ACADEMIC REGULATIONS
COURSE STRUCTURE
AND DETAILED SYLLABUS

ELECTRONICS AND
INSTRUMENTATION ENGINEERING

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2010-11)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B.Reddy Nagar :: MYLAVARAM – 521 230 :: Krishna District
Andhra Pradesh State
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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:

  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 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 1st 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>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>II</td>
<td>27</td>
<td>27</td>
<td>27</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>
</tr>
<tr>
<td>IV</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>V</td>
<td>30</td>
<td>29</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>VI</td>
<td>29</td>
<td>30</td>
<td>28</td>
<td>28</td>
<td>28</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>
</tr>
<tr>
<td>VII</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

| TOTAL    | 220 | 220 | 220 | 220 | 220 | 220 |

(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.

(ii) All the seminars 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, Industry oriented mini-project, seminar, project work and comprehensive viva shall be evaluated for 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. There shall be internal choice in each question.

(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/recogized external examiner.

(ix) There shall be seminars in the III semester and V semester and Term paper in VII semester. For the seminar and Term Paper, 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 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. The topics for
mini project, seminar and project work shall be different from each other. The topic for Term Paper and Project Work shall be preferably same. The evaluation of project work shall be conducted at the end of the VIII Semester.

(x) The comprehensive Viva-Voce shall be conducted for 100 marks, both at the end of VI 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.

(vi) 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.

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

(viii) 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 39 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 the 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>BT</td>
<td>First and Second semester</td>
</tr>
<tr>
<td>CS</td>
<td>Computer Science and Engineering Department</td>
</tr>
<tr>
<td>EC</td>
<td>Electronics &amp; Communication Engineering</td>
</tr>
<tr>
<td>EE</td>
<td>Electrical &amp; Electronics Engineering</td>
</tr>
<tr>
<td>EI</td>
<td>Electronics and Instrumentation Engineering</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>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Theory course</td>
</tr>
<tr>
<td>5</td>
<td>Lab course</td>
</tr>
</tbody>
</table>

Table 4: Course type description

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

For example, T195 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 161 credits from III Semester to VIII Semester (Total credits of 169) 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 43 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>
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<tr>
<td>&gt;=90</td>
<td>S</td>
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<td>&gt;=85 to &lt;90</td>
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<td>3.67</td>
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<td>&gt;=80 and &lt;85</td>
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<td>&lt;40</td>
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Passed on the aggregate marks secured for the best 161 Credits (Lateral Entry). The aggregate marks secured for 169 Credits. (i.e. III Semester to VIII Semester)

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

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 of fellow students/citizens.

(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.
## I SEMESTER

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<td>T300</td>
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**TOTAL CREDITS : 220**

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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. Applications of Differential Equations.

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 Multipliers method.

UNIT-IV

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

UNIT - V


TEXT BOOKS


REFERENCES

3. Elementary Differential equations by W. E. Boyce and R. C. Diprima - John Wiley & Sons, New Delhi,
T131 – C - PROGRAMMING

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

---------

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 ,McGrawHill,
English language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students acquire communicative competence in addition to their core skill development. The syllabus has been designed to develop linguistic and communicative competence of engineering students with special emphasis on professional and functional aspects of this language i.e., Listening, Speaking, Reading and Writing (LSRW skills). The emphasis in this syllabus is on skill development and practice of language 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 in formal and informal situations.

* To be able to face the academic and professional challenges of the present day scenario.

* To acquire communicative competence to interact with peers and others in various social situations.

**UNIT - I**

Chapter 1: “Read & Proceed” from *Active English* (Pearson))
1. An interview with Arundhati Roy
2. Jawaharlal Nehru's 'Tryst with Destiny' speech
3. Albert Einstein's essay 'The World as I See It'

**UNIT - II**

Chapter 2: “Travel” from *Active English* (Pearson))
1. Vikram Seth, *From Heaven Lake*
2. Ruskin Bond, *Landor Days*

**UNIT - III**

Chapter 3: “Gender” from Active English (Pearson)

**Short extracts from the following newspaper/journal pieces:**

1. The Telegraph report on the 20-year old Burdwan girl who walked out of her marriage in revolt of her in-laws' demands for dowry.
2. A perspective on astronaut Kalpana Chawla's Achievement
3. Sudha Murthy's write on what it is possible for women to achieve
UNIT - IV

Practice Exercises on Remedial Grammar covering
Common Errors in English, Subject-Verb Agreement, Reported Speech (Direct and Indirect),
Active and Passive Voice, Tense and Aspect

Vocabulary Development
Homophones & Homonyms; Word-formation; One-Word Substitutes; New & Select
Vocabulary Building (GRE Pattern), Same Word Used as Different Parts of Speech, Idioms
& Phrases, Words Often Confused.

UNIT - V

Technical Written Communication
Art of Writing: – Rules for Effective Writing – Argumentative Essay Writing (TOEFL Pattern),
(IELTS Pattern)

TEXT BOOK


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 Tropsech’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


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

2. Engineering physics by H K MALIK AK SINGH Tata McGraw hill
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)  
   
   ii) 5 4 3 2
   
   1 2 4 3 2 1
   1 2 3 3 2 1
   1 2 3 4 2 1
   1 2 3 4 5 1

   1 2 3 4 5 1
   1 2 3 4 2 1
   1 2 3 3 2 1
   1 2 4 3 2 1
   5 4 3 2 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 & 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 \( \text{K}_2\text{Cr}_2\text{O}_7 \) v/s \( \text{Na}_2\text{S}_2\text{O}_3 \) to determine the percentage purity of \( \text{K}_2\text{Cr}_2\text{O}_7 \) 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
External Marks : 75
Credits : 2
External Examination: 3 Hrs

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TRADES FOR EXERCISES: (Common to EEE, ECE, CSE, EIE & IT)

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:

T119 - APPLIED MATHEMATICS – II

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

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

T198 - ENGLISH-II

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

UNIT – I

Chapter 4: “Disaster Management” from Active English (Pearson)

UNIT – II

Chapter 5: “Health” from Active English (Pearson)

UNIT – III

Chapter 6: “Sports” from Active English (Pearson)

UNIT – IV

Listening
Listening - Process - Listening for Specific information - Listening for Note-taking - Listening and Making Inferences - Special Emphasis on TOEFL and IELTS models.

Reading
Reading as a Process, Comprehension: Predicting the Content - Skimming the Text for gist - Scanning for Specific Information - Transcoding: Types of Tests with Special Emphasis on TOEFL and IELTS models.

UNIT – V

Focus on Communication
Communication: Basic Concepts – Process — Channels – Barriers - Informal Conversation Vs Formal Expression Verbal and Non Verbal Communication

PRESCRIBED TEXTBOOK

REFERENCES
4. GRE and TOEFL. Kaplan and Baron's
T264 - NUMERICAL METHODS

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

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
UNIT - I

BASICS & RESULTANT OF FORCE SYSTEMS

UNIT - II

EQUILIBRIUM OF SYSTEMS OF FORCES

UNIT - III

PROPERTIES OF SURFACES
Centroids: Introduction - Determination of Centroids by integration method - Rectangle, circle, triangle from integration – Theorems of Pappus –Guldinus - Centroids of composite plane figures (T section, I section, - Angle section, Hollow section by using standard formula).


UNIT - IV

FRICTION
Introduction - Classification of friction - Laws of dry friction - Co-efficient of friction - Angle of friction - Angle of repose - Cone of friction - Wedge friction - Ladder friction - Problems involving the equilibrium of rigid bodies with frictional forces.

UNIT - V

DYNAMICS OF PARTICLES

TEXT BOOKS
REFERENCES

UNIT - I


UNIT- II

RECTIFIERS AND FILTERS: Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- ?section filter, Π- section filter, Multiple L- section and Multiple Îsection filter, and comparison of various filter circuits? in terms of ripple factors, basics of regulators.

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 gama, 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

AMPLIFIERS: Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of Av, Rv, Ri, A, Ro. Introduction to feedback Amplifier and Oscillators.

TEXT BOOKS
REFERENCES

UNIT - I

Introduction to Engineering Drawing and its importance - Introduction to Computer Aided Drafting, AutoCAD 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 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

P832 - ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

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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
SUGGESTED SOFTWARE/BOOKS

* Digital Mentor, Globarena, Hyderabad, 2005
* Sky Pronunciation Suite: Young India Films, Chennai, 2009
* Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
* Dorling Kindersley Series of Grammar, Punctuation, Composition, Dorling Kindersley, USA, 2001
* Learning to Speak English - 4 CDs. The Learning Company, USA, 2002
* Krishna Mohan, Effective English Communication, Tata McGraw Hills, New Delhi, 2007
P827 – ELECTRONIC DEVICES AND CIRCUITS USING LAB VIEW

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1. Identification, Specifications, Testing of R,LC Components (Colour Codes), and basic Electronic Instruments.

2. PN junction diode characteristics

3. Zener diode characteristics

4. Full wave Rectifier without & with filters

5. Transistor CB characteristics

6. Transistor CE characteristics

7. FET characteristics

8. CE Amplifier

9. CC Amplifier

10. FET Amplifier
T187 – ELECTRONIC CIRCUITS

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial :          External Marks : 75
Credits : 5        External Examination : 3 Hrs

UNIT - I


UNIT - II

LARGE SIGNAL AMPLIFIERS : Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C,Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT - III

FEEDBACK AMPLIFIERS : Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT - IV


UNIT - V

TEXT BOOK


REFERENCES

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, $\nabla \cdot D = \rho$

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, $\nabla \times B = 0$. Ampere’s circuitual law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere’s circuitual 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

4. “Electro magnetic Fields” by Sadiku, Oxford Publications
T294 – PULSE AND DIGITAL CIRCUITS

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

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 analyse 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.
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.
T206 – FLUID MECHANICS AND THERMAL ENGINEERING

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

UNIT - I

**Fluid Mechanics:** Introduction-Properties of Fluids-Pressure, Density, Specific Weight, Specific Gravity, Viscosity-T ypes of Fluids-T ypes of Fluid Flows-Continuity, Momentum and Bernoullis Equation - Flow Through Pipes-Friction Losses in Pipes-Darcys Weisbach Equation-Reynolds Number and its significance (10)

UNIT - II

**Pressure Measurement:** Total and Static Pressure measurements using Pitot Tube, Pitot-Static Tube, Manometers, Mechanical Gauges

**Velocity Measurement:** Anemometers-Cup and Vane Types, Hot-wire Anemometer

**Flow Measurements:** Introduction, Orifice meter, Venturi meter, Rotameter and Elbow meter (10).

UNIT - III


**First Law of Thermodynamics:** Statement-Internal Energy-Enthalpy-Specific Heats – Steady Flow Energy Equation.

**Second Law of Thermodynamics:** Kelvin-Plank and Clasius Statements, Reversible Process-Carnot Cycle- Entropy. (10)

UNIT - IV

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

**Internal Combustion Engines:** Classification-Working of Spark Ignition and Compression Ignition Engines-2 Stroke & 4 Stroke Engines (10)

UNIT - V


TEXT BOOKS

1. Hydraulics, Fluid mechanics and Hydraulic machinery MODI and SETH.

REFERENCES

1. Fluid Mechanics, White F.M. TMH
3. Engineering Thermodynamics—Cengel & Boles, TMH
4. Engineering Thermodynamics -- P.K.Nag, TMH
UNIT – I

DC Circuits: Basic components and electrical circuits, charge, current, voltage & power. Voltage and current sources, ohms law, current & voltage law & Kirchhoff’s current & voltage law. The single node-pair circuit, series and parallel connected independent sources, resistor in series and parallel, voltage and current division, basic nodal and mesh analysis. Nodal and mesh analysis. Introduction to network topology, trees and nodal analysis. Links and loop analysis.

UNIT – II


UNIT – III

Network Theorems: Tellegens, Superposition, Reciprocity, Thevinin’s, Norton’s, Max Power Transfer theorem. Milliman’s Theorem – Statement and proofs problem solving using dependent and independent sources for d.c and a.c excitation.

UNIT – IV

Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for d.c. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform methods of solutions.

UNIT – V


TEXT BOOK

REFERENCES
P826 – ELECTRONIC CIRCUITS LAB. 

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

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I) LIST OF EXPERIMENTS

1. Common Emitter and Common Source amplifier
2. Two Stage RC Coupled Amplifier
3. Current shunt Feedback Amplifier
4. Cascade Amplifier
5. Class A Power Amplifier (Transformer less)
6. Class B Complementary Symmetry Amplifier

II) Testing in the Hardware Laboratory (Six Experiments : 3 + 3) :

(A) Any Three circuits simulated in Simulation laboratory

(B) Any Three of the following

a. Class A Power Amplifier (with transformer load)

b. Class B Power Amplifier

c. Single Tuned Voltage Amplifier
d. Series Voltage Regulator
e. Shunt Voltage Regulator
P869 – PULSE AND DIGITAL CIRCUITS LAB.

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LIST OF EXPERIMENTS:

1. Linear Wave shaping.
2. Non Linear Wave shaping – Clipper.
3. Non Linear Wave shaping – Clamper.
4. Transistor as a switch.
5. Study of logic gates & some applications.
6. Study of Flip-Flop & some applications.
7. Astable Multivibrator.
10. Schmitt Trigger.
11. UJT as a Relaxation oscillator.
UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments. Financial Analysis through ratios: Ratios, Importance, types (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).
TEXT BOOK


REFERENCES

UNIT - I

Introduction to measurements - Physical measurement - Forms and methods of measurements – measurement Errors - Statistical analysis of measurement data - Probability of errors - Limiting errors.

UNIT - II


UNIT - III


UNIT - IV


UNIT - V

Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits, Spectrum analyzers, Different types of spectrum analyzer, Recorders, Introduction to magnetic recording techniques & X-Y plotters.

TEXT BOOK

REFERENCES

T220 – INDUSTRIAL INSTRUMENTATION

Lecture : 4 Periods/week  Internal Marks : 25
Tutorial : 1  External Marks : 75
Credits : 5  External Examination : 3 Hrs

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UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V

FLOW MEASUREMENT: Head type, Area type (Rotameter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type ,vertex shedding type, Hotwire anemometer type.Laser Doppler Veloci-meter.

TEXT BOOK


REFERENCES

T184 – ELECTRICAL TECHNOLOGY

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

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UNIT - I

DC MACHINES: Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generator.
D.C. MOTORS: DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne’s test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II

PERFORMANCE OF TRANSFORMERS: Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT - III

SINGLE PHASE INDUCTION MOTORS: Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

UNIT - IV


UNIT - V

ELECTRICAL INSTRUMENTS: Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

TEXT BOOK


REFERENCES

T320 – SWITCHING THEORY AND DIGITAL LOGIC

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

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.
T304 – SENSORS AND SIGNAL CONDITIONING

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

UNIT - I

Introduction to measurement systems: general concepts and terminology, measurement systems, sensor classification, general input-output configuration, methods of correction.
Performance characteristics: static characteristics of measurement systems, accuracy, precision, sensitivity, other characteristics: linearity, resolution, systematic errors, random errors, dynamic characteristics of measurement systems: zero-order, first-order, and second-order measurement systems and response.

UNIT - II

Resistive sensors & Signal conditioning for resistive sensors: potentiometers, strain gages and types, resistive temperature detectors (rtds), thermistors, magneto resistors, light-dependent resistors (ldrs) - measurement of resistance, voltage dividers, Wheatstone bridge. Balance and deflection measurements, sensor bridge calibration and compensation instrumentation amplifiers, interference types and reduction

UNIT – III

Reactance variation and electromagnetic sensors: capacitive sensors – variable & differential, inductive sensors - reluctance variation, eddy current, linear variable differential transformers (LVDTS), variable transformers: synchros, resolvers, inductosyn, magneto elastic sensors, electromagnetic sensors - sensors based on faraday's law, hall effect sensors

UNIT - IV

Signal conditioning for reactance variation sensors: problems and alternatives, ac bridges, carrier amplifiers - application to the LVDT, variable oscillators, resolver-to-digital and digital-to-resolver converters

UNIT - V

Self-generating sensors & Signal conditioning for self-generating sensors
thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors, electrochemical sensors - chopper and low-drift amplifiers, offset and drifts amplifiers, electrometer amplifiers, charge amplifiers, noise in amplifiers

TEXT BOOK:

REFERENCES
3. Instrument Transducers – An Introduction to Their Performance and Design – by Herman K.P. Neubrat, Oxford University Press.
LIST OF EXPERIMENTS

1. Magnetizing characteristics of separately excited DC generator
2. Load test on DC shunt generator
3. Swinburne’s test on DC shunt machine
4. Speed control of DC shunt motor
5. Brake test on DC shunt motor
6. OC and SC tests on 1-Ph transformer.
7. Load Test on 1-Ph Transformer
8. Brake test on 3-phase squirrel cage Induction motor
9. Regulation of 3-phase alternator by synchronous impedance method
10. Equivalent circuit of 1-phase induction motor

ADDITIONAL EXPERIMENTS

11. Speed control of Induction motor using MATLAB/Simulink
12. Speed Control of DC motor using MATLAB
P839 – INSTRUMENTATION – I LAB.

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LIST OF EXPERIMENTS:

2. 
4. 
7. Measurement of Strain using Strain gauge.
9. RTD Characteristics.
10. LVDT Characteristics.
11. Inductive & Capacitive Transducers.
12. Piezo electric transducer.
13. Bourdon tube.
T235 – LINEAR AND DIGITAL IC APPLICATIONS

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

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
Basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.
Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

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, wave form 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
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, 

REFERENCE BOOKS

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 
T306 – SIGNALS AND SYSTEMS

UNIT - I

SIGNAL ANALYSIS:
Classification of signals, Analogy between vectors and signals, Norm of a Vector, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.

UNIT - II

FOURIER SERIES AND FOURIER TRANSFORMS:
Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet’s conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform and its application to BandPass signals.

UNIT - III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:
Classification of Systems, impulse response, Response of a linear system, convolution in time domain and frequency domain, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, relationship between bandwidth and rise time. Cross correlation and auto correlation of functions, properties of correlation function, Relation between convolution and correlation, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function.

UNIT - IV

LAPLACE TRANSFORMS:
Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s relation between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.
UNIT - V

Z-TRANSFORMS:
Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOK


REFERENCES

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

Concepts of control systems- Open loop and closed loop control systems. Characteristics of feedback control systems: System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, and Simple electromechanical systems. Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason’s gain formula


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 - diagonalisation - solution of state equations - homogenous and non homogenous cases- properties of state transition matrix - relation between transfer function and state space models , Controllability and Observability.
TEXT BOOKS


REFERENCES

UNIT - I

Register Transfer Language And Microoperations: Register Transfer language, register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit.


UNIT - II

Micro Programmed Control: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Micro programmed control

UNIT III

Pipelining And Vector Processing: parallel processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC pipeline, Vector Processing


UNIT IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory. Associative Memory Cache Memory, Virtual Memory

UNIT V

INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP) Serial communication

TEXT BOOKS

REFERENCES

T254 – MICROPROCESSOR AND INTERFACING

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UNIT-I

Architecture of 8086 Microprocessor, Special functions of General purpose registers. 8086 flag register and function of 8086 Flags, Addressing modes of 8086. Instruction set of 8086. Assembler directives, simple programs, procedures, and macros. Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-II

Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram, Memory interfacing to 8086 (Static RAM & EPROM), Need for DMA. DMA data transfer Method, Interfacing with 8237/8257.

UNIT-III

8255 PPI – various modes of operation and interfacing to 8086, Interfacing Keyboard, Displays, 8279 Stepper Motor and actuators, D/A and A/D converter interfacing.

UNIT-IV


UNIT-V

Introduction to 80286, Salient Features of 80386, Real and Protected Mode Segmentation & Paging, Salient Features of Pentium, Branch Prediction. 8051 Microcontroller Architecture, Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOKS


REFERENCES

2. The 8086/8088 family: Design Programming and Interfacing, John Uffenbeck, PHI Learning.
UNIT - I


UNIT – II

CONTROL ACTIONS AND CONTROLLERS: Basic control actions- character sticks of two-position, three position, single speed and multiple floating, proportional, integral, and derivative control modes, PI, PD, PID control modes-problems. - Pneumatic, hydraulic and electronic controllers to realize various control actions.

UNIT - III


UNIT - IV

FINAL CONTROL ELEMENTS: I/P converter, P/I converter- pneumatic, electric and hydraulic actuators.- Control valves- character sticks of control valves –Globe, Butterfly, diaphragm and ball valves-control valve sizing, problems

UNIT - V

MULTI LOOP CONTROL SYSTEMS: Cascade control, feed forward control, ratio control, split range, multi variable control.

TEXT BOOKS


REFERENCES

1. Automatic process control-D.P.ECKMAN
2. Process systems analysis and control- Coughahows MCGraw Hill
3. Process control- B.G.Liptake
T290 – PROFESSIONAL ETHICS

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

UNIT - I

ENGINEERING ETHICS
Senses of 'Engineering Ethics' variety of moral issued 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

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 managers consulting engineers engineers as expert witnesses and advisors moral leaderships sample code of Ethics ( Specific to a particular Engineering Discipline ).

TEXT BOOKS

REFERENCES


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


P847 – LINEAR IC APPLICATIONS LAB.

Lab. : 3 Periods/week Internal Marks : 25

credits : 2 External Marks : 75

External Examination : 3 Hrs

---------------------------------------------------------------------------------------------------------------

LIST OF EXPERIMENTS:

1. OP-Amp applications-Adder, Subtractor & Comparator circuits.
2. Integrator & Differentiator circuits using IC 741.
3. Active filter applications-LPF & HPF (First order).
4. Active filter applications-BPF, Band Reject (Wide band), & Notch filters.
5. IC 741 oscillator circuits-Phase shift & Wien bridge oscillator.
7. IC 555 Timer-Monostable Multivibrator.
8. IC 555 Timer-Astable Multivibrator.
10. IC 565 - PLL applications.
11. IC 566 - VCO applications.
12. Voltage regulator using IC 723.
13. Three terminal voltage regulators-7805, 7809 & 7912.
14. 4-bit DAC using OP-Amp.
P865 – PROCESS CONTROL LAB.

Lab. : 3 Periods/week               Internal Marks : 25

External Marks : 75

Credits : 2               External Examination : 3 Hrs

---------------------------------------------------------------------------------------------------------------

LIST OF EXPERIMENTS:

1. Flow control.
2. Level Control.
3. Temperature Control.
4. Pressure Control.
5. I/P Converter.
6. Control valve (Quick opening &, Linear) Characteristics.
7. P/I converter.
10. Multi-loop control systems-Cascade & Ratio.
11. Temperature Transmitter.
13. Level Transmitter.
14. Pressure Transmitter.
UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V


TEXT BOOK


REFERENCES

# T244 – MANAGEMENT SCIENCE

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

**Introduction to Management and organisations**


### 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. types of production. Work study - Definition, objectives, method study - definition, 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**


### UNIT - IV

**Introduction to PERT / CPM**

Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

### UNIT - V

**Contemporary Management Practices& Human resources management**

Basic concepts of MIS, , Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Business Process outsourcing (BPO) , Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, merit rating, different methods of merit ratings. Wages and incentives
TEXT BOOKS

1. Dr. ARYASRI MANAGEMENT SCIENCE - TATA MCGRAW HILL PUBLICATIONS 2007 Edition
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

REFERENCES

**T140 – COMMUNICATION SYSTEMS**

<table>
<thead>
<tr>
<th>Lecture</th>
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**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 discriminatory, PPL.

**UNIT - III**

**SAMPLING AND DISCRETE TIME MODULATIONS**

Sampling theorem – low pass and band pass, Pulse Amplified 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**

PCM, Quantization noise, bandwidth, advantages over analog communication, PCM system, Differential PCM, Delta Modulation, Digital Modulation – Concepts of ASK, and Concepts of FSK, and Concepts of PSK, and Concepts of DPSK, Digital Multiplexing. POWER LINE CARRIER-Interfacing with power line, description of a typical system.
UNIT - V

MICROWAVE COMMUNICATION


TEXT BOOKS

REFERENCES
2. “Modern Digital & Analog Communication System”, Lathi, Oxford University
T266 – OBJECT ORIENTED PROGRAMMING (C++)

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

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 specifiers (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 constructors.

String class - Usage of standard library string class with example programs.

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, 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

T253 – MICROCONTROLLER AND APPLICATIONS

<table>
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UNIT - I

OVERVIEW OF ARCHITECTURE AND MICROCONTROLLER RESOURCES:

UNIT - II

8051 FAMILY MICROCONTROLLERS INSTRUCTION SET:
Basic assembly language programming – Data transfer instructions – Data and Bitmanipulation instructions – Arithmetic instructions – Instructions for Logical operations on the tes among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow.

UNIT - III

REAL TIME CONTROL: INTERRUPTS & TIMERS:
Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or disabling of the sources – Polling to determine the interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051. - Programmable Timers in the MCU’s – Free running counter and real time control – Interrupt interval and density constraints.

UNIT - IV

SYSTEMS DESIGN: DIGITAL AND ANALOG INTERFACING METHODS:

UNIT - V

REAL TIME OPERATING SYSTEM FOR MICROCONTROLLERS:
Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design –Software development tools for Microcontrollers.
TEXT BOOK


REFERENCES

T277 – POWER PLANT INSTRUMENTATION
Lecture : 4 Periods/week Internal Marks : 25
Tutorial : External Marks : 75
Credits : 3 External Examination : 3 Hrs

UNIT - I

BRIEF OVERVIEW OF POWER GENERATION- Hydro, thermal, Nuclear, solar, wind etc,
Importance of instrumentation for power generation- Thermal power plants – Building blocks
– Details of boiler processes – PI diagrams of boiler – co-generation – brief description of
transmission and grids.

UNIT - II

VARIOUS PARAMETERS AND MEASUREMENTS IN POWER PLANTS: Electrical
measurements – Current, Voltage, Power, Frequency, Power factor, trivector meter. Non
electrical parameters, feed water flow, fuel, air and steam with correction factors for
temperature. Pressure, temperature, level measurements-smoke density measurements -
Dust monitor- flue gas parameters.

UNIT - III

BOILER CONTROL & MONITORING SYSTEMS IN THERMAL POWER PLANTS:
Combustion Control – control of main header pressure, air & fuel ratio control – furnace draft
and excess air control – Drum level ( 3 element) control – main and reheat temperature
control, burner tilt up, by pass damper, super heater controls. ID & FD fan air flow controls –
Spray and Gas recirculation control – Boiler Feed Pump recirculation Control – Hot well and
deaerator level control – Control systems in Raw material (Coal) handling – Pulverizer
Control – Computers in power plants.

UNIT - IV

TURBINE AND ALTERNATOR MONITORING & CONTROL: Condenser Vacuum Control –
Gland Steam exhaust pressure control – Speed, Vibration, Shell and Bearing Temperature
monitor and control – Lubricating oil temperature control – Alternator vibration monitoring –
Hydrogen generator cooling system.

UNIT - V

ANALYSIS INSTRUMENTS IN POWER PLANTS: Thermal conductive type – Paramagnetic
type oxygen analyzers- field mount type oxygen analyzers – Infra red type – trim analyzer –
spectrum analyzer – Hydrogen Purity meter – Chromatography – pH meter – conductivity
cell – Fuel analyzer – Pollution monitoring and control instruments and analyzers.

TEXT BOOK

Power Plant Engineering: BLACK & VEATCH.
Publisher: Chapman & Hall Inc- New York, CBS Publishers & Distributors, New Delhi
(for Indian Reprint edition) - 2005.
REFERENCES

T336 – VIRTUAL INSTRUMENTATION

<table>
<thead>
<tr>
<th>Lecture</th>
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UNIT - I

VIRTUAL INSTRUMENTATION: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, and comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

UNIT - II

VI PROGRAMMING TECHNIQUES: VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

UNIT - III

DATA ACQUISITION BASICS: Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

UNIT - IV

VI CHASSIS REQUIREMENTS. Common Instrument Interfaces: Current loop, RS 232C/RS485, GPIB. - Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI.

UNIT - V

Networking basics for office & Industrial applications, VISA and IVI. - VI toolsets, Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system

TEXT BOOK


REFERENCES

T225 - INSTRUMENTATION AND CONTROL IN PETRO CHEMICAL INDUSTRIES

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

UNIT–I

UNIT–II
Atmospheric Distillation of Crude oil - Vacuum Distillation process - Thermal Conversion process - Control of Distillation Column - Temperature Control - Process control - Feed control - Reflux Control - Reboiler Control.

UNIT–III
Controls of chemical Reactors: Temperature Control, Pressure Control - Control of Dryers - Batch Dryers - Atmospheric and Vacuum; Continuous Dryers. - Control Heat Exchangers and Evaporators - variables and Degrees of freedom - Liquid to Liquid Heat Exchangers - Steam Heaters - Condensers -Reboilers and Vaporizers - Cascade Control - Feed forward Control.

UNIT–IV
Evaporators: Types of Evaporators. - Evaporators in Petroleum refinery

UNIT–V

TEXT BOOK
Dr. Ram Prasad, Petroleum Refining Technology, Khanna Publisher, 1st Edition, 2000

REFERENCES
T224 - INSTRUMENTATION AND CONTROL IN PAPER AND PULP INDUSTRIES

UNIT - I

Role of paper in various forms in the civilised world; history of paper making; per-capita consumption of paper and board in India and in other countries. Process description in diagrammatic and functional block details; conventional and non-conventional raw materials for paper manufacture. Various grades of paper; properties of paper.

UNIT - II

Different pulping processes; importance of kraft process; continuous and batch digesters, brown stock washers, bleaching plant, chemical recovery process; paper machine operations; conversion processes. Pulping process involves various chemical processes;

UNIT - III

Impact of effluents and need for treatment and disposal. Addition and removal of water in Paper making; process water, DM water and potable water; water treatment plant. - : Cogeneration Plant for steam and power generation

UNIT - IV

Identification of various process parameters in the industry; selection of suitable measurement hardware for flow, pressure, level, temperature, density, solids, consistency, pH, ORP, conductivity. Special gauges for measurement of basis weight, moisture and caliper. Control room layout for mill operations; graphic displays; alarm management.

UNIT - V

Special applications for controls; Digester blow tank controls; digester liquor feed pump control; brown stock washer level control; stock chest level control; dissolving tank density control; white liquor classifier density control; white liquor flow control; condensate conductivity control. dryer temperature control. Basis weight control; web moisture control. - Evolution of computer applications in the industry; Review of data logging, SCADA, DDC, PLC and DCS. Computer controls for online basis weight and web moisture in modern mills.
TEXT BOOK


REFERENCES

LIST OF EXPERIMENTS:

MICROPROCESSOR 8086:

1. Introduction to MASM/TASM.


3. Logic operations : - Shift & Rotate, Converting packed BCD to Unpacked BCD BCD to ASCII conversion.

4. By using string operations & Instruction prefix:- Move block of data, Reverse String, Sorting Inserting, Deleting string, Length of string, String comparison.

5. DOS/BIOS programming: - Reading key board (Buffered with & without echo), Display characters & Strings.

INTERFACING:

1. 8259-Interrupt controller: Generate a interrupt using 8259 Timer.

2. 8279-Keyboard display: Write a small program to display a string of characters.

3. 8255-PPI:Write ALP to generate sinusoidal wave using PPI.

4. 8251-USART:Write a program in ALP to establish communication between two processors.

MICROCONTROLLER 8051:

1. Reading & writing on a parallel port.

2. Timer in different modes.

3. Serial communication implementation.
P840: INSTRUMENTATION – II LAB.

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

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LIST OF EXPERIMENTS:

1. Design & simulation of Analog circuits using CAD package.
2. Design of PCB’s using packages & Fabrication of PCB.
3. Linearization of Thermistor using Microprocessor.
4. Study of level control using PLC.
5. PH measurement.
7. Calibration of P/I & I/P converters.
8. RPM indicator using Stroboscope.
12. Displacement measurement using Inductive pickup & Capacitive pickup.
13. PID controller setup.
T272 – OPTO ELECTRONICS AND LASER INSTRUMENTATION

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

UNIT - I

OPTICAL FIBERS AND THEIR PROPERTIES
Introduction to optical fibers – Light guidance – Numerical aperture – Dispersion – Different types of fibers and their properties. - Light Sources for fiber optics, Photo detectors, source coupling, splicing and connectors.

UNIT - II


UNIT - III

OPTO-ELECTRONIC COMPONENTS: LED, LD, PIN & APD, and Electro-optic, Magneto optic and Acousto-optic Modulators

UNIT - IV


UNIT - V

MEDICAL APPLICATIONS: Lasers and tissue interaction, Laser instruments for surgery, removal tumors of vocal cords, plastic surgery, DERMATOLOGY.

TEXT BOOK


REFERENCES

UNIT - I

Introduction to PC based instrumentation, PC, I/O Ports, Plug-in Ports, O/P systems with actuators, operating interface, operating system, PC expansion systems, Back-plane Bus.

UNIT - II

PC Programming-ALP, Data transfer operations, Sealing & Linearization.

UNIT - III

PLC’s-Definition, Overview, PLC block diagram, I/O modules, Power supplies, Ladder logics-Definition, Creating Ladder diagrams, PLC functions, Registers, Timer, Counters.

UNIT - IV

PLC Intermediate functions-Arithmetic functions, Comparison functions, Skip & MCR functions, Sequencer functions.

UNIT - V

PLC Installation- Maintenance, Trouble shooting, PLC-PID functions, Ladder languages, Field bus, Pro field bus, Industrial field bus, Smart sensors, Hart protocols.

TEXT BOOK

Computer control of process - by m.chidambaram. – narosa publishers

REFERENCES

2. PC based instrumentation concepts and practice–by n.Mathivanan - phi
T115 – ANALYTICAL INSTRUMENTATION

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

UNIT - I


UNIT - II

SPECTRO PHOTOMETERS : Spectral methods of analysis - Beer's law UV - visible spectrophotometers - single beam and double beam instruments - source and detectors - IR spectrophotometers - sources and detectors - FTIR spectrometers - atomic absorption spectrophotometer - flame emission spectrophotometers - sources of flame photometry - applications

UNIT - III

GAS ANALYSER & CHROMATOGRAPHY - Oxygen analyser - CO monitor - Nox analyser - H2S analyser - dust and smoke measurement- thermal conductivity type - thermal analyser - industrial analysers. - Gas chromatography - liquid chromatography - principles, types and applications - high-pressure liquid chromatography - detectors

UNIT - IV

NUCLEAR MAGNETIC RESONANCE AND RADIATION TECHNIQUES
NMR - basic principle - NMR spectrometers - applications - introduction to mass spectrophotometers - nuclear radiation detectors - GM counter - proportional counter - solid state detectors - introduction - to x-ray spectroscopy.

UNIT - V

ENVIRONMENTAL POLLUTION MONITORING INSTRUMENTS: Air pollution monitoring, instrument systems for-carbon monoxide-sulphur dioxide-nitrozen oxides-hydro carbons-ozone automated wet chemical analyzers-water pollution monitoring.

TEXT BOOK


REFERENCES

T338 – VLSI DESIGN

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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

MOS Technology

UNIT II

MOSFET Transistor

UNIT III

CMOS Logic Gates Design and Layout

UNIT IV

Storage Elements and Dynamic Logic Circuits

UNIT V

VHDL

TEXT BOOKS

REFERENCES

T163 – DIGITAL SIGNAL PROCESSING

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

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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
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

UNIT - II

Essentials of 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

Single Layer Feed Forward Neural Networks
Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Multilayer Feed forward Neural Networks
Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - IV

Associative Memories
UNIT - V

Fuzzy Logic System
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TEXT BOOK
2. Neural Networks – Simon Hakins, Pearson Education

REFERENCES
1. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
2. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
UNIT - I

INTRODUCTION: Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem. - Intelligent Agents: Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.- Problem Solving: Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, and issues in the design of search programs.

UNIT - II


UNIT - III

KNOWLEDGE: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation. - Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

UNIT - IV

REPRESENTING KNOWLEDGE USING RULES: Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

UNIT - V

REASONING: Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

TEXT BOOK

1. Artificial Intelligence, Ritch & Knight, TMH

REFERENCES

1. Artificial Intelligence A Modern Approach, Stuart Russell & Peter Norvig Pearson
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
5. Artificial Intelligence, Winston, Pearson Ed.
UNIT - I

Overview of MEMS
MEMS and Microsystems definitions and examples, Difference between Microsystems and Microelectronics, Benefits of miniaturization, Applications: Industrial/automotives sensors, Medical systems, aircraft sensors, Structural health monitoring, Telecommunication etc, Materials for MEMS.

UNIT - II

SCALING LAWS IN MINIATURIZATION
Introduction to Scaling, Scaling in Geometry, Scaling in Electrostatic forces. MEMS Design Considerations.

UNIT - III

MICRO FABRICATION - I
Introduction, Photolithography, Photoresists and Application, Light Sources, Photoresist Removal, Ion Implantation, Diffusion, Oxidation, Chemical Vapor Deposition (CVD), Sputtering, Deposition by Epitaxy, Etching.

UNIT - IV

MICRO FABRICATION - II

UNIT - V

MEMS DEVICES AND STRUCTURES

TEXT BOOK


REFERENCES

1. Fundamentals of Micro Fabrication, Marc Madou, CRC Press
2. The MEMS Handbook, Mohamed Gad-el-Hak, CRC Press
3. Micro and Smart Systems, G.K.Anantha Suresh, Wiley India
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
P820 – DIGITAL SIGNAL PROCESSING LAB.

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

Credits : 2                     

External Examination : 3 Hrs

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LIST OF EXPERIMENTS

USING TMS320C5X:

1. Generation of Signals
2. Linear Convolution
3. Implementation of a FIR filter
4. Implementation of an IIR filter
5. Calculation of FFT

USING MATLAB:

1. Generation of Discrete time Signals
2. Verification of Sampling Theorem
3. FFT and IFFT
4. time & Frequency response of LTI systems
5. Linear and Circular Convolution through FFT
6. Design of FIR filters (window design)
7. Design of IIR filters (Butterworth &Chebychev)
### P841 – INSTRUMENTATION – III LAB.

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<th>Lab.</th>
<th>Internal Marks</th>
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<td>3 Periods/week</td>
<td>25</td>
<td>75</td>
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**LIST OF EXPERIMENTS:**

1. Gas analyzer.
2. Gas & Liquid chromatography.
3. UV & VIS Spectrometer.
4. IR & FTIR Spectrometer.
5. Flame photometer.
8. Interfacing of ADC to PC.
9. Interfacing of DAC to PC & generate various types of signals.
10. Serial communication through RS232C between PCs.
11. GPIB interface-Master to slave data transfer.
12. GPIB interface-Slave to slave data transfer.
UNIT - I


UNIT - II

REGULATED POWER SUPPLIES: Block diagram, Principle of voltage regulation, Series and Shunt type Linear Voltage Regulators, Protection Techniques—Short Circuit, Over voltage and Thermal Protection.

UNIT - III

SCR AND THYRISTOR: Principle of operation and characteristics of SCR, Methods of Turn on and turn off mechanism, Gate characteristics, Ratings of SCR -Triggering of SCR, Diac and Triac Phase controlled half and full wave rectification.

UNIT - IV


UNIT - V


TEXT BOOK


REFERENCES

UNIT - I

Information systems in the enterprise: Why information systems, perspectives on information systems, contemporary approaches to information systems, - Four major types of systems in organizations, transaction processing systems, management information systems, decision support systems, executive support systems. - Systems from a functional perspective-Sales and Marketing Systems, Manufacturing and Production Systems, Financial and Accounting Systems, Human Resources Systems.

UNIT - II


UNIT - III

The wireless revolution: importance of wireless networking, wireless transmission media and devices, cellular network standards and generations, wireless computer networks and internet access, wireless technology in the enterprise. - Security and control: system vulnerability and abuse, importance of security and control, establishing a management framework for security and control, technologies and tools for security and control.

UNIT - IV

Enterprise Applications and Business Process Systems: What are enterprise systems, how enterprise systems work, supply chain management systems, customer relationship management systems, and enterprise integration trends?

UNIT - V

Redesigning the organizations with information systems: systems as planned organizational change, overview of system development, - Alternative systems building approaches – traditional systems life cycle, prototyping, end user development, application software package and outsourcing. - Managing change and international information systems: The importance of change management in information systems success and failure, managing implementation, managing global systems, technology issues and opportunities for global value chains.
TEXT BOOK


REFERENCES

T190 – EMBEDDED SYSTEMS

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

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 (RT-level), 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

3. Microcontrollers Architecture, Programming,
T322 – TELEMETRY AND TELE CONTROL

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

UNIT - I


UNIT - II

SYMBOLS AND CODES
Bits and Symbols, Time function pulses, Line and Channel Coding, Modulation Codes. Intersymbol Interference.

UNIT - III


UNIT - IV

SATELLITE & OPTICAL TELEMETRY

UNIT - V


TEXT BOOK
Telemetry Principles – D. Patranabis, TMH

REFERENCES
T106 – ADVANCED SENSORS

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

UNIT - I

SEMICONDUCTOR SENSORS: Metal Oxide Semiconductors, Hall Elements, Silicon Sensors, Silicon planar technology, Micromachine technology, silicon sensors for sensing radiation, mechanical, magnetic, chemical and other signals, IC sensors.

UNIT - II

CHEMICAL AND BIOMEDICAL SENSORS: Polymers, chemically modified electrodes, Membrane electrodes, Thick Film Devices, catalytic devices, Gas sensors.
OPTICAL SENSORS: Lasers, photo-detectors and optical fibre as sensors, Integrated optics

UNIT - III

MICRO SENSORS: Thin film sensors, Micro sensors for sensing thermal Radiation, Mechanical, Magnetic and Chemical signals.

UNIT - IV

INTERFACING AND SIGNAL PROCESSING: Intelligent and smart sensors, concepts of redundant and multi – sensory systems, operation in coded mode and mapping mode.

UNIT - V

SMART SENSORS: Basics of smart sensors, salient features of smart sensors, various components in smart sensors, TEDS, IEEE-1451 standards.

TEXT BOOK


REFERENCES

UNIT - I

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

UNIT - II

Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM :
Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT - III

STATE SPACE ANALYSIS :
State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state space equations

UNIT - IV

CONTROLLABILITY AND OBSERVABILITY :

UNIT - V

STATE FEEDBACK CONTROLLERS AND OBSERVERS :
Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman’s formula.- State Observers – Full order and Reduced order observers.

TEXT BOOK

Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition

REFERENCES

1. Digital Control and State Variable Methods by M.Gopal, TMH
3. Digital Control Engineering, M.Gopal
T169 – DSP PROCESSORS AND ARCHITECTURES

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

UNIT - I
INTRODUCTION TO DIGITAL SIGNAL PROCESSING: Introduction, A Digital signal-processing system, The Sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

UNIT - II
COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT - III
ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.
EXECUTION CONTROL AND PIPELINING: Hardware looping, Interrupts, Stacks, Relative Branch support Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT - IV
PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT - V
IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, an 8-Point FFT implementation on the TMS320C54XX,
TEXT BOOKS


REFERENCES

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
4. K.S.Fu, R.C Gonzalez and C.S.G.Lee, Robotics control, Sensing, vision, and intelligence; Mc Graw HILL International Editions
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 ,Pnuemotachograph ,Ventilators.

TEXT BOOK


REFERENCES

2. Medical instrumentation application & design – 3rd edition by jhon g.webster, editor jhon wiley.