.
Course Code: 20MA4BS04

Semester: IV

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Various methods to find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

Course Outcomes: After learning the contents of this paper the student must be able to

- Find the root of a given equation.
- Estimate the value for the given data using interpolation.
- Find the numerical solutions for a given ODE's.
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
- Taylor's and Laurent's series expansions of complex Function.
- Apply the transformations on different planes.

Unit – I

Algebraic and Transcendental Equations: Introduction – Bisection method, Iteration Method, Newton-Raphson method and Regular- Falsi method.

Unit – II

Interpolation: Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation.

Unit – III

Numerical Differentiation and integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

Unit – IV

Complex Differentiation: Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate.

Unit – V

Complex Integration: Line integrals, Cauchy's theorem, Cauchy's Integral formula, Cauchy's Integral theorem, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof). Bilinear Transformation, properties, cross ratio, fixed points.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. B.V. Ramana, Higher Engineering Mathematics- Tata McGraw Hill New Delhi- 11th Reprint- 2010.
4. S.R.K. Iyengar and R.K. Jain, Advanced Engineering Mathematics by – Narosa Publications.

REFERENCES

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of engineering Mathematics- Laxmi Publications.
3. Babu Ram, Numerical methods, Pearson Education.
4. Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education

POWER SYSTEM - I

Course: B.Tech Semester: IV

L	T	P	C
3	0	0	3

Course Code: 20EE4PC05

Prerequisite: Basic Electrical Engineering, Electrical Machines-I, Electrical Machines-II

Course Objectives:

- To understand the different types of power generating stations.
- To examine A.C. and D.C. distribution systems.
- To understand and compare overhead line insulators and Insulated cables.
- To illustrate the economic aspects of power generation and tariff methods.
- To evaluate the transmission line parameters calculations
- To understand the concept of corona

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the concepts of power systems.
- Understand the operation of conventional generating stations and renewable sources of electrical power.
- Evaluate the power tariff methods.
- Determine the electrical circuit parameters of transmission lines
- Understand the layout of substation and underground cables and corona.

UNIT - I

Generation of Electric Power

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant. **Non-Conventional Sources (Qualitative):** Ocean Energy, Tidal Energy, Wave Energy, wind Energy, Fuel Cells, and Solar Energy, Co-generation and energy conservation and storage.

UNIT -II

Economics of Generation: Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT - III

Overhead Line Insulators & Insulated Cables: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators. Introduction, insulation, insulating materials, Extra high voltage cables, grading of cables, insulation resistance of a cable, Capacitance of a single core and three core cables, Overhead lines versus underground cables, types of cables.

UNIT - IV

Inductance & Capacitance Calculations of Transmission Lines: Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance.

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-V

A.C. Distribution: Introduction, AC distribution, Single phase, 3-phase, 3-phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

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

TEXT BOOKS:

1. W.D. Stevenson –Elements of Power System Analysis, Fourth Edition, McGraw Hill, 1984.
2. C.L. Wadhwa –Generation, Distribution and Utilization of Electrical Energy, Second Edition, New Age International, 2009.
3. V.K. Mehta, Rohit Mehta- Principles of Power System

REFERENCE BOOKS:

1. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
2. M.V. Deshpande –Elements of Electrical Power Station Design, Third Edition, Wheeler Pub. 1998
3. H. Cotton & H. Barber -The Transmission and Distribution of Electrical Energy, Third “V.K Mehta and Rohit Mehta”, “Principles of Power Systems”, S. Chand & Company Ltd, New Delhi, 2004.

POWER ELECTRONICS LAB

Course: B.Tech Semester: IV
Course Code: 20EE5PC06

L T P C
0 0 2 1

Prerequisite: Power Electronics

Course Objectives:

- Apply the concepts of power electronic converters for efficient conversion /control of power from source to load.
- Design the power converter with suitable switches meeting a specific load requirement

Course outcomes: After completion of this course the student is able to

- Understand the operating principles of various power electronic converters.
- Use power electronic simulation packages & hardware to develop the power converters.
- Analyze and choose the appropriate converters for various applications
- Understand the concept of voltage regulators and Cyclo converters
- Analysis of inverter circuits and study of PWM techniques.

Any eight experiments should be conducted

1. Study of Characteristics of SCR, MOSFET & IGBT,
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase half controlled & fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. Single Phase Cyclo- converter with R and RL loads
7. Single Phase series & parallel inverter with R and RL loads
8. Single Phase Bridge inverter with R and RL load

Any two experiments should be conducted

1. DC Jones chopper with R and RL Loads
2. Three Phase half controlled bridge converter with R-load
3. Single Phase dual converter with RL loads
4. (a) Simulation of single-phase Half wave converter using R and RL loads
(b) Simulation of single-phase full converter using R, RL and RLE loads
(c) Simulation of single-phase Semi converter using R, RL and RLE loads
5. (a) Simulation of Single-phase AC voltage controller using R and RL loads
(b) Simulation of Single phase Cyclo-converter with R and RL-loads
6. Simulation of Buck chopper
7. Simulation of single phase Inverter with PWM control
8. Simulation of three phase fully controlled converter with R and RL loads, with and without freewheeling diode. Observation of wave forms for Continuous and Discontinuous modes of operation.
9. Study of PWM techniques

REFERENCE BOOKS:

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications.
2. User's manual of related software's
3. Reference guides of related software's
4. Rashid, Spice for power electronics and electric power, CRC Pres

DIGITAL ELECTRONICS LAB

Course: B.Tech Semester: IV

L T P C

Course Code: 20EE5PC07

0 0 2 1

Prerequisite: Digital Electronics

Course Objectives:

- Learn the basics of gates
- Construct basic combinational circuits and verify their functionalities
- Apply the design procedures to design basic sequential circuits
- Learn about counters
- Learn about Shift registers
- To understand the basic digital circuits and to verify their operation

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND/NOR gates
4. Design a 4-bit Adder / Subtractor
5. Design and realization a 4-bit gray to binary and Binary to Gray Converter.
6. Design and realization of a 4-bit pseudo random sequence Generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out Shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous Counters using flip-flops.
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2-bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc., 14. State machines

Major Equipment required for Laboratories:

1. Digital trainer kit.
2. 20MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Function generator.

ELECTRICAL MACHINES LAB – II

Course: B.Tech

Semester: IV

L T P C

Course Code: 20EE4PC08

0 0 2 1

Prerequisite: Electrical Machines – I & Electrical Machines – II

Course Objectives:

- To understand the operation of synchronous machines
- To understand the analysis of power angle curve of a synchronous machine
- To understand the equivalent circuit of a single-phase transformer and single-phase induction motor
- To understand the circle diagram of an induction motor by conducting a blocked rotor test

Course Outcomes: After the completion of this laboratory course, the student will be able

- Assess the performance of different machines using different testing methods
- To convert the Phase from three phase to two phase and vice versa
- Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
- Control the active and reactive power flows in synchronous machines
- Start different machines and control the speed and power factor

The following experiments are required to be conducted as compulsory experiments

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single-phase transformers
3. No-load & Blocked rotor tests on three phase Induction motor
4. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
5. V and Inverted V curves of a three—phase synchronous motor.
6. Equivalent Circuit of a single-phase induction motor
7. Determination of X_d and X_q of a salient pole synchronous machine
8. Load test on three phase Induction Motor

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list

1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
6. Measurement of sequence impedance of a three-phase alternator.
7. Vector grouping of Three Transformer 8. Scott Connection of transformer

TEXT 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.

REFERENCE BOOKS:

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

GENDER SENSITIZATION LAB

Course: B.Tech.
Course Code: 20GS3HS09

Semester IV

L T P C
0 0 2 0

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies—to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit - I

Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men, Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit - II

Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences

Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit - III

Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.

Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit - IV

Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective- Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:“Chupulu”.

Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life....”

Unit - V

Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

Text book

“Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

QUANTITATIVE ANALYSIS-II

(Common for CE, EEE, ECE, CSE, IT)

Course: B.Tech.

Semester: IV

L T P C

2 0 0 0

Course code: 20EE4HS10

Course Objectives: The students learn

- To improve the Logical Ability and Reasoning skills among the students to meet the expectations of Industry.
- To counsel the students to improve their career exposure across the Industry
- To improve the Data Sequences & Calendars problems.
- To enhance Non-Verbal Reasoning among the students as per the industry requirements
- To improve the graphical representation skills among the students.

Course Outcomes: The Students able

- To understand and practice logical reasoning
- To understand and practice the different classifications
- To understand and practice different Sitting Arrangements, Data Sequences.
- To understand and practice the Non-Verbal Reasoning.
- To understand and practice the graphs.

Unit-I

Coding Decoding, Directions, Blood Relations & Alphabet Test.

Unit-II

Statements & Arguments, Analogy Classification & Clocks.

Unit-III

Sitting Arrangements, Data Sequences & Calendars and Syllogism.

Unit-IV

Puzzle Test, Non-Verbal Reasoning, Cubs & Dice.

Unit-V

Tabulation, Bar Graphs, Pie Charts and Line Graphs.

TEXT BOOKS

- 1 R.S. Aggarwal, A Modern Approach to Logical Reasoning.
- 2 R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning.

REFERENCES

1. R.V.Praveen, Quantitative Aptitude and Reasoning.
2. Praxis groups, Campus Recruitment Complete Reference.
3. BS Sijwalii & Indu Sijwali, A New Approach to Reasoning Verbal, Non-Verbal & Analytical.