SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)
Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510

BACHELOR OF TECHNOLOGY
ELECTRICAL & ELECTRONICS ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)
ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR I, II, III AND IV YEARS
UNDER AUTONOMOUS STATUS FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2016 - 17

B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2016–17)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2017 - 18)

Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2016 (R16) FOR CHOICE BASED CREDIT SYSTEM (CBCS) B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2016-2017)

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institute / College" means an institute / college designated as autonomous institute / college by the UGC, New Delhi and JNTUH Statutes, 2014.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs granted by the University for promoting excellence.
- "Commission" means University Grants Commission (UGC), New Delhi.
- "AICTE" means All India Council for Technical Education.
- "University" means the Jawaharlal Nehru Technological University, Hyderabad.
- "College" means SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY, Hyderabad unless indicated otherwise by the context.
- "Program" means: Bachelor of Technology (B.Tech) degree program
- "Branch" means specialization in a program like B.Tech degree program in Electronics and Communication Engineering, B.Tech degree program in Computer Science and Engineering etc
- "Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, R14MTH1101: Mathematics - I, R14CSE1102 :Data Structures etc.
- T – Tutorial, P – Practical, D – Drawing, L - Theory, C – Credits

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2016 (R16) FOR CHOICE BASED CREDIT SYSTEM (CBCS) B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2016-2017)

1 Courses of study

The following courses of study (Branches) are offered at present by the college for specialization for the B. Tech. Course:

Sl. No.	Branch Code	Branch
1	1	CIVIL ENGINEERING
2	2	ELECTRICAL & ELECTRONICS ENGINEERING
3	3	MECHANICAL ENGINEERING
4	4	ELECTRONICS & COMMUNICATION ENGINEERING
5	5	COMPUTER SCIENCE & ENGINEERING
6	12	INFORMATION TECHNOLOGY

1.1 Eligibility Criteria for Admission

The eligibility criteria for admission into First year of four year B.Tech. degree programmes shall be as mentioned below:

- The candidate shall be an Indian National.
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted
- Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Andhra Pradesh
- Seats in each programme in the Institution are classified into **Category A** and **Category B** as per the Government Orders (G.Os.)

1.1.1 Category – A Seats:

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and State Government G.Os. as per other admission criteria laid down in the G.Os.

1.1.2 Category - B Seats

These seats will be filled by the institute as per the G.Os. Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The Candidates shall be admitted into the Third semester, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET

2. Credits

	Semester	
	Periods / week	**Credits**
Theory	03 / 04	03 / 04
Practical	03	02
Drawing	03 / 04	02 / 03
Mini Project	02	02
Comprehensive Viva Voce	--	02
Seminar	06	02
Main Project	15	09

Table : Compulsory subjects

Sl. No.	Subject Particulars
1	All practical subjects
2	Industry oriented mini project
3	Comprehensive Viva-Voce
4	Seminar
5	Project Work

3. Distribution and Weightage of Marks

i. The performance of a student in each semester shall be evaluated subject –wise with **a maximum of 100 marks for theory and 75 marks for practical subjects.** In addition, an Industry oriented mini- project, Technical Seminar, Comprehensive viva-voce, and Main Project Work shall be evaluated for **50, 50, 100 and 200 marks** respectively.

ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination, Two mid examinations will be conducted in each semester as per the academic calendar. Each mid examination is evaluated for 25 marks. First mid examination should be conducted for 1 – 2 ½ Units of syllabus and the second mid examination shall be conducted for 2 ½ - 5 Units of syllabus. The mid descriptive type

exam paper consists of Section-A and Section-B.

Section-A [compulsory] consists of 5 short answer questions and each carries one mark.

Section-B consists of 6 questions out of which 4 are to be answered and each question carries 5 marks. The time duration of each mid examination is 90 minutes.

Two assignments are to be given to students covering the syllabus of first mid and second Mid examinations and these assignments and Attendance are evaluated for 5 marks each. The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

At the end of the semester Internal Marks Maximum of 30 for the respective subjects are allotted as follows:

a) 25 marks for the average of the two mid term examinations

b) 5 marks of the average of the two assignment marks & Attendance

- **Award of final sessional marks :** Subject-wise attendance, average marks of two assignments and mid-examination marks will be added and rounded of to the next Integer.

iii. For practical subjects there shall be a continuous evaluation during the semester for **25 sectional marks and 50 marks for end examination**. Out of the 25 marks for internal, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and 10 marks for internal examination (two internal practical examinations will be conducted and the average of the two examinations will be taken into account) and 5 marks for laboratory record.

NOTE: A student who is absent for any assignment/Mid term examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/examination and no makeup test/examination shall be conducted.

iv. For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc., the distribution shall be **30 marks for internal evaluation (15 marks for day-to-day work and 15 marks for internal tests (**the average of the two examinations will be taken into account**) and 70 marks for end examination.** There shall be **two internal tests** in a semester. The Internal and End Examination pattern for the above subjects may be different from the other theory subjects.

v. There shall be an **industry-oriented mini-Project**, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. The **mini project shall be evaluated during the IV year II Semester.** The industry oriented mini project shall be submitted in report form and should be presented before a

committee, which shall be evaluated for **50 marks.** The committee consists of Head of the Department, the supervisor of mini project and a senior faculty member of the department and External Examiner.

vi. There shall be a **seminar presentation in IV year II Semester**. For the seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by a Departmental committee consists of the Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for **50 marks**. There shall be **no external examination for seminar.**

vii. There shall be a **Comprehensive Viva-Voce in IV year II semester**. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated **for 100 marks** by the Committee. There will be **no internal assessment for the Comprehensive viva-voce.**

viii. The Project work shall be started by the student in the beginning of the IV year II Semester. Out of a total of **200 marks** for the project work, **50 marks shall be for Internal Evaluation** and **150 marks for the Semester end Examination**. The Semester end Examination (viva-voce) shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The Internal Evaluation shall be on the basis of three seminars conducted during the IV year II semester for 20 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.**

4. Semester End Examination

(a) **Theory Courses**

Each course is evaluated for 70 marks. Examination is of 3 hours duration.

Question paper contains two sections [Section-A and Section-B]

Section-A : This Section Carries **20 marks** [Five short answer questions of four marks each and only one question to be set from any five units] **which is compulsory.**

Section-B: This Section carries 50 marks with 5 questions consisting of two parts each (a) and (b), out of which the student has to answer either (a) or (b), not both. Each question in Part B carries 10 marks.

(b) **Practical Courses**

Each lab course is evaluated for 50 marks. The examination shall be conducted by the laboratory teacher and another senior teacher

concerned with the subject of the same/other department/Industry. The external examiner may be appointed by the Chief Superintendent in consultation with HOD as and when required.

(c) **Supplementary Examinations**

Supplementary examinations will be conducted along with regular semester end examinations. (during even semester regular examinations, supplementary examinations of odd semester and during odd semester regular examinations, supplementary examinations of even semester will be conducted).

5. Attendance Requirements

i. A student shall be eligible to appear for the Semester end examinations if he / she acquires a **minimum of 75% of attendance in aggregate of all the subjects** for that semester.

ii. Condonation of shortage of attendance in aggregate **up to 10% (65% and above and below 75%)** in a semester may be granted by **Institute Academic Committee,**

iii. A student will not be permitted to write the end examination and hence not promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek re- admission for that semester when offered next. The student seeking re-admission for a semester will automatically forfeit all/any internal marks that he obtained in all the subjects of the present semester, as applicable.

iv Shortage of Attendance **below 65% in aggregate** shall in **NO case be condoned.**

v. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that semester.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance.

6. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.**5.**

i.. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project, if he secures **not less than 35% (25 out of 70 marks)** of **marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.**

ii. **Promotion Rules:**

Credits required for B.Tech. students to get Promotion from I to II year:

- A student will not be promoted from I year to II year unless he fulfills the academic requirement of 24 credits out of 48 credits of I year from all the examinations and secures prescribed minimum attendance.

Credits required for B.Tech. students to get Promotion from II to III year:

- A student will not be promoted from II year to III year unless he fulfills the academic requirement of 43 credits out of 72 credits up to II year I semester from all the relevant regular and supplementary examinations, whether he takes those examinations or not, and secures prescribed minimum attendance.

Credits required for B.Tech. students to get Promotion from III to IV year:

- A student will not be promoted from III year to IV year unless he fulfills the academic requirement of 72 credits out of 120 credits up to III year I semester from all the relevant regular and supplementary examinations, whether he takes those examinations or not, and secures prescribed minimum attendance.
- A student shall register and put up minimum attendance in all 192 credits and earn 192 credits. Grades obtained in the best 184 credits shall be considered for the calculation of CGPA.

7 Detained / Re-admitted Candidate

i. A detained student can seek re-admission into a semester by giving a written application and enclosing the memorandum of marks of all exams he/she has appeared till that date.
ii. Re-admission has to be effected within four weeks of the commencement of the semester. No application for re-admission will be accepted thereafter.
iii. A comprehensive list of all detained candidates is to be maintained in the Examination Branch of the College. The cases of detained candidates have to be examined by a committee of all Heads of Departments to ascertain whether a candidate when readmitted has to undergo any new subject (Substitute Subject) in view of change of course structure. The necessary decisions have to be maintained in the Examination Branch well in advance of the commencement of classes so that the candidate can be informed as and when he or she seeks re-admission.

8. Course pattern

i. The entire course of study is of four academic years. **All the I, II, III & IV years are of semester pattern .**
ii. A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may reappear for that subject at the supplementary examination whenever conducted.
iii. When a student is detained due to shortage of attendance in any semester, he/she may be re-admitted into that semester when it is offered next, **with the academic regulations of the batch into which he gets readmitted.**
iv. When a student is detained due to lack of credits in any year, he/she may be eligible to be promoted or for promotion into the next year after fulfillment of the academic requirements, **with the academic regulations of the batch into which he gets admitted**

9. Examinations and Assessment - The Grading System

For the award of grades in a course, all evaluation is done in marks as per the scheme of examination. **Marks so obtained are converted to grades at the end of semester as per the guidelines given below using Absolute Grading System.**

Award of Grade Using Absolute GRADING SYSTEM

Grade	GP	Marks
O (Out Standing)	10	≥ 90 - ≤ 100
A+	9	≥ 80 - < 90
A	8	≥ 70 - < 80
B+	7	≥ 60 - < 70
B	6	≥ 50 - < 60
C	5	≥ 45 - < 50
P	4	≥ 40 - < 45
F	0	< 40 - Fail
(Ab)	0	Absent

Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called **SGPA.** The **SGPA** is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \sum C_i P_i / \sum C_i$$

where,

C_i = The number of credits for the i^{th} course of a semester for which SGPA is to be calculated.

P_i = Grade points earned in the i^{th} course.

i_i = 1,2,……., n represent the number of courses in which a student has registered in the concerned semester the SGPA is calculated to two decimal places.

Cumulative Grade Point Average (CGPA)

An up to date assessment of the overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the student since he entered the institution.

$$CGPA = \sum C_j P_j / \sum C_j$$

where,

C_j = The number of credits for the j^{th} course up to the semester for which CGPA is to be calculated.

P_j = Grade points earned in the j^{th} course.

i_j = 1,2,……., n represent the number of courses in which a student has registered up to the semester for which the CGPA is to be calculated.

The CGPA is also calculated to two decimal places.

Note:

- As seen from above formula CGPA is **not average** of SGPA

10. Award of B.Tech. Degree and Class

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

i. Pursued **a course of study for not less than four academic years and not more than eight academic years.**
ii. Registered for **192 credits** and secured **192 credits.**

NOTE:

1. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course.

2. After securing the necessary 192 Credits as specified for the successful completion of the entire UGP, an exemption of 8 secured Credits (in terms of two of their corresponding Subjects/Courses) may be permitted for optional drop out from these 192 Credits earned; resulting in 184 Credits for UGP performance evaluation, i.e., the performance of the Student in these 184 Credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of UGP, which takes the SGPA of the IV Year II Semester into account)', and shall be indicated in the Grade Card of IV Year II Semester; however, the Student's Performances in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. Further, optional drop out for such 8 secured Credits shall not be allowed for Subjects/ Courses listed as … i) Laboratories/ Practicals, Industrial Training/ Mini-Project, iii) Seminar, iv) Major Project.

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

Class Awarded	CGPA to be secured
First Class with Distinction	≥ 7.75
First Class	6.75 ≤ CGPA < 7.75
Second Class	5.75 ≤ CGPA < 6.75
Pass Class	5.0 ≤ CGPA < 5.75

11. Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed to go into the next higher Semester. The award or issue of the Degree may also be withheld in such cases.

12. Transitory Regulations

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the Institute Academic Committee.

13. Minimum Instruction Days

The minimum instruction days for each semester shall be **90 clear instruction days.**

14. There shall be **no branch transfers** after the completion of admission process.

15. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules concerned in view.

16. TERMINATION FROM THE PROGRAMME

The admission of a student to the program may be terminated and the student is asked to leave the college in the following circumstances:

i. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

17. CURRICULUM

i. For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.

ii. The BOS for a program is completely responsible for designing the curriculum once in three years for that program.

18. GRIEVANCES REDRESSAL COMMITTEE

"Grievances and Redressal Committee" (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

Headed by Senior Faculty member
Heads of all departments
A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

19. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who does malpractice / behaves indiscipline in examinations. The committee shall consist of:

Principal.
Subject expert of which the subject belongs to.
Head of the department of which the student belongs to.
The invigilator concerned.
In-charge Examination branch of the college.

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the JNTUH/SICET from time to time.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

20. STUDENT'S FEEDBACK

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

21 CONDUCT AND DISCIPLINE

i. Each student shall conduct himself / herself in a manner befitting his / her association with SICET.

ii. He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.

iii. He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.

iv. Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), willful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.

v. **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**

vi. Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.

vii. Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.

viii. A student may be denied the award of degree / certificate even though he / she has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.

ix. Attendance is not given to the student during the suspension period.

22. OTHER ISSUES

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

a) Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.

b) Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and student's motivation are available.

c) Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.

d) Access to good library resources and Information & Communication Technology **(ICT)** facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

a) Teaching-learning process on modern lines, to provide *Add-On* Courses for *audit*/credit in a number of peripheral areas useful for student's self development.

b) Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.

c) Generous use of ICT and other modern technologies in everyday activities.

23. General

i. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

iv. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.

v. The College may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with effect from the dates notified by the College.

24. Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Applicable for students admitted from the academic year 2017-2018)

i. A student shall register for all 144 credits and earn all the 136 credits. Marks obtained in all 136 credits shall be considered for the calculation of the class.

ii. A student who fails to earn 144 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

iii. The same attendance regulations are adopted as that of B.Tech. Four year degree course.

iv. **Credits required for B.Tech. students to get Promotion from II to III year:**

- A student will not be promoted from II year to III year unless he fulfills the academic requirement of 24 credits out of 48 credits of II year from all the examinations and secures prescribed minimum attendance.

Credits required for B.Tech. students to get Promotion from III to IV year:

- A student will not be promoted from III year to IV year unless he fulfills the academic requirement of 43 credits out of 72 credits up to III year I semester from all the relevant regular and supplementary examinations, whether he takes those examinations or not, and secures prescribed minimum attendance.

- A student shall register and put up minimum attendance in all 144 credits and earn 144 credits. Grades obtained in the best 136 credits shall be considered for the calculation of CGPA.

v. **Award of B.Tech. Degree and Class:**

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

i. Pursued **a course of study for not less than four academic years and not more than six academic years.**

ii. Registered for **144 credits** and secured **144 credits.**

NOTE:

1. Students, who fail to fulfill all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Tech. course.

2. After securing the necessary 144 Credits as specified for the successful completion of the entire UGP, an exemption of 8 secured Credits (in terms of two of their corresponding Subjects/Courses) may be permitted for optional drop out from these 144 Credits earned; resulting in 136 Credits for UGP performance evaluation, i.e., the performance of the Student in these 136 Credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of UGP, which takes the SGPA of the IV Year II Semester into

account)' , and shall be indicated in the Grade Card of IV Year II Semester; however, the Student's Performances in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. Further, optional drop out for such 8 secured Credits shall not be allowed for Subjects/ Courses listed as … i) Laboratories/ Practicals, Industrial Training/ Mini-Project, iii) Seminar, iv) Major Project.

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

Class Awarded	CGPA to be secured
First Class with Distinction	≥ 7.75
First Class	6.75 ≤ CGPA < 7.75
Second Class	5.75 ≤ CGPA < 6.75
Pass Class	5.0 ≤ CGPA < 5.75

vi. All other regulations as applicable to B.Tech. four year degree course will hold good for B.Tech. (Lateral Entry Scheme).

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which 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/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from 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 practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is 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/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate 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/Asst. – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or 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.	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/year. 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 is registered against them.
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/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess 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/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges 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/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case 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/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Note : Students are advised to read the above regulations thoroughly. Ignorance with regards to the regulations cannot be construed as an excuse.

Frequently asked Questions and Answers about autonomy

1. **Who grants Autonomy? UGC, Govt., AICTE or University**

   In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. **Shall SICET award its own Degrees?**

   No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY on the Degree Certificate.

3. **What is the difference between a Deemed University and an Autonomy College?**

   A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. **How will the Foreign Universities or other stake – holders know that we are an Autonomous College?**

   Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.

5. **What is the change of Status for Students and Teachers if we become Autonomous?**

   An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.

6. **Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?**

   There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non – Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. **Will the students of SICET as an Autonomous College qualify for University Medals and Prizes for academic excellence?**

   No, SICET has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.

8. **Can SICET have its own Convocation?**

   No, since the University awards the Degree the Convocation will be that of the University.

9. Can SICET give a provisional degree certificate?

Since the examinations are conducted by SICET and the results are also declared by SICET, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10. Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11. What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 30% for internal assessment and 70% for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12. Will there be any Revaluation or Re-Examination System?

No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.

13. How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

14. Will the Degree be awarded on the basis of only final year performance?

No. The percentage of marks will reflect the average performance of all the semesters put together.

15. Who takes Decisions on Academic matters?

The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.

16. What is the role of Examination committee?

The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.

17. Is there any mechanism for Grievance Redressal?

Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.

18. How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulations.

19. Who declares the result?

The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.

20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?

We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.

21. Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

22. Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes are also enjoying autonomous status.

23. How many exams will be there as an autonomous college?

This is defined in the Rules & Regulations.

24 Is the College adapting Choice Based Credit System (CBCS) or Not ?
Yes, this College has adapted CBCS system with effect from the Academic Year 2016-17.

25. Note : What is Choice Based Credit System (CBCS)?

Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

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SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(an Autonomous Institution under JNTUH)

Choice Based Credit System (CBCS)

REGULATIONS – R16

Common to All Circuit Branches of B.Tech.
(ECE, ETM, CSE, IT, EEE)

I YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16HAS1101	English	4	0	4
R16MTH1101	Mathematics -1	4	0	4
R16EPH1101	Engineering Physics -1	3	1	3
R16CSE1101	Computer Programming	4	0	4
R16MED1144	Engineering Drawing	3	1	3
R16HAS1201	English Language & Communication Skills Lab	0	3	2
R16CSE1201	Computer Programming Lab	0	3	2
R16MED1201	Workshop practice	0	3	2
TOTAL		**18**	**11**	**24**

I YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16MTH1102	Mathematics –II	4	0	4
R16MTH1103	Numerical Methods	4	0	4
R16EPH1102	Engineering Physics -II	3	1	3
R16CSE1102	Data Structures Through ‘C’	3	1	3
R16ECH1101	Engineering Chemistry	3	1	4
R16CSE1202	Data Structures Through ‘C’ Lab	0	3	2
R16ECH1201	Engineering Chemistry Lab	0	3	2
R16EPH1201	Engineering Physics - II Lab	0	3	2
TOTAL		**17**	**12**	**24**

* T/P/D: Tutorial/Practical/Drawing Practice

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)

REGULATIONS – R16

B. Tech. ELECTRICAL & ELECTRONICS ENGINEERING

II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16MTH1104	Mathematics – III	3	1	3
R16MED1137	Fluid Mechanics and Hydraulic Machinery	3	1	3
R16ECE1102	Electronic Devices & Circuits	4	0	4
R16EEE1101	Electrical Circuits	3	1	3
R16EEE1102	Electro Magnetic fields	3	1	3
R16EEE1103	Electrical Machines – I	4	0	4
R16MED1204	Fluid Mechanics and Hydraulic Machinery Lab	0	3	2
R16ECE1201	Electronic Devices & Circuit Labs	0	3	2
TOTAL		**20**	**10**	**24**

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16HAS1103	Managerial Economics & Financial Analysis	3	1	3
R16EEE1104	Power Systems – I	3	1	3
R16ECE1135	Electronic Circuits	3	1	3
R16ECE1106	Switching Theory and Logic Design	3	1	3
R16EEE1105	Network Theory	4	0	4
R16EEE1106	Electrical Machines – II	4	0	4
R16EEE1201	Electrical Machines Lab – I	0	3	2
R16EEE1202	Electrical Circuits and Simulation Lab	0	3	2
TOTAL		**20**	**10**	**24**

* T/P/D: Tutorial/Practical/Drawing Practice

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Choice Based Credit System (CBCS)

REGULATIONS – R16

B. Tech. ELECTRICAL & ELECTRONICS ENGINEERING

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16ECE1117	IC Applications	4	0	4
R16HAS1104	Management Science	3	1	3
R16EEE1107	Power Systems – II	3	1	3
R16EEE1108	Control Systems	3	1	3
R16EEE1109	Power Electronics	3	1	3
R16EEE1110	Electrical Machines – III	4	0	4
R16EEE1203	Electrical Machines Lab - II	0	3	2
R16EEE1204	Control Systems and Simulation Lab	0	3	2
TOTAL		**20**	**10**	**24**

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16EEE1111	Electrical and Electronics Instrumentation	3	1	3
R16EEE1112	Static Drives	3	1	3
R16EEE1113	Computer Methods in Power Systems	3	1	3
R16ECE1118	Microprocessors and Interfacing Devices	4	0	4
R16HAS1102	Environmental Studies	3	1	3
R16CIV1132 R16CIV1123 R16HAS1105	**Open Elective** Disaster Management Intellectual Property Rights Human Values and Professional Ethics	4	0	4
R16HAS1202	Advanced English Language Communication Skills Lab	0	3	2
R16EEE1205	Power Electronics and Simulation Lab	0	3	2
TOTAL		**20**	**10**	**24**

* T/P/D: Tutorial/Practical/Drawing Practice

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Choice Based Credit System (CBCS)

REGULATIONS – R16

B. Tech. ELECTRICAL & ELECTRONICS ENGINEERING

IV YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16EEE1115	Switchgear and Protection	3	1	3
R16EEE1116	Utilization of Electrical Energy	3	1	3
R16ECE1114	Digital Signal Processing	4	0	4
R16EEE1118	Power System Operation and Control	3	1	3
R16EEE1119 R16ECE1115 R16EEE1120	**Elective - I** High Voltage Engineering VLSI Design Digital Control Systems	4	0	4
R16EEE1121 R16EEE1122 R16EEE1123	**Elective – II** Optimization Techniques Electrical Distribution Systems Electrical Estimation and Costing	3	1	3
R16ECE1215	Microprocessors and Interfacing Devices Lab	0	3	2
R16EEE1206	Electrical Measurements Lab	0	3	2
TOTAL		**20**	**10**	**24**

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R16EEE1125	Fundamentals of HVDC and FACTS Devices	3	1	3
R16CSE1144 R16EEE1124 R16EEE1126	**Elective – III** Neural Networks and Fuzzy Logic Renewable Energy Sources Principles of Reliability Engineering	3	1	3
R16EEE1117 R16EEE1127 R16ECE1129	**Elective - IV** Advanced Control Systems EHV AC Transmission Introduction to Nanotechnology	3	1	3
R16EEE1207	Industrial Oriented Mini Project	0	0	2
R16EEE1208	Seminar	0	6	2
R16EEE1209	Major Project	0	15	9
R16EEE1210	Comprehensive Viva	0	0	2
TOTAL		**9**	**24**	**24**

* T/P/D: Tutorial/Practical/Drawing Practice

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(COMMON TO ALL BRANCHES)

B.Tech. - I Year – I Semester	**for Circuit Branches**	**L**	**T/P/D**	**C**
B.Tech. - I Year – II Semester	**for Non-Circuit Branches**	**4**	**0**	**4**

(R16HAS1101) - ENGLISH

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

OBJECTIVES

To improve the language proficiency of the students in English with emphasis on LSRW skills.

To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.

To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES

1. Usage of English Language, written and spoken
2. Enrichment of comprehension and fluency
3. Gaining confidence in using language in verbal situations

SYLLABUS

I. Listening Skills

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the skills based approach to language learning
2. To train students in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

II. Speaking Skills

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: ***Skills Annexe - Functional English for Success)***
- Just A Minute(JAM) Sessions

III. Reading Skills

Objectives

1. To raise awareness in the students about the significance of silent reading and comprehension
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Scanning
- Recognizing coherence/sequencing of sentences

NOTE : *The students will be trained in reading skills using the prescribed text for detailed study*

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles

IV. Writing Skills

Objectives

1. To raise awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Five Units**, are prescribed:

For Detailed study: **First Textbook:** ***"Skills Annexe -Functional English for Success***", Published by Orient Black Swan, Hyderabad

For Non-detailed study

1. **Second text book** ***"Epitome of Wisdom",*** Published by Maruthi Publications, Guntur

The course content and study material is divided into **Five Units.**

Unit –I

1. Chapter entitled '***Wit and Humour****'* from '**Skills Annexe' -Functional English for Success**, Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'*Mokshagundam Visvesvaraya'*** from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad

L-Listening For Sounds, Stress and Intonation
S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
R- Reading for Subject/ Theme
W- Writing Paragraphs
G-Types of Nouns and Pronouns
V- Homonyms, homophones, synonyms and antonyms

Unit –II

1. Chapter entitled "***Cyber Age"*** from "***Skills Annexe -Functional English for Success***" Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'*Three Days To See'*** from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad

L – Listening for themes and facts
S – Apologizing, interrupting, requesting and making polite conversation
R- for theme and gist
W- Describing people, places, objects and events
G- Verb forms
V- noun, verb, adjective and adverb

Unit –III

1. Chapter entitled **'*Risk Management'*** from **"*Skills Annexe -Functional English for Success*"** Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'*Leela's Friend'*** by R.K. Narayan from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad

L – for main points and sub-points for note taking
S – giving instructions and directions; Speaking of hypothetical situations
R – reading for details
W – note-making, information transfer, punctuation
G – present tense
V – synonyms and antonyms

Unit –IV

1. Chapter entitled '***Human Values and Professional Ethics'*** from "***Skills Annexe -Functional English for Success"*** Published by Orient Black Swan, Hyderabad
2. Chapter entitled ***'The Last Leaf'*** from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad

L -Listening for specific details and information

S- narrating, expressing opinions and telephone interactions

R -Reading for specific details and information

W- Writing formal letters and CVs

G- Past and future tenses

V- Vocabulary - idioms and Phrasal verbs

Unit –V

1. Chapter entitled '***Sports and Health'*** from ***"Skills Annexe -Functional English for Success***" Published by Orient Black Swan, Hyderabad

2. Chapter entitled ***'The Convocation Speech'*** by N.R. Narayanmurthy' from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad

L- Critical Listening and Listening for speaker's tone/ attitude

S- Group discussion and Making presentations

R- Critical reading, reading for reference

W-Project proposals; Technical reports, Project Reports and Research Papers

G- Adjectives, prepositions and concord

V- Collocations and Technical vocabulary Using words appropriately

* Exercises from the texts not prescribed shall also be used for classroom tasks.

REFERENCES

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao**,** P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

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B.Tech. - I Year – I Semester

L	T/P/D	C
4	0	4

(R16MTH1101) Mathematics - I

UNIT - I **Solution for linear systems**

Matrices and Linear systems of equations: Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- LU Decomposition-LU Decomposition from Gauss Elimination –Solution of Tridiagonal Systems-Solution of Linear Systems Eigen values, Eigen vectors – properties – Condition number of rank, Cayley-Hamilton Theorem (without
Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix. Calculation of powers of matrix – Modal and spectral matrices.

UNIT – II **Linear Transformations**

Real matrices – Symmetric, skew - symmetric, orthogonal matrices, Linear Transformation – Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary Matrices – Eigen values and Eigen vectors of complex matrices and their properties.
Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - Index - signature - Sylvester law, Singular value decomposition.

UNIT – III Basic definitions of Sequences and series – Convergences and divergence – Ratio test – Comparison test– Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence - Functions of Single Variable- Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's Mean value Theorem – Generalized Mean Value theorem (all theorems without proof)

UNIT – IV **Application of Single variables:** Radius, Centre and Circle of Curvature – Evolutes and Envelopes. Tracing of curves in Cartesian and polar coordinates

Functions of several variables

Limits and continuity of functions of two variables- partial differentiation - total differential coefficient and chain rule - Jacobian- Functional dependence - Maxima and Minima of functions of two variables with constraints and without constraints-Lagrange's method of multipliers.

UNIT – V Multiple integrals - double and triple integrals-scalar and vector fields- Gradient-Divergence- Curl and their related properties, Potential function - Laplacian and second order operators. Line integral – work done – Surface integrals - Flux of a vector valued function. Vector integrals theorems: Green's -Stoke's and Gauss's Divergence Theorems (Statement & their Verification).

Text Books:

1. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.
2. Mathematical Methods by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.

References:

1. Engineering Mathematics-I , Shahnaz Bathul, PHI learning.
2. Mathematical Methods by Shahnaz Bathul, PHI learning.

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B.Tech. - I Year – I Semester

L	T/P/D	C
3	1	3

(R16EPH1101) Engineering Physics – I

UNIT – I

1. **Interference:** Superposition of waves, Young's double slit experiment, coherence, Newton's rings.
2. **Diffraction:** Fresnel and Fraunhofer diffractions, Fraunhofer diffraction at single slit and double slit, diffraction grating, Double refraction and Nicol prism.

UNIT - II

1. Ionic Bond, Covalent Bond, Metallic Bond, Hydrogen Bond, Vander Waals Bond, Calculation of Cohesive Energy of Diatonic Molecule

2.**Crystallography and Crystal Structures:** Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Diamond Structures, Structures of NaCl, ZnS, CsCl.

Unit III

1.**X-ray Diffraction:** Basic Principles, Bragg s Law, Laue Method, Powder Method, Applications of X-ray Diffraction.

2.**Defects in Crystals:** Point Defects: Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects; Estimation of Vacancies in Frenkel and Schottky Defects Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger s Vector, Surface Defects and Volume Defects.

Unit IV

1.**Principles of Quantum Mechanics:** Waves and Particles, de Broglie Hypothesis , Matter Waves, Davisson and Germers Experiment, G. P. Thomson Experiment, Heisenbergs Uncertainty Principle - Physical Significance of the Wave Function - Schrodinger s Time Independent Wave Equation - -Particle in One Dimensional Potential Box extension to Three Dimensions.

2.Elements of Statistical Mechanics: Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac Statistics (Qualitative Treatment), Photon Gas, Black Body Radiation, Plank's Law.

Unit V

1.Free Electron Theory of Metals: Classical free electron theory(Drude and Lorentz), Quantum Theory, Concept of Electron Gas, Fermi Energy, Density of Electrons state, Electrical conductivity of metals, relaxation time, collision time, mean free path

2. Band Theory of Solids: Electron in a periodic Potential, Bloch Theorem, Kronig-Penny Model (Quantitative Treatment), Origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators, Concept of Effective Mass of an Electron and Hole.

TEXT BOOKS

1. Applied Physics P.K.Palanisamy (SciTech Publications (India) Pvt. Ltd.
2. Applied Physics T. Bhima Shankaram & G. Prasad (B.S. Publications)
3. Engineering Physics P.K.Palanisamy (SciTech Publications (India) Pvt. Ltd.

REFERENCES

1. Applied Physics Mani Naidu Pearson Education
2. Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand & Co. Ltd
3. Introduction to Solid State Physics C. Kittel (Wiley Eastern).
4. Engineering Physics by T. Srikanth, K. Vijaya Kumar, S. Chandra Lingam, S. Chand & Co.Ltd.

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B.Tech. - I Year – I Semester

L	T/P/D	C
4	0	4

(R16CSE1101) Computer Programming

UNIT - I ***Introduction to Computers*** – Computer Systems - Computing Environments - Computer Languages –DOS/Linux Commands - System Development – SDLC - Creating and Running Programs;

Problem Solving Techniques – Flow Charts – Algorithms – Pseudo Code – Simple Illustrations - Domain Problems;

UNIT – II ***C Fundamentals*** – History of C Languages- Features of C- Structure of C- Reserved Words- Types - Identifiers – Constants - and Character set.;

Data Types – Basic Data Types- Derived Data Types- User Defined Data Types;

Basic Input Output- printf and scanf Functions- Format and Control Characters- Escape Sequences;

Expressions: Infix - Prefix – Postfix - Unary - Binary - Ternary;

Operators – Unary - Arithmetic- Relational- Logical – Bitwise - Assignment and Special Operators- Precedence and Associativity of Operators;

Statements – Syntax- Types of Statements- Evaluating Expressions- Type Conversions;

Branching – Conditional Branching - If - If-else – Nested If and Nested if else - Switch-Case - Control Structures (Loops) – While - Do-while - For - Dangling in Programming - Unconditional Branching - Break- Continue - Goto;

UNIT – III ***Arrays*** – Using Arrays in C – Two Dimensional Arrays- Multi-dimensional Arrays;

Pointers – Pointer Variable – Declaration – Definition – Initialization - Pointer to Pointers - Memory Mapping- Pointer Arithmetic- Arrays of Pointers – Dynamic Memory Allocation;

Strings – Basic Concepts on Strings - String Input/Output - Arrays of Strings - String Manipulation Functions;

UNIT – IV ***Functions*** – Function Definition- Function Declaration –Function Call – Parameters - Formal & Actual Parameters - Return Value - Scope of Parameters. Parameter Passing: Call by Value and Call by Reference - Passing Arrays as Function Arguments;

Recursion: Definition- Design – Limitations - Advantages and Disadvantages;

Macros – Pre-Processor Directives- Macro Creation- Conditional Compilation;

UNIT – V ***Enumerated, Structure and Union Types*** – Declaration – Initialization – Operations – Programming Applications - Nested Structures- Self Referential Structures- Structures as Function Arguments and Return Value - Differences Between Structures and Unions;

Files-Types of Files **-** File Pointer - File Opening Modes- Creating Files - Writing- Reading- Appending- Editing- Copying & Merge – Standard Library Functions - Random Accessing - Command Line Arguments - Error Handling;

Text Books:

1. "Computer Science- A Structured Programming Approach Using C" by B.A. Forouzan and R.F.Gilberg- Third Edition- Thomson.
2. "The C programming Language" by B.W.Kernighan- Dennis M.Ritchie- PHI Pearson Education.

References:

1. "Working with C" by Yashavant. P Kanetkar
2. "C how to program" by Paul Deitel and Havey Deitel- PHI
3. "Absolute beginner's guide to C"- Greg M. Perry- Second Edition- Sams Pub

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B.Tech. - I Year – I Semester

L	T/P/D	C
3	1	3

(R16MED1144) Engineering Drawing

UNIT - I INTRODUCTION TO ENGINEERING DRAWING:

Week 1- Principles of Engineering Graphics and their Significance, Lettering and BIS Conventions

Week 2 : Conic Sections including the Rectangular Hyperbola – General method only.

Week 3 : Cycloid, Epicycloids and Hypocycloid, Involute.

Week 4 : Scales-Plain, Diagonal and Vernier Scales.

UNIT – II ORTHOGRAPHIC PROJECTION:

Week 5 : Principles of orthographic projections–conventions – projections of points and Projections of lines inclined to one planes and Inclined to both the planes – True length of the line and True angle of the line and traces of a line.

Week 6: Projections of planes : Regular geometric figures parallel, Perpendicular and inclined to one reference plane – Plane inclined to the both the reference planes.

UNIT – III Projections of Solids

Week 7 : Projections of regular solids, Cube, Prisms, Pyramids, Tetrahedron, Cylinder and cone and axis inclined to both the reference planes.

UNIT – IV Sectional Views of Simple Solids

Week 8 : Sections or sectional views of right regular solids-Prism, cylinder, Pyramid, Cone.

Week 9 : Development of surfaces of right regular solids – Prism, Cylinder, Pyramid and Cone.

UNIT – V ISOMETRIC PROJECTIONS:

Week 10 : Principles of Isometric Projection – Isometric Scale – Isometric Views - Conventions – Isometric views of Lines, Plane Figures, Simple solids

Week 11 : Conversion of Isometric views to Orthographic views and vice – versa Conversions.

Week 12 : Basics of the perspective views including one point, two point, three point, zero point, infinite perspective and aerial perspective method. Drawings by visual ray method and vanishing point method. Introduction of AUTOCAD and Basic commands of AUTOCAD.

Text Books:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/Peason Edu.

References:

1. A text book of Engineering Drawing / Dhwan R K / S. Chand
2. Engineering Graphics with Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai
4. Text book of Engineering Drawing / K L Narayana / P Kannaih / Scitech

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(COMMON TO ALL BRANCHES)

B.Tech. - I Year – I Semester	**for Circuit Branches**	**L**	**T/P/D**	**C**
B.Tech. - I Year – II Semester	**for Non-Circuit Branches**	**0**	**3**	**2**

(R16HAS1201) ENGLISH LANGUAGE & COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives

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

Syllabus: English Language Communication Skills Lab shall have two parts:

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

The following course content is prescribed for the **English Language Communication Skills Lab**

Exercise – I

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session
Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise – II

CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise - III

CALL Lab: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV

CALL Lab: Intonation and Common errors in Pronunciation.
ICS Lab: Extempore- Public Speaking
Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V

CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume preparation.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**
   The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
ii) Headphones of High quality

2. **Interactive Communication Skills (ICS) Lab :**
   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation
2. *Speaking English Effectively* 2nd 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
7. Marks, J. 2009. *English Pronunciation in Use. Elementary.* Cambridge: CUP
8. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation
9. Soundararaj, Francis. 2012. *Basics of Communication in English. New Delhi: Macmillan*
10. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
11. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
12. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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(R16CSE1201) Computer Programming Lab

Objectives:

- To learn/strengthen a programming language like C- To learn problem solving techniques Recommended Systems/Software Requirements:
- Intel based desktop PC- ANSI C Compiler with Supporting Editors- IDE's such as Turbo C- Bloodshed C-
- Linux with gcc compiler(GNU Compiler collection)

Week – 1 (basic programming- if- if-else- switch)

a) Solving problems such as temperature conversion- student grading- income tax calculation- etc.- which expose students to use basic C operators.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program- which takes two integer operands and one operator form the user- performs the operation and then prints the result. (Consider the operators +, - ,*, /, % and use Switch Statement)

Week – 2 (while- do looping)

a) Write a C program to find the sum of individual digits of a positive integer.
b) Write a C program to generate all the prime numbers between 1 and n- where n is a value supplied by the user.
c) Write a program which checks a given integer is Fibonacci number or not.

Week – 3 (while- do looping)

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
b) 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.
c) Write a C function to read in two numbers- x and n- and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$
d) Write a C function to read in two numbers- x and n(no. of terms)- and then compute sin(x) and cos(x).

Week - 4 (For looping)

a) Write a C program to generate Pascal's triangle.
b) Write a C program to construct a pyramid of numbers.
c) Write a C program to calculate the following Sum:
Sum=$1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
d) The total distance travelled by vehicle in 't' seconds is given by distance = $ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

Week – 5 (Arrays)

a) Write a C program to find both the largest and smallest number of an array of integers.
b) Write a C program to find Addition of Two Matrices
c) Write a C program for Calculating transpose of a matrix in-place manner.
d) Write a C program to find Matrix multiplication by checking compatibility

Week – 6 (Strings)

a) Simple programming examples to manipulate strings.
b) Verifying a string for its palindrome property
c) Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string in to given main string from a given position.
   ii. To delete n Characters from a given position in a given string.
   iii. To replace a character of string either from beginning or ending or at a specified location

Week – 7 (Pointers)

a. Simple program to understand pointer concept
b. Program which explains the use of dynamic arrays.
c. Program to enlighten dangling memory problem (Creating a 2-D array dynamically using pointer to pointers approach.

Week – 8 (Structures)

a) Examples which explores the use of structures- union and other user defined variables
b) Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number ii) Writing a complex number
iii) Addition of two complex numbers iv) Multiplication of two complex numbers

Week – 9 (Functions)

a) Write a C function to generate Pascal's triangle.
b) Write a C function to construct a pyramid of numbers.
c) Write a C functions to find both the largest and smallest number of an array of integers.
d) Write a Pointer based function to exchange value of two integers using passing by address.

Week - 10 (Recursive Functions)

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.
ii) To find the GCD (Greatest Common Divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

Week – 11 (Files)

a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line)

Week – 12 (Command Line arguments and macros)

a) Copy source file contents into destination file by command line arguments
b) Write a program to implement conditional compilation

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(R16MED1201) WORKSHOP PRACTICE

Part – A (IT Workshop)

Week - 1 ***Introduction to Computers***: Identify the Peripherals of Computer - Components in CPU Assembling and Disassembling - Hardware trouble shooting;

Week - 2 ***Software Installation***: Introduction to Operating System- Installation of DOS- Windows and Unix/Linux Installation - Configuring and Trouble Shooting;

Week - 3 ***Drivers and Utilities***: Threats- Virus- Worms - anti, Virus- Firewall and Device Driver's Configuration;
Office Automation: Introduction- Need of Automation- Windowing- Toolbars- Menu Application;

Week - 4 ***Word Processing***: Formatting Styles - Applying Text Effects - Paragraphs- Borders- Backgrounds - Header and Footer - Tables – Images - Hyper linking – Mail Merge;

Week - 5 ***Spreadsheets:*** Creating Tabulated Information - Overview of Toolbars - Formatting Cells - Creation of Graphs and Charts - Learning Functions and Formulas;

Week - 6 ***Presentations:*** Orientation and Layouts of Presentation - Types of Views - Inserting Styles - Design and Custom Animation - Setup and Slide Show;

Week - 7 ***Browsing***: Introduction to Internet- LAN- Connecting Computers through LAN- Accessing Computers through LAN - Access to Websites and Emails - Search Engines like Google and MSN.

REFERENCES:

1) "Building a Dream PC" by Will Smith- Que Publications.
2) "Upgrading and Repairing PCs" 12th Edition- Scott Mueller- Que Publications
3) "Repairing and Upgrading your PC" by Robert Bruce Thompson; Barbara Fritchman Thompson- O'Rei
4) "Microsoft Office for the Older and Wiser: Get Up and Running with Office 2010 and Off 2007" by Sean McManus.
5) "The Essential Guide to Computing: The Story of Information Technology (Essential Gu Series)" by E. Garrison Walters-

Part – B (Engineering Workshop)

Trades for Exercises : At least two exercises from each trade

Week - 1 Carpentry
Week - 2 Fitting
Week - 3 Tin-smithy and Black-Smithy
Week - 4 House Wiring
Week - 5 Foundry
Week - 6 Welding
Week - 7 Plumbing & Machine Shop

Text Books :

1. Work shop Manual – P. Kannaiah / K.L. Narayana, Scitech Publishers
2. Work shop Manual by Venkatreddy
3. Work shop practice by Hazra Chowdary

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(R16MTH1102) Mathematics - II

UNIT - I **Differential equations of first order and their applications**

Overview of differential equations- exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories and geometrical applications

UNIT – II **Higher Order Linear differential equations and their applications**

Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X)= e^{ax} , Sin ax, Cos ax, and x^n, e^{ax} V(x), x^n V(x), method of variation of parameters. Applications to bending of beams, Electrical circuits, simple harmonic motion

UNIT – III **Partial differential equations**

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, Solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Method of separation of variables for second order equations -Two dimensional wave equation. Applications of linear partial differential equations-method of separation of variables - Solutions of one dimensional heat equation, wave equation and two dimensional Laplace equation under initial and boundary conditions

UNIT – IV **Fourier Series**

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions. Fourier transforms-Fourier sine and cosine transforms- inverse transforms.

UNIT – V **Laplace transform and its applications to Ordinary differential equations**

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations.

Text Books:

1. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.
2. Mathematical Methods by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.

References:

1. Engineering Mathematics-I , Shahnaz Bathul, PHI learning.
2. Mathematical Methods by Shahnaz Bathul, PHI learning.

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4	0	4

(R16MTH1103) Numerical Methods

UNIT - I **Solution of non- linear Systems**

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method. Existence of solution-Gauss elimination method(with pivoting) - Gauss Jordan method-Ill conditioned systems –Jacobi iterative method -Gauss siedel method-convergence of iterative methods.

UNIT – II **Interpolation:**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols- Difference Equations - Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula. B. Spline interpolation - Cubic spline.

UNIT – III **Curve fitting & Numerical Integration**

Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by the method of least squares. Numerical Differentiation and Integration – General Quadrature formula – Trapezoidal, Simpson's 1/3 and Simpson's 3/8 Rule , Gaussian Integration.

UNIT – IV **Numerical solution of IVP's in ODE**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Modified Euler's Method - Runge-Kutta Methods –Predictor-Corrector Method- Adams-Bashforth Method.

UNIT – V **Boundary value, Eigen value problems and solution of partial differential equations**

Finite difference method and solving Eigen value problems, power method-classification of partial differential equations- Laplace equation by Gauss Seidal & Jacobi Methods, parabolic equations. Solution of heat equation (One dimensional) by Schmith Method.

Text Books:

1. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
2. Advanced Engineering Mathematics by Jain & S.R.K. Iyengar, Narosa Publications.

References:

1. Numerical Methods by Dr. Shahnaz Bathul, PHI Learning Pvt. Ltd.
2. Numerical Methods by T.K.V. Iyengar, B. Krishna Gandhi and others, S Chand

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L	T/P/D	C
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(R16EPH1102) Engineering Physics - II

UNIT– I Semiconductor Physics: Fermi Level in Intrinsic and Extrinsic Semiconductors, Intrinsic Semiconductors and Carrier Concentration, Extrinsic Semiconductors and Carrier Concentration, Equation of Continuity, Direct & Indirect Band Gap Semiconductors, Hall Effect, Formation of PN Junction, PN Diode as a Rectifier (Forward and Reverse Bias).

Unit II Dielectric Properties: Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities -Internal Fields in Solids, Clausius -Mossotti Equation, Piezo-electricity, Pyro-electricity and Ferro- electricity.

Unit III Magnetic Properties: Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro Magnetism on the basis of Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials, Ferrites and their Applications Superconductivity, Meissner Effect, effect of Magnetic field, Type-1 and Type-II superconductors, Applications of Superconductors.

Unit IV 1. Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein s Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Carbon Dioxide Laser, Semiconductor Diode Laser, Applications of Lasers.
2.Fiber Optics: Principle of Optical Fiber, Construction of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers and Refractive Index Profiles, Attenuation in Optical Fibers, Optical Fibers in Communication System, Application of Optical Fibers.

Unit V 1.Acoustics of Buildings & Acoustic Quieting: Basic Requirement of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine s Formula for Reverberation Time(Quantitative Treatment), Measurement of Absorption Coefficient of a Material, Factors Affecting The Architectural Acoustics and their Remedies. Acoustic Quieting.
2.Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down Fabrication: Chemical Vapour Deposition, Physical Vapour

TEXT BOOKS

1. Engineering Physics V. Rajaendra, TATA Mc. Graw Hill Publishers.
2. Applied Physics P.K.Palanisamy (SciTech Publications (India) Pvt. Ltd.
3. Applied Physics T. Bhima Shankaram & G. Prasad (B.S. Publications)
4. Engineering Physics P.K.Palanisamy (SciTech Publications (India) Pvt. Ltd.

REFERENCES

1. Applied Physics Mani Naidu Pearson Education
2. Engineering Physics by P. Appalanaidu and Chandrasekhar VGS Booklinks.
3. Nanotechnology : A Gentle Introduction to the next Big Idea by M.Ratner, D. Ratner

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(R16CSE1102) Data Structures Through 'C'

UNIT - I

Data Structures – Introduction to Data Structures- Classification of Data Structures - Abstract Data Types

Stacks - Operations of Stack- Push - Pop- Display - Necessary Conditions on Stack - Array Representation - Stack Implementations – Stack implementation of Recursion - Stack Applications – Stack Application of Expression Conversion and Expression Evaluation;

UNIT - II

Queues-Operations of Queue- Insert- Remove - Display - Necessary Conditions on Queues - Array Representation - Types of Queues: Circular Queue- D-Queues- Operations- Implementation and Applications – Queue Application of Scheduling Algorithms – First-In-First-Out Scheduling Algorithm - Round-Robin Scheduling Algorithm

UNIT – III

Linked list – Disadvantages of Linear List and Advantages of Linked List- Singly Linked List -Operations of Linked List - Insertion- Deletion - Display – Searching - Types of Lists - Circular Linked List - Double Linked List – Operations- Implementation and Applications - Linked Representation of Stacks – Linked Representation of Queues;

UNIT – IV

Trees – Definition- Terminology- Tree Types. Binary Tree- Definition- Representation- Binary Search Tree - Binary Tree Traversals - In Order - Pre Order – Post Order Tree Traversal Techniques;

Graphs – Definitions- Graph Representations- Graph Traversals - BFS and DFS;

UNIT - V

Searching - Linear and Binary Search Methods;

Sorting - Bubble Sort - Selection Sort - Insertion Sort - Radix Sort - Quick Sort - Merge sort;

Complexity – Complexity of Searching and Sorting Techniques - Big O Notation- Comparison of Sorting Techniques;

Text Books

1. "Data Structures through C" by Yashavant. P Kanetkar, BPB
2. "Data Structures Using C" by Aaron M. Tenenbaum, Pearson Education

REFERENCES:

1. "C& Data structures" by P. Padmanabham- Third Edition- B.S. Publications.
2. "Data Structures using C" by A.M.Tanenbaum- Y.Langsam- and M.J. Augenstein- Pearson-Education / PHI
3. "C Programming & Data Structures" by E. Balagurusamy, TMH.
4. "C Programming & Data Structures" by P. Dey- M Ghosh R Thereja, Oxford University Press
5. "C& Data structures"by E V Prasad and N B Venkateswarlu, S. Chand&Co.

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Common to All Branches
(ECE, EEE, CSE, IT, MECH., CIVIL)

(R16ECH1101) Engineering Chemistry

UNIT I Electrochemistry and Batteries

Concept of Electro Chemistry, Conductors (electronic & electrolytic), Conductance-Specific, Equivalent and molar conductance, Ionic conductance, ionic mobilities and their interrelation, EMF: Electrode, Electrode potential, standard electrode potential, Nernst equation and its applications, types of electrodes- Reference Electrodes (SCE, Quinhydrone electrode), Ion Selective Electrode (Glass Electrode), Galvanic Cells & Concentration Cells, Numerical problems. Batteries: Primary Cells (dry cell and Lithium cells), secondary cells (lead-Acid cell, Ni-Cd cell). Applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cells, methanol – oxygen fuel cell, Advantages and applications of fuel cells.

Unit II Corrosion and its control

Definition, causes and effects of corrosion, types of corrosion. Chemical and Electrochemical corrosion (mechanism), Factors affecting rate of corrosion - Purity of metal, position of metal in Galvanic series, nature of corrosion product, temperature, pH, and humidity. Corrosion control methods – Cathodic protection, sacrificial anode, impressed current cathode. Surface coatings – metallic coatings (anodic and cathodic), methods of application of metallic coatings- hot dipping, (galvanizing, tinning) cementation, cladding, electroplating (Copper Plating), Electroless Plating (Ni plating) - Organic surface coatings – paints its constituents and their functions.

Unit III Polymers

Polymers Definition, Classification, Types of Polymerization (Addition, Condensation & Coordination). Plastics: Thermoplastic resins & Thermo set resins, Compounding & fabrication of plastics (Compression and injection moulding), Preparation, properties, engineering applications of: PVC, PS, Teflon, & Bakelite, Fibres-Nylon - 6, 6 and terylene, Fiber Reinforced plastics (FRP) - Applications Rubbers – Natural rubber, vulcanization. Elastomers – Buna-S, Butyl rubber and Thiokol rubber. Conducting Polymers: Preparation, Mechanism of conduction and applications of Poly acetylene and poly aniline.

Unit IV Water and Energy Sources

Water: Hardness of water, types of hardness, Causes of hardness, units. Numerical problems. Boiler feed water-internal treatment (Phosphate, Colloidal and Calgon conditioning), external treatment-Lime soda, Zeolite process & Ion exchange process and Numerical problems. Boiler troubles- scales & sludges, Priming and foaming, caustic embrittlement and boiler corrosion, Desalination of water-Reverse osmosis, potable water – treatment of water for domestic supply, disinfection by chlorination.

Energy sources: Fuels, Classification – Solid fuels – coal – analysis – proximate and ultimate analysis of coal, Liquid fuels – petroleum – refining of petroleum-cracking (thermal & catalytic), fixed bed catalytic cracking. Knocking (Octane and Cetane numbers) synthetic petrol –synthesis by Fischer Tropsech's process, Bergius Process; Gaseous fuels – Natural gas, CNG and LPG, Combustion – definition – HCV, LCV.

Unit V Surface and Materials Chemistry

Surface chemistry : Solid surfaces, types of adsorption, Langmuir adsorption isotherm, Calculation of surface area of solid & applications of adsorption, Colloids-classification of colloids, properties- Electrical (zeta potential) & optical (Tyndal effect) , applications of colloids.

Materials chemistry: Cement: composition of Portland cement, manufacture of port land Cement, setting & hardening of cement (reactions). Lubricants: classification, mechanism and properties of lubricant: Viscocity , Cloud point, pour point,flash & fire point,. Refractories: Classification, Characteristics of a good refractory.

TEXT BOOKS

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).
2. Text Book of Engineering Chemistry by Jyostna Cherukuri, Bharathi Kumari. VGS Publishers.
3. Text of Engineering Chemistry by S.S. Dara & Mukkanti S. Chand & Co,New Delhi(2006).

REFERENCES

1. Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).
2. Chemistry of Engineering Materials by R.P Mani and K.N.Mishra, CENGAGE learning.
3. Applied Chemistry – A text for Engineering & Technology – Springar (2005).
4. Text Book of Engineering Chemistry – Shasi Chawla, Dhantpat Rai publishing Company, NewDelhi (2008).

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(R16CSE1202) Data Structures Through 'C' Lab

Objectives:

- To learn/strengthen a programming language like C- To learn problem solving techniques Recommended Systems/Software Requirements:
- Intel based desktop PC- ANSI C Compiler with Supporting Editors- IDE's such as Turbo C- Bloodshed C-
- Linux with gcc (GNU Compiler Collection) compiler

Week – 1

Write a C program to implement a list using array with insert, delete, display, sort, search operations

Week – 2

Write a C program to implement Stack operations (push, pop, display) using an array

Week – 3

Write a C program to implement Queue operations (insert, remove, display) using an array

Week – 4 & 5

Write a C program on Stack applications.

a) to convert infix expression into postfix expression
b) Evaluate postfix expression.
c) Implement recursion

Week – 6

Write a C program to implement scheduling algorithms using Queue

a) First – In – First – Out Algorithm b) Round Robin Algorithm

Week – 7

Write a C program to perform Linked List operations (create, insert, delete, display & find)

Week – 8

Write a C program on implementations on Linked List

a) Stack operations using Linked List (pointers)
b) Queue operations using Linked List (pointers)

Week – 9

Write a C program on Searching techniques.

a) Linear Search b) Binary Search

Week - 10

Write a C program on Sorting techniques

a) Bubble Sort b) Selection Sort

Week – 11

Write a C program on Sorting techniques

a) Insertion Sort b) Radix Sort

Week – 12

Write a C program on Sorting techniques

a) Quick Sort b) Merge Sort

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Common to All Branches
(ECE, EEE, CSE, IT, MECH., CIVIL)

(R16ECH1201) Engineering Chemistry Lab

1 Titrimetry:

a. Estimation of hardness of water by EDTA method. (or)
b. Estimation of calcium in limestone by Permanganometry.
c. Estimation of Ferrous Ion by Permanganate
d. Estimation of Ferrous Ion by $K_2Cr_2O_7$

Instrumental methods:

2 Colorimetry:

a. Determination of ferrous iron in cement by colorimetric method. (or)
b. Estimation of Copper by Colorimetric method.

3 Conductometry:

a. Conductometric titration of strong acid Vs strong base. (or)
b. Conductometric titration of mixture of acids Vs strong base.

4. Potentiometry:

a. Titration of strong acid Vs strong base by potentiometry. (or)
b. Titration of weak acid Vs strong base by potentiometry.

5. Physical Properties:

a. Determination of viscosity of sample oil by redwood/oswald's viscometer
b. Determination Surface Tension of lubricants

6. Identification and Preparations:

a. Preparation of organic compounds Asprin
b. Benzimidazole

7. Mineral Analysis

a. Determination of percentage of copper in brass. (or)
b. Estimation of manganese dioxide in pyrolusite.

TEXT BOOKS

1. Practical Engineering Chemistry by K.Mukkanti, etal, B.S.Publishers, Hyd.

REFERENCES

1. Text Book of Engineering chemistry by R.N.Goyal and Harmendra Goel.
2. Instrumental Methods of Chemical Analysis, Chatwal Anand, Himalaya Publications.

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(R16EPH1201) Engineering Physics – II Lab
(Common for ECE, CSE, IT, EEE)

1. Determination of wavelength of a given source of light by using diffraction grating.
2. To find the frequency of a tuning fork – Melde's Experiment.
3. To find the frequency of ac signal generator – A.C Sonometer.
4. Time constant of an RC – Circuit
5. LCR – Circuit
6. Newton Rings
7. Dispersive power of the material of a Prism – Spectrometer.
8. Stewart and Gee's Experiment
9. Torsional pendulum
10. Energy gap of a semi conductor.
11. Characteristics of a laser diode.
12. Numerical aperture of optical fiber
13. Bending loss of optical fiber

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(R16MTH1104) Mathematics - III

Objectives: To learn

- Transforming the given variable coefficient equation (Cauchy's and Lagrange's) into the one with constant coefficients.
- Identifying ordinary points, singular points and regular singular points for the given ODE.
- Finding the series solution around a regular singular point.
- Solve the given ODE with variable coefficients by Frobenius method and test the convergence of its series solution.
- Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials.
- Differentiation and Integration of complex valued functions.
- Evaluation of integrals using Cahchy's integral formula.
- Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
- Evaluation of integrals using residue theorem.
- Transform a given function from z - plane to w – plane.
- Identify the transformations like translation, magnification, rotation and reflection and inversion.
- Properties of bilinear transformations.

UNIT – I:

Linear ODE with variable coefficients and series solutions(second order only): Equations reducible to constant coefficients-Cauchy's and Lagrange's differential equations. Motivation for series solutions, Ordinary point and Regular singular point of a differential equation , Transformation of non-zero singular point to zero singular point. Series solutions to differential equations around zero, Frobenius Method about zero.

Unit-II

Special Functions : Legendre's Differential equation, General solution of Legendre's equation, Legendre polynomials Properties: Rodrigue's formula – Recurrence relations, Generating function of Legendre's polynomials – Orthogonality. Bessel's Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function , Trigonometric expansions involving Bessel functions.

UNIT-III:

Complex Functions –Differentiation and Integration : Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method. Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

UNIT-IV:

Power series expansions of complex functions and contour Integration: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity. Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type

(a) Improper real integrals $\int f(x)dx$ (b) $\int_c^{c\,2} f(\cos,\sin)d$

UNIT-V:

Conformal mapping: Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection, Transformations like e^{Z}, $\log Z$, Z^2, and Bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given .

TEXT BOOKS:

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

REFERENCES:

1. Complex Variables Principles And Problem Sessions By A.K.Kapoor, World Scientific Publishers
2. Engineering Mathematics-3 By T.K.V.Iyengar andB.Krishna Gandhi Etc
3. A Text Book Of Engineering Mathematics By N P Bali, Manesh Goyal
4. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edit. 2013, Chapman & Hall/CRC
5. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education
6. Mathematics For Engineers By K.B.Datta And M.A S.Srinivas,Cengage Publications

Outcome: After going through this course the student will be able to:

- Apply the Frobenius method to obtain a series solution for the given linear 2 ODE.
- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and Legendre polynomials.

After going to through this course the student will be able to

a) analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem.
b) Find the Taylor's and Laurent series expansion of complex functions
c) The conformal transformations of complex functions can be dealt with ease.

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(R16MED1110) FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT I

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension-vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

Fluid kinematics: stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

UNIT-II

Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line - hydraulic gradient line.

Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle.

UNIT III

Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes.

Hydroelectric power stations: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT IV

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube-theory- functions and efficiency.

Performance of hydraulic turbines: Unit and specific quantities, Model Analysis, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank,

UNITV

Centrifugal pumps: classification, working, work done – manomertic head, static head- losses and efficienciesspecific speed- Model analysis, pumps in series and parallel-performance characteristic curves, NPSH, water hammer

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley ,John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements)

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(R16ECE1102) ELETRONIC DEVICES & CIRCUITS

Objectives:

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers This course focuses:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, BJTand FET amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

UNIT -I:

P-N Junction Diode: Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-AmpereCharacteristics, Temperature dependence of VI characteristic, Ideal versus Practical – Resistance levels (Staticand Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, BreakdownMechanisms in Semiconductor Diodes, Zener Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the helpof Energy Band Diagram), Varactor Diode, SCR and Semiconductor Photo Diode.

UNIT -II:

Rectifiers and Filters : The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge RectifierHarmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, p- SectionFilters, Comparision of Filters, Voltage Regulation using Zener Diode.

UNIT -III:

Bipolar Junction Transistor and UJT: The Junction Transistor, Transistor Current Components, Transistor asan Amplifier, Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter andCommon Collector Configurations, Limits of Operation , BJT Specifications, BJT Hybrid Model, Determination oh-parameters from Transistor Characteristics, Comparison of CB, CE, and CC Amplifier Configurations, UJT and Characteristics.

UNIT -IV:

Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector - Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE0} and ß, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, Analysis of a Transistor Amplifier Circuit using h Parameters.

UNIT -V:

Field Effect Transistor and FET Amplifiers

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed.,1998, TMH.
2 Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013
3 Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford

REFERENCE BOOKS:

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits - K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

Course Outcomes:

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

- Understand and Analyse the different types of diodes, operation and its characteristics
- Design and analyse the DC bias circuitry of BJT and FET.
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

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(R16EEE1101) ELECTRICAL CIRCUITS

Objective:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course if laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems and network topology.

UNIT –I:
Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, Voltage and Current Sources, Independent and Dependent Sources, Source Transformation, Voltage – Current relationship for Passive Elements (for different input signals –Square, Ramp, Saw tooth and Triangular). Kirchhoff's Laws, Network Reduction Techniques – Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh for DC Excitations.

UNIT –II:
Single Phase A.C. Circuits: R.M.S. and Average values and form factor for different periodic wave forms, Steady State Analysis of R, L and C (in Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase and Phase difference, Concept of Power Factor, Real and Reactive powers, J-notation, Complex and Polar forms of representation, Complex power.

UNIT –III:
Locus diagrams, Resonance and Magnetic circuits: Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor. Magnetic circuits-Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT –IV:
Network Topology: Definitions, Graph, Tree, Basic cutset and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks.

UNIT –V:
Network Theorems (With A.C. & D.C): Tellegen's, Superposition, Reciprocity, Thevinin's, Norton's, Maximum Power Transfer, Milliman's and Compensation theorems for D.C excitations.

TEXT BOOKS:
1. Electric Circuits - A.Chakrabarhty, Dhanipat Rai & Sons.
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.

REFERENCE BOOKS:

1. Engineering Circuit Analysis - William Hayt ,Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuit Analysis - K.S.Suresh Kumar, Pearson Education.
3. Electrical Circuits - David A.Bell, Oxford University Press.
4. Network Analysis and Circuits - M.Arshad, Infinity Science Press.
5. Circuits - A.Bruce Carlson, Cengage Learning.
6. Electrical Circuits: An Introduction - KCA Smith & RE Alley, Cambridge University Press.

Outcome:

After going through this course the student gets a thorough knowledge on basics of circuit concepts, electrical parameters, single phase AC circuits, magnetic circuits , resonance, network topology and network theorems with which he/she can able to apply the above conceptual things to real-world problems and applications.

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(R16EEE1102) ELECTRO MAGNETIC FIELDS

Objective:
The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT – I:
Electrostatics: Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law, div (D) = v Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II:
Conductors, Dielectrics and Capacitance: Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and coaxial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III:
Magneto Statics: Static magnetic fields – Biot-Savart's law –- Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.
Ampere's circuital law and its applications: viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

UNIT-IV:
Force in Magnetic Fields And Magnetic Potential : Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field. Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

UNIT – V:

Time Varying Fields : Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=- B/ t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current .

TEXT BOOKS:

1. "Engineering Electromagnetics" William H. Hayt & John. A. Buck McGraw-Hill Companies.
2. "Electro magnetic Fields", Sadiku, Oxford Publications.

REFERENCES:

1. "Introduction to Electro Dynamics",D J Griffiths, Prentice-Hall of India Pvt.Ltd.
2. "Electromagnetic Fields", Y Mallikarjuna Reddy, Universities Press.
3. "Electromagnetics",J. D Kraus Mc Graw-Hill companies.
4. "Electromagnetism-Problems with solutions", Ashutosh Pramanik, PHI Learning.
5. "Electromagnetics-Problems and solutions", William H. Hayt & John. A. Buck McGraw-Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on vector algebra, 3-dimensional coordinate systems, electrostatics, behavior of conductors insulators semiconductors dielectrics and capacitance, magneto statics, time-varying fields, interaction between electricity and magnetism, different laws, Maxwell's equations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1103) ELECTRICAL MACHINES - I

Objective:
Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

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

UNIT – II:
D.C. Generators & Armature Reaction : D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Problems
Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT – III:
Types of D.C Generators & Load Characteristics : 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 – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT – IV:
D.C. Motors & Speed Control Methods: 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 DC Motors: Armature voltage and field flux control methods. Ward-Leonard system. Principle of 3 point and 4 point starters – protective devices.

UNIT – V:
Testing of D.C. Machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency. Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a DC motor test**.**

TEXT BOOKS:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

REFERENCE BOOKS:

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
3. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
5. Electrical Machines, R. K. Srivastava, Cengage Learning.

Outcome:

After going through this course the student gets a thorough knowledge on electromechanical energy conversion, construction operation characteristics speed control methods and testing of different types of DC Generators and DC motors, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16MED1204) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Determination of friction factor for a given pipe line.
4. Determination of loss of head due to sudden contraction in a pipeline
5. Verification of Bernoulli's theorem.
6. Impact of jets on Vanes.
7. Performance Test on Pelton Wheel.
8. Performance Test on Francis Turbine.
9. Performance Test on Kaplan Turbine.
10. Performance Test on Centrifugal Pump.
11. Performance Test on Multi Stage Centrifugal Pump.
12. Performance Test on Reciprocating Pump.

Note: Any 10 of the above 12 experiments are to be conducted.

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(R16ECE1201) ELECTRONIC DEVICES & CIRCUIT LAB

PART A: (Only for Viva-voce Examination)

Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
   i. Multimeters (Analog and Digital)
   ii. Function Generator
   iii. Regulated Power Supplies
   iv. CRO.

PART B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
4. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
5. Half Wave Rectifier with & without filters.
6. Full Wave Rectifier with & without filters.
7. FET characteristics.
8. Design of Self-bias circuit.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier .
12. SCR characteristics.
13. UJT Characteristics

PART C: Equipment required for Laboratories:

1. Regulated Power supplies (RPS)	-0-30 V
2. CRO's	-0-20 MHz.
3. Function Generators	-0-1 MHz.
4. Multimeters	
5. Decade Resistance Boxes/Rheostats	
6. Decade Capacitance Boxes	
7. Ammeters (Analog or Digital)	-0-20 μA, 0-50μA, 0-100μA, 0-200μA, 0-10 mA.
8. Voltmeters (Analog or Digital)	-0-50V, 0-100V, 0-250V
9. Electronic Components	-Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes – Ge & Si type, Transistors – NPN, PNP type)

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(R16HAS1103) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Objectives:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

Unit I

Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

Unit II

Production & Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

Unit IV

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

Unit V

Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trasing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

Outcomes:

At the end of the course, the student will

- Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- Develop an understanding of
- Analyse how capital budgeting decisions are carried out.
- Understanding the framework for both manual and computerised accounting process
- Know how to analyse and interpret the financial statements through ratio analysis.

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(R16EEE1104) POWER SYSTEMS – I

Objectives:
Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

UNIT-I :
POWER STATIONS
THERMAL POWER STATION: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.
Nuclear Power Stations: Nuclear Fission and Chain reaction.- Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components - Moderators, Control rods, Reflectors and Coolants. Radiation hazards - Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR. Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

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

UNIT-III Air insulated & Gas insulated (GIS) substations
Classification of substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.
Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV: POWER FACTOR AND VOLTAGE CONTROL
Causes of low Power Factor -Methods of Improving Power Factor -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical Power Factor for constant KW load and constant KVA type loads, Numerical Problems.
Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

UNIT-V: ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF
Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.
Costs of Generation and their division into Fixed, Semi-fixed and running Costs.
Desirable Characteristics of a Tariff Method. – Tariff Methods: Flat Rate, Block-Rate, two-part - three-part, and power factor tariff methods and Numerical Problems.

TEXT BOOKS

1. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
2. Electrical Power System, P.S.R. Mruthy, B.S. Publications

REFERENCE BOOKS

1. Test book of Power System Engineering, R.K. Rajput, Laxmi Publications Pvt. Ltd.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI.
3. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
4. Generation of Electrical Energy, Dr. B.R. Gupta, S. Chand.

Outcome:

After going through this course the student gets a through knowledge on thermal gas and nuclear power plants operation, AC & DC distribution systems operation, AIR insulated and GAS insulated indoor / outdoor substations operation, voltage control and power factor improvement techniques, economic aspects of power generation and deferent types of TARIFF methods with which he/she can able to apply the above conceptual things to real – world electrical and electronics powers and applications.

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(R16ECE1135) ELECTRONIC CIRCUITS

Objectives :

Electrical circuits plays significant role in day to day life of entire mankind. This course deals with the concept of different types of amplifiers, oscillators, vibrators, clippers, clampers, switch characteristics of various semi conductors, linear way shaping and frequency response of bipolar junction transistor and field effect transistor.

UNIT I: SINGLE STAGE AMPLIFIERS DESIGN AND ANALYSIS

Review of CE, CB, CC& CS amplifiers-Classification of Amplifiers, Distortion in amplifiers-Approximate analysis, CE, CB, CC amplifiers comparison**.**

FEEDBACK AMPLIFIERS: Concept 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**.**

UNIT II: BJT & FET FREQUENCY RESPONSE

Logarithms-Decibels-General frequency consideration-Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing

UNIT – III: MULTIVIBRATORS

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

CLIPPERS AND CLAMPERS; Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT IV: LARGE SIGNAL AMPLIFIERS:

Class –A Power Amplifier, Maximum Value of Efficiency of Class-A Amplifier, Transformer coupled amplifier-Push Pull Amplifier-Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier)-Phase Inverters, Transistor Power Dissipation, Thermal Runway, Heat sinks.

LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs**.**

UNIT – V: SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

TEXT BOOKS:

1. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nasheisky, 9th Edition 2007, Pearson Education
2. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, 2nd edition 2008, Tata McGraw Hill Companies.
3. Solid State Pulse Circuits by David A. Bell, 4th Edition, Prentice Hall of India

REFERENCE BOOKS:

1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Electronic Devices and Circutits, Anil K. Maini, Varsha Agrawal, 1st Edition, WILEY.
3. Pulse, Digital & Switching Waveforms by Jacob Milliman, Harbert Taub and Mothiki S Prakash rao, 2nd edition 2008, Tata McGraw Hill Companies**.**

Outcome:

After going through this course the student gets a through knowledge on various electronic circuits like oscillators, multi-vibrators, frequency response analysis, clippers and clampers, switching characteristics of semiconductor devices, concept of wave-shaping, with this knowledge they can apply sufficient knowledge for solving real world problems.

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(R16ECE1106) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

UNIT - I:

Number System and Boolean Algebra And Switching Functions: Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.
Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT - II:

Minimization and Design of Combinational Circuits: Introduction, The Minimization with theorem, The Karnaugh Map Method, Five and Six Variable Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Tabular Method, Partially Specified Expressions, Multi-output Minimization, Minimization and Combinational Design, Arithmetic Circuits, Comparator, Multiplexers, Code Converters, Wired Logic, Tristate Bus System, Practical Aspects related to Combinational Logic Design, Hazards and Hazard Free Relations.

UNIT - III:

Sequential Machines Fundamentals: Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, The Flip-Flop, The D-Latch Flip-Flop, The "Clocked T" Flip-Flop, The " Clocked J-K" Flip-Flop, Design of a Clocked Flip-Flop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration, Clock Skew.

UNIT - IV:

Sequential Circuit Design and Analysis: Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Aspects, State Reduction, Design Steps, Realization using Flip-Flops
Counters - Design of Single mode Counter, Ripple Counter, Ring Counter, Shift Register, Shift Register Sequences, Ring Counter Using Shift Register.

UNIT - V:

Sequential Circuits: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.

REFERENCE BOOKS:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
2. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
3. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
4. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
5. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
6. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

Course Outcomes:

Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyse small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

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(R16EEE1105) NETWORK THEORY

Objectives:
This course introduces the basic concepts of network theory which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course if laid on the basic analysis of circuits which includes three phase circuits, transient analysis of DC and AC circuits, network functions, two-port network parameters, Fourier analysis of AC circuits, design and analysis of filters.

UNIT-I : THREE PHASE AC CIRCUITS
Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced and unbalanced three phase circuits- Measurement of Active and Reactive power.

UNIT-II
D.C & A.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (series and parallel combination) for D.C & A.C. excitation-Initial conditions-solution method using differential equation and Laplace transforms.

UNIT-III: NETWROK FUNCTIONS:
The Concept of Complex Frequency, Physical Interpretation of Complex Frequency, Transform Impedance and Transform Circuits Series and parallel Combination of Elements, Terminal Pairs or Ports, Networks Functions for the One-port and Two-port, Poles and Zeros of Network Functions, Significance of poies and Zeros, Properties of Driving Point Functions, Properties of Transfer Functions, Necessary Conditions for Driving Point Functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot.

UNIT-IV: NETWORK PARAMETERS
Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Cascaded networks, concept of transformed network – 2port network parameters using transformed variables.

UNIT-V: FILTERS & FOURIER ANALYSIS OF A.C. CIRCUITS
Low pass, High pass, Band pass, Band elimination, Prototype filter design. The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and phase angle spectra, Fourier Integrals and Fourier Transforms – properties of Fourier Transforms .

Text Books:

1. Engineering Circuit by A. Chakrabarthy, Dhanipat Rai & Sons
2. Network Analysis, N.C. Jagan and C. Laxminararyna, BS Publications.

Reference Books:

1. Engineering Circuit Analysis, William Hayt, Jack E. Kemmerly, S M Durbin, McGraw Hill Companies.
2. Electric Circuits by David A. Bell, Oxford University Press.
3. Electric Circuit Analysis, K.S. Suresh Kumar, Pearson Education.
4. Circuits, A. Bruce Carlson, Cengage Learning.
5. Network Analysis and circuits, M. Arshad, Infinity Science Press/
6. Electrical Circuits and introduction, KCA Smith & RE Alley, Cambridge University Press.

Outcome:

After going through this course the student gets a thorough knowledge on three-phase systems of electrical circuits, transient analysis of AC and DC networks, Laplace transforms, different types of network functions, two-port network parameters, operation and design of various filter circuits, Fourier transforms and analysis of AC circuits through Fourier transforms, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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B.Tech. - II Year – II Semester

L	T/P/D	C
4	-/-/-	4

(R16EEE1106) ELECTRICAL MACHINES – II

Objectives:

As an extension of Electrical machines I course this subject facilitates to study of the performance of Transformers and Induction motors which are the major part of industrial drives and agricultural pump sets.

Unit I

Single Phase Transformers: 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 II

Testing of Transformers: Testing of 1-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.

Unit III

Auto & Poly-Phase Transformers: Auto transformers: Equivalent circuit – comparision with two winding transformers.

Poly-Phase Transformers: Poly-phase connections-Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching – off load and on load tap changing; Scott connection.

Unit IV

Poly-Phase Induction Motors: Poly-Phase induction motors-construction 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 pf at standstill and during operation. 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 – double cage and deep bar rotors – equivalent circuit – phasor diagram – crawling and cogging.

Unit V

Circle Diagram & Speed Control of Induction Motors: Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations.
Speed control: change of frequency; change of poles and methods consequent poles; cascade connection. Injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

TEXT BOOKS:

1. Electrical machines-PS Bhimbra, Khanna Publishers.
2. Principles of Electrical Machines, V.K. Mehta, Rohit Mehta, S.Chand Publishing.

REFERENCE BOOKS:

1. Electric Machines, I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
2. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
3. Fundamentals of Electric Machines, B.R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M.V. Deshpande, PHI learning Private Limited.
5. Electrical Machines, R.K. Srivastava, Cengage Learning.
6. Performance and Design of AC Machines, MG. Say, BPB Publishers.
7. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw Hill Companies.
8. Electric machinery, A.E. Fitzgerald, C. Kingsley and S.Umans, Mc Graw Hill Companies.

Outcomes:

After going through this course the student gets a thorough knowledge on construction operation characteristics and testing of different types of Transformers and construction operation characteristics testing (concept of circle diagram) and speed control methods of poly-phase induction motors, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1201) ELECTRICAL MACHINES LAB – I

The following experiments are required to be conducted compulsory experiments

1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunt machines.
6. Fields test on DC series machines.
7. Swinburne's test and speed control of DC shunt motor..
8. Brake test on DC compound motor.

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

9. Brake test on DC shunt motor.
10. Retardation test on DC shunt motor.
11. Separation of losses in DC shunt motor.

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B.Tech. - II Year – II Semester

L	T/P/D	C
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(R16EEE1202) ELECTRIC CIRCUITS AND SIMULATION LAB

PART-A: ELECTRICAL CIRCUITS

1) Verification of Thevenin's, and Norton's Theorems
2) Verification of Superposition and Maximum Power Transfer Theorems
3) Verification of RMS value of complex wave
4) Verification of Compensation Theorem
5) Verification of Reciprocity , Millmann's Theorems
6) Locus Diagrams of RL and RC Series Circuits
7) Series and Parallel Resonance
8) Determination of Self, Mutual Inductances and Coefficient of coupling
9) Determination of Z and Y Parameters
10) Determination of Transmission line and hybrid parameters
11) Measurement of Active Power for Star and Delta connected balanced loads
12) Measurement of Reactive Power for Star and Delta connected balanced loads
13) Measurement of 3-phase Power by two - Wattmeter Method for unbalanced loads

PART-B: PSPICE SIMULATION

1) Simulation of DC Circuits
2) DC Transient response
3) Mesh Analysis
4) Nodal Analysis

Note :

- PSPICE Software Package is necessary.
- Eight experiments are to be conducted from PART-A and any Two from PART-B

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B.Tech. - III Year – I Semester

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(R16ECE1117) IC APPLICATIONS

UNIT - I:

Integrated Circuits: Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT - II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential.

Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, introduction to voltage regulators.

UNIT - III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

UNIT - IV:

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT - V:

D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.

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(R16HAS1104) MANAGEMENT SCIENCE

Objectives:

This course is intended to familiarize the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organizational structure, production operations, marketing, Human resource Management, product management and strategy.

UNIT - I:

Introduction to Management and Organisation: Concepts of Management and organization- nature, importance and Functions of Management, Systems Approach to Management - Taylor's Scientific Management Theory- Fayal's Principles of Management- Maslow's theory of Hierarchy of Human Needs- Douglas McGregor's Theory X and Theory Y - Hertzberg Two Factor Theory of Motivation - Leadership Styles, Social responsibilities of Management, Designing Organizational Structures: Basic concepts related to Organisation - Departmentation and Decentralization, Types and Evaluation of mechanistic and organic structures of organisation and suitability.

UNIT - II:

Operations and Marketing Management: Principles and Types of Plant Layout-Methods of Production(Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement - Business Process Reengineering(BPR) - Statistical Quality Control: control charts for Variables and Attributes (simple Problems) and Acceptance Sampling, TQM, Six Sigma, Deming's contribution to quality, Objectives of Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Store Records - JIT System, Supply Chain Management, Functions of Marketing, Marketing Mix, and Marketing Strategies based on Prodcut Life Cycle, Channels of distribution.

UNIT - III:

Human Resources Management(HRM): Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating - Capability Maturity Model (CMM) Levels - Performance Management System.

UNIT - IV:

Project Management (PERT/ CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

UNIT - V:

Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

TEXT BOOKS:

1. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.
2. P. Vijay Kumar, N. Appa Rao and Ashnab, Chnalill, Cengage Learning India, 2012.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz and Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management - Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford Uiversity Press, 2012.
5. Samuel C. Certo: Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner: Management, Wiley, 2012.
7. Parnell: Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

Outcomes:

By the end of the course, the student will be in a position to

- Plan ana organizational structure for a given context in the organisation carry out production operations through Work study.
- carry out production operations through Work study.
- understand the markets, customers and competetion better and price the given products appropriately.
- ensure quality for a given product or service.
- plan and control the HR function better.
- plan, schedule and control projects through PERT and CPM.
- evolve a strategy for a business or service organisation.

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(R16EEE1107) POWER SYSTEMS – II

Objective :

This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT - I:

Transmission Line Parameters: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems.
Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT - II:

Performance of Short and Medium Length Transmission Lines: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-III:

Power System Transients & Factors Governing The Performance of Transmission Lines: Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors - Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT - IV:

Overhead Line Insulators & Sag and Tension Calculations: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

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

UNIT - V:

Underground Cables: Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TEXT BOOKS:

1. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Electrical Power Systems, PSR, Murthy, BS Publications.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Text Book of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution S. N. Singh, PHI.
4. Principles of Power Systems, V. K. Mehta and Rohit Mehta S. Chand Company Pvt. Ltd.
5. Power System Engineering, I.J.Nagarath and D.P.Kothari, TMG.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder, PHI, 3/e, 2010
8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition, 2/e.

Outcome:

After going through this course the student gets a thorough knowledge on calculation of transmission line parameters, performance analysis of short medium long length transmission lines and factors affecting the performance analysis of transmission lines, transients in power systems, operation of different types of overhead line insulators, sag and tension calculation of transmission lines and detailed analysis of underground cables for power transmission and distribution, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1108) CONTROL SYSTEMS

Objective :

In this course it is aimed to introduce to the students the principles and applications of control systems in every day life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT - I:

Itroduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

UNIT - II:

Transfer of Function Repressentation: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT- III:

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT - IV:

Stability Analysis in S-Domain: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci. Basics of PID controllers.

UNIT - V:

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

TEXT BOOKS:

1. Control Systems theory and applications, S. K. Bhattacharya, Pearson.
2. Control Systems, N. C. Jagan, B.S. Publications.

REFERENCE BOOKS:

1. Control Systems, A. Ananad Kumar,PHI.
2. Control Systems Engineering, S. Palani, Tata McGraw Hill.
3. Control Systems, Dhanesh N. manik, Cengage Learning.
4. Control Systems Engineering, I.J Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
5. Control Systems, N. K.Sinha, new Age International (P) Limited Publishers.

Outcome:

After going through this course the syudent gets a thorough knowledge on open loop and close loop control systems, concept of feedback in control systems, mathematical modeling and transfer function derivations of translational and rotational systems, Transfer functions of Synchros, AC and DC servo motors, Transfer function representation through block diagram algebra and signal flow graphs, time response analysis of different ordered systems through their characterostoc equation and time-domain specifications, stability analysis of control systems in S-domain through R-H criteria and root-locus techniques, frequency response analysis through bode diagrams, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1109) POWER ELECTRONICS

Objective:

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT - I:

Power Semi Conductor Devices & Communication 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 – SCR - UJT firing circuit —– Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT - II:

AC-DC Converters (1-Phase & 3-Phase Controlled Rectifiers): Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Free wheeling Diode –Numerical problems. Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Free wheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems. Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms – Numerical Problems.

UNIT - III:

DC-DC Converters (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, Jones chopper, AC Chopper, Problems.

UNIT - IV:

AC-AC Converters (AC Voltage Controllers) & Frequency Changers (Cyclo-Converters): 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 – Firing circuits -Numerical problems -Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms.

UNIT - V:

DC-AC Converters (Inverters): Inverters – Single phase inverter – Basic series inverter, parallel inverter - operation and waveforms - Three phase inverters (180, 120 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques - Numerical problems.

TEXT BOOKS :

1. Power Electronics, Dr. P. S. Bimbhra, Khanna Publishers
2. Power Electronics Devices, Circuits and Industrial applications, V. R. Moorthi, Oxford University Press.

REFERENCE BOOKS :

1. Power Electronics; Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
2. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw - Hill Publishing Company.
3. Power Electronics, Vedam Subramanyam, New Age International (P) Limited, Publishers.
4. Elements of Power Electronics, Philip T. Krein, Oxford University Press.
5. Power Electronics, M. S. Jamil Asghar, PHI Private Limited.
6. Power Electronics, P. C. Sen, Tata Mc Graw-Hill Publishing.
7. Power Electronics, K. Hari Babu, Scitech Publications India Pvt. Ltd.
8. Principles of Power Electronics, John G. Kassakian, martin F. Schlect, Geroge C. Verghese, Pearson Education.
9. Thyristorised Power Controllers, G. K. Dubey, S. R. Doradra, A. joshi and R. M. K. Sinha, New Age International (P) Limited Publishers.

Outcome:

After going through this course the student gets a thorough knowledge on construction operation V-I characteristics commutationfiring and protection of various power semiconductor devices, focused analysis of thyristor device, nature of the R, RL and RLE loads for different power inputs, AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers, AC-to-AC power conversion through AC voltage controllers, Frequency conversion through cyclo-converters, DC-to-AC power conversion through 1-phase & 3-phase inverters, different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1110) ELECTRICAL MACHINES – III

Objective :

This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT - I:

Synchronous Machine & Characteristics: 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 EMF – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT - II:

Regulation of Synchronous Generator: 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 - III:

Parallel Operation of Synchronous Generator: 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 reactances.

UNIT - IV:

Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed .

Power Circles: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT - V:

Single Phase Motors & Special Machines: Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory Equivalent circuit - split-phase motors - Capacitor start Capacitor run motors. Principles of A.C. Series motor-Universal motor, Stepper motor shaded pole motor, (Qualitative Treatment only).

TEXT BOOKS:

1. Electrical Machines – by P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

REFERENCE BOOKS:

1. Electromachanics - III (Synchronous and single phase machines), S. Kamakashiah, Right Publishers.
2. Electric Machines, I. J. Nagrath & D. P. Kothari, Tata Mc Graw Hill Publishers.
3. Performance and Design of AC Machines, MG. Say, BPB Publishers.
4. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
5. Electric machinery, A.E. Fitzerald, C. Kingsley and S. Umans, Mc Graw Hill Companies.
6. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
7. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
8. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
9. Electrical Machines, R. K. Srivastava, Cengage Learning.

Outcome:

After going through this course the student gets a thorough knowledge on, construction operation characteristics regulation parallel-operation power circles starting & speed control methods of synchronous machines and construction operation charcteristics of single-phase motors and special machines, with which he/she can able to apply the above conceptual things to real-world electrical and problems and applications.

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(R16EEE1203) ELECTRICAL MACHINES LAB - II

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. Break test on three-phase Induction Motor.
4. No-load & Blocked rotor tests on three - phase Induction motor
5. Regulation of a three - phase alternator by synchronous impedance & m.m.f. methods
6. **V** and **Inverted V** curves of a three - phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of **Xd** and **Xq** of a salient pole synchronous machine

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

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

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(R16EEE1204) CONTROL SYSTEMS AND SIMULATION LAB

Any Eight of the following experiments are to be conducted:

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

Any two simulation experiments are to be conducted:-

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

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid,M/s PHI Publications.
2.PSPICE A/D user's manual - Microsim, USA.
3.PSPICE reference guide - Microsim, USA.
4. MATLAB and its Tool Books user's manual and - Mathworks, USA.

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3	-/1/-	3

(R16EEE1111) ELECTRICAL AND ELECTRONICS INSTRUMENTATION

Objective:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of $_4$F1LC parameters voltage, current Power factor, power, energy and magnetic measurements.

UNIT-I:

Introduction to Measuring Instruments : Classification — deflecting, control and damping torques — Ammeters and Voltmeters — PMMC, moving iron type instruments — expression for the deflecting torque and control torque —Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type — Extension of range of E.S. Voltmeters.

UNIT — II:

Potentiometers & Instrument Transformers: Principle and operation of D.C. Crompton's potentioimeter— standardization — Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization — applications. CT and PT — Ratio and phase angle errors.

UNIT —III:

Measurement of Power & Energy: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques — Extension of range of wattmeter using instrument transformers — Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter — driving and braking torques —errors and compensation's — testing by phantom loading using R.S.S. meter. Three phase energy meter — tri-vector meter, maximum demand meters.

UNIT — IV:

DC & A.0 Bridges: Method of measuring low, medium and high resistance — sensitivity of wheat-stone's bridge - carey foster's bridge, kelvin's double bridge for measuring low resistance, measurement of high resistance — loss of charge method.

Measurement of inductance- Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty Bridge. Wien's bridge — Schering Bridge.

UNIT-V:

Transducers & Oscilloscopes: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

CRO: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO Measurement of phase and frequency-lissajous patterns.

TEXT BOOKS:

1. Electrical and Electronic Measurements and Instrumentation, R. K. Rajput, S. Chand & Company Ltd.
2. Electrical Measuring Instruments and Measurements, S. C. Bhargava, BS Publications.

REFRENCE BOOKS:

1. Electrical & Electronic Measurement & Instruments, A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical and Electronic Measurements, G. K. Banerjee, PHI Learning Pvt. Ltd.
3. Electrical Measurements and Measuring Instruments, Golding and Widdis, Reem Publications.
4. Electrical Measurements, Buckingham and Price, Prentice — Hall
5. Electrical Measurements: Fundamentals, Concepts, Applications, Reissland, M.U, New Age International (P) Limited, Publishers.
6. Electrical Measurements and measuring Instruments, E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.

Outcome:

After going through this course the student gets a thorough knowledge on, different types of measuring instruments their construction operation and characteristics, resistance voltage current measurements through potentiometers, voltage current measurements through instrument transformers, power and energy measurements through watt and energy meters, resistance measurements through DC bridges, capacitance and inductance measurements through AC bridges, operation of different types of transducers, measurement of phase and frequency through CRO, range extension of measuring instruments and different types of errors & their reduction methods in measuring instruments, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1112) STATIC DRIVES

Objective:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

UNIT - I:

Control of DC Motors through Phase Controlled Rectifiers: Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors —continuous current operation — output voltage and current waveforms — Speed and Torque expressions — Speed — Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters connected to DC separately excited and DC series motors — output voltage and current waveforms — Speed and Torque expressions — Speed — Torque characteristics — Problems.

UNIT - II:

Four Quadrant Operation of DC Drives through Dual Converters: Introduction to Four quadrant operation — Motoring operations, Electric Braking — Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of DC motors by dual converters — Closed loop operation of DC motor (Block Diagram Only).

UNIT-III:

Control of DC Motors By Choppers (1-, 2-, 4- Quadrant Operations): Single quadrant, Two —quadrant and four quadrant chopper fed dc separately excited and series excited motors — Continuous current operation — Output voltage and current wave forms — Speed torque expressions — speed torque characteristics — Problems on Chopper fed DC Motors — Closed Loop operation (Block Diagram Only).

UNIT - IV:

Control of Induction Motors: Variable voltage characteristics: Control of Induction Motor by Ac Voltage Controllers — Waveforms — speed torque characteristics.

Variable frequency characteristics: Variable frequency control of induction motor by Voltage source and current source inverter and cyclo-converters PWM control — Comparison of VSI and CSI operations — Speed torque characteristics — numerical problems on induction motor drives — Closed loop operation of induction motor drives (Block Diagram Only).

Static rotor resistance control: Slip power recovery — Static Scherbius drive — Static Kramer Drive — their performance and speed torque characteristics — advantages applications — problems.

UNIT - V:

Control of Synchronous Motors: Separate control & self control of synchronous motors — Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor — Operation — Waveforms — speed torque characteristics — Applications —Advantages and Numerical Problems — Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI.

TEXT BOOKS:

1. Power Semiconductor Drives, PV Rao, BS Publications.
2. Fundamentals of Electric Drives, G K Dubey Narosa Publications

REFERENCE BOOKS:

1. Power Semiconductor Drives, S. B. Dewan, G. R. Slemon , **A.** Straughen, Wiley Pvt Ltd.
2. Electric Drives N. K. De, P. K. Sen, PHI Learning Private Ltd.
3. Thyristor Control of Electric drives, Vedam Subramanyam Tata McGraw Hill Publications.
4. Electrical machines and Drive Systems, John Hindmarsh, Alasdair Renfrew, Newnes.
5. Electric Motors and Drives, Fundamentals, Types and Applications Austin Hughes, Newnes.
6. Power Electronics and Variable Frequency Drives Technology and Applications, Bimal K. Bose, Wiley India Pvt. Ltd.
7. A First course on Electrical Drives, S K Pillai, New Age International (P) Ltd.
8. Modern Power Electronics and AC Drives, B.K.Bose, PHI.
9. Power Electronic Circuits, Devices and applications, M.H.Rashid, **PHI.**

Outcome:

After going through this course the student gets a thorough knowledge on, steady-state analysis control speed-torque characteristics and closed-loop operation of DC motors (separately excited shunt motor and series motor) through phase controlled rectifiers and choppers, single-quadrant two-quadrant and four-quadrant operations forward-motoring forward-braking reverse-motoring reverse-regenerative braking operations of DC motor's

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(R16EEE1113) COMPUTER METHODS IN POWER SYSTEMS

Objective:

This course introduces formation of Z bus of a transmission line, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT - I:

Power System Network Matrices: Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

Formation of Z_{Bus}: :Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element from a new bus to reference; Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition .of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems). - Modification of ZBus for the changes in network (Problems).

UNIT - II:

Power Flow Studies: Load Flows: Necessity of Power Flow Studies — Data for Power Flow Studies — Derivation of Static load flow equations.

Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Newton-Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods: Comparison of Different Methods — DC load Flow.

UNIT - III:

Short Circuit Analysis: Per-Unit System of Representation: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

Symmetrical Component Theory: Symmetrical Component Transformation,
Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT - IV:

Steady State Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT - V:

Transient Stability Analysis: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. - Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. Computer Techniques in Power System Analysis, M.A.Pai, TMH Publications.
2. Computer techniques and models in power systems, K.Uma rao, I.K.International.

REFERENCE BOOKS:

1. Power System Analysis, PSR Murty, BS Publications.
2. Power system Analysis Operation and control, Abhijit Chakrabarth, Sunita Haldar, PHI.
3. Power System Analysis, Hadi Saadat , TMH.
4. Modern Power System Analysis, Turan Gonen, CRC Press.
5. Modern Power Systems Analysis, Xi — Fan Wang, Yonghua Song, Malcolm Lrving, Springer International.
6. Electrical Power Systems Analysis, Security and Deregulation, P. V. Venkatesh, B. V. Manikandan, S. Charles Raja, A.Srinivasan, PHI.
7. Modern Power system Analysis, I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company.
8. Power System Analysis, T. K. Nagasarkar, M. S. Sukhija. Oxford University Press.
9. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.

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(R16ECE1118) MICROPROCESSORS AND INTERFACING DEVICES

Objective:
The objective of this course is to introduce 8086 versions of Microprocessor and its architectural aspects and different components interfacing with it along with 8051 microcontroller information.

UNIT-I:
8086 Microprocessor: 8086 architecture-Functional Diagram, Register Organization, Memory segmentation, memory addresses, physical memory organization, signal descriptions of 8086- common function signals, Minimum and maximum mode signals, Read Write cycles Timing diagrams, interrupt structure of 8086.

UNIT-II:
Assembly Language Programming: Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical branch and cell instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III:
Peripheral Interfacing with 8086 Microprocessor: 8255 PPI, Keyboard, display controllers, stepper motor, AID, D/A Converter Interfacing with 8086 microprocessor. Static and Dynamic memories, Vector interrupt table, interrupt service routine, Introduction to DOS and BIOS interrupts, 8259, DMA controller 8257 Interfacing with 8086 microprocessor.

UNIT-IV:
Communication Interface: Serial Communication Standards, serial data transfer schemes, 8251 USART architecture and interfacing RS-232, IEEE -488, prototype and trouble shooting.

UNIT-V:
Introduction to Microcontrollers: Overview of 8051-Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051.

TEXT BOOKS:
1. Advanced microprocessors and peripherals, A.K. Ray and K M Bhurchandani, TMH.
2. Microprocessors and Microcontrollers, Architecture, Programming and System Design, Krishna Kant, PHI Learning PVT. Ltd.

REFERENCE BOOKS
1. D.V.HaII, "Micro Processor and Interfacing ", Tata McGraw-Hill.
2. Microprocessors and Interfacing, N. Senthil, Kumar, M. Saravanan, S. Jeevanathan, S. K. Shall, Oxford University press.
3. Microprocessors, PC Hardware and Interfacing, N. Mathivanan, PHI Learning PVT. Ltd.
4. Microprocessors, Nilesh B. Bahadure, PHI Learning PVT. Ltd.
5. Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, Liu & Gibson, PHI.
6. Kenneth J Ayala, "The 805[1] Micro Controller", Cengage learning.

7. The 8051 micro-controllers' architecture and programming and applications, K Uma rao, Andhe pallavi, Pearson.
8. Microcontrollers and applications, Ajay V. Deshmukh, Tata McGraw-Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on, architecture, pin diagram, register and memory organizations, concept of memory segmentation, minimum and maximum mode of operations, timing diagrams, addressing modes, instruction set, assembler directives, macros, procedures, vector interrupts , peripheral and communication interfacing of 8086 microprocessor and 8051 microcontroller, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16HAS1102) ENVIRONMENTAL STUDIES

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

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, Biomagnification, 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:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation

Global Environmental Problems 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.

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, 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.

SUGGESTED TEXT BOOKS:

1 Textbook 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. New Delhi.
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.

Outcomes:

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

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(R16CIV1132) DISASTER MANAGEMENT
(OPEN ELECTIVE)

Unit-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit –III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters
Infrequent events: Cyclones – Lightning – Hailstorms
Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation) Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion
Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion
Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation
Biological hazards/ disasters:- Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages
1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

REFERENCES

1. R.B.Singh (Ed) Environmental Geography, Heritage Publishers New Delhi,1990
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawan, 1997
3. Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978
4. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
6. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003
8. A.S. Arya Action Plan For Earthquake,Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R.K. Bhandani An overview on Natural & Man made Disaster & their Reduction,CSIR, New Delhi
10. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001

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(R16CIV1123) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE)

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tate Mc Graw Hill Publishing company ltd.,

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(R16HAS1105) HUMAN VALUES AND PROFESSIONAL ETHICS (OPEN ELECTIVE)

Objectives : This introductory course input is intended

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Unit I:

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

Unit II:

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

Unit III:

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

Unit IV:

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence : Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature-

recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Unit V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics : Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations

TEXT BOOKS

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

REFERENCE BOOKS

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

Relevant CDs, Movies, Documentaries & Other Literature:

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

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(R16HAS1202) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Introduction

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion,

intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

Minimum Requirement:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics.**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ**
- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

Prescribed Lab Manual: A book titled ***A Course Book of Advanced Communication Skills (ACS) Lab*** published by Universities Press, Hyderabad.

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**

Books Recommended:

1) Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2) Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3) Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4) Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5) The Basics of Communication: A Relational Perspective. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
6) English Vocabulary in Use series, Cambridge University Press 2008.
7) Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
8) Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
9) Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10) Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.

11) Job Hunting by Colm Downes, Cambridge University Press 2008.
12) Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13) English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.
14) Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/ Cambridge University Press.
15) International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

***Advanced Communication Skills Lab Practicals**:*

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

1. Seminar/ Professional Presentation

2. A Report on the same has to be prepared and presented.

**** Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***

**** Not more than two students to work on each mini project.***

**** Students may be assessed by their performance both in oral presentation and written report.***

Outcomes

- Accomplishment of sound vocabulary and its proper use contextually.
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

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(R16EEE1205) POWER ELECTRONICS AND SIMULATION LAB

Any Eight of the Experiments in Power Electronics Lab

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 fully controlled bridge converter with R and RL loads.
5. Forced Commutation circuits (Class A, Class B, Class C, Class D and Class E).
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel, inverter with R and RL loads.
8. Single Phase Cyclo-converter with R and RL loads.
9. Single Phase half controlled converter with R load.
10. Three Phase half controlled bridge converter with R-load.
11. Single Phase series inverter with R and RL loads.
12. Single Phase Bridge converter with R and RL loads.
13. Single Phase dual converter with RL loads.
14. Operation of MOSFET based chopper.

Any two simulation experiments with PSPICE/PSIM:

1. Single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
2. Resonant pulse commutation circuit and Buck chopper.
3. Single- phase Inverter with PWM control.

REFERENCE BOOKS:

1. Simulation of Electric and Electronic circuits using PSPICE, M.H.Rashid, PHI.
2. PSPICE AD user's manual — Microsim, USA.
3. PSPICE reference guide — Microsim, USA.
4. MATLAB and its Tool Books user's manual and — Mathworks, USA.
5. Spice for power electronics and electric power, Rashid , CRC Press.

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(R16EEE1115) SWITCHGEAR AND PROTECTION

Objectives

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasis on Neutral grounding for overall protection.

UNIT – I

Circuit Breakers: Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – II

Electromagnetic and Static Relays: Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. **Relays Classification:** Instantaneous, DMT and IDMT types. Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation. **Distance relays:** Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. **Static Relays:** Static Relays verses Electromagnetic Relays.

UNIT – III

Generator & Transformer Protection : Protection of generators: against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected. **Protection of transformers:** Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT – IV

Feeder &Bus-Bar protection & Grounding: Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection. **Neutral Grounding:** Grounded and Ungrounded Neutral Systems. - Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

UNIT – V

Protection Against Over Voltages: Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinco-xide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

TEXT BOOKS:

1. Switchgear and Protection, Sunil S Rao, Khanna Publlishers.
2. Protection and Switchgear, Bhavesh Bhalja, R. P. Maheshwari, Nilesh G. Chothani, Oxford University Press.

REFERENCE BOOKS:

1. Electrical Power Systems, C.L.Wadhwa, New Age international (P) Limited, Publishers.
2. Power System Protection and Switchgear, Badari Ram, D.N Viswakarma, TMH Publications.
3. Electrical Power System Protection, C. Christopoulos and A. Wright, Springer International.
4. Electrical Power Systems, PSR. Murty, BS Publications.
5. Power system protection and switch gear by Bhuvanesh Oza, TMH,
6. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
7. A Textbook of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
8. Principles of Power Systems**,** V.K Mehta and Rohit Mehta S.Chand Company Pvt. Ltd.

Outcomes:

After going through this course the student gets a thorough knowledge on, various types of protective devices (circuit breakers, relays etc..) and their co-ordination, protection of generators, transformers, feeders, bus-bars, through different types of protective devices, overvoltage protection, lightening, concept of earthling and grounding, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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3	-/1/-	3

(R16EEE1116) UTILIZATION OF ELECTRICAL ENERGY

Objectives

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their application to electrical traction systems.

UNIT – I

Electric Drives: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT – II

Electric Heating & Welding: Electric Heating: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. **Electric welding:** resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT – III

Illumination : Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT – IV

Electric Traction-I : System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking. Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT – V

Electric Traction-II: Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. Utilization of Electrical Power, Er. R. K. Rajput, Laxmi Publications.
2. Art & Science of Utilization of electrical Energy, Partab, Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Utilization of Electric Energy, E. Openshaw Taylor, University press.
2. Generation, Distribution and Utilization of electrical Energy, C.L. Wadhwa, New Age International (P) Limited.
3. Utilization of Electrical Power including Electric drives and Electric traction, N.V.Suryanarayana, New Age International (P) Limited.
4. Utilization of Electric Energy, VVL Rao, University Press.

Outcomes:

After going through this course the student gets a thorough knowledge on, electric drives characteristics and their applicability in industry, nature of different types of loads and their characteristics, concept of electric heating welding, illumination, electric traction and utilization of electric energy by the above mentioned means, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16ECE1114) DIGITAL SIGNAL PROCESSING

Objectives

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete-time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real-world signal processing applications.
- To acquaint in FFT algorithms, Multi-rate signal processing techniques and finite word length effects.

UNIT – I

Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, Linear Shift Invariant Systems, Stability, and Causality, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT – II

Discrete Fourier series: DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

UNIT – III

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT – IV

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency
Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT – V

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion. **Finite Word Length Effects:** Limit cycles, Overflow

Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round-off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Dead Band Effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCE BOOKS:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009
4. Discrete Systems and Digital Signal Processing with MATLAB – Taan S. EIAli, CRC press, 2009.
5. *Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and* Barrie W. Jervis, 2 Edition, Pearson Education, 2009.
6. Digital Signal Processing - Nagoor Khani, TMG, 2012

Outcomes:

On completion of this subject, the student should be able to:

- Perform time, frequency and Z -transform analysis on signals and systems.
- Understand the inter-relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of roundoff errors.
- Design a digital filter for a given specifications. Understand the fast computation of DFT and appreciate the FFT processing.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

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(R16EEE1118) POWER SYSTEM OPERATION AND CONTROL

Objectives

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

UNIT – I

Economic Operation of Power Systems: Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II

Hydrothermal Scheduling: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems-Short term hydrothermal scheduling problem.

UNIT – III

Modeling: Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function. **Modeling of Excitation System**: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT – IV

Single Area & Two-Area Load Frequency Control : Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

Load frequency control of 2-area system: Uncontrolled case and controlled case, tie-line bias control.

Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – V

Reactive Power Control: Overview of Reactive Power control – Reactive

Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems. Load compensation: Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation. (Qualitative treatment)

TEXT BOOKS:

1. Power System Operation and Control, Dr. K. Uma Rao, Wiley India Pvt. Ltd.
2. Power Systems Analysis, operation and control, Abhijit Chakrabarti, Sunitha Halder, PHI.

REFERENCE BOOKS:

1. Operation and Control in Power Systems, PSR Murthy, BS Publications.
2. Power systems stability and control, Prabha Kundur, The McGraw – Hill companies**.**
3. Power System Analysis, C.L.Wadhwa, Newage International.
4. Modern Power System Analysis, I.J.Nagrath & D.P.Kothari Tata McGraw – Hill Publishing Company Ltd.
5. Power System Analysis and Design*,* J.Duncan Glover and M.S.Sarma, Cengage Learning.
6. Power System Analysis, Grainger and Stevenson, Tata McGraw Hill.

Outcomes:

After going through this course the student gets a thorough knowledge on, economic operation of power systems, scheduling of hydro-thermal power plants, modeling of the power system components like turbine, governor and excitation systems, necessity of keeping the frequency of the power system constant , load frequency control in single and two area systems, operation of load frequency controllers, reactive power control, uncompensated transmission line and compensation in transmission systems through shunt and series compensations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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4	-/-/-	4

(R16EEE1119) HIGH VOLTAGE ENGINEERING
(ELECTIVE - I)

Objectives

This subject deals with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition High voltage testing methods are also discussed.

UNIT – I

Introduction to High Volatge Engineering: Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT – II

Break Down in Dielectric Materials: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT – III

Generation & Measurement of High Voltages & Currents : Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators. Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT – IV

Over Voltages & Insulation Co-Ordination: Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT – V

Testing Of Materials & Electrical Apparatus: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements. Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, and Radio Interference measurements.

TEXT BOOKS:

1. High Voltage Engineering, M.S.Naidu and V. Kamaraju, TMH Publications.
2. High Voltage Engineering, C.L.Wadhwa, New Age Internationals (P) Limited.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals, E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier.
2. High Voltage Insulation Engineering, Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited.
3. High Voltage Engineering, Theory and Practice, Mazen Abdel Salam, Hussein Anis, Ahdan El-Morshedy, Roshdy Radwan , Marcel Dekker

Outcomes:

After going through this course the student gets a thorough knowledge on, basics of high voltage engineering, break-down phenomenon in different types of dielectrics, generation and measurement of high voltages and currents, the phenomenon of over-voltages, concept of insulation coordination, testing of various materials and electrical apparatus used in high voltage engineering, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16ECE1115) VLSI DESIGN
(ELECTIVE - I)

Objectives

The objectives of the course are to:

- Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
- Give exposure to the design rules to be followed to draw the layout of any logic circuit.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT – I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS **Basic Electrical Properties:** Basic Electrical Properties of MOS and BiCMOS Circuits: I – V relationships, MOS transistor threshold Voltage, g , g , Figure of merit ùo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT – II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 ìm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT – III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT – IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT – V

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3 Ed, Pearson, 2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3 Edition, 1997.
4. VLSI Design- K. Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

Course Outcomes:

- Upon successfully completing the course, the student should be able to:
- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit
- Draw the layout of any logic circuit which helps to understand and estimate parasitics of any logic circuit
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics
- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand Design of large memories.
- design simple logic circuit using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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(R16EEE1120) DIGITAL CONTROL SYSTEMS
(ELECTIVE - I)

Objectives

This course gives fundamentals digital control systems, z-transforms, state space representation of the control systems, concepts of controllability and observabilty, estimation of stability in different domains, design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

UNIT – I

Introduction : Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

Z – TRANSFORMS: Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms. Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT – II

State Space Analysis: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and its Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations. Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT – III

Stability Analysis: Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – IV

Design of Discrete Time Control System : Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – V

State Feedback Controllers & Observers: Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2 Edition.
2. Digital Control Systems , V. I. George, C. P. Kurian, Cengage Learning

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2 Edition, 2003.Digital Control and State Variable Methods by M.Gopal, TMH .
2. Digital Control Engineering Analysis and Design M. Sami Fadali Antonio Visioli, AP Academic Press.

Outcomes:

After going through this course the student gets a thorough knowledge on, basics of digital control systems, z-transforms, mapping between S-plane and Z-plane, state-space analysis, concept of controllability and observabilty, derivation of pulse-transfer function, stability analysis in S-domain and Zdomains, stability through jury-stability test, stability through bilinear transformation and R-H criteria, design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1121) OPTIMIZATION TECHNIQUES
(ELECTIVE - II)

Objectives

This course introduces various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming, constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.

UNIT – I

Introduction & Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II

Linear Programming: Standard form of a linear programming problem –geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – III

Transportation Problem & Unconstrained Optimization: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

UNIT – IV

Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – V

Dynamic Programming: Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited.
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited.

REFERENCE BOOKS:

1. Operations Research, Dr. S.D.Sharma.
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt .LTd.
3. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd.
4. Operations Research, Richard Bronson, Govindasami Naadimuthu, Tata Mc Graw – Hill Company Limited.

Outcomes:

After going through this course the student gets a thorough knowledge on, Optimization of electrical and electronics engineering problems through classical optimization techniques, linear programming, simplex algorithm, transportation problem, unconstrained optimization, constrained non-linear programming and dynamic programming, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1122) ELECTRICAL DISTRIBUTION SYSTEMS (ELECTIVE - II)

Objectives

This course gives the complete knowledge of electrical distribution systems, the design of feeders, substations. It also gives conceptual knowledge on how to determine the performance of a distribution system through its important parameters i.e. voltage drops and power losses and the very important thing that protection of the system by means of protective devices and their co-ordination during the several fault conditions. It also specifies how to improve the voltage profiles and power factor of the system to better value using various voltage control and compensation techniques.

UNIT – I

Introduction & General Concepts: Introduction to distribution systems: Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor.

Classification of loads: Residential, commercial, Agricultural and Industrial loads and their characteristics.

UNIT – II

Distribution Feeders & Substations: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. **Substations:** Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT – III

Distribution System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – IV

Protective Devices & Co-Ordination: Objectives of distribution system protection, types of common faults and procedure for fault calculations.

Protective Devices: Principle of operation of Fuses, Circuit Reclosures, and line sectionalizes, and circuit breakers. **Coordination of Protective Devices:** General coordination procedure.

UNIT – V

Voltage Control & P.F Improvement: Equipment for voltage control, effect of series capacitors, line drop Compensation, effect of AVB/AVR. Powerfactor control using different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched), capacitor allocation - Economic justification –Procedure to determine the best capacitor location.

TEXT BOOKS:

1. Electrical Power Distribution Systems,V.Kamaraju , TMH.
2. Elecrical Distrubution Systems, Dr. S. Siva naga raju, Dr. K. Shankar. Danapathi Rai Publications.

REFERENCE BOOKS:

1. Electric Power Distribution System Engineering, Turan Gonen, CRC Press.
2. Electric Power Generation, Transmission and Distribution, SN. Singh, PHI Publishers.

Outcomes:

After going through this course the student gets a thorough knowledge on, general aspects of electrical distribution systems, design and analysis of distribution feeders and substations, distribution systems analysis through voltage-drop and power loss calculations, operation of protective devices used in distribution systems and their co-ordination, voltage control and power factor improvement through capacitor compensation and distribution system faults analysis, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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L	T/P/D	C
3	-/1/-	3

(R16EEE1123) ELECTRICAL ESTIMATION AND COSTING (ELECTIVE - II)

Objectives

Emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability. Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design. These techniques should help the students to successfully estimate costing of the products / projects that are part of our every day usage.

UNIT – I

Design Considerations of Electrical Installations: Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections , Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT – II

Electrical Installation for Different Types of Buildings and Small Industries: Electrical installations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT – III

Overhead and Underground Transmission and Distribution Lines: Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT – IV

Substations: Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT – V

Design of Illumination Schemes: Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes.

TEXT BOOKS:

1. Electrical Design Estimating and Costing, K. B. Raina, S. K. BhattAcharya, New Age International Publisher.
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.
3. Electricity Pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P. E., CRC Press.

REFERENCE BOOKS:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650V), Indian Standard Institution, IS: 31061966.
5. Code of Practice for earthling, Indian Standard Institution, IS:30431966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts), Indian Standard Institution, IS: 2274-1963.
8. Electrical Installation, estimating and costing, Gupta J. B., Katson, Ludhiana.

Outcomes:

After going through this course the student gets a thorough knowledge on, estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability, exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16ECE1215) MICROPROCESSORS AND INTERFACING DEVICES LAB

8086 Microprocessor:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversion.
7. ASCII to Decimal conversion.
8. Program for sorting an array for 8086.
9. Program for searching for a number or character in a string for 8086.
10. Program for string manipulations for 8086.

MASM Programming:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series. 6. Hexadecimal to Decimal conversion.

8051 Microcontroller:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series.
6. Masking of Bits.
7. Hexadecimal to Decimal conversion.

Interfacing with 8086 Microprocessor:

1. Stepper motor interfacing to 8086.
2. Traffic Light Controller interfacing to 8086.
3. Elevator simulator interfacing to 8086.
4. Seven-segment Display interfacing to 8086.
5. Tone Generator interfacing to 8086.
6. Interfacing ADC and DAC to 8086.
7. SRAM and DRAM interfacing to 8086.
8. Digit Key - interfacing to 8086.

Note: Minimum of 12 experiments to be conducted.

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(R16EEE1206) ELECTRICAL MEASUREMENTS LAB

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit
6. Schering bridge & Anderson bridge.
7. Measurement of 3-phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

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

9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
12. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using a.c. bridge
16. Measurement of % ratio error and phase angle of given C.T. by comparison.

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L	T/P/D	C
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(R16EEE1125) FUNDAMENTALS OF HVDC AND FACTS DEVICES

Objectives

This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Harmonics and Filters, Reactive power control and Power factor improvements of the system. It also deals with basic FACTS concepts, static shunt and series compensation and combined compensation techniques.

UNIT – I

Introduction: Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of Gratez circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT – II

Converter & HVDC System Control: Principles of DC Link Control –Converters Control Characteristics – system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

UNIT – III

Harmonics, Filters and Reactive Power Control : Introduction, generation of harmonics, AC and DC filters, Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

Power Flow Analysis in AC/DC Systems: Modeling of DC/AC converters, Controller Equations-Solutions of AC/DC load flow –Simultaneous method Sequential method.

UNIT – IV

Introduction to FACTS : Flow of power in AC parallel paths and meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers.

Static Shunt Compensators: Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

UNIT – V

Static Series Compensators : Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes.

Combined Compensators: Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller, control structure.

TEXT BOOKS:

1. HVDC Transmission, S. Kamakshaiah, V. Kamaraju, The Mc – Graw Hill Companies.
2. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani, Laszlo Gyugyi, IEEE Press, Wiley India.

REFERENCE BOOKS:

1. HVDC and Facts Controllers Applications of Static Converters in Power Systems, Vijay K. Sood, Kluwer Academic Publishers.
2. HVDC Power Transmission Systems: Technology and system Interactions, K.R.Padiyar, New Age International (P) Limited.
3. Thyristor – Based Conrollers for Electrical Transmission Systems, R. Mohan Mathur, Rajiv K. Varma.Wiley India.
4. FACTS Modeling and Simulation in Power Networks, Enrique Acha, Wiley India Distributed by BSP Books Pvt. Ltd.

Outcomes:

After going through this course the student gets a thorough knowledge on, basics of HVDC system, converters control schemes harmonics filters reactive power control and power flow analysis in HVDC systems and basic concepts of FACTS, necessity of FACTS controllers and their operation, shunt and series compensation through various static compensators, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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3	-/1/-	3

(R16CSE1144) NEURAL NETWORKS AND FUZZY LOGIC (ELECTIVE - III)

Objectives

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

UNIT – I

Introduction & Essentials to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCullochPitts Model, Historical Developments, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT – II

Single & Multi Layer Feed Forward Neural Networks : Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, and Derivation of Back propagation (BP) Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT – III

Associative Memories-I: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

UNIT – IV

Associative Memories-II: Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield

Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

UNIT – V

Fuzzy Logic: Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, De-fuzzification methods.

TEXT BOOKS:

1) Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, Rajasekharan and Pai, PHI.
2) Neural Networks and Fuzzy Logic, C. Naga Bhaskar, G. Vijay Kumar, BS Publications.

REFERENCE BOOKS:

1. Artificial Neural Networks, B. Yegnanarayana, PHI.
2. Artificial Neural Networks, Zaruda, PHI.
3. Neural Networks and Fuzzy Logic System, Bart Kosko, PHI.
4. Fuzzy Logic and Neural Networks, M. Amirthavalli, Scitech Publications India Pvt. Ltd.
5. Neural Networks, James A Freeman and Davis Skapura, Pearson Education.
6. Neural networks by satish Kumar , TMH, 2004
7. Neural Networks, Simon Hakins , Pearson Education.
8. Neural Engineering, C.Eliasmith and CH.Anderson, PHI.

Outcomes:

After going through this course the student gets a thorough knowledge on, , biological neurons and artificial neurons, comparative analysis between human and computer, artificial neural network models, characteristics of ANN's, different types of activation functions, learning strategies, learning rules, perceptron models, single and multi layer feed-forward and feed-back neural networks, back-propagation algorithm, Kolmogorov Theorem, different types of associative memories and basics of fuzzy logic, concept of classical and fuzzy sets, fuzzy logic system components fuzzification and defuzzification, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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3	-/1/-	3

(R16EEE1124) RENEWABLE ENERGY SOURCES
(ELECTIVE - III)

Objectives

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

UNIT – I

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT – II

Solar Energy Collection, Storage & Applications: Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Storage & Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT – III

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria. **Bio-Mass**: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT – IV

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT – V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, and principles of DEC.

TEXT BOOKS:

1) Non-Conventional Energy Sources, G.D. Rai, Khanna Publishers.
2) Introduction to renewable energy, Vaughn Nelson, CRC Press (Taylor & Francis).

REFERENCE BOOKS:

1) Renewable Energy Resources, Twidell & Wier, CRC Press (Taylor & Francis).
2) Renewable Energy Sources and Emerging Technologies, D. P. Kothari, K. C. Singal, Rakesh Ranjan, PHI Learning Private Limited.
3) Fundamentals of Renewable Energy Systems, D. Mukherjee, S. Chakrabarti, New Age International.
4) Renewable Energy Power for a sustainable Future, Godfrey Boyle, Oxford University Press.
5) Renewable energy resources, Tiwari and Ghosal, Narosa publications.
6) Renewable Energy Technologies, Ramesh & Kumar, Narosa publications.
7) Non-Conventional Energy Systems, K Mittal, Wheeler publications.

Outcomes:

After going through this course the student gets a thorough knowledge on, , various types of renewable energy sources i.e. solar, wind, bio-mass, geothermal, ocean , hybrid energy systems and principles of direct energy conversion, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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3	-/1/-	3

(R16EEE1126) PRINCIPLES OF RELIABILITY ENGINEERING
(ELECTIVE - III)

Objectives

This subject introduces the concept of probability, reliability, distribution functions, and various methods and techniques to calculate and estimate the reliability of different engineering problems and models.

UNIT – I

Basics of Probability Theory & Distribution: Basic probability theory –rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

UNIT – II

Network Modeling & Reliability Analysis: Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

UNIT – III

Reliability Functions: f(t), F(t), R(t), h(t) and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT – IV

Markov Modeling: Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

UNIT – V

Frequency & Duration Techniques: Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

TEXT BOOKS:

1. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

Outcomes:

After going through this course the student gets a thorough knowledge on, basic probability theory, distribution functions , reliability analysis of various models through different methods, reliability functions, repairable irreparable systems reliability through markov modeling frequency and duration techniques, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1117) ADVANCED CONTROL SYSTEMS
(ELECTIVE - IV)

Objectives

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

UNIT – I

Stability Analysis-I: Frequency Domain: Polar Plots-Nyquist Plots-Stability Analysis. Lag, Lead, Lead-Lag Controllers design in frequency Domain.

UNIT – II

Stability Analysis-II: Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

UNIT – III

Phase-Plane Analysis: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT – IV

Describing Function Analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT – V

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. Advanced Control Theory, Somanath Majhi, Cengage Learning.

REFERENCE BOOKS:

1. Control Systems theory and applications, S.K Bhattacharya, Pearson.
2. Control Systems, N.C.Jagan, BS Publications.
3. Control systems, A.Ananad Kumar, PHI.
4. Control Systems Engineering, S.Palani, Tata-McGraw-Hill.
5. Control systems, Dhanesh N.Manik, Cengage Learning.
6. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
7. Control Systems, N.K.Sinha, New Age International (P) Limited Publishers.
8. Modern Control Engineering, Yaduvir Singh, S. Janardhanan, Cengage Learning.
9. Modern Control Engineering, K. Ogata, Prentice Hall of India, 3 edition, 1998.
10. Modern Control System Theory, M. Gopal, New Age International Publishers.
11. Modern Control Engineering, D. Roy Choudhury, PHI Learning.

12. Digital Control and State Variable Methods, M. Gopal, Tata Mc Graw-Hill Companies.

Outcomes:

After going through this course the student gets a thorough knowledge on, , basics of advanced control systems, stability analysis of control systems in frequency domain through polar & nyquist plots , design of lag, lead, laglead compensators in frequency domain, stability analysis through lypanov stability , phase-plane analysis, non-linear systems , describing functions ,state space analysis of continuous systems and concept of controllability and observabilty, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16EEE1127) EHV AC TRANSMISSION
(ELECTIVE - IV)

Objectives

This course introduces the concepts of extra high voltage AC transmission. It also emphasis on the behavior of the line parameters for extra high voltages, voltage gradients of the transmission line conductors gradients, the effect of corona, electrostatic filed calculations, travelling wave theory concept, voltage control when the line carries extra high voltages.

UNIT – I

Introduction : Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples.

Line and ground reactive parameters: Line inductance and capacitances – sequence inductances and capacitances – modes of propagation – ground return - Examples

UNIT – II

Voltage Gradients of Conductors: Electrostatics – field of sphere gap –field of line changes and properties – charge – potential relations for multi conductors – surface voltage gradient on conductors – distribution of voltage gradient on sub-conductors of bundle – Examples.

UNIT – III

Corona Effects: Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples. Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

UNIT – IV

Electro Static Field: Electrostatic field: calculation of electrostatic field of EHV/AC lines – effect on humans, animals and plants – electrostatic induction in unenergized circuit of double-circuit line – electromagnetic interference Examples.

Traveling wave theory: Traveling wave expression and solution- source of excitation- terminal conditions- open circuited and short-circuited endreflection and refraction coefficients-Lumped parameters of distributed lines- generalized constants-No load voltage conditions and charging current.

UNIT – V

Voltage Control: Power circle diagram and its use – voltage control using synchronous condensers – cascade connection of shunt and series compensation – sub synchronous resonance in series capacitor – compensated lines – static VAR compensating system.

TEXT BOOKS:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVAC and DC Transmission by S. Rao.

REFERENCE BOOKS:

1. Rokosh Das Begamudre,"Extra High Voltage AC Transmission Engineering"– Wiley Eastern LTD.
2. Edison,"EHV Transmission line"- Electric Institution.

Outcomes:

After going through this course the student gets a thorough knowledge on, general aspects and necessity of extra high voltage (EHVAC) transmission, advantages and disadvantages of EHVAC, concepts of voltage gradient, effects of corona, electro static field calculations, theory of travelling waves and voltage control of EHVAC transmission, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(R16ECE1129) INTRODUCTION TO NANOTECHNOLOGY
(ELECTIVE - IV)

Objectives

Nano-Technology is one of the core subjects of multidisciplinary nature. This has extensive applications in the field of energy, electronics, Biomedical Engineering. Etc. Built to specifications by manufacturing matter on the atomic scale, the Nano products would exhibit an order of magnitude improvement in strength, toughness and efficiency. The objective here is imparting the basic knowledge in Nano Science and Technology.

UNIT – I

Introduction: History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges and Future Prospects.

UNIT – II

Unique Properties Of Nanomaterials: Microstructure and Defects in Nano-crystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and disclinations, **Effect of Nano-dimensions on Materials Behavior:** Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, Enhanced solid solubility, **Magnetic Properties**: Soft magnetic nanocrystalline alloy, Permanent magnetic nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties and Mechanical Properties.

UNIT – III

Synthesis Routes: Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Sol-gel method ,Self assembly, **Top down approaches:** Mechanical alloying, Nano-lithography, **Consolidation of Nanopowders**: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT – IV

Tools to Characterize Nanomaterials: X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT – V

Applications of Nanomaterials: Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water- Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS:

1) Text Book of Nano Science and Nano Technology, B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University PressIIM.
2) Introduction to Nanotechnology, Charles P. Poole, Jr., and Frank J. Owens, Wley India.

REFERENCE BOOKS:

1) Nano: The Essentials, T.Pradeep, Mc Graw- Hill Education.
2) Nanomaterials, Nanotechnologies and Design, Michael F. Ashby, Paulo J. Ferreira and Daniel L.Schodek.
3) Transport in Nano structures, David Ferry, Cambridge University press.
4) Nanofabrication towards biomedical application: Techniques, tools, Application and impact, Ed. Challa S.S. R. Kumar, J. H. Carola.
5) Carbon Nanotubes: Properties and Applications, Michael J. O'Connell.
6) Electron Transport in Mesoscopic systems, S. Dutta, Cambridge University press.

Outcomes:

The present syllabus of "Introduction to Nano Technology" will give insight into many aspects of Nanoscience, technology and their applications in the prospective of materials science.

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(R16EEE1207) INDUSTRIAL ORIENTED MINI PROJECT

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(R16EEE1208) SEMINAR

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L	T/P/D	C
-	-/15/-	9

(R16EEE1209) MAJOR PROJECT

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B.Tech. - IV Year – II Semester

L	T/P/D	C
-	-/-/-	2

(R16EEE1210) COMPREHENSIVE VIVA