ACADEMIC REGULATIONS
COURSE STRUCTURE
AND DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS
ENGINEERING

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2011-12)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
L.B.Reddy Nagar :: MYLAVARAM – 521 230 :: Krishna District
Andhra Pradesh State
# ACADEMIC REGULATIONS FOR AUTONOMOUS STREAM

(2011-2012 Batch)

(Common to all branches)

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1. **INTRODUCTION**

Academic Programmes of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These academic rules and regulations are applicable to the students admitted during academic year 2010-11 into first year of four year undergraduate programme offered by the college leading to Bachelor of Technology (B.Tech) degree in the disciplines viz., Computer Science and Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Information Technology, Mechanical Engineering.

1.1 Lakireddy Balireddy College of Engineering, Mylavaram, an autonomous institution, follows Semester pattern for all four years of its undergraduate B.Tech programmes with internal and external evaluation.

1.2 **Semester Pattern**: Each academic year shall be divided into two semesters, each of 20 week duration, including instruction, evaluation, etc. Each semester consists of a minimum of 90 instruction days with at least 35 to 40 contact periods per week.

2. **PROGRAMMES OFFERED (UNDER GRADUATE)**

Presently, the college is offering Under Graduate Programmes in the following disciplines:

* Aero Space Engineering (AE)
* Computer Science and Engineering (CS)
* Electronics and communication Engineering (EC)
* Electrical and Electronics Engineering (EE)
* Electronics and instrumentation Engineering (EI)
* Information Technology (IT)
* Mechanical Engineering (ME)

3. **ELIGIBILITY CRITERIA FOR ADMISSION**

* The eligibility criteria for admission into 1st year B.Tech programme shall be as mentioned below:
* Admissions in each programme in the Institution are classified into **CATEGORY - A** (70% of intake) and **CATEGORY- B** (30% of intake).

3.1 **CATEGORY – A SEATS**:

* The candidate shall be of 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.
* The candidate should have passed the qualifying examination (10+2) or equivalent on the date of his/her counseling for admission and secured the rank at the Common Entrance Test conducted by the State and also satisfy other conditions laid down in the G.O.s.

* The candidate should satisfy Local/Non-Local status requirement as laid down in the Andhra Pradesh Educational Institutions (Regulation of Admissions) Order, 1974 as subsequently amended.

### 3.2.1 CATEGORY - B SEATS:

* The candidate shall be of Indian National or a Non-Resident Indian.

* The candidate should have completed 16 years of age as on 31st December of the Academic year for which the admissions are being conducted.

* Category B Seats shall be thrown open for admission to all the eligible candidates on the basis of merit from within the state, other states, Union territories and NRI/NRI sponsored candidates

* Out of the 30% quota of Category B Seats, seats not exceeding 15% of the sanctioned intake in each course shall be filled on merit basis with NRI/NRI sponsored candidates (vide G.O.Ms.140 HE Dept Dt:31.07.08), who have passed qualifying examination with not less than 50% of aggregate marks or Cumulative Grade Point Average (CGPA) equivalent to 5 on a scale of 10.

* The remaining 15% of seats and the leftover seats after filling NRI/NRI sponsored candidates shall be filled with candidates from within state as per the merit order (EAMCET/AIEEE) interpreted by a Division Bench of Hon’ble High Court of AP in W.P. No.17385/2009 dt.:18-09-2009, which is put on website. Only thereafter if any still remain unfilled the colleges can fall back upon the option of filling up such vacant seats with candidates who have qualified at the qualifying examination.

### 3.3 CATEGORY: LATERAL ENTRY

* The candidates should have passed the qualifying exam.(B.Sc. graduation & Diploma holders) shall be admitted into the II nd year Ist semester directly, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh. The candidate shall also satisfy any other eligibility requirements stipulated by the JNT University and / or the Government of Andhra Pradesh from time to time.
4. **AWARD OF B.TECH DEGREE**

A student will be declared eligible for the award of the B.Tech. by JNTUK 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 220 credits and secured 212 credits with specified compulsory subjects

**COMPULSORY SUBJECTS**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Specified Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>All the first year subjects</td>
</tr>
<tr>
<td>2.</td>
<td>All Practical Subjects</td>
</tr>
<tr>
<td>3.</td>
<td>Internship</td>
</tr>
<tr>
<td>4.</td>
<td>Comprehensive viva-voce</td>
</tr>
<tr>
<td>5.</td>
<td>Seminar</td>
</tr>
<tr>
<td>6.</td>
<td>Project Work</td>
</tr>
<tr>
<td>7.</td>
<td>Mini Project</td>
</tr>
</tbody>
</table>

5. **DURATION OF THE PROGRAMME**

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

6. **SEMESTER –WISE DISTRIBUTION OF CREDITS**

**TABLE 1 SEMESTER-WISE CREDITS DISTRIBUTION**

<table>
<thead>
<tr>
<th>SEMESTER</th>
<th>CSE</th>
<th>IT</th>
<th>ECE</th>
<th>EIE</th>
<th>EEE</th>
<th>ME</th>
<th>AE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>II</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>28</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>III</td>
<td>28</td>
<td>28</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>IV</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>V</td>
<td>30</td>
<td>28</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>VI</td>
<td>28</td>
<td>30</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>VII</td>
<td>32</td>
<td>32</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>VII</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
</tbody>
</table>
(i) There shall be an internship of four weeks duration (summer vacation) in an industry/ top academic institutes or R & D centers of excellence at the end of the VI semester.

(ii) The internships shall be supervised by a competent faculty member of the institute who in turn shall be in touch with the respective division head of the industry. The internships are compulsory and are credit based.

(iii) All the seminars, Term Paper and mini projects are credit based

7. DISTRIBUTION AND WEIGHTAGE OF MARKS:

(i) In each semester the course of study consists of 5 theory subjects + 3 laboratories or 6 theory subjects + 2 laboratories. However, in the VIII semester there shall be only 3 theory subjects in addition to the project work and comprehensive viva-voce.

(ii) The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, internship, seminar, Term Paper, Project work and Comprehensive Viva- Voce shall be evaluated for 50, 50, 50, 200 and 100 marks respectively.

(iii) For each theory subject the distribution shall be 25 (20+5 marks for attendance) marks for Internal Evaluation and 75 marks for the end semester examination.

(iv) For each theory subject, during each semester there shall be 2 tests, for a duration of 90 minutes. One descriptive test to be conducted in 1 – 2 units and the second test be conducted in 3 – 5 units thereby. However, 75% weightage for the best and 25% for the other first test shall be considered for awarding sessional marks

(v) The question paper for internal examinations shall contain 3 questions and each question consists of internal choice.

(vi) For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks(10 marks for day-to-day work, 10 marks for Internal test and 5 marks for attendance) and 75 end examination marks. The end examination shall be conducted by the teacher concerned and another external member.

(vii) For the subject having design and / or drawing (such as Engineering Graphics, machine Drawing), and estimation, the distribution shall be 25 marks for internal evaluation (10 marks for day-to-day work, 10 marks for Internal tests and 5 marks for attendance) and 75 marks for end examination. There shall be one internal test in a Semester.

(viii) All project works / internships / mini projects shall be evaluated by the committee. The committee consists of, head of the department, the supervisor of mini project and a senior faculty member of the department along with duly approved / recognized external examiner.
(ix) There shall be seminars in the III semester and V semester and Term Paper in VII semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Department committee consisting of Head of the department, seminar supervisor and a senior faculty member. The Term Paper / Seminar report shall be evaluated for 50 marks.

(x) Out of a total 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project. The End Semester Evaluation (viva-voce) shall be conducted by the same committee appointed for internship evaluation. The topics for mini project, seminar and project work shall be different from each other. The topic for Term Paper and Project work can be same. The evaluation of project work shall be conducted at the end of the VIII Semester.

(x) The comprehensive viva shall be conducted for 100 marks both in VI semester and VIII Semesters. The comprehensive viva shall be evaluated in the topics covering the core aspects of the subject in which the candidate is likely to graduate.

8. ATTENDANCE REGULATIONS AND CONDONATION:

(i) A student shall be eligible to appear for end semester examinations, if acquired a minimum of 75% of attendance in aggregate of all the subjects.

(ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (65% and above and below 75%) in each semester may be granted by the College Academic Committee. However, the subject of granting is purely at the discretion of the College Academic Committee or competent authority.

(iii) A Student will not be 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 as and when offered next.

(iv) Due weightage in each of the subjects shall be given to the attendance. Marks not exceeding 5 shall be given to all such candidates who satisfies the following criteria

<table>
<thead>
<tr>
<th>% of attendance</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 90</td>
<td>5</td>
</tr>
<tr>
<td>85 to &lt;90</td>
<td>4</td>
</tr>
<tr>
<td>80 to &lt;85</td>
<td>3</td>
</tr>
<tr>
<td>&gt;75 to &lt;80</td>
<td>2</td>
</tr>
<tr>
<td>=75</td>
<td>1</td>
</tr>
</tbody>
</table>
(v) 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 particular semester and their registration for examination shall stands cancelled.

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

(vii) Attendance may also be condoned for those who participate in prestigious sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose and recommended by the concerned authority.

9. **MINIMUM ACADEMIC REQUIREMENTS:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.8.

(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/she secures not less than a minimum of 40% of marks exclusively at the end semester examinations in each of the subjects in which candidate had appeared. However, the candidate should have secured minimum of 40% marks in both external and internal components put together to be eligible for passing in the subject.

(ii) A student will be promoted to next semester, if he satisfies the minimum attendance requirement.

(iii) Only such candidates who had completed their II Semester to III Semester of study and had obtained at least 40 credits (50% of the total credits up to III Semester) are eligible to study V Semester.

(iv) To be eligible to study VII Semester, the candidate should have secured a minimum of 68 credits (50% of the total credits up to V Semester).

(v) There shall be supplementary examinations along with the regular even semester examinations enabling the students to give a fair chance to appear in the subject if failed any.

(vi) However, an advanced supplementary examination shall be conducted for all such students who had failed in only one subject at the VII Semester of their study. Such an examination is applicable only for those students pursuing VIII semester.

(vii) Students who fail to earn 212 credits as indicated in the course structure including compulsory subjects as indicated in table – I within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.
10. **COURSE PATTERN:**

(i) The entire course of study is of four academic years. Each academic year shall have two semesters

(ii) A Student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject as and when conducted.

(iii) All admitted students’ are to study 4 electives during their course of four year study at the institute. The following shall be the programme of study of electives.

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>No. of electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

(iv) During the VIII semester, it is mandatory that departments offer 3 theory subjects and a comprehensive viva (covering all core subjects of engg) along with project work

(v) When a student is detained due to lack of credits/shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.

11. **AWARD OF GRADE:**

After a student has satisfied the requirement prescribed for the award of B.Tech. Degree, he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point of scale 4. The grade points are awarded as follows:

<table>
<thead>
<tr>
<th>CGPA</th>
<th>Award Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=3</td>
<td>First Class with Distinction</td>
</tr>
<tr>
<td>&gt;=2.4 and &lt;3</td>
<td>First division</td>
</tr>
<tr>
<td>&gt;2 and &lt;2.4</td>
<td>Second division</td>
</tr>
<tr>
<td>&gt;=1.6 and &lt; 2</td>
<td>Pass division</td>
</tr>
<tr>
<td>&lt; 1.6</td>
<td>Fail</td>
</tr>
</tbody>
</table>
Based on the performance of the candidate, the following shall be the criteria for the
award of letter grades at the end of each semester in the subjects in which the candidate
appeared for the examination

<table>
<thead>
<tr>
<th>Percentage of Marks Scored</th>
<th>Letter Grades</th>
<th>Grade points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=90</td>
<td>S</td>
<td>4.00</td>
</tr>
<tr>
<td>&gt;=85 to &lt;90</td>
<td>A+</td>
<td>3.67</td>
</tr>
<tr>
<td>&gt;=80 and &lt;85</td>
<td>A</td>
<td>3.33</td>
</tr>
<tr>
<td>&gt;=75 and &lt;80</td>
<td>B+</td>
<td>3.00</td>
</tr>
<tr>
<td>&gt;=70 and &lt;75</td>
<td>B</td>
<td>2.67</td>
</tr>
<tr>
<td>&gt;=65 and &lt;70</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>&gt;=60 and &lt;65</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>&gt;=55 and &lt;60</td>
<td>D+</td>
<td>1.67</td>
</tr>
<tr>
<td>&gt;=50 and &lt;55</td>
<td>D</td>
<td>1.33</td>
</tr>
<tr>
<td>&gt;=40 and &lt;50</td>
<td>E</td>
<td>1.00</td>
</tr>
<tr>
<td>&lt;40</td>
<td>F</td>
<td>0</td>
</tr>
</tbody>
</table>

11.1 Calculation of Grade Points Average (GPA)* for semester

The performance of each student at the end of each semester is indicated in
terms of GPA. The GPA is calculated as below:

\[ GPA = \frac{\sum (CR \times GP)}{\sum CR} \]

Where \( CR \) = Credits of a course
\( GP \) = Grade points awarded for a course
* GPA is calculated for the candidates who passed all the courses in that year/semester.

11.2 Calculation of Cumulative Grade Point Average (CGPA) for Entire
Programme.

The CGPA is calculated as below:

\[ CGPA = \frac{\sum (CR \times GP)}{\sum CR} \]  

(for entire programme)

Where \( CR \) = Credits of a course
\( GP \) = Grade points awarded for a course
12. **MINIMUM INSTRUCTION DAYS:**

The minimum instruction for each semester shall be 90 instruction days excluding examination days.

13. **GENERAL:**

(a) Where the words "he" "him" "his", occur in the regulations, they include "she", "her".

(b) The academic regulation should be read as a whole for the purpose of any interpretation.

(c) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Director is final.

(d) The Institute may change or amend the academic regulations or syllabi at any time duly approved by Academic council and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

14. **CHANGE OF BRANCH**

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

15. **TRANSITORY REGULATIONS**

A candidate, who is detained or discontinued in the semester, on readmission shall be required to do all the courses in the curriculum prescribed for such batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed in such courses, which he/she had passed in the earlier semester(s) he/she was originally admitted into.

15.1 A student who is following the JNTU, Kakinada curriculum, detained due to lack of academics/attendance at the end of the first semester of second year, shall join the autonomous batch of III Semester. Such students will study all the courses prescribed for that batch, in which the student joins. The first year marks shall not be converted in to course credits. However, the student has to clear all his first year backlog subjects by appearing the supplementary examinations, conducted by JNTU, Kakinada and courses prescribed in Autonomous stream for the award of Degree. The class will be awarded based on the academic performance of a student. Such candidates will be considered on par with lateral entry candidates of autonomous stream and will be governed by the regulations applicable to lateral entry candidates category.

15.2 A student who is following the JNTU, Kakinada curriculum, detained due to lack of academics/attendance at the end of the second semester of second year and also at the subsequent semesters, shall join with the autonomous batch at the appropriate semester. Such candidates shall be required to pass in all the courses
in the programme prescribed by concerned BOS for such batch of students, to be eligible for the award of degree. However, exemption will be given in all those courses of the semester(s) of the batch, which the candidate joins now, which he/she had passed earlier. The student has to clear all his backlog subjects by appearing the supplementary examinations, conducted by JNTU, Kakinada and College(Autonomous stream) for the award of Degree. The class will be awarded based on the academic performance of a student in the autonomous Pattern.

16. **COURSE CODE AND COURSE NUMBERING SCHEME**

Course Numbers are denoted by six digit unique alpha numeric characters. First two digits are described in Table 2.

<table>
<thead>
<tr>
<th>First Two Digits</th>
<th>Name of the Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>Aerospace Engineering Department</td>
</tr>
<tr>
<td>CS</td>
<td>Computer Science and Engineering Department</td>
</tr>
<tr>
<td>EC</td>
<td>Electronics &amp; Communication Engineering Department</td>
</tr>
<tr>
<td>EE</td>
<td>Electrical &amp; Electronics Engineering Department</td>
</tr>
<tr>
<td>EI</td>
<td>Electronics and Instrumentation Engineering Department</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology Department</td>
</tr>
<tr>
<td>ME</td>
<td>Mechanical Engineering Department</td>
</tr>
</tbody>
</table>

**TABLE 2 : FIRST AND SECOND DIGITS DESCRIPTION**

Third digit represents semester of offering as mentioned in Table No. 3. Fourth digit represents the type description (Theory/Lab.) of the course.

<table>
<thead>
<tr>
<th>THIRD DIGIT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Semester</td>
</tr>
<tr>
<td>2</td>
<td>Second Semester</td>
</tr>
<tr>
<td>3</td>
<td>Third Semester</td>
</tr>
<tr>
<td>4</td>
<td>Fourth Semester</td>
</tr>
<tr>
<td>5</td>
<td>Fifth Semester</td>
</tr>
<tr>
<td>6</td>
<td>Sixth Semester</td>
</tr>
<tr>
<td>7</td>
<td>Seventh Semester</td>
</tr>
<tr>
<td>8</td>
<td>Eight Semester</td>
</tr>
</tbody>
</table>

**TABLE 3: THIRD DIGIT DESCRIPTION**
Fourth digit represents course type, as per Table No. 4

<table>
<thead>
<tr>
<th>FOURTH DIGIT</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>0</td>
<td>Theory course</td>
</tr>
<tr>
<td>5</td>
<td>Lab course</td>
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</table>

**TABLE 4 : COURSE TYPE DESCRIPTION**

Fifth digit represents course number of the respective semester as described in Figure 1 below.

For example, CS105 course, the course is offered in the first semester (1), the course is of theory type (0) and the course number in that semester (5).

**FIGURE. 1 : COURSE CODE DESCRIPTION FOR COURSES**

For example, CS 451 course, the course is offered in Computer Science and Engineering Department (CS); offered in the fourth semester (4), the course is of lab type (5) and the course number is (1), as given in figure.2 below.

**FIGURE. 2 : COURSE CODE DESCRIPTION FOR COURSES**

17. **MEDIUM OF INSTRUCTION**

The medium of instruction and evaluation is English.
18. **AMENDMENTS TO REGULATIONS**

The Academic council from time to time may revise, amend, or change the regulations, schemes of examinations, and/or syllabi.

19. **ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)**

(i) The students have to acquire 168 credits from III Semester to VIII Semester of B.Tech Programme (Regular) for the award of the degree

(ii) Students, who fail to fulfill the requirement for the award of the degree in 7 consecutive academic years from the year of admission, shall forfeit their seat.

(iii) The same attendance regulations are to be adopted as that of B.Tech (Regular)

19.1 **Rules For Promotion into Next Higher Class:** (VI Semester to VII Semester)

A student shall be promoted from VI Semester to VII Semester only if he fulfills the academic requirements of 42 credits up to V semester.

19.2. **Award of Grade in each semester:**

After a student has satisfied the requirement prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes:

Based on the performance of every candidate, the following shall be the criteria for the award of grades at the end of each semester

<table>
<thead>
<tr>
<th>Percentage of Marks Scored</th>
<th>Letter Grades</th>
<th>Grade points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=90</td>
<td>S</td>
<td>4.00</td>
</tr>
<tr>
<td>&gt;=85 to &lt;90</td>
<td>A+</td>
<td>3.67</td>
</tr>
<tr>
<td>&gt;=80 and &lt;85</td>
<td>A</td>
<td>3.33</td>
</tr>
<tr>
<td>&gt;=75 and &lt;80</td>
<td>B+</td>
<td>3.00</td>
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<tr>
<td>&gt;=70 and &lt;75</td>
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<td>2.67</td>
</tr>
<tr>
<td>&gt;=65 and &lt;70</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>&gt;=60 and &lt;65</td>
<td>C</td>
<td>2.00</td>
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<tr>
<td>&gt;=55 and &lt;60</td>
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<td>1.67</td>
</tr>
<tr>
<td>&gt;=50 and &lt;55</td>
<td>D</td>
<td>1.33</td>
</tr>
<tr>
<td>&gt;=40 and &lt;50</td>
<td>E</td>
<td>1.00</td>
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<tr>
<td>&lt;40</td>
<td>F</td>
<td>0</td>
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</table>

Passed on the aggregate marks secured for the best 161 Credits (Lateral Entry).

The aggregate marks secured for 168 Credits. (i.e. III Semester to VIII Semester)
20. **GRADE CARD**

The grade card issued shall contain the following:

- a) The credits for each course offered for that semester
- b) The letter grade obtained in each course
- c) The SGPA/CGPA
- d) Total number of credits earned by the student up to the end of that semester

21. **CONDUCT AND DISCIPLINE**

(a) Students shall conduct themselves within and outside the premises of the Institute in a manner befitting the students of our Institution.

(b) As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.

(c) The following acts of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

(i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the campus.

(ii) Willful damage or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

(d) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

(e) Mutilation or unauthorized possession of library books.

(f) Noisy and unseemly behavior, disturbing studies of fellow students.

(g) Hacking in computer systems (such as entering into other person’s areas without prior permission, manipulation and/or damage of computer hardware and software or any other cyber crime etc.

(h) Usage of camera cell phones in the campus.

(i) Plagiarism of any nature.

(j) Any other act of gross indiscipline as decided by the academic council from time to time.
(k) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debarment from a examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

(l) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the Head of the Department and the principal respectively, shall have the authority to reprimand or impose fine.

(m) Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the principal for taking appropriate action.

(n) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council.

(o) The Institute Level Standing Disciplinary Action Committee constituted by the academic council, shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

(p) The Principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the Programmes Committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the academic council earlier, shall be reported to the academic council for ratification.

(q) “Grievance and Redressal Committee” (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative /disciplinary matters.

(r) All the students must abide by the code and conduct rules of the college.

22. MALPRACTICES

(a) The Principal shall refer the cases of malpractices in internal assessment tests and Semester-End Examinations, to a Malpractice Enquiry Committee, constituted by him/her for the purpose. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action, against the erring students basing on the recommendations of the committee.
(b) Any action on the part of candidate at an examination 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.

23. **AWARD OF RANK**

The rank shall be awarded based on the following:

1.1 Only such candidates who pass the Final Semester examination at the end of the eighth semester (Final Semester) after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree shall be eligible for the award of rank. Candidates, who lose one or more Semesters of study for any reason whatsoever are not eligible for the award of rank.

1.2 Ranks shall be awarded in each branch of study for the top five students appearing for the Regular Examinations.

1.3 Award of prizes, scholarships, or any other Honors shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.
## COURSE STRUCTURE

### I-SEMESTER

<table>
<thead>
<tr>
<th>Code No.</th>
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<th>Scheme of Examination</th>
<th>Total Credits</th>
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<td>Lab.</td>
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<td>English - I</td>
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<td>--</td>
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<td>Numerical methods</td>
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<td>--</td>
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<td>Electronics Devices and Circuits</td>
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<td>-</td>
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<td>Power Systems - I</td>
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<td>1</td>
<td>-</td>
<td>25</td>
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<td>4</td>
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<td>Lectures</td>
<td>Tutorial</td>
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### V-SEMESTER

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<td>1</td>
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<tr>
<td>T148</td>
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<td>Tutorial</td>
<td>Lab</td>
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|          |                                          | 24            | 5          | 6   | 275      | 625      | 900   | 31      |
### VIII-SEMESTER

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<td>Data Base Management Systems</td>
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**TOTAL CREDITS : 220**

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<td>VII Semester</td>
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<td>VIII Semester</td>
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T118 - APPLIED MATHEMATICS – I

Lecture : 4 Periods/week                     Internal Marks : 25
Tutorial : 1 Period/Week                  External Marks : 75
Credits : 4                               External Examination : 3 Hrs

UNIT - I


UNIT - II

Linear differential equations of second and higher order with constant coefficients and with variable coefficients, method of variation of parameters and their simple applications to Simple Harmonic Motion and Electrical Circuits.

UNIT - III

Generalized Mean Value theorems (without proof), Functions of several variables, Maxima and Minima of functions of two variables with constraints and without constraints. Lagrangian Multiplier method.

UNIT - IV

Curve tracing – Cartesian curves. Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian Coordinates. Multiple integrals - double and triple integrals (Cartesian Coordinates only) – Changing of order of Integration. (Cartesian Coordinates only)

UNIT - V


TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

UNIT - I

Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.
Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT - II

Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs.

UNIT - III

Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two dimensional and multi-dimensional arrays, applications of arrays. pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

UNIT - IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.

UNIT - V

Input and output – concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.

TEXT BOOKS

2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
REFERENCES

3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples by Prof. N.B. Venkateswarlu and, Prof. E.V. Prasad, S Chand & Co, New Delhi
4. C/C++ for Engineers and Scientists, Harry H. Cheng, McGraw Hill,
English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

**OBJECTIVES**

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
- To enable the students to face the academic and professional challenges of the present day scenario.
- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

**UNIT - I**

Chapter – 1: “Read & Proceed” from Step by Step *(Pearson)*
Extensive Reading - Masterminds– The Trailblazers – **Jagadis Chandra Bose** *(Orient Longman)*

**UNIT - II**

Chapter – 2: “Travel” from Step by Step *(Pearson)*
Extensive Reading - Masterminds– The World of Figures and Physics – **Chandra SekharaVenkata Raman** *(Orient Longman)*

**UNIT - III**

Chapter – 3: “Gender” from Step by Step *(Pearson)*
Extensive Reading - Masterminds–The Institution Builders– **Shanti SwarupBhatnagar** *(Orient Longman)*
UNIT - IV

Vocabulary – Synonyms, Antonyms, Words often Confused, Gerunds & Infinitives, Prefixes & Suffixes, Word plurals, Analogy
Grammar – Parts of Speech, Sentence Completion, Question Tags, Tense and Aspect

UNIT - V

Analytical Writing – Sentence Construction – Types of sentences, Exercises with scrambled words & Jumbled sentences, Paragraph writing, Dialogue writing (Formal & Informal), Letter Writing (Formal & Informal), Resume writing, Expansion (of a given topic), Abstract Writing (Summarizing / Synopsis), Decision-making, Drafting E-Mails & Memo writing, Essay writing.

TEXT BOOKS

- Step by Step (Pearson)
- Masterminds by EnakshiChatterjee (Orient Longman)

REFERENCES

T191 - ENGINEERING CHEMISTRY

Lecture : 4 Periods/week          Internal Marks : 25

External Marks : 75

Credits : 3             External Examination : 3 Hrs

UNIT - I


UNIT - II

FUELS AND COMBUSTION: Definition and classification of Fuels- conventional fuels (solid, liquid, gaseous), Solid fuels- coal - analysis, Proximate and ultimate analyses of coal – significances, Liquid Fuels – primary- petroleum- refining of petroleum- cracking, knocking, synthetic petrol – Bergius and Fischer Tropsch’s process; Gaseous fuels- octane number – cetane number,– water gas, producer gas CNG, and biogas - gross and net calorific values – (definition only) – flue gas analysis – Orsat’s apparatus.

UNIT - III


UNIT - IV


UNIT - V


2. LUBRICANTS: Introduction to Lubricants, Principles and function of lubricants - Types of Lubrication and Mechanism - Thick Film or Hydrodynamic Lubrication, Thin Film or
Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants-Viscosity, flash and fire point, cloud and pour point, aniline point, Neutralization Number and mechanical strength, Selection of lubricants.

TEXT BOOKS


REFERENCES

UNIT - I

INTERFERENCE: Superposition of waves-double slit interference- Young’s double slit experiment- Coherence – Interference from thin films- Newton’s rings.

DIFFRACTION: Diffraction and wave theory of light (Fresnel and Fraunhofer diffractions) - single slit Diffraction, Intensity in single- slit diffraction, Calculating the intensity- Double slit interference and diffraction combined.

GRATINGS AND SPECTRA - Multiple slits-width of the maxima, Diffraction gratings, Grating spectrum – Dispersion and Resolving power.

POLARIZATION: Polarization by reflection Brewster’s law - Double refraction -Polarization by scattering - Retarders -Optical Activity.

UNIT - II

CRYSTAL STRUCTURES: Introduction –periodic arrays of atoms-Lattice translation vectors, Basis and crystal structure, Primitive cell, fundamental types of lattices-three dimension lattice types, Crystal systems- Structure and packing fractions of Simple cubic- Body centered cubic- Face centered cubic crystals.

X-RAY DIFFRACTION: Directions and planes in crystals – Miller indices – separation between successive (h k l) planes- Diffraction of X-rays by crystal planes – Braggs law- Laue method- powder method.

UNIT - III


UNIT - IV

SUPER CONDUCTIVITY : Phenomenon, Meissner effect, critical parameters, Type I, Type II Super conductors, BCS theory of super conductivity, Applications of Super conductors.

UNIT - V


TEXT BOOKS
2. Engineering Physics by V RAJENDRAN Tata McGrahill

REFERENCES
1. Introduction to solid state physics, C. Kittel, John wiley, 1999.
2. Engineering physics by H K MALIK  AK SINGH TATA McGRAHILL
I) Write a programme in ‘C’ language to cover the following problems.
   a) Roots of Quadratic Equation.
   b) Example program which shows the usage of various Operators available in C Language.
   c) Example program which shows the usage of various preliminary Data types available in C Language.
   d) Example programs to illustrate the order of evaluation.

II) WRITE EXAMPLE PROGRAMS
   a) To check whether the given year is leap year (or) not
   b) Converting given two digit number into words using switch statement
   c) To illustrate the usage of ‘goto’ statement.
   d) Finding smallest& biggest number from the given set of 4 numbers using ‘if’ statement.
   e) Calculate the student grade in the examination – assume suitable constraints.
   f) Prepare electricity bill for the consumed units – assume suitable constraints.

III) EXAMPLE PROGRAMS
   a) To Display first N natural numbers
   b) To find whether the given number is Armstrong (or) not
   c) To find reverse of the given number and to check whether it is palindrome (or) not.
   d) To find whether given number is strong number (or) not.
   e) To check whether given number is Prime (or) not
   f) To display prime numbers with in the given range(Nesting of Loops).
   g) To display the following structure(Nesting of Loops)

   i) 1
      1 2
      1 2 3
      1 2 3 4
      1 2 3 4 5

   ii) 5 4 3 2 1
      4 3 2 1
      3 2 1
      2 1
      1
IV) Write example programs in C Language:
   a) To find factorial of a given number using functions.
   b) Swap two numbers using functions.
   c) To find GCD of two numbers using recursion
   d) Write a recursive function to solve Towers of Honai problem.
   e) Write an example program to illustrate use of external & static
      storage classes.

V) Write example programs in C Language to perform following operations:
   a) Finding the sum and average of given numbers using Arrays.
   b) To display elements of array in reverse order
   c) To search whether the given element is in the array (or) not
      using linear search & binary search.
   d) Write a C program to perform the following operations
      i) Addition, subtraction and multiplication of Matrices
      ii) Transpose of given matrix
         (The above operations are to be exercised using functions also by
         passing arguments)
   e) Write a C program to find whether the given string is palindrome
      (or) not.
   f) To accept line of text and find the number of characters, number of
      vowels and number of blank spaces in it.
   g) Write an example program to illustrate the use of any 5 string
      handling functions.

VI) a) Example program to bring clarity on pointer declaration &
      initialization and Pointer arithmetic.
   b) Write an example program to describe the usage of call by reference.
   c) Write a program to find sum of the elements of the array using
      functions.
   d) Write an example program to illustrate the usage of command line
      arguments.
   e) Program to illustrate the usage of dynamic memory management
      functions.

VII) a) Write an example program using structures to process the student
      record. Assume suitable fields for student structures (Different
      kinds of initialization of structure variables are to be exercised)
   b) Write a program to read records of 10 employees and find their
      average salary (exercise array of structures & Nested structures
      concepts through this program).
   c) Write a program to handle a structure variable using pointers and
      implement self referential structure (i.e. A structure variable
      having a pointer to itself)

VIII) Write an example program on file to perform following operations:
   a) Accessing content from files and writing content in to it.
      (Exercise different file operation modes)
   b) Copy the contents of one file into another (Exercise different file
      operation modes)
P830 - ENGINEERING PHYSICS AND CHEMISTRY LAB

Internal Marks : 25
Lab/Practicals: 3 Period/Week External Marks : 75
Credits : 2 External Examination : 3 Hrs

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ENGINEERING PHYSICS LABORATORY
(Any 5 experiments)

LIST OF EXPERIMENTS

1. LCR Resonance circuit
2. Newton’s Rings – Determination of Radius of curvature of plano convex lens
3. Verification of laws by using sonometer
4. Meldy’s experiment
5. Wedge shaped film
6. Volume Resonator
7. Refractive index of light
8. Diffraction Grating – Normal incidence method
9. Rigidity modulus of a given wire
10. Frequency of AC supply – Sonometer

ENGINEERING CHEMISTRY LABORATORY
(Any 5 experiments)

1. Estimation of total Hardness of water by EDTA method
2. Determination of Temporary and permanent hardness of water.
3. Iodometric Titration of K₂Cr₂O₇ v/s Na₂S₂O₃ to determine the percentage purity of K₂Cr₂O₇ sample.
4. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry.
5. Determine the amount of Oxalic acid and Sulphuric acid in 1 liter solution by using given standard Sodium Hydroxide and Potassium Permanganate solution
7. Determination of Dissolved Oxygen (DO) content by Winkler’s method.
8. Preparation of Urea formaldehyde resin.
P831 - ENGINEERING WORKSHOP

Internal Marks : 25
Lab/Practicals: 3 Period/Week
Credits : 2

External Marks : 75
External Examination : 3 Hrs

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TRADES FOR EXERCISES:

At least three exercise from each trade:

1. Carpentry
2. Fitting
3. House – Wiring
4. Plumbing

TRADES FOR EXERCISES: (MECHANICAL ENGINEERING)

At least two exercise from each trade:

1. Carpentry
2. Fitting
3. Tin - Smithy
4. Black - Smithy
5. House - Wiring
6. Plumbing

TEXT BOOK :


P832 - ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
The English Language Communications Skills Lab focuses on practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts. It aims at improving the communicative competence of students and to enrich their power of expression, articulation and persuasiveness. The thrust is on developing competences, both linguistic as well as communicative, in order to improve employability potential.

OBJECTIVES

1. To expose the students to a variety of self-instructional, learner-friendly modes of English language learning and stimulate intellectual and attitudinal exercise.
2. To provide students with the required facility and practice to face computer-based competitive exams such GRE, TOEFL, IELTS etc.
3. To enable them to learn better pronunciation through emphasis on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To develop necessary attitudes and behaviors so as to improve their employability quotient.

SYLLABUS

The following course content is prescribed for the English Language Communication Skills Laboratory sessions:

1. Dimensions of Phonetics: Phonetic Transcription, Sounds, Stress, Intonation, Rhythm, Varieties of Spoken English: Indian, British and American
2. Oral Presentations -- Prepared and Extempore -- JAM
3. Role Play
4. Describing Objects / Situations / People
5. Information Transfer
6. Debates
7. Group Discussions
T119 - APPLIED MATHEMATICS – II

Lecture : 4 Periods/week                     Internal Marks : 25
Tutorial : 1 Period/Week                 External Marks : 75
Credits : 4                                External Examination : 3 Hrs

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UNIT – I

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac’s delta function. Inverse Laplace transforms – Convolution theorem - Applications of Laplace transforms to ordinary differential equations

UNIT – II


UNIT – III


UNIT – IV


UNIT – V


TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

OBJECTIVES

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
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- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

UNIT - I

Chapter 4: “Disaster Management” from Step by Step (Pearson)
Extensive reading – Masterminds - The institution builders - Meghanad Saha (Orient Longman)

UNIT - II

Chapter 5: “Health” from Step by Step (Pearson)
Extensive reading – Masterminds- The New Age – Homi Jehangir Bhabha (Orient Longman)

UNIT - III

Chapter 6: “Sports” from Step by Step (Pearson)
Extensive reading – Masterminds - The New Age – Vikram Sarabhai (Orient Longman)

UNIT - IV

Grammar – Articles, Prepositions, Voice, Speech, Concord, Correction of Sentences
Vocabulary – Phrasal verbs, Gerunds, Infinitives, One word Substitutes.
UNIT - V

Analytical writing – Comprehension, Technical dialogue writing,
Presentation skills - Note making, Information transfer / Data interpretation (Tables, Pie-
charts, Bar graphs, Tree diagrams, Pictograms, etc.), Report writing

TEXTBOOK

*Step by Step, Pearson Education, New Delhi 2010.*
*Master Minds,* (Orient Longman).

REFERENCES

4. GRE and TOEFL, Kaplan and Baron's, Latest editions.
T264 - NUMERICAL METHODS

UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V


TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

1. Introductory Methods of Numerical Analysis by S. S. Sastry – PHI
2. Numerical Methods for Engineers with programming and software application by Steven C. Chopra and Ra. P. Canale – TMGH

T179- ELECTRICAL CIRCUIT ANALYSIS – I
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 is laid on the basic analysis of circuits which includes magnetic circuits Single phase circuits etc.

UNIT - I

INTRODUCTION TO ELECTRICAL CIRCUITS

UNIT - II

NETWORK TOPOLOGY
Definitions – Graph – Tree, Basic cut-set and Basic Tie-set matrices for planar networks – Loop and Nodal analysis of Networks with independent voltage and current sources - Duality & Dual networks

UNIT - III

MAGNETIC CIRCUITS

UNIT - IV

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 - V

RESONANCE & LOCUS DIAGRAMS
Resonance – series, parallel circuits, concept of band width and Q factor
Locus diagrams- Series R-L, R-C, R-L-C and parallel combination with variation of various parameters
TEXT BOOKS


REFERENCES

1. Network Analysis by Vanvalkenburg, PHI.
2. Electric Circuits by A. Chakraborthy, Dhanipat Rai & Co.
4. Problems in Electrical Engineering 9th edition N. N. Parker smith
UNIT - I


UNIT - II


UNIT - III

TRANSISTOR and FET CHARACTERISTICS : Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Current components in a transistor, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha,Beta and gamma, FET- JFET characteristics, Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Comparison of Transistors, Introduction to SCR and UJT.

UNIT - IV

BIASING AND STABILISATION : BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in VBE, Ico,) Thermal run away, Thermal stability.

UNIT - V


TEXT BOOK

REFERENCES

UNIT - I

Algorithm Analysis:
Mathematical Background, Model, Analysis and Run Time Calculations, Lists: Abstract Data Types, the List ADT, Singly Linked, Doubly Linked, Circular Linked List ADTs, Polynomial ADT.

UNIT - II

Stacks And Queues: The Stack ADT and applications; Infix to postfix expression conversion, Evaluation of Postfix expressions. The Queue ADT and Applications.

UNIT - III


UNIT - IV


UNIT - V

Hashing: Hash Function, Separate Chaining, Open Addressing, Rehashing, and Extendible Hashing.

TEXT BOOK

Mark Allen Weiss: “Data Structures and Algorithm Analysis in C”, 2nd ed, AW.

REFERENCES

P829 - ENGINEERING DRAWING WITH AUTOCAD LAB.

Internal Marks : 25
Lab/Practicals : 3 Period/Week
Credits : 2

External Marks : 75
External Examination : 3 Hrs

UNIT - I

Introduction to Engineering Drawing and its importance -Introduction to Computer Aided Drafting, Auto CAD commands, Setup Commands, Drawing Commands, Editing Commands, Dimensioning Commands -Theory of Projection – Elements of projection, planes of projection, and methods of projection. Orthographic Projection - Lines used in general engineering drawing, types of surfaces, invisible lines, precedence of lines, selection of views, principles of multi view drawing, steps to draw orthographic views, orthographic projection of different objects.

UNIT - II

Isometric Drawing- Theory of isometric projection-Isometric view and Isometric projection Isometric projection from Orthographic views for simple objects.

UNIT - III

Projections of points - Projection of straight Lines –Various positions of straight lines w.r.t reference planes, inclined to both planes.

UNIT - IV

Projections of Planes –Introduction, Planes parallel to reference planes, inclined to one reference plane and perpendicular to other, planes perpendicular to both reference planes, planes inclined to both reference planes.

UNIT - V

Projections of Solids –Types of solids, Polyhedra, solids of revolution, Projection of solids in simple position, projection of solids with axis inclined to one reference plane and parallel to other.

TEXT BOOKS

P827 – ELECTRONIC DEVICES AND CIRCUITS AND LabVIEW LAB.

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Internal Marks</th>
<th>External Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Periods/week</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>Credits : 2</td>
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</tr>
</tbody>
</table>

| External Examination: 3 Hrs |

List of Experiments

1. Signal Generation
2. PN junction diode characteristics
3. Zener diode characteristics
4. Full wave rectifier without & with filters
5. Transistor CE characteristics
6. Transistor CB characteristics
7. FET characteristics
8. CE Amplifier
9. CC Amplifier
10. Common Source FET Amplifier

Additional Experiments

11. Feedback amplifier (Voltage Series)
12. Feedback amplifier (Current Series)
OBJECTIVE

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

UNIT - I

Network theorems (both ac & dc networks)
Superposition, Reciprocity, Thévenin’s, Norton’s, Maximum Power Transfer, Millman’s and Compensation and Tellegen’s theorems- Statements of theorems and steps for solving networks.

UNIT - II

Three Phase Circuits
Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of active and reactive power

UNIT - III

Two Port Network Parameters
Open circuit impedance(Z) network parameters, Short circuit admittance(Y) network parameters – Transmission(ABCD), Inverse transmission(A'B'C'D') and hybrid parameters – Relationship between each two port network parameters – Reciprocity and Symmetry concepts of two port network parameters network.

UNIT - IV

Transient Analysis (both ac & dc networks)

UNIT - V

Network Synthesis
TEXT BOOK


REFERENCES

2. Network Analysis by Vanvalkenburg, PHI.
5. Electrical circuits-schauem series
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 – Gauss’s law – Application of Gauss’s Law – Maxwell’s first law, \( \text{div}(\mathbf{D}) = \rho_v \)

UNIT - II

Conductors and Dipole
Laplace’s and Poisson’s equations – Solution of Laplace’s equation in one variable. 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 co-axial 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 – Oesterd’s experiment - 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, \( \text{div}(\mathbf{B}) = 0 \). 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 – Curl (\( \mathbf{H} \))=\( \mathbf{J}_c \), Field due to a circular loop, rectangular and square loops.

UNIT - IV

Force in Magnetic fields
UNIT - V

Time Varying Fields

TEXT BOOKS


REFERENCES

1. “Introduction to Electro Dynamics” by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
4. “Electro magnetic Fields” by Sadiku, Oxford Publications
UNIT - I


UNIT - II

MINIMIZATION OF SWITCHING FUNCTIONS:
Map method, Prime implicants, Don’t care combinations, Minimal SOP and POS forms, Tabulation Method, Prime –Implicant chart, simplification rules.

UNIT - III

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips MSI & LSI: MUX Realization of switching functions, Parity bit generator, Code-converters. PROGRAMMABLE LOGIC DEVICES Basic PLD’s-ROM, PROM, PLA, PLD. Realization of Switching functions using PLD’s.

UNIT - IV

SEQUENTIAL CIRCUITS: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector. 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.

UNIT - V

ALGOROTHIMIC STATE MACHINES: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples.

TEXT BOOKS

REFERENCES

4. An Engineering Approach To Digital Design – Fletcher, PHI.
OBJECTIVE

This course introduces the concepts of various AC & DC machines in Electrical Engineering discipline. The emphasis of this course is laid on the machines which include D.C. Generators, D.C Motors, Single phase transformers, Auto transformers & Poly phase transformers.

UNIT - I

D.C. Generators

UNIT - II

D.C Motors
Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation–Speed control-3 point and 4 point starters–Constant and Variable losses-calculation of efficiency – condition for maximum efficiency – brake test – Swinburne’s test –Hopkinson’s test.

UNIT - III

Single phase transformers
Types - constructional details-emf equation - operation on no load and on load - phaser diagrams– Equivalent circuit - losses and efficiency-regulation. All day efficiency-effect of frequency & supply voltage on core losses- minimization of hysteresis and eddy current losses.

UNIT - IV

Testing of Single Phase Transformer
O.C and S.C tests - Sumner’s test - predetermination of efficiency and regulation-separation of losses test-Parallel operation with equal and unequal voltage ratios.

UNIT - V

Auto transformers & Poly-phase transformers
Auto transformers- comparison with two winding transformers-Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ-Scott connection -three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing.
TEXT BOOK


REFERENCES

OBJECTIVE

Electrical power plays significant role in day to day life of entire mankind. This course concerns with various types of power generation (renewable and non-renewable) along with its economic aspects.

UNIT - I

THERMAL AND NUCLEAR POWER STATIONS
Thermal Power Station: Line diagram of thermal power station showing paths of coal, steam, water, air, ash and flue gasses-Brief description of TPS components: Boilers, super heaters, Economizers, turbines, condensers, cooling towers and chimney.

UNIT - II

GAS AND SOLAR POWER GENERATION
Gas power station: Principle of operation and components (block diagram approach only).
Solar power generation: Line diagram of solar energy storage, solar energy collector, point focusing collector, solar power generation.

UNIT - III

WIND AND BIO-MASS ENERGY
Wind Energy: Basic principles of WEC, site selection consideration, basic components of WECS, classification of WECS, Wind energy collectors.

UNIT - IV

ECONOMIC ASPECTS OF POWER GENERATION
Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, capacity, utilization and plant use factors – Numerical problems.

UNIT - V

TARIFF METHODS
Costs of generation and their division into fixed, semi-fixed and running costs. Desirable characteristics of a Tariff Methods, Tariff Methods: simple rate, flat rate, block rate, two-part, three-part, and power factor tariff methods.

TEXT BOOK

REFERENCES

5. "Electrical power systems" by J.B.Gupta, S. K. Kataria & Sons, 2009
OBJECTIVE

To understand the structure and the properties of the fluid. To know the complexities involved in solving the fluid flow problems. To study the energy exchange process in fluid mechanics handling incompressible fluids.

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.

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.

UNIT - II

Closed conduit flow

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.

UNIT - III

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.

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

UNIT - IV

Performance of hydraulic turbines
Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT - V
Centrifugal pumps
Classification, working, work done – manometric head- losses and efficiencies-specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

Reciprocating pumps
Working, Discharge, slip, indicator diagrams.

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

REFERENCES
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
P822 – ELECTRICAL CIRCUITS LAB.

Lab. : 3 Periods/week                      Internal Marks : 25

Credit : 2

External Marks : 75

External Examination : 3 Hrs

PART-A: ELECTRICAL CIRCUITS

1) RMS Value of complex waveform
2) Verification of superposition Theorem and maximum power transfer theorem
3) Verification of Thevenin’s and Norton’s Theorem
4) Verification of Compensation & Reciprocity Theorem
5) Measurement of parameters of a choke coil
6) Determination of Self, Mutual Inductances and Coefficient of coupling
7) Z and Y Parameters, Transmission and hybrid parameters
8) Measurement of Active & Reactive power and pf for Star and Delta connected balanced loads

PART-B: PSPICE SIMULATION

09) Transient response of RL and RC circuits for DC Input
10) Loop and Nodal Analysis

Additional experiments

11) Series and parallel resonance
12) Measurement of power by two wattmeter method for 3- phase unbalanced loads
<table>
<thead>
<tr>
<th>Lab Experiments List</th>
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</thead>
<tbody>
<tr>
<td>1. Verification of Bernoulli's Theorem</td>
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<tr>
<td>2. Calibration of Venturimeter</td>
</tr>
<tr>
<td>4. Determination of friction factor for a given pipe line</td>
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<tr>
<td>5. Determination of loss of head due to sudden contraction in a pipeline</td>
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<tr>
<td>6. Impact of jets on Vanes.</td>
</tr>
<tr>
<td>7. Performance Test on Pelton Wheel.</td>
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<tr>
<td>8. Performance Test on Kaplan Turbine.</td>
</tr>
<tr>
<td>10. Performance Test on Multi Stage Centrifugal Pump.</td>
</tr>
</tbody>
</table>

**Additional Experiments**

| 11. Performance Test on Reciprocating Pump. |
| 12. Turbine flow meter. |
IV-SEMESTER
T199– ENVIRONMENTAL STUDIES

Lecture : 4 Periods/week
Internal Marks : 25
External Marks : 75
Credits : 3
External Examination : 3 Hrs

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems -Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. [11 Lectures]

UNIT – II


UNIT – III

Environmental Pollution: Definition, Types, Cause, effects and control measures of:
- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides. [11 Lectures]
UNIT – IV


UNIT – V


**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**

Textbook of Environmental Sciences and Technology by M. Anji Reddy BS Publication.
OBJECTIVES

It deals with basic theory of transmission lines modeling and their performance analysis. It also deals with AC distribution systems, classification & types and about underground cables.

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, 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, Sag calculations and numerical problems.

UNIT - II

Performance of Transmission Lines:

UNIT - III

Underground Cables:

UNIT - IV

AC Distribution Systems
Tie Lines, Sectionalization lines, Radial and Meshed lines, distribution line power flow, loss calculations, reconfiguring the system for loss minimization, conductor selection, loadability, SCADA. Power factor control: Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors power factor correction and capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.
UNIT - V

Gas Insulated Substations (GIS)
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, Failure of GIS.

TEXT BOOK

Transmission And Distribution Electrical Energy By Colin Bayliss

REFERENCES

T294 – PULSE AND DIGITAL CIRCUITS

Lecture : 4 Periods/week          Internal Marks : 25
Tutorial : 1 Period/Week           External Marks : 75
Credits : 4          External Examination : 3 Hrs

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OBJECTIVE

The course has been designed to give an overall view of I/O signals, RC networks as integrator, differentiator and attenuators. The students get familiarized with diode, clippers and transistors and their characteristics. The students will be able to analyze and design multivibrators. They also get familiarized with time based generators and sampling gates.

UNIT - I

LINEAR WAVESHAPING
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT - II

NON-LINEAR WAVE SHAPING
Diode clippers, Transistor clippers, clipping at two independent levels, 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 - III

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

UNIT - IV

TIME BASE GENERATORS
General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.
SYNCHRONIZATION AND FREQUENCY DIVISION Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.
UNIT - V

SAMPLING GATES
Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates. Realization of logic gates using diodes & transistors: AND, OR gates using Diodes, Resistor, Transistor Logic, Diode Transistor Logic.

TEXT BOOKS

REFERENCES
1. Pulse and Digital Circuits – A. Anand Kumar, PHI.
2. Wave Generation and Shaping L. Strauss.
OBJECTIVE

In this subject students are able to understand Laws of Thermodynamics, energy exchange processes, and cycle analysis to simple heat engine cycles to estimate thermal efficiency as a function of pressures and temperatures at various points in the cycle.

UNIT - I


UNIT - II


UNIT - III


**Entropy:** Introduction, Clasius Inequality, Property Diagrams, Isentropic relations for ideal gases, Principle of Increase of Entropy-Closed and Control Volumes. Third Law of Thermodynamics.

UNIT - IV

**Pure Substance:** Introduction, Phases of Pure Substance, Phase Change Processes, Property Diagrams (T-v, P-v, P-T), P-v-T Surface.

**Vapor Power Cycles:** Analysis of Carnot Vapor Cycle, Simple Rankine Cycle

UNIT - V

**Gas Power Cycles:** Introduction, Analysis of Power Cycles- Carnot, Otto, Diesel, Dual and Brayton.

**Refrigeration Cycles:** Reversed Carnot Cycle, Bell-Coleman Cycle, Simple Vapor Compression Cycle.
TEXT BOOK


REFERENCES

2. Fundamentals of Classical Thermodynamics -- G.J.Van Wylen & Sonntag.TMH
3. Engineering Thermodynamics -- P.K.Nag, TMH
T266 - OBJECT ORIENTED PROGRAMMING (C++)

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Internal Marks</th>
<th>Tutorial</th>
<th>External Marks</th>
<th>Credits</th>
<th>External Examinations</th>
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<td>4 Periods/week</td>
<td>25</td>
<td>1 Period/Week</td>
<td>75</td>
<td>3</td>
<td>3 Hrs</td>
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</table>

UNIT - I

Introduction:
OOP Paradigm, OOPS principles, Merits of OOP languages, Demerits of Procedure Oriented Programming languages C++ Overview, Data types, Identifiers, Operators, Type casting, C++ Characteristics, Difference between class and structure, declaration of variables, dynamic initialization of variables, new and delete operators, I/O Manipulators.

UNIT - II

Classes and Objects:
Defining Classes in C++, accessing class members, access specifies (Public and Private), defining member functions, static data members, static member functions, friend functions, friend classes, inline functions, nested classes, passing objects to functions, returning objects, object assignment, Array of objects, constructor and destructor, Constant and volatile keywords, constant and volatile member functions.

UNIT - III

Inheritance:
Base class, derived class, access specifier (Protected), scope rules, abstract base class, virtual base class, single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance and hybrid inheritance, calling base class constructor, String class.

UNIT - IV

Polymorphism:
Pointers, Pointers to objects, ‘this’ Pointer, Pointers to derived Classes. Concept of Polymorphism, Compile time Polymorphism: Operator Overloading, Overloading Unary Operators, and Overloading Binary Operators, Function Overloading.

Run time Polymorphism:
Virtual functions, Pure Virtual Functions.

Templates: Introduction, Class Templates, Function Templates.

UNIT - V

Files and Exception Handling:
Exception Handling: Introduction, Mechanism, try, throw, catch, specifying Exceptions.
I/O Streams: C++ Streams, C++ Stream classes, Unformatted I/O Operations,Formatted I/O Operations, Formatting using Manipulators.

TEXT BOOK


REFERENCES

T182 – ELECTRICAL MACHINES - II

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial : 1 Period/Week  External Marks : 75
Credits : 4  External Examination : 3 Hrs

OBJECTIVE

This subject facilitates to study and the performance of induction motors which is main drive for industrial applications. This subject also introduces the study and performance of synchronous machines.

UNIT - I

Poly-phase induction motors:
Poly-phase induction motors—construction details—Production of a rotating magnetic field—principle of operation—rotor emf and rotor frequency—rotor reactance, rotor current and power factor—equivalent circuit—phasor diagram—crawling and cogging—power stages

UNIT - II

Performance of Induction Motors:
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 characteristics—condition for maximum torque—relation between torque and slip—losses and efficiency—no load and blocked rotor test—equivalent circuit—circle diagram—induction generator.

UNIT - III

Single phase induction motors:

UNIT - IV

Synchronous Generators:
Synchronous generator—construction, working principle—emf equation—armature reaction—regulation methods—EMF, MMF, ZPF methods—synchronizing to infinite bus bars—two reaction theory—parallel operation of synchronous generators.

UNIT - V

Synchronous Motors:
Synchronous motor—constructional features, principle of operation of synchronous motor—methods of starting—power developed by a synchronous motor—synchronous motor with different excitations—effect of increased load with constant excitation, effect of changing excitation constant load—torque equation—V curve and inverted V curve—hunting.
TEXT BOOK


REFERENCES

3. Electric Machines –by Ashfaq & Hussain
# P823 – ELECTRICAL MACHINES – I LAB.

Lecture : 3 Periods/week  
Internal Marks : 25  
External Marks : 75  
Credits : 2  
External Examination : 3 Hrs

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**LIST OF EXPERIMENTS**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O.C &amp; S.C tests on 1-phase transformer</td>
</tr>
<tr>
<td>2</td>
<td>Sumpner’s test on a pair of 1-phase transformers</td>
</tr>
<tr>
<td>3</td>
<td>Load Test on 1-phase Transformer</td>
</tr>
<tr>
<td>4</td>
<td>Scott Connection</td>
</tr>
<tr>
<td>5</td>
<td>Polarity Testing of a transformer</td>
</tr>
<tr>
<td>6</td>
<td>Magnetization characteristics of a D.C. shunt generator</td>
</tr>
<tr>
<td>7</td>
<td>Swinburne’s test on D.C. shunt machine &amp; Speed control of D.C. motor</td>
</tr>
<tr>
<td>8</td>
<td>Brake test on D.C. shunt motor</td>
</tr>
<tr>
<td>9</td>
<td>Hopkinson’s test</td>
</tr>
<tr>
<td>10</td>
<td>Separation of stray losses in a D.C. motor.</td>
</tr>
</tbody>
</table>

**Additional Experiments**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Load characteristics of a separately excited D.C. motor using Lab-view</td>
</tr>
<tr>
<td>12</td>
<td>Calculation of voltage regulation for a 1-phase transformer using lab-view</td>
</tr>
</tbody>
</table>
P861 – OBJECTED ORIENTED PROGRAMMING (C++) LAB

Lab. : 3 Periods/week        Internal Marks : 25
External Marks : 75
Credits : 2                External Examination : 3 Hrs

Objectives:
• To make the students familiar with the concepts of Object Oriented Programming using C++
1. Write a C++ program to find the sum of individual digits of a positive integer.
2. Write a C++ program to generate the first ‘n’ terms of the sequence. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are formed by adding the preceding two terms in the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n. Where ‘n’ is a value supplied by the user.
4. Write a C++ program to find the factorial of a given integer.
5. Write a C++ program to find the GCD of two given integers.
6. Write a C++ program to find the nth Fibonacci number.
7. Write a C++ program to perform addition, subtraction and multiplication operations on two complex numbers using classes and objects.
8. Write a C++ program to find out the total and average marks of 10 students using Classes and objects?
9. Write a C++ program to implement static data members and static member functions.
10. Write a C++ program to implement matrix ADT using a class. The operations Supported by this ADT are:
     a) Reading a matrix.
     b) Displaying a matrix
     c) Addition of matrices.
     d) Multiplication of matrices.
11. Write a C++ program to illustrate the usage of following:
     Default Constructor, Parameterized Constructor, Copy Constructor and Destructor.
12. Write a C++ program that illustrates the usage of following forms of inheritance.
     (Exercise the access specified protected also)
     a) Single Inheritance
     b) Multiple Inheritance
     c) Multi level Inheritance
     d) Hierarchical Inheritance.
13. Write a C++ program to count the lines, words and characters in a given text using standard library string object.
14. Write a C++ program that illustrates the concept of Function overloading?
15. Write a C++ program that overloads the binary + operator to concatenate two strings and to add two complex numbers.
16. Write a C++ program that overloads the unary ++ operator to increment each element of the given one dimensional array by ‘1’?
17. Write a C++ program that illustrates run time polymorphism by using virtual functions.
18. Write a template based C++ program to check whether the given item is existed in the array or not.
19. Write an example C++ program to illustrate the procedure of exceptions handling.
20. Write a C++ program to display the contents of a text file.
21. Write a C++ program which copies the contents of one file to another.

TEXT BOOKS
V-SEMESTER
OBJECTIVE

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

UNIT - I

OPERATIONAL AMPLIFIER

UNIT - II

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 - III

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.

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.

UNIT - IV

LOGIC FAMILIES
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 tristate outputs, CMOS transmission gate, IC interfacing - TTL driving CMOS & CMOS driving TTL. Design using TTL -74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2’s Complement system, Digital comparator circuits.
UNIT - V

SEQUENTIAL CIRCUITS & MEMORIES
74XX & CMOS 40XX series of IC counters.
ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs,
synchronous DRAMs.

TEXT BOOKS

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd,

REFERENCES

1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and
   Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications –
   Denton J. Daibey, TMH.
3. Design with Operational Amplifiers and Analog Integrated Circuits - Sergio
4. Applications and Design with Analog Integrated Circuits by J.Michael Jacob
UNIT - I

Measuring Instruments
Classification of measuring instruments, Essentials of indicating instruments: deflecting, controlling and damping systems. Construction, working, torque equation, various advantages and disadvantages of MI (attraction and repulsion), and PMMC. Ammeter and Voltmeter theory: Extension of range of ammeters and voltmeters using shunt, multiplier. Universal shunt, Universal multiplier.

UNIT - II

Measurement of R, L, C

UNIT - III

Special purpose measuring instruments:
Instrument Transformers: Construction, connection of CT & PT in the circuit, advantages of CT / PT over shunt and multipliers for range extension, transformation ratio, turns ratio, nominal ratio, burden etc, and ratio and phase angle error. Power factor meter, Frequency meter. Potentiometers: Principle of D.C. & A.C. Potentiometer (only Crompton’s type) & its applications.

UNIT - IV

Measurement of power and Energy

UNIT - V

INSTRUMENTATION
Transducers, classification & selection of transducers, strain gauges, inductive transducers, LVDT, capacitive transducers, piezoelectric and Hall-effect transducers, photo-voltaic & photo-conductive cells.
TEXT BOOKS

1. Electrical measurement & measuring instrument by E. W. Golding & widening, Fifth edition,
   A. H. Wheeler & Co. ltd.
2. A Course in Electrical and Electronic measurements & Instrumentation – by A. K.
   Sawhaney, Dhanpat Rai & Sons

REFERENCES

   Sons.
2. Instrumentation: Measurement and Analysis by Nakra & Chaudhari Sixth Reprint,
3. Introduction to Measurements and instrumentation by Ghosh, Second Edition PHI
   Publication.
4. Introduction to Measurements and instrumentation by Anand PHI Publication.
OBJECTIVE

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of the 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

Control system modeling

UNIT - II

Time domain analysis

UNIT - III

Frequency domain analysis

UNIT - IV

Compensators
Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers.

UNIT - V

State variable analysis
State variable methods - introduction to the state variable concept - state space models - physical variable - phase variable and diagonal forms from time domain -solution of state equations - properties of state transition matrix - relation between transfer function and state space models , Controllability and Observability.
TEXT BOOKS


REFERENCES

OBJECTIVE

The main objective is to acquaint engineers with the basic principles of organization, operation and performance of the modern-day computer systems. It covers all the aspects of computer technology, from the underlying integrated circuit technology used to construct computer components, to the use of parallel organization concepts in combining those components.

UNIT - I

REGISTER TRANSFER & MICRO-OPERATIONS:

UNIT - II

BASIC COMPUTER ORGANIZATION AND DESIGN:
Introduction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic. MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

UNIT - III

CENTRAL PROCESSING UNIT:

UNIT - IV

MEMORY ORGANIZATION:
Memory Hierarchy, Main Memory, Auxiliary memory, Associative Men Cache Memory, Virtual Memory, Memory Management hardware.

UNIT - V

INPUT-OUTPUT ORGANISATION:
Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication.
TEXT BOOK


REFERENCES

1. ‘Computer Architecture and Organisation’ 2nd edition., John P Hayes,
2. ‘Computer Organization’ 2nd edition., V.Carl Hamacher et.al,
OBJECTIVE

To understand theory and principles of modern communication systems that addresses the variety, reality, complexity, and pervasiveness of today's communication systems. Topics included are AM modulation transmission and reception, FM modulation transmission and reception, single sideband communication (SSB) communication technique, Digital, wireless communication and wireless digital communication.

UNIT - I

AMPLITUDE MODULATION SYSTEMS
Need for modulation, normal AM, generation and demodulation (envelope & synchronous detection), modulation index, SSB: Generation using filter and phasing method, detection. Frequency division multiplexed systems using SSB.

UNIT - II

ANGLE MODULATION SYSTEMS
Concept of frequency and phase modulation, frequency deviation and modulation index, FM spectra, Carson’s rule, narrowband FM, generation of wideband FM Armstrong method, direct FM generation. Demodulation of FM discriminator, PPL.

UNIT - III

SAMPLING AND DISCRETE TIME MODULATIONS
Sampling theorem – low pass and band pass, Pulse Amplitude Modulation (PAM), Pulse width Modulation (PWM), Pulse Position Modulation (PPM) their generation and detection-phase time division multiplying
Review of random signals and noise, signal to noise ratio in amplitude and angle modulated systems. Thermal shot noise.

UNIT - IV

DIGITAL COMMUNICATION

UNIT - V

SATELLITE & FIBRE OPTIC COMMUNICATIONS
TEXT BOOKS


REFERENCES

2. “Modern Digital & Analog Communication System”, Lathi, Oxford University
OBJECTIVE

This course covers Fourier series and transform, and their applications, Laplace transform applications to electrical circuits, sampling of systems and Z-transforms and its inverse. Students will get knowledge on signals and systems and their applications.

UNIT–I
FOURIER SERIES AND FOURIER TRANSFORM REPRESENTATION
Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function, Properties of Fourier Transform, Parseval’s theorem, Fourier transform of some common signals, Fourier transform relationship with Laplace Transform.

UNIT–II
APPLICATIONS OF FOURIER SERIES AND FOURIER TRANSFORM REPRESENTATION
Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier series.

UNIT – III
LAPLACE TRANSFORM APPLICATIONS
Application of Laplace transform Methods of Analysis – Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem – Convolution Integral – Applications

UNIT-IV
SAMPLING
Sampling theorem – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

UNIT-V
Z-TRANSFORMS
Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

TEXT BOOKS:
REFERENCE BOOKS:
1. Linear System Analysis – A N Tripathi, New Age International
2. Network and Systems – D Roy Chowdhary, New Age International
3 Engineering Network Analysis and Filter Desgin- Gopal G Bhisk & Umesh
4. Linear system analysis by A.Cheng, Oxford publishers
T290 – PROFESSIONAL ETHICS

Lecture : 4 Periods/week  
Internal Marks : 25

Tutorial : 1  
External Marks : 75

Credits : 3  
External Examination : 3 Hrs

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UNIT - I

ENGINEERING ETHICS
Senses of ‘Engineering Ethics’ variety of moral issues types of inquiry moral dilemmas
moral autonomy Kohlberg's theory Gilligan's theory consensus and controversy – Models
of Professional Roles theories about right action Selfinterest customs and religion uses of
ethical theories.

UNIT - II

HUMAN VALUES
Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue
– Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage –
Valuing Time – Cooperation – Commitment – Empathy – SelfConfidence – Character –
Spirituality

UNIT - III

ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation engineers as responsible experimenters codes of ethics a
balanced outlook on law the challenger case study

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS
Safety and risk assessment of safety and risk risk benefit analysis and reducing risk the
three mile island and chernobyl case studies. Collegiality and loyalty respect for authority
collective bargaining confidentiality conflicts of interest occupational crime professional
rights employee rights Intellectual Property Rights (IPR) discrimination.

UNIT - V

GLOBAL ISSUES
Multinational corporations Environmental ethics computer ethics weapons development
engineers as managersconsulting engineersengineers as expert witnesses and advisors
moral leadershipsample code of Ethics ( Specific to a particular Engineering Discipline ).

TEXT BOOKS

York 1996.
Hall of India, New Delhi, 2004.
REFERENCES

2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
P824 – ELECTRICAL MACHINES LAB – II

Lab. : 3 Periods/week                                Internal Marks : 25
       
Credits : 2                                    External Marks : 75

List of Experiments

1. Brake test on squirrel cage induction motor
2. Regulation of 3-phase alternator by synchronous impedance & MMF method
3. Regulation of 3-phase alternator by ZPF method
4. No load & blocked rotor test on 3-phase induction motor
5. V & inverted V curves of a synchronous motor
6. Equivalent circuit of 1-phase induction motor
7. Determination of $x_d$ and $x_q$ of a salient pole synchronous machine
8. Load test on of 3-phase alternator
9. Break test on of single phase induction motor
10. Load test on of slip ring induction motor

Additional Experiments

11. Torque-Speed characteristics of induction motors using Lab-view
12. Speed control of Induction motor using MATLAB / Simulink
P814 – CONTROL SYSTEMS AND INSTRUMENTATION LAB.

Lab. : 3 Periods/week Internal Marks : 25

External Marks : 75

Credits : 2 External Examination : 3 Hrs

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LIST OF EXPERIMENTS

CONTROL SYSTEMS LAB

1. Time Response of Second Order System.
2. Effect of P, PD, PI, PID controller on second order systems.
4. Lag and lead compensation – Magnitude & phase plot
5. Determination of transfer function and effect of feedback on dc servo motor.
6. Design of controller for 2\textsuperscript{nd} order system by using MATLAB.

INSTRUMENTATION LAB

7. Measurements of unknown resistance, inductance, and capacitance using Bridges
8. To plot the displacement –voltage characteristics of the given LVDT
9. Measurement of ratio and Phase angle error by using CT & PT
10. Plot the output characteristics of a torque transducer.

ADDITIONAL EXPERIMENTS

11. PLC- study and verification of truth tables of logic gates simple Boolean expressions and application of speed control of motor
12. Stepper motor control using LABVIEW.
OBJECTIVES

This course deals with relays and circuit breakers for protection of generators, transformers, and feeder bus bars from over current, over voltage and other hazards.

UNIT - I

Protection
Importance of protective relaying- Causes and consequences of dangerous currents; faults, overloads and switching over currents, fundamental requirements of good protection scheme-Primary & back up protection- speed of operation of a relay, upper and lower limits for the time of relay operation.

UNIT - II

Switch Gear

UNIT - III

Classification of Relays

UNIT - IV

Generator Protection: Protection against stator and rotor faults and abnormal operating conditions such as unbalanced loading, loss of excitation, Over speeding.
Transformer Protection: Types of faults, Over current protection, Differential protection, Protection against high resistance ground faults, Interturn faults, Bucholz relay, CT’s ratio selection.
Bus bars and Feeder Protection: differential protection of bus bars
Over Current relays: Instantaneous, DMT and IDMT and Directional relay applications, differential protection of lines, translay relay protection, Distance protection.

UNIT - V

Over Voltage Protection
Causes of over voltages: lightning, switching, insulation failure and arching grounds, methods of protection-ground wire, Peterson coils, surge absorbers and diverters , location of protective apparatus – insulation coordination- neutral earthing.
TEXT BOOKS

Power System Protection by PM Anderson

REFERENCES

T244 – MANAGEMENT SCIENCE

Lecture : 4 Periods/week Internal Marks : 25
Tutorial : 1 External Marks : 75
Credits : 3 External Examination : 3 Hrs

OBJECTIVE

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

UNIT - I

Introduction to Management and organizations

UNIT - II

Operations management
Plant location and Layout -definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- , types of plant layout. Production & its types Work study objectives, method study, objectives, steps involved- time study, steps involved- equipment, different methods of performance rating- allowances, standard time calculation. Work Sampling – definition, steps involved, standard time calculations, and differences with time study.

UNIT - III

Materials Management and Marketing Management

UNIT - IV

Project Management & Financial Management
UNIT - V

Human resources management & Contemporary Management Practices
Functions of HRM, Job Evaluation, merit rating, Salary administration performance appraisal, Grievance handling.
Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Business Process outsourcing (BPO) Ethics in management, social factors, unfair trade practices.

TEXT BOOK

REFERENCES
1. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2005
OBJECTIVE

To introduce the concept of DFT and its computation. To study the properties of DFS and FFS. To study the Z-transforms and its applications. To understand the basic structures of IIR and FIR systems. This course will help to understand the design techniques for digital filters.

UNIT - I

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. Introduction to Digitals and Signals.

UNIT - II

Discrete Fourier series

UNIT - III

Realization of Digital Filters
Review of Z-transforms, Applications of Z – transforms, Relation between Z-transform and DFS solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function, MULTIRATE DIGITAL SIGNAL PROCESSING Introduction to Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT - IV

FIR & IIR Digital Filters:
UNIT - V

Architecture of TMS320XXX
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.
Introduction –Architectural overview – Memory and I/O spaces -Internal architecture – Central Processing Unit (CPU) – Program control.

Addressing Modes and Assembly Language Instructions of C2xxx
Data formats – Addressing modes – groups of addressing mode – Assembly language instructions

TEXT BOOK


REFERENCES

6. Fundamentals of DSP by Lonnie – C LUDEMAN by john willey & sons
T255 – MICROPROCESSORS AND MICRO CONTROLLERS

Lecture : 4 Periods/week               Internal Marks : 25
Tutorial : 1               External Marks : 75
Credits : 4               External Examination : 3 Hrs

Objective:
The objective of the Microprocessor and Microcontrollers is to familiarize with the architecture of 8086 processor, assembling language programming and interfacing with various modules. Microcontroller concepts helps the student to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

UNIT-I 8086 ARCHITECTURE

UNIT-II ASSEMBLY LANGUAGE PROGRAMMING OF 8086
Assembly Directives, Macro’s, Simple Programs using Assembler, Implementation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features.

UNIT-III INTERFACE
Memory and I/O Interfacing with 8086, 8255 PPI and interface to 8086, A/D, D/A Converter Interfacing. 8257 (DMA Controller), USART, RS-232, 8259 (Interrupt Priority Control).

UNIT-IV INTRODUCTION TO MICRO CONTROLLERS
Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming.

UNIT-V INTERFACING AND INDUSTRIAL APPLICATIONS OF 8051
Applications of Micro Controllers, Interfacing 8051 to LED’s, Push button, Relay’s and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:
2. Microcontrollers-Raj Kamal, Pearson Education

REFERENCE BOOKS:
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

UNIT - II

PHASE-CONTROLLED CONVERTERS

UNIT - III

DC TO DC CONVERTERS

UNIT - IV

AC TO AC CONVERTERS & CYCLOCONVERTERS
AC voltage regulators–1-phase ac voltage controller with R and RL loads– Single phase to single phase cyclo-converters -basic principle of operation–Step up and step-down cycloconverter.

UNIT - V

INVERTERS
Single phase inverter–Voltage Source Inverter (VSI) -Analysis with R & RL loads- 3-phase inverters–180 and 120 mode of operation-PWM Techniques, Single Pulse Width Modulation, Multiple Pulse Width Modulation, Sinusoidal & Modified Sinusoidal PWM-Hysteresis Current Controlled PWM techniques– and Current Source Inverter(CSI)
TEXT BOOK


REFERENCES

T285 – PROBABILITY AND STATISTICS

UNIT - I


UNIT - II


UNIT - III

Population and samples. Sampling distribution of mean (with known and unknown variance), proportion, variances. - Sampling distribution of sums and differences. Point and interval estimators for mean, variance and proportions.

UNIT - IV

Statistical Hypothesis – Errors of Type I and Type II errors and calculation. One tail and two-tailed tests. Testing of hypothesis concerning means, proportions and their differences using Z-test. Tests of hypothesis using Student’s t-test, F-test and $\chi^2$ test. Applications of decision making using the above tests.

UNIT - V

Simple Correlation and Regression.
Queuing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems related to the evaluation of waiting time, length of the queue etc.

TEXT BOOK

Probability and Statistics for Engineers, Miller ,John E. Freund, PHI

REFERENCES

1. Probability and Statistics, Gupta & Kapoor
2. Probability, Statistics and Queuing theory applications for Comp. Sciences, 2/e, Trivedy, John Wiley
OBJECTIVE

Renewable Energy Systems are an important technology that has the potential to advance environmental goals and eventually support a sustainable future. In this subject students are exposed to solar, wind, fuel cells and biomass energy systems.

UNIT - I


UNIT - II

WIND POWER PLANTS: Introduction, Appropriate Location, Wind Power, General Classification of Wind Turbines, Generators and Speed Control Used in Wind Power Energy Analysis of Small Generating Systems.

UNIT - III


UNIT - IV


UNIT - V


TEXT BOOK

Integration of Alternative Sources of Energy, Felix a. Farret, M. Godoy simoes, a John Wiley & sons, inc., publication.
REFERENCES

OBJECTIVE

This course introduces the concepts of various advanced machines in Electrical Engineering discipline. The emphasis of this course is laid on the machines which includes Stepper Motors, Switched Reluctance Motors, Brushless DC Motors, Servomotors and Linear Motors.

UNIT - I

Stepper Motors
Constructional features, Principle of operation, Variable Reluctance (VR) stepping motor, Characteristics of Step Motor in Open Loop Drive, open loop and closed loop control of step motor. Areas of Application of Stepping Motors.

UNIT - II

Switched Reluctance Motors
Constructional features, Principle of operation. Torque equation, Torque-speed Characteristics, Power Converter for SR Motor, Drive and power circuits, Control of SR Motor for Traction-Type Load.

UNIT - III

Brushless DC Motors
Construction ,principle of operation of BLDM, Sensing and logic switching scheme, basic drive circuit ,power converter circuit, Transient analysis , methods of reducing torque pulsations , control strategies for BLDM.

UNIT - IV

Permanent Magnet Materials and Motors
Minor hysteresis loops and recoil line, stator frames of Conventional PM dc Motors, Equivalent circuit of a PM, Development of Electronically Commutated dc motor from Conventional dc motor.

UNIT - V

Linear Induction Motors and Linear Synchronous Motors
Types of linear motors, linear induction motor: Construction details, LIM Equivalent Circuit, Steps in design of LIM, Linear Synchronous Motor: Principle and Types of LSM, LSM Control.

TEXT BOOKS

1. Special electrical Machines by Venkataratnam, University press
REFERENCES

OBJECTIVE

The course has been so designed to give the students an overall view of the mechanical components. The mathematics associated with the same. Actuators and sensors necessary for the functioning of the robot.

UNIT - I

End Effectors: Introduction – Types of end effectors – Mechanical grippers – Vacuum cups, magnetic grippers, adhesive grippers and others – Robot / End effectors interface – Considerations in gripper selection and design

UNIT - II


UNIT - III

Manipulator jacobian – problems – Dynamics: Introduction, Lagrange Euler formulation, Problems

UNIT - IV

Trajectory Planning: Introduction – considerations on trajectory planning – joint Interpolated trajectory – Cartesian path trajectory – problems

UNIT - V

Sensors: Position sensors: Potentiometers, resolvers, encoders – velocity sensors
Robot Application in Manufacturing: Material transfer and machine loading/ unloading applications – Processing operations – Assembly and inspection – Future applications.

TEXT BOOK

REFERENCES

2. Robert J. Schilling, Fundamentals of robotics analysis & control, PHI Learning private limited, New Delhi
3. Saeed B. Niku, Introduction to robotics analysis systems Application, PHI Learning private limited, New Delhi
P863 – POWER ELECTRONICS LAB.

Lab. : 3 Periods/week Internal Marks : 25

External Marks : 75

Credits : 2 External Examination : 3 Hrs

LIST OF EXPERIMENTS

1. Characteristics of SCR, IGBT & Power MOSFET.


6. Three phase fully controlled bridge converter with R Load.

7. Single phase dual converter with RL load.

8. Single Phase ac to dc converter with LC filter using MATLAB/SIMULINK

9. Single phase inverter with current controlled PWM technique using MATLAB/SIMULINK

ADDITIONAL EXPERIMENTS

10. SCR circuit simulation & the possible circuit states using LabVIEW.

11. Single phase fully controlled PWM rectifier with R & RL loads using PSCAD.
<table>
<thead>
<tr>
<th>No.</th>
<th>Experiment</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>Op Amp Applications – Adder, Subtractor, Comparator circuits.</td>
</tr>
<tr>
<td>3.</td>
<td>Integrator and Differentiator circuits using IC 741.</td>
</tr>
<tr>
<td>4.</td>
<td>Active filter Applications – LPF, HPF (first order).</td>
</tr>
<tr>
<td>5.</td>
<td>Active filter Applications – BPF, Band Reject (wide band) and Notch filters.</td>
</tr>
<tr>
<td>6.</td>
<td>IC 741 Oscillator circuits – Phase shift and Wien Bridge Oscillators.</td>
</tr>
<tr>
<td>8.</td>
<td>IC 555 timer – Monostable operation circuits.</td>
</tr>
<tr>
<td>9.</td>
<td>IC 555 timer – Astable operation circuits.</td>
</tr>
<tr>
<td>10.</td>
<td>Schmitt trigger circuits - using IC 741 and IC 555.</td>
</tr>
</tbody>
</table>

**ADDITIONAL EXPERIMENTS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Three terminal voltage Regulators – 7805,7809,7912.</td>
</tr>
<tr>
<td>12.</td>
<td>4-bit DAC using Op Amp.</td>
</tr>
</tbody>
</table>
OBJECTIVE

This course is an extension of Power Electronics applications to DC and AC 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. After going through this course student will understand the control of industrial drives.

UNIT - I

Rectifier Controlled DC Motor Drives
Controlled rectifiers circuits- Single phase fully controlled rectifier fed separately excited DC motors – single phase semi converter and single phase full converter for continuous and discontinuous modes of operation – freewheeling diode operation-speed torque characteristics.
Three phase semi converter and three phase full converter for continuous and discontinuous modes of operation– Addition of Freewheeling diode.

UNIT - II

Chopper controlled DC motor drives

UNIT - III

Control of Induction motor drives
Control of induction motor by voltage source inverter- control of induction motor by current source inverters- comparison of voltage source and current source inverter drives- stator voltage control-stator frequency control-Open loop volts/Hz control.

UNIT - IV

Slip power controlled wound rotor Induction motor Drives
Static rotor resistance control-Slip-power recovery Drives- Static scherbius drive- Phasor diagram-Torque expression –power factor considerations-equivalent circuit and analysis-closed loop speed control of static scherbius drive-Modes of operation- Static Kramer drive.

UNIT - V

Control of Synchronous motor drives:
Synchronous motors – Operation of self controlled synchronous motors-by VSI, CSI and Cycloconverters. Load commutated CSI fed Synchronous Motor speed torque characteristics, Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control.
TEXT BOOKS


REFERENCES

1. Semiconductor Controlled drives – G. K. Dubey-prentice hall
T283 – POWER SYSTEM OPERATION AND CONTROL

<table>
<thead>
<tr>
<th>Lecture</th>
<th>4 Periods/week</th>
<th>Internal Marks</th>
<th>25</th>
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</thead>
<tbody>
<tr>
<td>Tutorial</td>
<td>1</td>
<td>External Marks</td>
<td>75</td>
</tr>
<tr>
<td>Credits</td>
<td>4</td>
<td>External Examination</td>
<td>3 Hrs</td>
</tr>
</tbody>
</table>

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OBJECTIVE

This course contains the essentials of system operation and includes topics like Economic Operation, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control, voltage collapse and reactive power control.

UNIT – I

Economic Operation

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation without line losses, Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula

UNIT – II

Hydro Thermal Scheduling


UNIT - III

Modelling of Turbine, Generator and Governor

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

Modelling of Generator (Steady State and Transient Models): Description of Simplified Network Model of a Synchronous Machine (Classical Model).

UNIT - IV
Load Frequency Control

Necessity of keeping frequency constant.

*Single Area Load Frequency Control*
Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

*Two-Area Load Frequency Control*
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

Voltage Collapse and Reactive Power Control

Comparison of angle stability with voltage stability, reactive power flow and voltage collapse, V-Q sensitivity analysis, 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.

TEXT BOOKS


REFERENCES

OBJECTIVE

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 networks and fuzzy network systems application to electrical engineering is also presented. This subject is very important and useful for doing project work.

UNIT - I

Introduction to Neural Networks
Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT - II

Artificial Neural Networks
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 - III

Feed Forward Neural Networks

UNIT - IV

Fuzzy Logic- I
Introduction to Fuzzy sets & classical sets - properties, Operations, relations and cardinalities, Fuzzy membership functions - different types. Fuzzification, Membership value assignment, development of rule base and Implication methods.

UNIT - V

Fuzzy Logic- II

TEXT BOOKS

2. Neural Networks – Simon Hakins, Pearson Education
REFERENCES

1. Fuzzy logic with engineering application by Timothy J Ross, Wiley publications
2. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
OBJECTIVE

To introduce MOS theory / Manufacturing Technology. To study inverter / counter logic / stick / machine diagram / sequential circuits. To study address / memory / arithmetic circuits. To get familiarised with VHDL programming behavioural/Structural/concurrent/ process.

UNIT –I

IC TECHNOLOGY

MOS, PMOS, NMOS, CMOS & BiCMOS technologies, Photolithography and Pattern Transfers, Basic Electrical Properties of MOS and CMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design.

UNIT-II

VLSI CIRCUIT DESIGN PROCESSES


UNIT-III

CMOS Logic Gates Design and Layout

Basic circuit concepts, Sheet Resistance RS and its concept to MOS, Area Capacitance Units, Calculations of Delays, Driving large Capacitive Loads, Wiring Capacitances, Alternate gate circuits, Tri state circuits, Transmission Gate and Pass Transistor Logic.

UNIT-IV

SUBSYSTEM DESIGN

Subsystem Design, 4-by-4 barrel Shifters, carry look ahead Adder, ALUs, 4x4 array Multipliers, Parity generators, Comparators, Zero/One Detectors, binary Counters, Memory Elements: SRAM, DRAM, basic ROM.

UNIT-V

VHDL SYNTHESIS

TEXTBOOKS:

REFERENCES:
OBJECTIVES

This course introduces the methods of power system network modeling and analysis under different operating conditions. It uses the concepts developed earlier under power systems and mathematics and derives necessary tools for system analysis under systems approach. The methods developed here become basic tools in system operation and control. 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 for the following cases (without mutual coupling): Addition of element from a new bus to reference node, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference node and Addition of element between two old buses (Derivations and Numerical Problems)- $Z_{bus}$ modifications (Problems)

UNIT - II

Power Flow Methods


UNIT - III

Power Flow Techniques Continued:

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 (only Theory) - Comparison of Different Methods.
UNIT - IV

Network Faults and Fault Calculations:

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, Numerical Problems.


Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.


UNIT - V

Power System 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

Derivation of Swing Equation, Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation, Point-by-Point Method, Methods to improve Steady State and Transient Stability.

TEXT BOOKS


REFERENCES

T213 – HIGH VOLTAGE ENGINEERING

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial : 1  External Marks : 75
Credits : 4  External Examination : 3 Hrs

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OBJECTIVE

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

UNIT - I

Introduction

UNIT - II

Break Down in Liquid Dielectrics

UNIT - III

Generation of high voltages, currents and testing

UNIT - IV

Measurement of high voltages and currents

UNIT - V

Insulation Co-ordination and Grounding of EHV Systems
TEXT BOOK


REFERENCES

6. Extra High Voltage A. C. Transmission Engineering , R D Begamudre , Publisher: New Age International
7. High Voltage Engineering, Mazen Abdel-Salam, Hussein Anis, Marcel Dekker publishers.
OBJECTIVE

This course is a basic mathematical tool in solution of number of system operational methods and design of components and systems. The course also contains non-traditional optimization techniques like Genetic Algorithms and Particle Swarm methods. The contents of this course are also widely used in operations research in systems planning and management.

UNIT - I

Linear Programming (LP)
Introduction through engineering applications, standard form of LP problem (LPP), Geometrical interpretation, simplex method and algorithm, two phases of simplex method, Numerical problems, Revised simples method, Duality in LP, Dual simplex method, sensitivity analysis.

UNIT - II

Applications and extensions of LP
Transportation problem, Assignment problem, Karmarkar’s method, Quadratic programming and Engineering Applications.

UNIT - III

Non-linear Programming – Unconstrained minimization

UNIT - IV

Non-linear Programming – Constrained Minimization

UNIT - V

Dynamic Programming & Non-traditional Optimization
Principle of optimality, computational procedure, applications from engineering. Evolutionary Programming Techniques – Genetic Algorithm (GA), the three parameters of GA, computational procedure for both binary and analogue coded inputs. Introduction to Particle swarm Optimization. Numerical examples.
TEXT BOOKS


REFERENCES

T145 – COMPUTER NETWORKS

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial : 1  External Marks : 75
Credits : 3  External Examination : 3 Hrs

UNIT - I


UNIT - II

Data link layer: design issues- framing, error detection and correction, CRC, Elementary data link protocols- sliding window protocols. Medium Access Control Sub layer: Channel allocation problem- multiple access protocols- Ethernet- Data link layer switching.

UNIT - III

Network layer: Network layer design issues- Routing algorithms- congestion control algorithms-Quality of service- Internetworking- network layer in the Internet.

UNIT - IV

Transport layer: Transport service- Elements of transport protocols- Internet transport protocols: TCP & UDP.

UNIT - V


TEXT BOOK


REFERENCES

UNIT - I

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

UNIT - II

Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods (p.nos 76-141).

UNIT - III

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering.

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation

UNIT - IV

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms

Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation

UNIT - V

Object Recognition : Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching

TEXT BOOK


REFERENCES

2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
I. Programming

1. Write a program using 8086 and verify for
   (a) Addition and subtraction of two Multi-byte numbers.
   (b) Addition and subtraction of two ASCII numbers.
   (c) Packed BCD to unpacked BCD and BCD to ASCII conversion.
2. Write a program using 8086 for
   (a.) Multiplication of two 16-bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.
   (b.) Division of two 16-bit numbers by repeated subtraction method and test for typical data.
3. Write a program using 8086 for finding square root of a given number and verify.
4. Write a program using 8086 and verify for finding:
   (a.) The largest number of an array.
   (b.) The smallest number from an array.
5. Write the program using 8086 for arranging an array of numbers in
   (a.) Descending order.
   (b.) Ascending order.
6. Write a program using 8086 for string operations
   (a.) String comparison.
   (b.) Reverse the string.

II. INTERFACING

7. Interfacing and programming of 8251 and 8259
8. Interfacing and programming of 8279.
10. Write a program to control the operation of stepper motor using 8086 microprocessor.

III. Additional Experiments

12. Program to generate firing pulses for rectifier using PIC Microcontroller.
1. Determination of Transmission Line Parameters
2. Determination of Breakdown strength of oil by Variable Distance Electrodes
3. Fault Analysis (LL, LG, LLL) of transmission Lines
4. Formulation of admittance matrix
5. Solution of load flows using Gauss-seidal method
6. Power Flow using newton-rapson method
7. Power Flow using fast decoupled method with MATLAB
8. Time domain and frequency domain testing of a single phase transmission line using Matlab/Simulink.
9. To plot the power angle characteristics of a generator using Matlab/Simulink
10. Transient and small signal stability analysis

ADDITIONAL EXPERIMENTS

11. No load and short circuit test of 3 phase alternator using PSCAD.
12. Determination of Earth resistance under various conditions
OBJECTIVE

High Voltage DC Transmission (HVDC), Flexible AC Transmission Systems (FACTS) and control aspects of HVDC and FACTS systems for voltage control & reactive power control etc will be studied.

UNIT - I

HVDC Basic Concepts

UNIT – II

Analysis of HVDC Converters
Configurations of converters-characteristics of 6 pulse and 12 pulse converters, operation as an inverter, Principal of DC Link Control – Converters Control Characteristics – Firing angle control and extinction angle control – Starting and stopping of DC link; Power Control.

UNIT - III

Power Flow Analysis in AC/DC Systems

UNIT - IV

Modeling of FACTS controllers:
FACTS, inherent limitations of transmission systems, basic types of FACTS controllers. Controllers based on conventional thyristors - Thyristor Controlled Reactor, Static VAR Compensator.

UNIT - V

Power flow including FACTS Controllers
Introduction, Power flow solutions including FACTS Controllers-Static VAR Compensator, Thyristor Controlled Series Compensator, Static Series Compensator and Unified Power Flow Controller.
TEXT BOOKS


REFERENCES

4. HVDC transmission - J.Arrillaga, Peter Peregrinus
5. HVDC power transmissions systems: Technology and system interactions by K.R.padiyar, New age International (P) Ltd.
7. HVDC transmission - Adamson and Hingorani.
OBJECTIVE

This subject deals with the Basic Concepts of Power Quality issues. In addition to the basic Concepts, Power Frequency Disturbances, Voltage Sags and Interruptions, Fundamentals of Harmonics, and Power Quality Monitoring are also discussed.

UNIT - I

Introduction to Power Quality
What is Power Quality?, Voltage Quality, Why are we concerned about power quality?, The power quality evaluation procedure-Need for a consistent-Vocabulary, General classes of power quality problems, Transients, Long-Duration voltage variations, Short-Duration voltage variations, Voltage Imbalance, waveform distortion, voltage fluctuation, Power frequency variations, Power quality terms, Ambiguous Terms.

UNIT - II

Power Frequency Disturbances
Introduction-Common power frequency disturbances-Cures for low frequency disturbances-Voltage tolerance criteria

UNIT - III

Voltage Sags and Interruptions
Sources of sags and interruptions-Estimating Voltage sag performance-Fundamental principles of protection-Solutions at the End-User level-Evaluating the economics of different ride through alternatives-Motor starting sags-Utility system fault clearing issues

UNIT - IV

Fundamentals of Harmonics
Harmonic Distortion-Voltage versus current distortion-Harmonic versus Transients-Power system Quantities under non sinusoidal conditions-Harmonic indices-Harmonic sources from commercial loads-Harmonic sources from industrial loads-Locating harmonic sources-System response characteristics-Effects of harmonic distortion-Inter harmonics

UNIT - V

Power Quality Monitoring
Monitoring considerations-Historical perspective of power quality measuring instruments-Power quality measurement equipment-Assessment of power quality measurement data-Application of intelligent systems-Power quality monitoring standards

TEXT BOOKS

1. Electrical power systems quality-Roger C.Dugan- McGraw- Hills
2. Power quality- C.Sankaran, CRC Press
REFERENCES

OBJECTIVE

This subject deals with the Fundamentals of Embedded systems, information about Devices and Buses for Devices network. In addition to the fundamentals, embedded programming and Real time operating systems are also discussed.

UNIT - I

EMBEDDED SYSTEM INTRODUCTION: Embedded systems overview, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RTlevel), custom single purpose processor design (RT-level), optimizing custom single purpose processors.

UNIT - II

STATE MACHINE AND CONCURRENT PROCESS MODELS : Introduction, models Vs. languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, Implementation, data flow model, real-time systems.

UNIT - III

EMBEDDED / RTOS CONCEPTS : Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem, Embedded operating systems Embedded Linux, Real-time operating systems, RT Linux, Handheld operating systems, Windows CE.

UNIT - IV


UNIT - V


TEXT BOOK

REFERENCES

T335 – UTILIZATION OF ELECTRICAL ENERGY

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial : Internal Marks : 75
Credits : 4  External Examination : 3 Hrs

UNIT - I

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 , rheostat braking and regenerative braking., trapezoidal and quadrilateral speed time curves.

UNIT - II

ELECTRIC TRACTION – II
Calculations of tractive effort, Mechanics of train movement, power, specific energy consumption for given run, effect of varying acceleration and braking retardation on specific energy consumption, adhesive weight and coefficient of adhesion

UNIT - III

ILLUMINATION:  laws of illumination, polar curves photometry sources of light, Discharge lamps, MV and SV lamps, Basic principles of light control, Types and design of lighting and flood lighting, LED lighting systems.

UNIT - IV


UNIT - V

UPS AND BATTERIES: UPS, configuration off-line and online UPS, selection and design considerations of UPS. Batteries- Primary and Secondary batteries, Primary batteries - definition and examples, Dry cell- construction and working. Secondary batteries–definition-examples- Lead acid storage cell - Nickel/Cadmium battery, lithium-ion battery, Ultra-capacitors.

TEXT BOOKS


REFERENCES

UNIT - I

Introduction to software engineering: The evolving role of Software, software, changing nature of software, legacy software, software myths
Software process: layered technology, process frame work, CMMI, process patterns, assessment, personal and team process models, process technology, product and process

UNIT - II

Process models: Prescriptive models, water fall model, incremental, evolutionary and specialized process models, unified process
Software engineering practice: communication practices, planning practices, modeling practices, construction practice and deployment.

UNIT - III

Requirements Engineering: A bridge to design and construction, RE tasks, initiating the RE process, Eliciting Requirements, developing use cases, building the analysis models, negotiating and validating requirements.
Building the analysis model: requirements analysis, analysis modeling approaches, data modeling concepts, OOA, scenario based modeling, flow rated modeling, class based modeling, creating a behavior model

UNIT - IV

Design Engineering: Design within the context of software engineering, design process and software quality, design concepts, design model, pattern based software design
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design

UNIT - V

Testing Strategies: A strategic to software testing, strategic issues, test strategies for conventional software, object oriented software, validation testing, system testing, the art of debugging
Testing tactics: software testing fundamentals, white box testing: basis path testing, control structure testing. Black box testing, OO testing methods

TEXT BOOK

REFERENCES

OBJECTIVES

The objective of Distribution Automation Function is to enhance the reliability of power system service, power quality, and power system efficiency by automating the following three processes of distribution operation control: data preparation in near-real-time; optimal decision-making; and the control of distribution operations in coordination with transmission and generation systems operations.

UNIT - I

Distribution Automation and the utility system
Introduction to Distribution Automation (DA), control system interfaces, control and data requirements, centralized (Vs) decentralized control, DA System (DAS), DA Hardware, DAS software. DA capabilities, Automation system computer facilities, management processes, Information management, system reliability management, system efficiency management, voltage management, Load management.

UNIT - II

Communication Systems for DA
DA communication requirements, Communication reliability, Cost effectiveness, Data rate Requirements, Two way capability, Ability to communicate during outages and faults, Ease of operation and maintenance, Conforming to the architecture of data flow Distribution line carrier (Power line carrier), Ripple control, Zero crossing technique, telephone, cable TV, Radio, AM broadcast, FM SCA, VHF Radio, UHF Radio, Microwave satellite. fiber optics, Hybrid Communication systems, Communication systems used in field tests.

UNIT - III

Technical Aspects
DA benefit categories, Capital deferred savings, Operation and Maintenance savings, Interruption related savings, Customer related savings, Operational savings, Improved operation, Function benefits, Potential benefits for functions, function shared benefits, Guidelines for formulation of estimating equations Parameters required, economic impact areas, Resources for determining benefits impact on distribution system, integration of benefits into economic evaluation.

UNIT - IV

Economic Evaluation Methods
Development and evaluation of alternate plans, Select study area, Select study period, Project load growth, Develop Alternatives, Calculate operating and maintenance costs, Evaluate alternatives.
UNIT - V

Economic comparisons
Economic comparison of alternate plans, Classification of expenses and capital expenditures, Comparison of revenue requirements of alternative plans, Book Life and Continuing plant analysis, Year by year revenue requirement analysis, short term analysis, end of study adjustment, Break even analysis, Sensitivity analysis computational aids.

TEXT BOOK


REFERENCES

1. IEEE Tutorial Course “Distribution Automation”.
2. IEEE Working Group on “Distribution Automation”.
OBJECTIVE

This subject deals with the state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modal control and optimal control systems.

UNIT - I

DESCRIBING FUNCTION ANALYSIS
Introduction to Non Linear Systems, behavior of nonlinear systems, properties of Nonlinear Systems, Types of Nonlinearities – Saturation – Dead Zone – Hysteresis-Relay-Backlash etc. Introduction to Linearization of nonlinear systems, Describing function (DF) – Derivation of general DF, DF for different nonlinearities -saturation, Dead-Zone-Dead-Zone and Saturation, Hysteresis-Backlash, Stability analysis of Non – Linear systems through describing functions.

UNIT - II

PHASE PLANE ANALYSIS
Introduction to phase plane analysis, singular points, and their classification, limit cycle and behavior of limit cycle. Analytical method, Isocline method, and delta method for constructing Trajectories, phase plane analysis of nonlinear control systems.

UNIT - III

STABILITY ANALYSIS

UNIT – IV

Introduction to Adaptive Control System
Definition of adaptive control system, functions of adaptive control, gain scheduling, model reference, series and parallel schemes and their industrial applications.

UNIT – V

Introduction to Sliding mode Control
Introduction, concept of variable structure control (VSC), ideal sliding motion and chattering, switching function, reachability condition, properties of sliding motion.

Text Book
1. Modern Control System Theory by M. Gopal – New Age International – 1984
Reference books

# T155 – DATABASE MANAGEMENT SYSTEMS

<table>
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<th>Lecture</th>
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## UNIT - I

**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

**Data modeling using the Entity Relationship Model:** ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

## UNIT - II

**Relational data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra.

**Introduction to SQL:** Characteristics of SQL, Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

## UNIT - III

**Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

## UNIT - IV

**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

## UNIT - V

**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

## TEXT BOOK

Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill

## REFERENCES

4. Date C J, “An Introduction To Database System”, Addision Wesley
OBJECTIVES

To study different types of electrodes used in bio-potential recording.

• To understand the characteristics of bio-amplifiers and different types of recorders.
• To understand how to measure various biochemical and nonelectrical parameters of human system.
• To study the instrumentation concerned with measuring the blood flow volume, velocity and number of particles in the blood.

UNIT - I

Components of medical instrumentation system, Bio signals, Static & Dynamic Characteristics, Bio amplifier, Problems with components of Medical system, Cell structure, Nernest equation, Action & Resting potentials.

UNIT - II

Bio-potential electrodes, Bio chemical electrodes, Internal Electrodes, External electrodes.

UNIT - III

ECG – Heart cardiac cycle, Electrical & Mechanical activities of heart, Cardiovascular system, ECG Recorder, Enthoven triangle (12-Lead configuration), Blood Pressure measurement, Blood flow measurement, Electrodes for ECG.

UNIT - IV

Pacemaker, Defibrillators, Short wave Diathermy, Hemo-Dialysis, EEG-Anatomy, Recorders Electrodes for EEG, Electrode-Placement, MG-Introduction, Recorder, Electrodes for EMG.

UNIT - V

Respiration, Spirometry, Pneumotachograph, Ventilators.

TEXT BOOK

Bio medical instrumentation & measurements – 2nd edition by Leslie Chromwell, Fred J. Weibell, Erich A. Pfeiffer – Phi Publisher

REFERENCES