# RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

**AUTONOMOUS**

NANDYAL-518501, KURNOOL DIST., A.P., INDIA

# ELECTRONICS & INSTRUMENTATION ENGINEERING


**ESTD: 1995**

Applicable for students admitted into B.Tech (Regular) from 2010-11
&
B.Tech (Lateral Entry Scheme) from 2011-12

**ACADEMIC REGULATION, COURSE STRUCTURE & DETAILED SYLLABUS**

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG & TECHNOLOGY, NANDYAL

AUTONOMOUS

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

NANDYAL-518501, KURNOOL DIST., A.P., INDIA

(Affiliated to J.N.T.U.A, Anantapur)

# ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

## B.Tech (Regular) from 2010-11 and B.Tech (Lateral Entry Scheme) from 2011-12

For pursuing four year under graduate Bachelor Degree Programme of study in Engineering (B.Tech), Two year Master (post graduate) Degree of study in Engineering (M.Tech),Two year Master (post graduate) degree of study in Business Administration (MBA),Three year Master (post graduate) Degree of study in Computer Applications (MCA) offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal - 518501 under Autonomous status and herein referred to as RGMCET(Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2010-11 onwards. Any reference to "Institute" or "College" in these rules and regulations stands for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified here after shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

The candidate seeking admission into the first year of study of four year B.Tech degree Programme should have

i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination certified by Board of Intermediate Examinations) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or any equivalent certified by State Board of Technical Education) for admission.

ii) Secured a rank in the EAMCET examination conducted by A.P. State Council for Higher Education (APSCHE) for allotment of a seat by the Convener, EAMCET, for admission.

***Admission Procedure:***

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree programme as follows:-

a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.

b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

**Admission to the Second year of Four year B.Tech Degree Programme in Engineering:**

i) Candidates qualified in ECET and admitted by the Convener, ECET, in such cases for admission, when needed permission from the statutory bodies are to be obtained.

ii) 10% of the sanctioned strength in each programme of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

***List of Programmes offered***

1) B.Tech – Regular ( & Lateral Entry)
2) M.Tech – Regular
3) MBA – Regular
4) MCA – Regular

**1. Academic Regulations for 2010 B.Tech (Regular)**

(Effective for the students admitted into the I year from the Academic Year 2010-2011)

The B.Tech Degree will be conferred by the Jawaharlal Nehru Technological University, Anantapur, to students who are admitted to the program and fulfil all the requirements for the award of the Degree as specified below.

***1.0 Award of B.Tech. Degree***

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

1.1) Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.

1.2) Registered for 240 credits and secured 232 credits with compulsory subjects as listed in Table-1 below.

**Table 1: Compulsory Subjects**

| S.No | Subject Particulars |
|---|---|
| 1. | All the first year subjects |
| 2. | All practical subjects |
| 3. | All audit courses/soft skills/open electives |
| 4. | Mini project |
| 5. | Seminar |
| 6 | Comprehensive viva voce |
| 7. | Project work |

***2.0 Forfeit of seat***

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

***3.0 Courses of study***

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

1. Civil Engineering.
2. Computer Science and Engineering.
3. Electrical and Electronics Engineering.
4. Electronics and Communication Engineering.
5. Electronics and Instrumentation Engineering.
6. Information Technology.
7. Mechanical Engineering.

and any other course as approved by the authorities of the University from time to time.

**Table 2: Credits**

| | I Year | | | | Semester | | | |
|---|---|---|---|---|---|---|---|---|
| | Periods /Week | Credits | Internal Marks | External Marks | Periods /Week | Credits | Internal Marks | External Marks |
| Theory | 02 | 04 | 30 | 70 | 04 | 04 | 30 | 70 |
| | 03 | 05 | 30 | 70 | | | | |
| | 03+1* | 05 | | | | | | |
| | 03+1* | 06 | | | | | | |
| Practical | 03 | 03 | 25 | 50 | 03 | 02 | 25 | 50 |
| Practical / Drawing | 03+1* | 02 | | | 06 | 04 | | |
| | 06 | 06 | 30 | 70 | | | 30 | 70 |
| Open Electives/Audit courses /Soft skills courses | 03 | | | | | 02** | 100 | |
| Mini Project | | | | | | 02 | | 50 |
| Seminar | | | | | | 02 | 50 | |
| Comprehensive Viva-voce | | | | | | 04 | | 50 |
| Project | - | - | | | | 12 | 50 | 100 |

**[*Tutorial,**

****Open Electives/Audit courses/Soft skills course credits will not be considered for the award of division. However all these courses have to be cleared through Internal evaluation by scoring minimum of 40%.The credits obtained in these courses will be taken in to account for award of degree.]**

### *4.0 Distribution and Weightage of Marks*

4.1 The performance of the student in each semester / I year shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, mini-project, comprehensive viva, seminar shall be evaluated for 50 marks each and the project work shall be evaluated for 150 marks.

4.2 For theory subjects the distribution shall be 30 marks for Internal Evaluation (25 marks for internal test and 05 marks for assignments) and 70 marks for the End-Examination.

4.3 For the semester system, during the semester there shall be 2 tests for theory subjects. In each Internal test there shall be one compulsory (short answers) question and 3 descriptive questions. The duration of internal test will be for 2 hrs. First test to be conducted in 1 – 3 units and second test to be conducted in 4 - 6 units of each subject. For awarding of 25 Internal marks the performance of the student in two Internal examinations conducted one in the middle of the semester and the other towards the end of the semester giving a weightage of 0.75 for the better score and 0.25 for the other score will be considered. There shall be two assignments (problem based) in each semester for award of 05 marks so that Internal component (marks) will be 30 marks (25 marks for Internal test+05 marks for assignments).

4.4 For the I year class which shall be on yearly basis, there shall be 3 tests. For awarding of 25 Internal marks the performance of the student in three Internal examinations conducted as per the schedule giving a weightage of 0.5 for the best score, 0.25 for better score and 0.25 for the other score will be considered. The distribution of syllabus for the conduct of Internal tests in the first year shall be as follows:

**Table 3: Units for Internal Tests**

| I Year | | Semester | |
|---|---|---|---|
| **2 Units** | **First Internal test.** | **3 Units** | **First Internal test.** |
| **3 Units** | **Second Internal test.** | **3 Units** | **Second Internal test.** |
| **3 Units** | **Third Internal test.** | | |

In a year there shall be at least three assignments and in each semester there shall be two assignments for the award of 5 marks.

4.5 In the case of open electives/Audit courses and soft skills subjects two Internal examinations shall be conducted one in the middle of the semester and the other at end of the semester for 70 marks and the marks scored by the student in these exams with a weightage of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 70. The remaining 30 marks are based on the average marks scored in two assignments.

4.6 No makeup test for Internal examination or assignments will be conducted in any subject or practical. The student, who is absent for any test shall be deemed to have scored zero in that test.

### *5.0 Question Paper Pattern:*

5.1 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 10 marks (It contains 5 questions of two marks - no choice in first question). The remaining 3 questions carry 5 marks each.

5.2 The End Examination question paper will have 7 questions and students have to write 5 questions. However, the first question is compulsory and it consists of 7 short answer questions, each carrying 2 marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 14 marks.

5.3 For practical subjects there shall be a continuous evaluation during the semester for 25 Internal marks and 50 End Examination marks. Of the 25 marks for Internal, 20 marks shall be awarded for day-to-day work and 5 marks to be awarded by conducting an Internal laboratory test. The End Examination shall be conducted by the teacher concerned and an external Examiner from other institutions.

5.4 For the subject having design and / or drawing, (such as Engineering Graphics, Machine Drawing etc ) and estimation, the distribution shall be 30 marks for Internal evaluation (15 marks for day-to-day work and 5 marks for Internal tests and 10 marks for assignments) and 70 marks for End Examination.

There shall be two Internal tests in a Semester and the best of the two shall be considered for the award of marks for Internal tests. However in the I year class, there shall be three Internal tests and the average of best two will be taken into consideration for award of Internal marks.

5.5 The Engineering Drawing Practice Lab, wherever offered is to be treated as a theory subject. Evaluation method adopted for theory subjects shall be followed here as well.

5.6 There shall be mini-Project, in collaboration with an industry (wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc) after III year II Semester examination and implementation/simulation shall be carried out in IV first semester during lab classes. Implementation or construction of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I Semester. The mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external Examiner, Head of the Department, the supervisor of mini project and a senior faculty member of the Department. There shall be 25 Internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

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

5.8 There shall be a comprehensive viva voce examination at the end of IV year II semester for 50 marks which shall be conducted by HOD, senior faculty and external Examiner from other institute.

5.9 The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The evaluation of project work shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by committee consists of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by committee consists of head of the Department or his nominee, senior faculty member and the supervisor of project.

**Table4: Distribution of weightages for examination and evaluation:**

| S.No | Nature of subject | Marks | Type of examination and mode of assessment | | Scheme of Examination |
|---|---|---|---|---|---|
| 1 | Theory | 70 | End Examination (External evaluation) | | End Examination in theory subjects will be for 70 marks. |
| | | 30 | 25 | Internal examinations (Internal evaluation) | These 25 marks are awarded to the students based on the performance in three(yearly) or two(semester) Internal examinations with a weightage of 0.5 for best score, 0.25 for better score, 0.25 for other score (yearly) and 0.75 for better score and 0.25 for the other score(semester) respectively. |
| | | | 05 | Assignments (Internal evaluation) | Average of two assignments each of 05 marks |
| 2 | practical | 50 | End lab examination (External evaluation) | | This End Examination in practical subjects will be for a maximum of 50 marks. |
| | | 25 | 20 | Internal evaluation | Day-to-day performance in lab experiments and record |
| | | | 05 | Internal evaluation | Internal lab examination at the end of year/semester |
| 3 | Mini Project | 50 | End Examination (External evaluation) | | This End Examination in miniproject will be for a maximum of 50 marks. |
| | | 25 | Internal evaluation | | Day-to-day performance in executing mini project. |
| 4 | Seminar | 50 | Internal evaluation | | Based on the performance in two seminars during semester |
| 5 | Comprehensive Viva | 50 | External evaluation | | This end viva voce examinations in all the subjects for 50 marks |
| 6 | Project work | 100 | External evaluation | | This end viva voce in project work for 100 marks |
| | | 50 | Internal evaluation | | These 50 marks are awarded based on the performance of the student which includes attendance and regularity |
| 7 | Open electives/ Audit courses/ softskills | 70 | Internal evaluation | | These 70 marks are awarded to the students based on the performance of two Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score |
| | | 30 | Internal evaluation | | Based on the two assignments |

### *6.0 Attendance Requirements:*

6.1 The student shall be eligible to appear for End Examinations of the semester/ year if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester/year.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester / year may be granted by the College Academic Committee.

6.3 The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / year, as applicable. They may seek re-admission for that semester / year when offered next.

6.4 **Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned.**

6.5 Students whose shortage of attendance is not condoned in any semester / year are not eligible to take their End Examination of that class and their registration shall stand cancelled.

6.6 The stipulated fee shall be payable towards Condonation of shortage of attendance.

### *7.0 Minimum Academic Requirements:*

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

7.1 The student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or project if he secures not less than 35% of marks in the End Examination and he has to score minimum of 40% marks from Internal and external exam marks put together to clear the subject.

7.2 The student shall be promoted from II to III year only if he fulfils the academic requirement of securing 40 out of 80 credits from one regular and one supplementary examinations of I year, and one regular examinations of II year I semester irrespective of whether the candidate takes the examination or not.

7.3 The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing total 72 out of 144 credits from the following examinations, whether the candidate takes the examinations or not.

a) Two regular and two supplementary examinations of I year.
b) Two regular and one supplementary examinations of II year I semester.
c) One regular and one supplementary examinations of II year II semester.
d) One regular examination of III year I semester.

7.4 The student shall register and put up minimum attendance in all 240 credits and earn the 232 credits. Marks obtained in the best 220 credits (excluding the credits obtained in audit courses/soft skills and open electives) shall be considered for the calculation of percentage of marks.

7.5 Students who fail to earn 232 credits as indicated in the course structure including compulsory subjects as indicated in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

**Table 5: Promotion rules**

| Promotion from | Total credits to register | Total credits to be earned for promotion |
|---|---|---|
| II year to III year | 80 | 40 |
| III year to IV year | 144 | 72 |

### *8.0 Course pattern:*

8.1 The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years shall be on semester pattern.

8.2 The student is 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 at the supplementary examination.

**Table: 6 Course pattern**

| Year | Semester | No.of Subjects | No.of Audit subjects | Number of Labs | Total credits | |
|---|---|---|---|---|---|---|
| First year | | O7 {ENG-4,EP-5,EC-5,M1-5, MM/EM-5,CDS-6,ED-6} | 00 | 04 | 1X4=04<br>4X5=20<br>2X6=12<br>4X3=12 | 48 |
| Second year | First | 06 | 01 | 03 | 6X4=24<br>1X2=02<br>3x2=06 | 32 |
| | Second | 06 | 01 | 03 | 6X4=24<br>1X2=02<br>3x2=06 | 32 |
| Third year | First | 06 | 01 | 03 | 6X4=24<br>1X2=02<br>3x2=06 | 32 |
| | Second | 06 | 01 | 03 | 6X4=24<br>1X2=02<br>3x2=06 | 32 |
| Fourth year | First | 06 | 01 | 02<br>Mini project | 6X4=24<br>1X2=02<br>3x2=06 | 32 |
| | Second | 03 | 01 | Seminar<br>Comprehensive Viva<br>Project Viva | 3x4 =12<br>1X2=02<br>1X2=02<br>1X4=04<br>1X12=12 | 32 |
| | | | | | **GRAND TOTAL** | **240** |

### *9.0 Award of Class:*

After the student has satisfied the requirements 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:

**Table 7: Award of Division**

| Class Awarded | % of marks to be secured | |
|---|---|---|
| First Class with Distinction | 70% and above | From the aggregate marks secured for the best 220 Credits excluding audit courses/ open elective/soft skills credits. |
| First Class | Below 70% but not less than 60% | |
| Second Class | Below 60% but not less than 50% | |
| Pass Class | Below 50% but not less than 40% | |

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

### *10.0 Supplementary Examinations:*

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

### *11.0 Transcripts:*

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

### *12.0 Rules of Discipline:*

12.2 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

12.3 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject(s) and grading is done accordingly.

12.4 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

12.4.1 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

### *13.0 Minimum Instruction Days:*

The minimum instruction days for each semester / I year shall be 95/180 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

### *14.0 Amendment of Regulations:*

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted.

### *15.0 Transfers*

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

### *16.0 General:*

16.2 The Academic Regulation should be read as a whole for the purpose of any interpretation.

16.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

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

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

## ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year from the Academic Year 2011-2012 on wards)

**1.0** The Students have to acquire 184 credits out of 192 from II to IV year of B.Tech. Program (Regular) for the award of the degree.

**2.0** Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

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

**4.0 Promotion Rule:**

The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 48 out of 96 credits from the examinations.

a) Two regular and one supplementary examinations of II year I semester.

b) One regular and one supplementary examinations of II year II semester.

c) One regular examination of III year I semester.

**5.0 Award of Class:**

After the student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes: The marks obtained in the best 172 credits will be considered for the calculation of percentage and award of class.

**Table 1: Award of Division**

| Class Awarded | % of marks to be secured | From the aggregate marks secured for best 172 Credits. (i.e. II year to IV year) excluding audit/open electives/soft skills |
|---|---|---|
| First Class with Distinction | 70% and above | |
| First Class | Below 70% but not less than 60% | |
| Second Class | Below 60% but not less than 50% | |
| Pass Class | Below 50% but not less than 40% | |

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

**5.1 All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)**

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

COURSE STRUCTURE

(Common to Branches: ECE, EEE, EIE, CSE & IT)

# I B.Tech

| Code | Subject | Scheme of instruction periods/week | | Credits | Scheme of Examination | | |
|---|---|---|---|---|---|---|---|
| | | Theory | Practical | | Internal Marks | External Marks | Total Marks |
| **Theory** | | | | | | | |
| A0001101 | English | 3+1* | - | 4 | 30 | 70 | 100 |
| A0002101 | Engineering Physics | 3+1* | - | 5 | 30 | 70 | 100 |
| A0003101 | Engineering Chemistry | 3+1* | - | 5 | 30 | 70 | 100 |
| A0004101 | Mathematics – I | 3+1* | - | 5 | 30 | 70 | 100 |
| A0005101 | Mathematical Methods | 3+1* | - | 5 | 30 | 70 | 100 |
| A0501101 | C Programming and Data Structures | 3+1* | - | 6 | 30 | 70 | 100 |
| A0301101 | Engineering Drawing | 3+1* | - | 6 | 30 | 70 | 100 |
| **Practical** | | | | | | | |
| A0591101 | C Programming and Data Structures Lab | - | 3 | 3 | 25 | 50 | 75 |
| A0391101 | Engineering and IT Workshop | - | 3 | 3 | 25 | 50 | 75 |
| A0091101 | Engineering Physics Lab and Engineering Chemistry Lab | - | 3 | 3 | 25 | 50 | 75 |
| A0092101 | English Language Communication Skills Lab | - | 3 | 3 | 25 | 50 | 75 |
| | **Total** | **28** | **12** | **48** | **310** | **690** | **1000** |

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**COURSE STRUCTURE**

**II B.TECH, I-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A0008103 | Mathematics-III | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0010103 | Environmental Studies | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0401103 | Electronic Devices and Circuits | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0402103 | Signals and Systems | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0405103 | EM Waves &Transmission lines | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0205103 | Electric circuits | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0007103 | Aptitude Arithmetic Reasoning & Comprehensive (Audit Course) | 3 | - | - | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A0491103 | Electronic Devices and Circuits Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A0492103 | Signals & systems simulation lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A0293103 | Electric circuits Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| | ***Contact Periods / Week*** | **21** | **6** | **9** | **32** | **285** | **640** | **925** |

**II B.TECH, II-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A0207104 | Control Systems | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0209104 | Electrical Technology | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0407104 | Electronic Circuit Analysis | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0408104 | Pulse & Digital Circuits | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0409104 | Switching Theory & Logic Design | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1001104 | Industrial Instrumentation | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0009103 | Corporate Management Skills (Audit Course) | 3 | - | - | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A0297104 | Electrical Technology Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A0494104 | Electronic Circuit Analysis Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A0495104 | Pulse & Digital Circuits Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| | ***Contact Periods / Week*** | **21** | **6** | **9** | **32** | **285** | **640** | **925** |

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**COURSE STRUCTURE**
**III B.TECH, I-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A0012105 | Management science | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0415105 | Linear IC Applications | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0416105 | Digital IC applications through VHDL | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1002105 | Electrical and electronic measurements | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1003105 | Sensors and Signal conditioning | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1004105 | Process Control Instrumentation | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1005105 | Lab View (Audit Course) | 3 | - | | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A0499105 | Linear IC applications Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A0481105 | Digital IC Applications using VHDL LAB | - | - | 3 | 2 | 25 | 50 | 75 |
| A1091105 | Sensors and Transducers Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| | ***Contact Periods / Week*** | **21** | **6** | **9** | **32** | **285** | **640** | **925** |

**III B.TECH, II-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A0013105 | Managerial Economics and Financial Analysis | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0505104 | Computer Organization | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0417106 | Digital Signal Processing | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0421106 | Microprocessors and Interfacing | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1006106 | Computer aided process control | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1007106 | Biomedical instrumentation | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1209104 | Java programming (Audit Course) | 3 | - | - | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A0093105 | Professional Communication and Soft Skills Lab (PROS LAB) | - | - | 3 | 2 | 25 | 50 | 75 |
| A0587108 | Java programming lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A1092106 | Process Control Instrumentation lab | - | - | 3 | 2 | 25 | 50 | 75 |
| | ***Contact Periods / Week*** | **21** | **6** | **9** | **32** | **285** | **640** | **925** |

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**COURSE STRUCTURE**

**IV B.TECH, I-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A1008107 | Micro Electronics and VLSI Technology | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1009107 | Principles of communication | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A0426107 | Digital image processing | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1010107 | Analytical Instrumentation | 3 | 1 | - | 4 | 30 | 70 | 100 |
| | **Elective-I** | 3 | 1 | - | 4 | 30 | 70 | 100 |
| | **Elective-II** | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1016107 | Embedded C (Audit Course) | 3 | - | | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A0498105 | Microprocessor & Microcontrollers lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A1093107 | Analytical & PC based instrumentation Lab | - | - | 3 | 2 | 25 | 50 | 75 |
| A1094107 | Mini Project | - | - | 3 | 2 | 25 | 50 | 75 |
| | ***Contact Periods / Week*** | **21** | **6** | **9** | **32** | **285** | **640** | **925** |

**IV B.TECH, II-SEMESTER**

| Subject Code | Subject | Hours/ Week | | | Credits | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Lab | | Internal | External | Total |
| A1017108 | Industrial Electronics | 3 | 1 | - | 4 | 30 | 70 | 100 |
| | **Elective-III** | 3 | 1 | - | 4 | 30 | 70 | 100 |
| | **Elective-IV** | 3 | 1 | - | 4 | 30 | 70 | 100 |
| A1022108 | Programmable logic controllers(Audit Course) | 3 | - | - | 2 | 30 | 70 (Internal Evaluation) | 100 |
| A1097108 | Project Work | - | - | - | 12 | 50 | 100 | 150 |
| A1095108 | Seminar | 3 | - | - | 2 | 50 | - | 50 |
| A1096108 | Comprehensive Viva-Voce | - | - | - | 4 | - | 50 | 50 |
| | ***Contact Periods / Week*** | 15 | 3 | - | 32 | 220 | 430 | 650 |

## ELECTIVES

Elective-I

1. Fiber optics & laser instrumentation (A1011107)
2. Digital control system (A1012107)
3. Power plant instrumentation (A1013107)

Elective-II

1. Embedded system design using Microcontrollers (A1014107)
2. Computer Networks (A0511105)
3. Digital system design (A1015107)

Elective-III

1. Distributed control system, Networks and protocols (A1018108)
2. Robotics and Automation (A1019108)
3. Artificial Neural networks (A1020108)

Elective-IV

1. Electrical Drives & control (A0231108)
2. Telemetry & telecontrol (A1021108)
3. DSP processor architecture and applications (A0434108)

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| T | C |
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## (A0001101) ENGLISH

### 1. INTRODUCTION :

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

### 2. OBJECTIVES:

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

b) To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.

c) To develop study skills as well as communication skills in formal and informal situations.

### 3. SYLLABUS:

**Listening Skills:**

**Objectives**

1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.

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

**Speaking Skills:**

**Objectives**

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

- Oral practice
- Role play – Individual/Group activities (Using exercises from all units of the prescribed text)
- Describing objects/situations/people
- Just A Minute (JAM) Sessions.

**Reading Skills:**

**Objectives**

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

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

The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

**Writing Skills:**

**Objectives**

1. To develop an awareness in the students the skill to write exact and formal writing.
2. To equip them with the components of different forms of writing.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Editing a passage

**4. TEXTBOOKS PRESCRIBED:**

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

**For Detailed study: ENJOYING EVERYDAY ENGLISH**, Sangam Books (India) Pvt Ltd Hyderabad, 2009

**For Non-detailed study: INSPIRING LIVES**, Maruti Publications, Guntur, 2009

**UNIT -I**

a) Heaven's Gate from **ENJOYING EVERYDAY ENGLISH**.

b) Mokshagundam Visvesaraya from **INSPIRING LIVES**

**UNIT -II**

a) Sir C.V.Raman from **ENJOYING EVERYDAY ENGLISH.**

b) Mother Teresa from **INSPIRING LIVES.**

**UNIT -III**

a) The Connoisseur from **ENJOYING EVERYDAY ENGLISH**.

b) Dr. Amartya Kumar Sen from **INSPIRING LIVES.**

**UNIT -IV**

a) The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**.

b) Gertrude Elion from **INSPIRING LIVES.**

**UNIT -V**

a) Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**.

b) Vishwanathan Anand from **INSPIRING LIVES.**

**UNIT-VI**

a) Odds against Us from **ENJOYING EVERYDAY ENGLISH**.

b) Charlie Chaplin from **INSPIRING LIVES.**

**UNIT – VII**

a) Exercises on Reading and Writing Skills, Reading Comprehension, Letter writing,Report writing

**UNIT – VIII**

Exercises on Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

**Evaluation**: The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

**REFERENCES:**

1. Technical Communication , Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
2. Essential Grammar in Use, (with CD) 3rd edn, Cambridge University Press, 2009.
3. Resumes and Interviews, M.Ashraf Rizvi, Tata - Mcgraw Hill, 2009.
4. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
5. Communication Skills for Technical Students, T.M.Farhathullah, Orient Blackswan, 2008.
6. Developing Communication Skills, 2nd edn. by Krishna Mohan & Meera Banerji , Macmillan, 2009.
7. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
8. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
9. Longman Dictionary of Contemporary English with DVD, Pearson Longman.

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## (A0002101) ENGINEERING PHYSICS

**UNIT I**

**OPTICS:** Interference - Interference in thin films by reflection - Newton's rings - Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit - Diffraction grating - Grating spectrum - polarization - Nicol prism -Theory of circular and elliptical polarized light - Quarter and half wave plates.

**UNIT II**

**CRYSTAL STRUCTURES AND X-RAY DIFFRACTION:** Introduction -Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure Simple cubic - Body Centered Cubic - Face Centered Cubic crystals - Miller indices of planes and directions in crystals – Separation between successive (h k l) planes - X-ray diffraction by crystal planes - Bragg's law – Laue and Powder methods.

**UNIT III**

**PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY:** Waves and Particles - de-Broglie's hypothesis - Heisenberg's uncertainity principle - Schroedinger's one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box - Energy levels - Fermi-Dirac distribution and effect of Temperature(qualitative treatment only) - Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands - metals, semi conductors & insulators.

**UNIT IV**

**SEMICONDUCTORS:** Intrinsic and extrinsic semiconductors - Law of mass action - Continuity equation - Drift & diffusion - Einstein's relation - Hall effect - Direct & indirect band gap semiconductors- p-n junction - Band diagram of p-n junction diode - Diode Equation-LED, LCD & Photo diode.

**UNIT V**

**MAGNETIC PROPERTIES:** Introduction - Origin of magnetic moment - Classification of magnetic materials - Dia, Para , Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials - Magnetic bubbles memory.

**DIELECTRIC PROPERTIES:** Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field – Clausius - Mossotti equation –Frequency dependence of polarisability (qualitative treatment only) - Ferro electricity- $BaTio_3$.

**UNIT VI**

**SUPERCONDUCTIVITY:** General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - Josephson effects - BCS theory - Applications of superconductors.

**LASERS:** Introduction - Characteristics of laser - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser - GaAs Laser - Applications of Lasers in Industry, Scientific and Medical fields.

**UNIT VII**

**FIBER OPTICS:** Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Types of Optical fibers and refractive index profiles - Optical fiber communication systems - Application of optical fibers.

**UNIT VIII**

**NANOMATERIALS:** Introduction - Basic principles of nano materials - Fabrication of nano materials - ball milling - plasma arching - Chemical vapour deposition method - sol-gel methods - properties of nano materials - carbon nano tubes - properties and applications of carbon nano tubes - Applications of nano materials.

**TEXT BOOKS:**

1. Engineering Physics by V. Rajendran & K.Thyagarajan, Tata McGraw-Hill Publishing Co. Ltd.
2. Engineering Physics by M.R.Srinivasan New Age Publications.
3. Engineering Physics by M.N.Avadhanulu, S.Chand Publications, New Delhi.

**REFERENCES:**

1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India.
2. Solid State Physics by C.Kittel, Wiley India.
3. Engineering Physics by Mittal, I.K.International.
4. Introduction to Nanoscience & Nano Technology by K.K Chattopadhya A.N. Banarjee , Prentice – Hall of India Pvt. Ltd.

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## (A0003101) ENGINEERING CHEMISTRY

**UNIT I**

**Water:** Sources of Water, Types of impurities in Water, Hardness of Water - Temporary and Permanent hardness, Units, Estimation of hardness by EDTA Method, Analysis of Water - Dissolved Oxygen, Disadvantages of Hard Water, Problems on hardness of water, Methods of Treatment of Water for Domestic Purpose - Sterilisation: Chlorination, Ozonisation.

**Water for Industrial purpose**: Water for Steam Making, Boiler Troubles - Carry Over (Priming and Foaming), Boiler Corrosion, Scales and Sludges, Caustic Embrittlement, Water Treatment - Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Ion- Exchange Process; Demineralization of Brakish Water - Reverse Osmosis.

**UNIT II**

**Science of Corrosion:** Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack), Wet Corrosion, Theories of Corrosion and Mechanism, Electro Chemical Theory of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Oxygen absorption type, Factors Influencing Corrosion, Control of Corrosion - Cathodic Protection - Sacrificial anode and Impressed Current, Uses of Inhibitors, Electro Plating and Electro less plating (copper and nickel).

**UNIT III**

**Polymers:** Polymerization Reactions - Basic concepts, Types of Polymerization - Addition and Condensation Polymerization, Plastics - Thermosetting and Thermoplastics, Composition, Properties and Engineering Uses of the Following: Teflon, Bakelite, Nylon, Rubber - Processing of Natural Rubber and Compounding, Elastomers - Buna S, Buna N, Polyurethane Rubber; Silicone Rubber, Conducting Polymers, Synthesis and applications of Polyacetylene and Poly aniline Liquid Crystals definition, properties, suitable examples and Engineering Applications.

**UNIT IV**

**Chemistry of nano materials:** Nano materials definition, properties and applications.

**Explosives and Propellants**: Explosives, Classification, precautions during storage, blasting fuses, important explosives, Rocket propellants, classification of propellants**.**

**Lubricants :** Principles and function of lubricants - Classification and properties of lubricants - Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralization Number and Mechanical Strength.

**UNIT V**

**Electro Chemistry:** Conductance - Equivalent Conductance - Molecular Conductance, Conductometric Titrations - Applications of Conductivity Measurements.

**Electrochemical Cells:** Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni–Cd cell), Lithium batteries, Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell

**Insulators** – Definition, Properties and Characteristics of Insulating Materials, Engineering Applications.

**UNIT VI:**

Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams - one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.

**UNIT VII:**

**Fuels and Combustion:** Definition and Classification of fuels, Solid, liquid & gaseous fuels, Characteristics of a good fuel, Metallurgical Coke - Characteristics & Manufacture (Otto-Halfmann),
Petroleum - Refining - Synthetic Petrol, Calorific Value & its determination (Bomb Calorimeter - Junker's Gas Calorimeter). Combustion: Flue gas analysis by Orsat's apparatus.

**UNIT VIII:**

**Building Materials:**

Cement: composition of Portland cement, analysis, setting & hardening of cement (reactions).

**Refractories:** Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material.

**TEXT BOOKS**

1. Chemistry for Engineers Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C.Ramachandraiah, McGraw Hill Higher Education Hyd., 2009.
2. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2008).
3. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, 15th edition New Delhi (2008).

**REFERENCE**

1. Engineering Chemistry Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications (India) Pvt. Limited, Hyderabad. 2009.
2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh - Universities press.
3. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008.
4. Physical Chemistry - Glasston & Lewis.
5. Engineering Chemistry (Vol.1&2) by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004).
6. Applied Chemistry: A Text Book for chemistry for Engineers & Technologists, G.D. Gesser, Springer, 2000

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## (A0004101) MATHEMATICS – I

**UNIT I**

Differential equations of first order and first degree - Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

**UNIT II**

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type $e^{ax}$, Sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), xV(x), method of variation of parameters.

**UNIT III**

Rolle's Theorem - Lagrange's Mean Value Theorem - (excluding proof). Simple examples of Taylor's and Maclaurin's Series - Functions of several variables - Jacobian - Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

**UNIT IV**

Raidus of Curvature - Curve tracing - Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

**UNIT V**

Multiple integral: Double and triple integrals - Change of Variables - Change of order of integration.

**UNIT VI**

Laplace transform of standard functions -Inverse transform - First shifting Theorem, Transforms of derivatives and integrals - Unit step function - Second shifting theorem - Dirac's delta function - Convolution theorem - Laplace transform of Periodic function.

**UNIT VII**

Differentiation and integration of Laplace transform - Application of Laplace transforms to ordinary differential equations of first and second order.

**UNIT VIII**

Vector Calculus: Gradient – Divergence - Curl and Their properties; Vector integration - Line integral - Potential function - Area, Surface and volume integrals, Vector integral theorems: Green's theorem - Stoke's and Gauss's Divergence Theorem (excluding their proof), Verification of Green's - Stoke's and Gauss's Theorems.

**TEXT BOOKS**

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. A Text Book of Engineering Mathematics, C. Sankaraiah, V.G.S. Book Links.
3. A Text Book of Engineering Mathematics-1,E. Rukmangadachari, E. Keshava Reddy, Pearson Education.

**REFERENCES**

1. A Text Book of Engineering Mathematics, B.V. Ramana, Tata Mc Graw Hill.
2. A Text Book of Engineering Mathematics, Thomson Book Collection.
3. A Text Book of Advanced Engineering Mathematics – A Computer Approach, N.Bail, M.Goyal & C.Watkins.
4. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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## (A0302101) MATHEMATICAL METHODS

**UNIT I**

**Matrices:** Elementary row transformations – Rank – Echelon form, normal form – Solution of Linear System of Homogenous and Non Homogeneous equations – Direct Methods – Gauss Elimination, Gauss Jordan methods.

Eigen Values, Eigen vectors – Properties. Cayley – Hamilton Theorem – Inverse and powers of a matrix by Cayley–Hamilton theorem – Diagonolization of matrix. Calculation of powers of matrix.

**UNIT II**

Real matrices – Symmetric, Skew – Symmetric, orthogonal matrices Linear Transformation – Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary matrices – Eigen values and Eigen vectors and their properties. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

**UNIT III**

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

**Interpolation:** Introduction – Finite differences – Forward Differences – backward Differences –Newton's forward and backward difference formulae for interpolation – Lagrange's Interpolation formula.

**UNIT IV**

Curve fitting: Fitting a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

**UNIT V**

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

**UNIT VI**

Fourier Series: Determination of Fourier coefficients – Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions. Fourier integral theorem (statement only) – Fourier sine and cosine integrals, Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

**UNIT VII**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace equation under initial and boundary conditions.

**UNIT – VIII**

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

**TEXT BOOKS:**

1. Mathematical Methods, T.K.V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. Mathematical Methods, C. Sankaraiah, V.G.S. Book Links.
3. Mathematical Methods, G. Shanker Rao, E. Keshava Reddy, I. K. International Publishing House Pvt. Ltd.

**REFERENCES:**

1. Numerical Methods for Scientific and Engineering Computation , M.K. Jain, S.R.K. Iyengar & R.K. Jain, New Age international Publishers.
2. Mathematical Methods – Pal – Oxford.
3. Introduction to Numerical Analysis – S.S. Sastry Printice Hall of India.
4. Mathematical Methods, S.K.V.S. Sri Ramachary, M. Bhujanga Rao, P.B. Bhaskar Rao & P.S. Subramanyam, BS Publications.

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## (A0501101) C PROGRAMMING AND DATA STRUCTURES

**UNIT I**

Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method.

**UNIT II**

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements -break, continue, goto.

**UNIT III**

Functions - Library Functions, Top-Down Design and Structure Charts, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands.

Arrays - Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.

**UNIT IV**

Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Programming Applications, Pointer to Functions, Command- Line Arguments.

Strings - String Basics, String Library Functions, Longer Strings, String Comparison, Arrays of Pointers, Character operations, String-To-Number and Number-To- String Conversions, Pointers and Strings.

**UNIT V**

Structure and Union – Introduction, Features of Structures. Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

**UNIT VI**

Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

**UNIT VII**

Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

Linked List - Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

**UNIT VIII**

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort. Searching- Linear and Binary Search Methods.

**TEXT BOOKS :**

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

**REFERENCES :**

1. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press**.**
3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand**.**
4. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill**.**
5. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG & TECHNOLOGY, NANDYAL

AUTONOMOUS

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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| 3+1* | 6 |

**(A0301101) ENGINEERING DRAWING**

**UNIT – I**

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

a) Conic Sections including the Rectangular Hyperbola – General method only.

b) Cycloid, Epicycloids and Hypocycloid

c) Involutes.

d) Helices

**UNIT – II**

PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

**UNIT – III**

PROJECTIONS OF PLANES: Projections of regular Plane surfaces, Projection of lines and planes using auxiliary planes.

**UNIT – IV**

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to one or both planes – Auxiliary Views.

**UNIT – V**

SECTIONS & DEVELOPMENTS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids– Prism, Cylinder, Pyramid and Cone – True shapes of sections.

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

**UNIT – VI**

ISOMETRIC & ORTHOGRAPHIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Conversion of Isometric Views to Orthographic Views - Conventions.

**UNIT – VII**

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

**UNIT – VIII**

PERSPECTIVE PROJECTIONS: Perspective View: Plane Figures and Simple Solids,Vanishing Point Methods (General Method only).

**TEXT BOOKS:**

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering Drawing, Johle /Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e Pearson education

**REFERENCES:**

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishesrs
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub
4. Engineering Drawing, Venkata Reddy, B.S.Publishers.

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**(A0591101) C PROGRAMMING AND DATA STRUCTURES LAB**

**Objectives:**

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

**Recommended Systems/Software Requirements:**

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

**Exercise l**

a) Write a C program to find the sum of individual digits of a positive integer.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 2**

a) Write a C program to calculate the following Sum:

$Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

b) Write a C program toe find the roots of a quadratic equation.

**Exercise 3**

Write C programs that use both recursive and non-recursive functions

i) Find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

**Exercise 4**

a) The total distance travelled by vehicle in 't' seconds is given by distance $S = ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration ($m/sec^2$) respectively. Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

**Exercise 5**

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
i) Addition of Two Matrices
ii) Multiplication of Two Matrices

**Exercise 6**

a) Write a C program that uses functions to perform the following operations:
i) To insert a sub-string in to a given main string from a given position.
ii) To delete n Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not

**Exercise 7**

a) Write a C program that displays the position or index in the string S where the string T begins, or –1 if S doesn't contain T.
b) Write a C program to count the lines, words and characters in a given text.

**Exercise 8**

a) Write a C program to generate Pascal's triangle.
b) Write a C program to construct a pyramid of numbers.

**Exercise 9**

Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:

$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

**Exercise 10**

1) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
2) Write a C program to convert a Roman numeral to its decimal equivalent.

**Exercise 11**

Write a C program that uses functions to perform the following operations:

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

(Note: represent complex number using a structure.)

**Exercise 12**

a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

**Exercise 13**

a) Write a C programme to display the contents of a file.
b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**Exercise 14**

Write a C program that uses functions to perform the following operations on singly linked list.:

i) Creation
ii) Insertion
iii) Deletion
iv) Traversal

**Exercise 15**

Write C programs that implement stack (its operations) using

i) Arrays
ii) Pointers

**Exercise 16**

Write C programs that implement Queue (its operations) using

i) Arrays
ii) Pointers

**Exercise 17**

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

**Exercise 18**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort
ii) Selection sort

**Exercise 19**

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search
ii) Binary search

**Exercise 20**

Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

**Exercise 21**

Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

**Exercise 22**

Write C programs to implement the Lagrange interpolation and Newton - Gregory forward interpolation.

**Exercise 23**

Write C programs to implement the linear regression and polynomial regression algorithms.

**Exercise 24**

Write C programs to implement Trapezoidal and Simpson methods.

**REFERENCE BOOKS**

1. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
2. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
3. Computer Basics and C Programming, V. Rajaraman, PHI Publications.
4. Programming in C and Data Structures, J.R.Hanly, Ashok.N.K.Kamthane and A.Ananda Rao, Pearson Education.

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## (A0391101) ENGINEERING AND IT WORKSHOP

### ENGINEERING WORKSHOP

**Objectives:** The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. **TRADES FOR EXERCISES:**

   a) Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock.

   b) Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.

   c) Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet.

   d) House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.

   e) Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.

   f) Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

2. **TRADES FOR DEMONSTRATION:**

   a) Plumbing

   b) Machine Shop

   c) Metal Cutting

   Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

**REFERENCE BOOKS:**

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

# IT WORKSHOP

**Objectives:**

The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

**PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on a working PC (PIV or higher)to disassemble and assemble back to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

**Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (**It is recommended to use Microsoft office 2007 in place of MS Office 2003)**

**PC Hardware**

**Exercise 1 - Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Exercise 2 - Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

**Exercise 3 - Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Exercise 4 - Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Exercise 5 - Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Exercise 6 - Task 6: Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**OFFICE TOOLS**

**LaTeX and Word**

**Exercise 7 - Word Orientation**: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 1: Using LaTeX and Word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**EXCEL**

**Exercise 8 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**LaTeX and MS/equivalent (FOSS) tool Power Point**

**Exercise 9 - Task1:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

**Exercise 10 - Task 2 :** Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Internet & World Wide Web** **2 Exercises**

**Exercise 11 - Task 1**: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

**Exercise 12 - Task 2**: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

**Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

**REFERENCES:**

1) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2) LaTeX Companion – Leslie Lamport, PHI/Pearson.
3) Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4) Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5) Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6) IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and
7) Ken Quamme. – CISCO Press, Pearson Education.

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I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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## (A0091101) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB

### *ENGINEERING PHYSICS LAB*

Any TEN of the following experiments are to be performed during the Academic year.

| S.No | Name of the Experiment |
|---|---|
| 1. | Determination of wavelength of given source – spectrometer – normal incidence method |
| 2. | Dispersive power of the prism – Spectrometer |
| 3. | Determination of wavelength of a laser source - Diffraction Grating |
| 4. | Determination of particle size by using a laser source |
| 5. | Determination of thickness of a thin wire using parallel fringes |
| 6. | Newton's Rings |
| 7. | Magnetic field along the axis of a current carrying coil – Stewart and Gee's method |
| 8. | Numerical aperture of an optical fiber |
| 9. | Hall Effect |
| 10. | B – H Curve |
| 11. | Energy gap of a material of p-n junction |
| 12. | Determination of rigidity modulus of a wire material – Torsional pendulum |
| 13. | Determination of dielectric constant |
| 14. | Verification of laws of stretched string – Sonometer |
| 15. | Melde's experiment – Transverse & Longitudinal modes |

Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee's apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde's apparatus

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

***ENGINEERING CHEMISTRY LAB***

| S.No | Name of the Experiment |
|---|---|
| 1) | Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron |
| 2) | Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry |
| 3) | Preparation of Standard EDTA solution and Estimation of Hardness of Water |
| 4) | Preparation of Standard EDTA and Estimation of Copper |
| 5) | Determination of Manganese in Steel and Iron in Cement |
| 6) | Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conducto metric titration |
| 7) | Determination of viscosity of the oils through Redwood viscometer |
| 8) | Determination of calorific value of fuel using Bomb calorimeter |
| 9) | Estimation of dissolved oxygen |
| 10) | Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid) |

**BOOKS:**

1. Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M.Enterprizes Ltd.
2. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

**Equipment Required:**

- ♣ Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
- ♣ Analytical balance (keroy) (15 Nos)
- ♣ Calorimeter
- ♣ Bomb Calorimeter
- ♣ Redwood viscometer No.1& No.2
- ♣ Conductometer/ Conductivity bridge
- ♣ Wash bottles, test tube stands, burette stands
- ♣ Gas cylinders with Bunsen burners
- ♣ Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr's salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,

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AUTONOMOUS

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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## (A0092101) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

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

**Objectives:**

1. To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
4. To initiate them into greater use of the computer in resume preparation, report- writing, format-making etc.
5. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

**SYLLABUS:**

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

- ♣ Introduction to the Sounds of English - Vowels, Diphthongs & Consonants.
- ♣ Introduction to Stress and Intonation.
- ♣ Situational Dialogues (giving directions etc.)
- ♣ Speaking on the mobiles and telephone conversation.
- ♣ Role Play.
- ♣ Oral Presentations- Prepared and Extempore.
- ♣ 'Just A Minute' Sessions (JAM).
- ♣ Describing Objects / Situations / People.
- ♣ Information Transfer.
- ♣ Debate

**Minimum Requirement:**

**The English Language Lab shall have two parts:**

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement (Hardware component):**

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

- ♣ P – IV Processor
- ♣ Speed – 2.8 GHZ
- ♣ RAM – 512 MB Minimum
- ♣ Hard Disk – 80 GB
- ♣ Headphones of High quality

**PRESCRIBED SOFTWARE: GLOBARENA**

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- The Rosetta Stone English Library
- Clarity Pronunciation Power – Part I
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd with CD
- Learning to Speak English - 4 CDs
- Microsoft Encarta with CD
- Murphy's English Grammar, Cambridge with CD
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

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

1. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
2. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
3. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
4. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Body Language , Your Success Mantra , Dr Shalini Verma, S.Chand & Co, 2008
6. English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009
7. A Handbook for Englsih language Laboratories, E.Sureshkumar, P.Sreehari, Foundation Books, 2009
8. DELTA's key to the Next Generation TOEFL Test, 6 audio CDS, New Age International Publishers, 2007

**DISTRIBUTION AND WEIGHTAGE OF MARKS**

***English Language Laboratory Practical Paper:***

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

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**II B.Tech I-Sem (EIE)**

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## (A0008103) MATHEMATICS – III

(Common to ECE, EEE & EIE)

**OBJECTIVE:**

This course is intended to impart knowledge to students in the areas of complex variables, analyticity, complex integration, Taylor's series, Laurent series, contour integrals, Argument principle and conformal mappings.

**EXPECTED OUTCOMES**:

- Students will able to use Beta and Gamma functions to solve some special integrals that are not able to by using general methods.
- Students will able to use of the concept complex analysis is to find the solution of the equations which does not have solution in real plane.
- Students will able to use the concept of complex analysis is widely used in space study, aero system, potential functions, fluid mechanics etc.

**UNIT - I**

Functions of a complex variable – Continuity – Differentiability – Analyticity –Properties – Cauchy - Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne -Thompson method.

Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties - General power $Z^c$ (c is complex), principal value.

**UNIT-II**

Complex integration: Line integral-evaluation along a path by indefinite integration-Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula.

**UNIT-III**

Complex power series: Radius of convergence-Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point-Isolated singular point-pole of order m- essential singularity.

**UNIT-IV**

Residue- Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type :

a) improper real integrals $\int_{\infty}^{\infty} f(x)\,dx$ b) $\int_0^{2\pi} f(cos\theta, sin\theta)\,d\theta$

c) $\int_{-\infty}^{\infty} e^{imx} f(x)\,dx$ d) integrals by indentation.

**UNIT-V**

Argument principle –Rouche's Theorem – determination of number of zeros of complex polynomials-Maximum Modulus principle-Fundamental theorem of Algebra, Liouville's Theorem.

**UNIT-VI**

Con formal mapping: Transformation by $e^z$, ln z ,$z^2$, $z^n$ (n positive integer)sin z,cosz, z + a/z, Translation, rotation, inversion and bilinear transformation – fixed -points- cross ratio- properties- invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given point

**TEXT BOOKS:**

1) A Text book of Engineering Mathematics, Vol – III by T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand and company.
2) Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3) Engineering Mathematics by B.V. Ramana, Tata McGraw Hill .

**REFERENCES:**

1) Advanced Engineering Mathematics by Erwin Kreyszig - Wiley Publications.
2) Engineering Mathematics – III A by Dr.M.K. Venkat araman – The National Publishing co.
3) A text book of Engineering Mathematics by N.P.Bali, Iyengar-Lakshmi Publications (Pvt ltd)

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

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## (A0010103) ENVIRONMENTAL STUDIES

(Common to ECE, EIE, CSE & IT)

**OBJECTIVE**: At the end of the course the student is expected to understand.
Multidisciplinary nature of environment, Natural resources, Concept of Ecosystems, Biodiversity and its conservation, Environmental Pollution, Social Issues and the environment, Human Population and the environment

**EXPECTED OUTCOMES**
Ability to understand multidisciplinary nature of environment. Ability to understand concept of ecosystems

**UNIT-I: Introduction of Environmental Studies-Natural Resources**
Definition, The Global environment and its segments; Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere Scope and Importance of Environmental Studies–-Need for public awareness Renewable and non-renewable resources–Natural resources and associated problems – Forest resources: Introduction –deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources :Introduction– Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Introduction, 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. - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**UNIT – II Ecosystems**
Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT – III Biodiversity and its conservation**
Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels- India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT – IV Environmental Pollution**
Definition, 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.

**UNIT–V Social Issues and the Environment**
From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. –Consumerism and waste products. –Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT–VI Human Population and the Environment**

Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. , Infectious diseases,-Tuber colossi, cancer, Water Borne Deseases-Malaria, Diheria -Women and Child Welfare. - Role of information Technology in Environment and human health. -Case Studies.

**TEXT BOOK:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. A Basic Course in environmental Studies by S.Deswal and A.Deswal, Dhanpat Rai & Co

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## (A0401103) ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, EEE, EIE & CSE)

**OBJECTIVES:**

At the end of the course the student is expected to understand the concepts of

- Diode characteristics, Rectifiers, filters, regulators, Transistors, Transistor biasing, stabilization, FET transistors and Amplifiers

**EXPECTED OUTCOMES**

- Ability to understand the characteristics of diode BJT and FET transistors
- Ability to understand the diode applications.
- Ability to understand the amplifiers

**UNIT- I: SEMICONDUCTOR DIODE CHARACTERISTICS**

PN junction Diode equation, VI characteristics of p-n diode, Static and Dynamic Resistances, Temperature dependence of VI characteristic, Diode equivalent circuits, Diode capacitances, Breakdown Mechanisms in Semi Conductor Diodes, Zener diode characteristics, Principle of operation and Characteristics of Tunnel Diode with the help of energy band diagrams, Varactar Diode, Schottky Barrier Diode, Thermistor.

**UNIT- II: RECTIFIERS, FILTERS AND REGULATORS**

PN junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π- section filter, comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using Zener diode.

**UNIT- III: BJT TRANSISTORS**

Operation of BJT, Transistor as an amplifier, Junction transistor, Detailed study of currents in a transistor, Input and Output characteristics of transistor in CB, CE, and CC configurations, Relation between Alpha, Beta and Gamma.BJT specification, Transistor as an Amplifier, Principle of operation and characteristics of SCR.

**UNIT-IV: TRANSISTOR BIASING AND STABILISATION**

DC and AC Load lines, Operating point, Importance of Biasing, Fixed bias, Collector to Base, Voltage Divider bias, Bias stability, Stabilization factors, ($S$, $S'$, $S''$), Compensation techniques, (Compensation against variation in $V_{BE}$, $I_{co}$,) Thermal run away, Thermal stability in CE configuration.

**UNIT- V: FET TRANSISTORS**

Operation and characteristics, Pinch-Off voltage, Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Comparison of Transistors (BJT, FET, and MOSFET). Principle of operation and characteristics of UJT.

**UNIT-VI: BJT AND FET AMPLIFIERS**

Small signal low frequency transistor amplifier circuits, h-parameter representation of a transistor, Analysis of single stage transistor amplifier (CE, CB, and CC) using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of $A_I$ , $R_i$ , $A_v$ , $R_o$, Small signal model of JFET, Analysis of single stage FET amplifier (CS, CG, and CD) using h-parameters

**TEXT BOOKS:**


1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
3. Electronic Devices and Circuits- David A. Bell, 5th Edition, 2008, Oxford University Press.


**REFERENCES:**


1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
5. Electronic Devices and Circuits- Prof GS N Raju I K International Publishing House Pvt. Ltd 2006

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**II B.Tech I-Sem (EIE)**

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## (A0402103) SIGNALS AND SYSTEMS

(Common to ECE, EIE & EEE)

**OBJECTIVES:**

- To help the students to mathematically analyze different types of signals and their associated systems.
- To make the students to mathematically analyze different types of Fourier series representation of different signals
- To make the students to mathematically analyze the Fourier transform, Laplace transforms Z–transform representation of different signals
- To make the students to mathematically analyze the transmission of signals through linear systems
- To analyze the Concepts of convolution and correlation of different signals
- To understand the concept of sampling.

**EXPECTED OUTCOMES:**

- Understand the concept of a frequency domain representation of a signal and basic concepts of bandwidth.
- Be able to compute the Fourier transform of common signals.
- Understand system response concepts in discrete time.
- Understand discrete-time frequency response.
- Be aware of issues related to sampling
- Have a basic understanding of the use of the FFT for analysis.
- Demonstrate ability to move between time domain and frequency domain (frequency response).
- Demonstrate understanding of signal space concepts, in particular Fourier series.

**UNIT-1 INTRODUCTION TO SIGNALS**

Analogy between vectors and signals, 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-2 REPRESENTATION OF SIGNALS USING 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 unit step function.

**UNIT-3 SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS**

Linear system, impulse response, Impulse response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, 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, Causality and physical realization-The poly wiener criterion relationship between bandwidth and rise time.

**UNIT-4 CONVOLUTION AND CORRELATION OF SIGNALS**

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Properties of convolution, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**UNIT-5 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.

**UNIT-6 SAMPLING THEOREM AND Z-TRANSFORM**

Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of discretetime signals. Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, 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 BOOKS:**

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

**REFERENCES:**

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rd Edn., 2000.
3. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.
5. Signals and Systems- S.C Goyal, Technical Publication

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## (A0405103) ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

**OBJECTIVES:**

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
- To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber optics and electronic electromagnetic structures including those on the sub-micron scale.
- To provide basic laboratory exposure to electromagnetic principles and applications

**EXPECTED OUTCOMES:**

- Ability to work on Maxwell equations.
- Ability to get knowledge on electromagnetic waves, guided wave and transmission lines

**UNIT I**

**Review of Coordinate Systems, Vector Calculus:**

**STATIC ELECTRIC FIELDS :** Coulomb's Law, Electric Field Intensity, Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Continuity Equation, Poisson's and Laplace's Equations, Related Problems.

**UNIT II: STATIC MAGNETIC FIELDS**

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Ampere's Force Law, Related Problems.

**UNIT III: TIME VARYING EM FIELDS**

Faraday's Law of induction, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Poynting Theorem, Related Problems.

**UNIT IV: EM WAVE PROPAGATION**

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Relations Between E & H. Sinusoidal Variations. Wave Propagtion in Lossless and Conducting Media. Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics. Polarization. Related Problems .

**UNIT V: GUIDED WAVES**

Parallel Plane Waveguides Introduction, Transverse Electric waves(TE), Transverse Magnetic waves(TM), TEM Modes – Concepts, expressions and Analysis, Cut-off Frequencies, Velocities, Wavelengths, Related Problems.

**UNIT VI: TRANSMISSION LINES**

Types, Equivalent Electrical circuits, Transmission Line Equations, Primary & Secondary Constants, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Distortion – Distortionless and minimum attenuation condition, Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines. Related Problems.

**TEXT BOOKS :**


1) Elements of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2) Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3) Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4) Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn. Pte. Ltd., 2005.
5) Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications),New Delhi, 2001.

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## (A0205103) ELECTRIC CIRCUITS

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Basics of circuit analysis.
- Network topology.
- Ac circuits.
- Locus diagrams, resonance and magnetic circuits.
- Transient analysis, Network theorems for dc and ac circuits

**EXPECTED OUTCOMES**

- Ability to understand the R,L,C elements, Ac and dc analysis of different network topologies

**UNIT-I BASICS OF CIRCUIT ANALYSIS**

Circuit concept - R-L-C parameters: fundamentals, properties, construction - voltage and current sources - independent and dependent sources - source transformation - voltage and current relationship for passive elements for DC, square, ramp, saw tooth, triangular input signals - Ohm's law - Kirchhoff's laws - Network reduction techniques for Series, parallel, series parallel connections of active and passive elements - Star to Delta - Delta to Star transformation - Nodal analysis - Mesh analysis - Super node - Super mesh analysis for D.C excitations.

**UNIT-II Network Topology**

Concept of network graph - Terminology used - Relation between Twigs and Links - Properties of a Tree in a graph - Formation of Incidence matrix [A] - Cut-set matrix – Tie set - Fundamental Cut set - Fundamental Tie set matrix for planar networks - Duality and Dual networks.

**UNIT-III AC Circuits**

RMS - Average values - Form factor for different wave forms - Sinusoidal alternating quantities - Phase and phase difference - complex and polar form of representation - j operator - Steady state analysis of R,L,C in series, parallel and series parallel combinations - Concept of power factor – reactance – impedance – Susceptance – Admittance - Real and Reactive power - Complex power.

**UNIT-IV Locus Diagrams, Resonance and Magnetic circuits**

Concept of locus diagram - construction of locus diagram for series RL – RC - RLC and parallel combination with variation of various parameters - Concept of Resonance - Series resonance - Parallel resonance – Bandwidth – Selectivity - Q factor - Faraday's laws of electromagnetic induction - concept of self and mutual inductance - Dot convention - Coefficient of coupling.

**UNIT-V Transient Analysis**

Initial conditions in elements - Evaluating initial conditions in networks - Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for impulse - step - pulse and sinusoidal excitations - Solution using differential equation approach and Laplace transform methods of solutions - Response of circuits for non-sinusoidal periodic inputs.

**UNIT-VI Network Theorems for DC and AC circuits**

Super position theorem - Thevenin's theorem - Norton's theorem - Maximum power transfer theorem - Millman's theorem - Tellegen's theorem - Reciprocity theorem - Substitution theorem - Compensation theorem.

**TEXT BOOKS:**

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", TMH publishers, 6th edition, New Delhi.
2. A. Chakrabarti, "Circuit Theory-Analysis and Synthesis", Dhanpat Rai & Co. (Pvt) Ltd., Delhi.

**REFERENCES:**

1) Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi.
2) R.P.Punagin, "Electric Circuits", Interline Publishers, Bangalore.
3) Bernard Grob, "Basic Electronics", TMH, New Delhi.

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## (A0007103) APTITUDE ARITHMETIC REASONING AND COMPREHENSIVE

(Common to ECE, EEE & EIE)

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Ratio, proportion, progression and percentages
- Profit, loss, percentages, interest, time and work, indices, surds, geometry and menstruation
- Permutations and combinations
- Series, analogies, coding decoding
- Directions
- Reasoning

**EXPECTED OUTCOMES:**

- Ability to understand-aptitude arithmetic, reasoning, Comprehensive

**UNIT I:**

Numbers, Number Systems Simple Equations, Ratio, Proportion, Variation Quadratic Equations, Progressions Percentages.

**UNIT II:**

Profit, Loss, Partnerships Averages, Mixtures & Allegations, Simple Interest, Compound Interest ,Time and Work-Pipes, indices, surds, inequalities ,Cisterns Time and Distance Geometry and Menstruation.

**UNIT III:**

Permutations & Combinations and Probability Data Interpretation & Data Sufficiency.

**UNIT IV**:

Number & Letter Series, Analogies, Coding Decoding, Odd Man Out Blood Relations.

**UNIT V:**

Direction Sense, Symbols and Notations Deductions & Connectives Clocks, Calendars Analytical

**UNIT VI:**

Reasoning (Distribution+ Binary Logic + Puzzles) Cubes, Venn Diagrams Analytical Puzzles (Linear + Circular +Selections + Sequencing + Routes & Networks + Comparisons) and Non Verbal Reasoning

**References:**

1) R.S.Agarwal " Quantitative Techniques" S.Chand Series
2) Shankuntala Devi " Techniques of Reasoning" S.Chand Series

**II B.Tech I-Sem (EIE)**

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## (A0491103) ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to ECE, EEE, CSE & EIE)

**OBJECTIVE:**

- At the end of the course the student is expected to understand
- Identification of all electrical components and electronic devices, Drawing the device characteristics

**EXPECTED OUTCOMES:**

- Ability to identify the all the electrical and electronic components, Ability to connect all electronic devices

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT.
3. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies.
4. Study and Operation of CRO.

**(For Laboratory examination – Minimum of 10 experiments)**

1. Generating the Lissajious patterns and finding unknown frequency.
2. PN Junction diode characteristics.
3. Zener diode characteristics and Zener as a Regulator.
4. Transistor CB characteristics (Input and Output).
5. Transistor CE characteristics (Input and Output).
6. Rectifier without filters (Full wave & Half wave).
7. Rectifier with filters (Full wave & Half wave).
8. FET characteristics.
9. MOSFET characteristics.
10. SCR characteristics.
11. UJT characteristics.
12. Series and shunt regulators using transistors.

**Equipment required for Laboratories:**

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| 1. | Regulated Power supplies (RPS) | - 0-30v |
| 2. | CROs | - 0-20M Hz. |
| 3. | Function Generators | - 0-1 M Hz. |
| 4. | Multimeters | |
| 5. | Decade Resistance Boxes/Rheostats | |
| 6. | Decade Capacitance Boxes | |
| 7. | Micro Ammeters (Analog or Digital) | - 0-20 µA, 0-50µA, 0-100µA, 0-200µA |
| 8. | Voltmeters (Analog or Digital) | - 0-50V, 0-100V, 0-250V |
| 9. | Electronic Components | - Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, diodes (Ge & Si type), transistors (npn & pnp type). |

**II B.Tech I-Sem (EIE)**

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## (A0492103) SIGNALS AND SYSTEMS SIMULATION LAB

(Common to ECE, EIE & EEE)

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Signal Analysis
- Fourier Series Representation of Periodic Signals
- Fourier Transforms
- Signal Transmission through Linear Systems
- Convolution and Correlation of Signals
- Sampling Theorem

**EXPECTED OUTCOMES**

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

Analyze different types of signals and systems, Representation of signals using Fourier series and Fourier transformation, Representation of signals using Laplace transformation

1. Basic operations on Matrices.
2. Generation of various signals and sequences (Periodic and aperiodic). Such as unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc function.
3. Operation on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal or sequence and real imaginary parts of signals.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform.
12. Locating zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transform functions.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S.Values and its skew, kurtosis and PSD, probability distribution function.
14. Sampling theorem verification.
15. Removal of noise by auto correlation/cross correlation in a given signal corrupted by noise.
16. Impulse response of a raised cosine filter.
17. Verification of Weiner-Khinchine relations.
18. Checking a Random process for stationary in wide sense.

**Using Licensed MATLAB of version 7.0 and above**

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## (A029310) ELECTRIC CIRCUITS LAB

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Basics of circuit analysis
- Network topology
- Ac circuits
- Locus diagrams, resonance and magnetic circuits
- Transient analysis, Network theorems for dc and ac circuits.

**EXPECTED OUTCOMES:**

- Ac and dc analysis of different network topologies
- Ability to understand the R,L,C elements

**Experiments to be implemented in both Simulation (Multisim) and Hardware**

1. Realization of Ohm's law
2. Realization of Kirchhoff's voltage and current law.
3. Realization of network reduction techniques – Resistors in series, Parallel, Series parallel.
4. Calculation of RMS, Average, Peak values, form factor and peak factor of Sinusoidal, Square and Triangular waveforms.
5. Realization of Star to Delta and Delta to Star transformation.
6. Current Locus diagram with RC with R with varying and C Varying and RL with R varying.
7. Series and Parallel Resonance: Resonance frequency, Q factor, Bandwidth determination for RLC network.
8. Transient response in R-L and R-C circuit.
9. Transient response of RLC circuit.
10. Realization of Thevenin's and Norton's theorems with DC excitation.
11. Realization of Super position theorem with DC excitation.
12. Realization of Maximum power transfer theorem with DC excitation.

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**II B.Tech II-Sem (EIE)**

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## (A0207104) CONTROL SYSTEMS

(Common to EIE & EEE)

**OBJECTIVES:**

- Be prepared to apply mathematics, established scientific and engineering knowledge, for the development and implementation of a broad range of electronic systems
- Be knowledgeable about current technologies and be prepared to adapt to technology advances and ensure professional growth through an appreciation for lifelong learning.
- Basic skill in methods of design and analysis across a broad range of electrical and computer engineering areas

**EXPECTED OUTCOMES:**

- An ability to apply knowledge of mathematics (like differential equations), and engineering.
- Ability to analyze and design Closed loop control systems and open loop control systems and transfer function representation of the control system.
- Ability to analyze the all test signal responses for different ordered control systems.
- Ability to analyze the time response and frequency response by using different plots.
- Ability to analyze the stability in time/frequency domain by using different plots.

**UNIT I: INTRODUCTION**: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Examples-Types of feedback control systems.
Mathematical modelling of Electrical & Mechanical (Translational & rotational) systems – Differential equations, Electrical analogous (F-V, F-I) of mechanical system-Use of Laplace transforms in control systems-Transfer function: Concepts, features-Transfer functions of above systems.

**UNIT II: BLOCK DIAGRAM & SIGNAL FLOW GRAPH REPRESENTATION:** Block diagram representation of electrical systems and reduction techniques-Signal flow graphs and reduction using mason's gain formula-Transfer function of DC servomotor, AC servomotor.

**UNIT-III: TIME RESPONSE ANALYSIS**: Definition & classification of time response-Standard test signals-Type & order of a system-Transient response of first order and second order systems for step input-Transient response specifications-Steady state response-Steady sate errors and error constants-Effects of PD, PI & PID controllers.

**UNIT IV**: **STABILITY ANALYSIS IN S-DOMAIN**: The concept of stability – Routh's stability criterion, special, special cases, advantages and limitations.
Root locus technique: The root locus concept, construction of root loci-Effects of adding poles and zero's to G(s) H(s) on the root loci.

**UNIT V: FREQUENCY RESPONSE ANALYSIS**: Introduction – Steady state response to sinusoidal input (frequency response) – Bode diagrams – Phase margin and gain margin – Stability analysis from bode plots – Determination of transfer function from Bode diagram.

**UNIT VI: POLAR AND NYQUIST PLOTS:** Polar plots – Nyquist plots – Stability analysis.

**TEXT BOOKS:**

1) Control systems – U.A. Bakshi & V.U.Bakshi, Technical publications, Pune.
2) Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, 2nd edition.

**REFERENCES:**

1) Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., edition 1998.
2) Automatic Control Systems by B. C. Kuo, John wiley and son's, 2003.
3) Control Systems Engg. by NISE 3rd Edition – John wiley.

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AUTONOMOUS

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**II B.Tech II-Sem (EIE)**

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## (A0209104) ELECTRICAL TECHNOLOGY

(Common to ECE & EIE)

**OBJECTIVES:**

- To learn about AC and DC machines and their working principle, construction, characteristics, operation, testing and application.
- To learn about the principle of measuring devices and construction of PMMC,MI meters

**EXPECTED OUTCOMES:**

- Student can able to testing the machines like load test, finding the efficiencies and regulation of open circuit and short circuit characteristics.
- Student can able to know the characteristics of open circuit and short circuit characteristics.

**UNIT –I: DC MACHINES**

Principle of operation of DC machine, EMF Equation, Types of Generators, magnetization and load Characteristics of DC Generators.-Numerical problems

DC Motor- Types of DC Motors- Characteristics of DC Motors- 3point starters for dc shunt motor-losses and efficiency-Swinburne's test, load test-speed control of DC shunt motor-Numerical problems.

**UNIT –II: TRANSFORMERS**

Principle of operation of Transformer-constructional features- Phasor Diagram on no load and load – equivalent circuit-losses, efficiency and regulation of a transformer, OC & SC tests on transformer- Numerical problems

**UNIT –III: THREE PHASE INDUCTION MOTOR**

Principle of operation of 3-phase Induction motor-slip ring and squirrel cage motors- slip torque characteristics-efficiency calculation-starting methods-speed control of induction motor- Numerical problems

**UNIT –IV: SINGLE PHASE INDUCTION MOTOR**

Principle of operation of 1-phase Induction motor- constructional features -shaded pole motors-capacitor motor-split phase motors-equivalent circuit

**UNIT –V: ALTERNATORS**

Constructional features- Principle of operation-types-EMF equation- distribution and coil span factors- pre determination of regulation by synchronous impedance method – OC & SC test- Numerical problems

**UNIT –VI: SPECIAL MACHINES**

Construction and principle of operation of DC, AC Servomotors- AC tachometers- Stepper Motors(variable reluctance, permanent magnet and hybrid types)- Synchros- Switched reluctance motor- universal motor-Applications.

**TEXT BOOKS:**

1. Principle of Electrical Engineering by V.K.Mehta, Rohith Mehta, S.Chand publications.
2. Generalized Theory of Electrical Machines by P.S.Bimbra, Khanna publication
3. Electrical Technology-volume II – B L Theraja- S. Chand.

**REFERENCE BOOKS**:

1. Electrical Machinery- J B Guptha- katsonbooks .
2. Electrical Machines – I J Nagrath and D P Kothari- PHI Publications.

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**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**II B.Tech II-Sem (EIE)**

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## (A0407104) ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE & EIE)

**OBJECTIVES:**

- Analysis of junction transistor and multistage amplifiers.
- Help students make transition from analysis of electronic circuits to design of electronic circuits. Equip students with a number of specific.
- Techniques that speed up design and analysis. Teach students a structured approach to the design problem.
- To understand the Analysis of transistor at high frequencies.
- Describe the various classes of their efficiencies power amplifiers
- To understand the concept of designing of tuned amplifier.
- The student will construct and analyze voltage regulator circuits.
- To understand the circuit configuration and the principle operation of converters, including diode rectifiers, controlled AC-DC converters and DC choppers

**EXPECTED OUTCOMES:**

- The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
- Designing and analyzing the transistor at high frequencies.
- Determine the efficiencies of power amplifiers.
- Determine Frequency response and design of tuned amplifiers.
- Ability to design different types of regulators like switching and IC regulators

**UNIT-1: MULTI STAGE AMPLIFIERS:**

Review of Small Signal Analysis of Transistors, Millers Theorem, Different Coupling Methods used in Amplifiers-RC, Direct, Transformer coupled Amplifiers. Analysis of Cascaded RC Coupled amplifiers. High Input Resistance Transistor Circuits. Cascode Transistor Configuration, CE-CC Amplifiers. Two Stage RC Coupled JFET amplifier (in Common Source (CS) configuration), Difference Amplifier

**UNIT-2: HIGH FREQUENCY TRANSISTOR CIRCUTS:**

Transistor at High Frequencies, Hybrid-□π Common Emitter Transistor Model, Determination of Hybrid- π Parameters, Variation of Hybrid Parameters with |IC|, |VCE| and Temperature. The Hybrid-π CE Short Circuit Current Gain, CE Current Gain with Resistance Load, Gain Band width product, Design of High frequency Amplifier. Frequency Effects, Amplifier Analysis.

**UNIT-3: FEEDBACK AMPLIFIERS:**

Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components and their analysis,

**UNIT-4: OSCILLATORS:**

Condition for Oscillations. RC and LC type Phase Shift oscillators. Hartley and Colpitts oscillators, Wein bridge oscillator, Crystal oscillators, Frequency and amplitude stability of Oscillators.

**UNIT-5: LARGE SIGNAL AMPLIFIERS:**

Importance of Power Amplifiers, Types of Power amplifiers, Class A Power Amplifier, Maximum Efficiency of Class A Amplifier, Transformer Coupled Audio Amplifier, Types of Distortions in amplifiers, Push Pull Amplifier (Class A, Class B), Complimentary Symmetry , Phase Inverters, Class D Operation, Class S Operation, Heat Sinks.

**UNIT-6: TUNED AMPLIFIERS:**

Introduction, Q-Factor, Small Signal Tuned Capacitive Coupled, Tapped Single Tuned Capacitance Coupled Amplifier, Single Tuned Transformer Coupled Amplifier, Effect of Double Tuned CE Amplifier, Application of Tuned Amplifiers. Synchronous Tuning, Stagger Tuning, Stability of Tuned Amplifiers.

**TEXT BOOKS :**

1. Integrated Electronics – J. Millman and C.C. Halkias, Mc Graw-Hill, 1972.
2. Electronic Devices and Circuits, Theodore F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Edition, 6th Edition, 2004.

**REFERENCES :**

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.
2. Micro Electronic Circuits – Sedra A.S. and K.C. Smith, Oxford University Press, 5th ed.
3. Micro Electronic Circuits: Analysis and Design – M.H. Rashid, Thomson PWS Publ., 1999.
4. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
5. Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.
6. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.

**II B.Tech II-Sem (EIE)**

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## (A0408104) PULSE AND DIGITAL CIRCUITS

(Common to ECE & EIE)

**OBJECTIVES:**

- This course describes active and passive devices, and circuit configurations used for the generation and processing of pulse, digital and switching waveforms. These non-sinusoidal signals find extensive applications in such fields as computers, control systems, counting and timing systems, data processing systems, digital instrumentation, pulse communications, radar telemetry, television and in many areas of experimental research.
- This course presents a thorough study of the following basic circuits and techniques: Transmission networks like differentiator and integrator. These include how pulse type signals are transmitted, shaped or amplified by linear circuits. Clippers, Comparators, Clampers, the transistor as switch, switching timings, different multi-vibrators and time-base generators.
- This course presents Synchronization and synchronization with frequency division, sampling gates, basic logic gates and logic families

**EXPECTED OUTCOMES:**

- To learn about Different types of non-sinusoidal signals.
- To learn about How to generate and processing of non-sinusoidal signals.
- To learn about Limiting and storage circuits and their applications.
- To learn about Different synchronization techniques, basics of different sampling gates and their uses.
- To learn about Basics of digital logic families.

**UNIT I: LINEAR WAVE SHAPING:** 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.

**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, Different clamping Circuits, Clamping circuit theorem.

**UNIT III: MULTI VIBRATOR CIRCUITS:** Diode as a switch, Piecewise linear diode characteristics, Diode Switching times, Transistor as a switch, Designing of transistor switch, Transistor-switching times, Analysis and design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

**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.

**UNIT V: SAMPLING GATES AND SYNCHRONIZATION:** Basic operating principles of sampling gates, Pulse Synchronization of relaxation devices.

**UNIT VI: REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS:** AND, OR & NOT gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CMOS Logic Families, and comparison between the logic families.

**TEXT BOOKS:**

1. Pulse, Digital and Switching Waveforms – Jacob Millman and Herbert Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002 .

**REFERENCES:**

1. Pulse and Digital Circuits – A.Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.
4. Pulse and Digital Electronics – G.K.Mithal

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## (A0409104) SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE & EIE)

**OBJECTIVES:**

- Understand the different number system, its conversions and binary arithmetic.
- Know the fundamentals of Boolean algebra and theorems, Karnaugh maps including the minimization of logic functions to SOP or POS form.
- Analysis of logic circuits and optimization techniques to minimize gate count, signals, IC count, or time delay.
- To strengthen the principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
- To fortify the documentation standards for logic designs, standard sequential devices, including counters and registers.
- To understand the logic design of programmable devices, including PLDs, RAMS, and ROMS including its sequencing and control.

**EXPECTED OUTCOMES:**

- Ability to differentiate between analog and digital representations.
- Ability to convert a number from one number system to its equivalent in of the other number system.
- Cite the advantages of the octal and hexa decimal number systems and to understand the difference between BCD and straight binary.
- Ability to Perform the three basic logic operations and construct the truth tables for the different types of gates. And Implement logic circuits using basic AND, OR and NOT gates.
- Ability to Use De-Morgan's theorem to simplify logic expressions and describe the concept of active LOW and active HIGH logic signals and Use Boolean algebra and K-map as tool to simplify and design logic circuits and Design simple logic circuits without the help of truth tables.
- Ability to Construct and analyze the operation of flip-flop and Troubleshoot various types of flip-flop circuits.

**UNIT-I: NUMBER SYSTEMS, CODES AND BOOLEAN ALGEBRA:**

Philosophy of number systems – complement representation of Negative numbers, Binary arithmetic, Binary codes, Error Detecting &Error Correcting codes, Hamming codes. Fundamental postulates of Boolean algebra, Basic theorems and properties.

**UNIT-II: SWITCHING FUNCTIONS AND IT'S MINIMIZATION**

Switching functions, Canonical and standard forms, Algebraic simplification Digital Logic Gates, properties of XOR gates, Universal Gates ,Multilevel NAND/NOR realizations. K-map method, Prime Implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime - Implicant chart, simplification rules.

**UNIT-III: COMBINATIONAL LOGIC DESIGN**

Design using conventional logic Gates, Encoder, Decoder, Multiplexer, De-Multiplexer, MUX realization of Switching functions ,Parity bit generator, Code-converters, Hazards and Hazards free realization.

**UNIT-IV: PROGRAMABLE LOGIC DEVICES, THRESHOLD LOGIC**

Basic PLD's-ROM, PROM, PLA, PAL Realization of switching function using PLD's. Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate synthesis.

**UNIT-V: SEQUENTIAL CIRCUITS**

Classification of sequential circuits, Basic Flip-Flops, Excitation and Characteristic Tables. Steps in Synchronous Sequential circuit design. Design of modulo-N counters, Ring and Johnson counters, Universal shift register, Serial Binary adder, Sequence Detector. FSM-capabilities and Limitations, Mealy and Moore models, Minimization of completely specified and incompletely specified Sequential Machines.

**UNIT-VI: ALGOROTHIMIC STATE MACHINES**

Salient features of the ASM chart, simple examples, System design using data path and control subsystems, Control Implementations, Examples of Weighing Machine and Binary multiplier.

**TEXTBOOKS:**

1. Switching &Finite Automata theory- Zvi Kohavi, TMH,2nd Edition.
2. Digital Design-Morries Mano, PHI, 3rd Edition,2006.
3. Switching Theory and Logic design-A. Anand Kumar,2008.

**REFERENCES:**

1. An Engineering Approach to Digital Design-Fletcher, PHI.
2. Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
3. Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications.

**II B.Tech II-Sem (EIE)**

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## (A1001104) INDUSTRIAL INSTRUMENTATION

**OBJECTIVES**:
At the end of the course the student is expected to understand
Metrology, Velocity and acceleration measurement, Force and torque measurement, Pressure, Flow, Density and radiation measurements

**EXPECTED OUTCOMES**:
Ability to design and implement different industrial measurements like velocity, acceleration, force, torque, pressure, flow ,density and radiation measurements using different methods

**UNIT-I: PRESSURE MEASUREMENT**
Basics of Pressure measurement – Deadweight Gages and Manometers types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gage, Knudsen Gage, Momentum Transfer Gages, Thermal Conductivity Gages, Ionization Gazes, Dual Gage Techniques.

**UNIT–II : FLOW MEASUREMENT**
Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type, vertex shedding type, Hotwire anemometer type, Laser Doppler Velocity-meter.

**UNIT – III : TEMPERATURE MEASUREMENT**
Temperature standards - fixed points -filled-system thermometers - Bimetallic thermometer- Thermocouple - Laws of thermocouple - Cold junction compensation- Measuring circuits - Speed of response -linearization - Resistance thermometer- 3 lead and 4 lead connections - thermistors - IC temperature sensors - Radiation pyrometer- Optical Pyrometer-Installation, maintenance and calibration of thermometers and thermocouples.

**UNIT –IV : LEVEL MEASUREMENT**
Visual techniques - Float operated devices - Displacer devices - Pressure gauge method - Diaphragm box-Air purge system-Differential pressure method – Hydro-step for boiler drum Level measurement - Electrical methods - Conductive sensors - capacitive sensors –Ultrasonic Method - Point level sensors-Solid level measurement.

**UNIT –V : VELOCITY, ACCELERATION, FORCE AND TORQUE MEASUREMENT**
Linear and angular velocity measurement – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods - Accelerometers of different types - Gyroscopes.
Force measurement – Different methods –Torque measurement – Dynamometers- Gyroscopic Force and Torque Measurement – Vibrating wire Force transducer.

**UNIT – VI : MISCELLANEOUS MEASUREMENTS**
Measurement of density, viscosity, humidity, sound and nuclear radiation detectors.

**TEXT BOOKS:**
1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Mechanical measurements by – A.K Shawney, Khanna publishers
3. Instrumentation by Rangan, Mani, sharma.

**REFERENCES:**
1. Process Instruments and Control Handbook – by Considine D.M., 4/e, McGraw Hill International, 1993.
2. Mechanical and Industrial Measurements – by Jain R.K., Khanna Publishers, 1986.
3. Instrument Technology, vol. I – by Jones E.B., Butterworths, 1981.

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## (A0009103) CORPORATE MANAGEMENT SKILLS

(Common to ECE, EEE & EIE)

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Concept of communication
- Types
- Non verbal communication

**EXPECTED OBJECTIVES**:

Ability to understand the corporate communication and motivation

I) **Concept of Communication** – Significance, Scope and functions of Business Communication – Process and dimensions of communication – Essentials of good communication – Channels of communication – Formal, informal communication – Upward, Downward, Horizontal communication – Grapevine Phenomenon.

II) **Types of communication**: **Verbal – Oral Communication:** Advantages and limitations of oral communication, written communication – Characteristics, significance, advantages & Limitations of written communication.

III) **Non verbal Communication:** Sign language – Body language – Kinesics – Proxemics – Time language and Hap tics: Touch language.

IV) **Interpersonal communication** – Interpersonal communication – Communication models: Exchange theory – Johari window – Transactional analysis, Communication styles.

V) **Managing Motivation** to Influence Interpersonal communication – Inter-personal perception – Role of emotion in inter personal communication.

VI) **Barriers to communication**: Types of barriers – Technological – Socio-Psychological barriers – Overcoming barriers. Listening – Types of listening – Tips for effective listening..

**REFERENCES:**

1. Business Communication, Meenakshi Raman, Oxford University Press.
2. Business Communication, Raymond V.Lesikar, Neeraja Pandit et al.,TMH
3. English for Business Communication, Dr.T.M Farhatulla, Prism books Pvt. Ltd.
4. Business Communications,Hudson,5/e,Jaico Publications
5. Business communication for managers, Penrose, Raspbery, Myers, Cengage
6. The Skills of Communication, Bills Scot, Gower publishing company Limited, London.
7. Effective Communication, Harward Business School, Harward Business Review
8. No.1214.
9. Essentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand

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## (A0297104) ELECTRICAL TECHNOLOGY LAB

(Common to ECE & EIE)

1. OCC test on dc generator.
2. Load Test on DC shunt motor.
3. Load test on DC series motor.
4. Swinburne's test on DC Shunt motor.
5. Speed control of DC Shunt motor by Armature control method.
6. Speed control of DC Shunt motor by Field control method.
7. OC & SC test on 1 phase Transformer (Efficiency)
8. OC & SC test on of 1 phase Transformer (regulation)
9. Load test on 3-phase Induction motor
10. Equivalent circuit of Single phase Induction motor.
11. Regulation of Alternator by using Synchronous Impedance methods.
12. Characteristics of Synchro.

**II B.Tech II-Sem (EIE)** P 3 C 2

## (A0494104) ELECTRONIC CIRCUIT ANALYSIS LAB

(Common to ECE & EIE)

**I) Design and Simulation in Simulation Laboratory using Multisim OR Pspice OR Equivalent Simulation Software.**

1. Common Emitter and Common Source amplifier
2. Two Stage RC Coupled Amplifier
3. Current shunt Feedback Amplifier
4. Cascade Amplifier
5. Wien Bridge Oscillator using Transistors
6. RC Phase Shift Oscillator using Transistors
7. Class A Power Amplifier (Transformer less)
8. Class B Complementary Symmetry Amplifier
9. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

**II) Testing in the Hardware Laboratory**

A. Any Three circuits simulated in Simulation laboratory

B. Any Three of the following

1. Class A Power Amplifier (with transformer load)
2. Class B Power Amplifier
3. Single Tuned Voltage Amplifier
4. RC Phase Shift Oscillator
5. Wien Bridge Oscillator
6. Crystal Oscillator

**II B.Tech II-Sem (EIE)** P C
3 2

(A0495104) PULSE AND DIGITAL CIRCUITS LAB
(Common to ECE & EIE)

**Minimum Ten experiments to be conducted:**

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.

**III B.Tech I-Sem (EIE)**

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## (A0012105) MANAGEMENT SCIENCE

**OBJECTIVES:**

- To know the concept of management, administration.
- To know the personnel management and human research management.
- To know and analyze the steps involved in the corporate planning process.
- To understand present effective production techniques.

**EXPECTED OUTCOMES:**

- Students will able to know how to design the plant layout and location.
- Students will able to know importance of human resource department in organization.
- Students will able to know how the SWOT analysis helps to generate alternative corporate strategies.
- Students will able by using the contemporary practices how to survive in competitive global market.

**UNIT-I: INTRODUCTION TO MANAGEMENT**

Concepts of Management - Nature, Importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiment, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation

**UNIT-II: BASIC ISSUES IN ORGANIZATION**

Designing Organic Structures of Organization (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization, Virtual organization, Cellular organization, Team structure, Boundary less organization and Departmentation, Leadership Styles, Social responsibilities of Management

**UNIT-III: OPERATIONS MANAGEMENT**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management, Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

**UNIT-IV: HUMAN RESOURCES MANAGEMENT**

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

**UNIT-V: PROJECT MANAGEMENT (PERT/CPM)**

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

**UNIT-VI: WOMEN ENTREPRENEURSHIP**

Scope of Entrepreneurship among women- Promotional efforts supporting Women Entrepreneurs in India – Opportunities for women entrepreneurs – Challenges/Problems of Women Entrepreneurs – Successful cases of Women Entrepreneurs.

**TEXT BOOK:**

1. Aryasri: Management Science, TMH, New Delhi.

**REFERENCE BOOKS:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2007.
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2007.
3. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2007.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2007.
5. Memoria & S.V.Ganker, Personnel Management, Himalaya, 25/e, 2007.
6. Schermerhorn: Management, Wiley, 2007.
7. Parnell: Strategic Management, Biztantra, 20073.
8. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2007.

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## (A0415105)LINEAR IC APPLICATIONS

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Differential amplifiers
- Op-amp applications, Timers, phase locked loops, and D/A, A/D converters

**EXPECTED OUTCOMES:**

Ability to understand Differential amplifier configurations, design of applications using op amp,

**UNIT-I: DIFFERENTIAL AMPLIFIERS**

Differential amplifier**:** introduction, DC and AC analysis of dual input and balanced output configuration, properties of other differential amplifier configurations, FET type, constant current bias, current mirror-cascaded differential amplifier stages, level translator.

**Introduction to operational amplifiers:** Block diagram, analysis of 741 op-amp circuit, electrical parameters of op-amp (741c) - the ideal op amp- equivalent circuit of an op-amp- integrated circuits.

**UNIT-II: LINEAR APPLICATIONS OF OP-AMPS**

Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters, Buffers.

**UNIT-III: NON LINEAR APPLICATIONS OF OP-AMPS**

Non-linear function generation, comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers.

**UNIT-IV: ANALOG FILTERS**

Introduction- Butterworth filters-first order, second order LPF, HPF filters-. Band pass, Band reject and all pass filters.

**UNIT-V: TIMERS AND 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,565 PLL ,applications of PLL-Frequency multiplication, frequency translation, AM, FM and FSK demodulators.

**UNIT–VI: D/A AND A/D CONVERTERS**

Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications

**TEXT BOOKS:**

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, 4th edition, PHI, 1987.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2003.

**REFERENCES:**

1 Operational Amplifiers & Linear ICs by David A. Bell, 2nd edition, Oxford University Press, 2010.
2 Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
3 Operational amplifiers and Linear Integrated Circuits- R.F Coughlin & Fredrick Driscol- PHI 6th Edition.

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## (A0416105)DIGITAL IC APPLICATIONS THROUGH VHDL

**OBJECTIVES:**

- To be able to use computer-aided design tools for development of complex digital logic circuits
- To be able to model, simulate, verify, analyze, and synthesize with hardware description languages
- To be able to design and prototype with standard cell technology and programmable logic
- To be able to design tests for digital logic circuits, and design for testability

**EXPECTED OUTCOMES:**

- Able to use computer-aided design tools for development of complex digital logic circuits.
- Able to model, simulate, verify, analyze, and synthesize with hardware description languages.
- Able to design and prototype with standard cell technology and programmable logic.
- Able to design tests for digital logic circuits, and design for testability.

**UNIT- I: CMOS LOGIC**

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

**UNIT- II: BIPOLAR LOGIC AND INTERFACING**

Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

**UNIT- III**: **THE VHDL HARDWARE DESCRIPTION LANGUAGE**

Design flow, program structure, types and constants, functions and procedures, libraries and packages.

**THE VHDL DESIGN ELEMENTS:** Structural design elements, data flow design elements, behavioral design elements, and time dimension and simulation synthesis.

**UNIT- IV: COMBINATIONAL LOGIC DESIGN**

Decoders, encoders, three state devices, multiplexers and demultiplexers, EX-OR gates and parity circuits, comparators, adders & substractors, ALUs, VHDL modes for the above ICs.

**UNIT- V: DESIGN EXAMPLES (USING VHDL)**

Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder, designing with ROM.

**UNIT- VI: SEQUENTIAL LOGIC DESIGN**

Latches and flip-flops, counters, shift register, and their VHDL models.

**TEXT BOOKS:**

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

**REFERENCES:**

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.
2. Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.

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## (A1002105)ELECTRICAL AND ELECTRONIC MEASUREMENTS

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Electrical measurements
- Electronic measurements
- Oscilloscopes, signal generators and frequency measurements

**EXPECTED OUTCOMES**:

- Ability to understand electrical and electronic measurements and understanding the working of various instruments.

**UNIT-1: ELECRICAL MEASUREMENTS**

Electrical standards**:** ampere, voltage, resistance, capacitance & inductance standards-Suspension Galvanometer-Torque & deflection of the galvanometer-PMMC mechanism-DC Ammeters-DC voltmeters-Voltmeter sensitivity-Series and Shunt type ohm meters-Multimeters-Alternating current indicating instruments**:** electrodynamometer, rectifier type-Thermo instruments-Electrodynamometers in power measurements-Watt hour meter-Power factor meter.

**UNIT-II: BRIDGE MEASUREMENTS**

Resistance Measurement**:** Wheat stone bridge, Kelvin bridge- AC bridges**:** Condition for bridge balance-Inductance measurement**:** Maxwell Bridge, Hay Bridge- Capacitance measurement: Schering Bridge- Frequency measurement**:** Wein Bridge- Problems of shielding and grounding.

**UNIT-III: ELECTRONIC MEASUREMENTS**

FET input electronic volt-ohm-ammeters- AC voltmeters: rectifier type, true RMS type- Digital voltmeters: Ramp, Dual slope integration&SAR types – Q meter- Vector impedance meter-Vector volt meter- RF power and voltage measurement.

**UNIT-IV: OSCILLOSCOPES**

Oscilloscope block diagram- Vertical deflection system-Delay line-Horizontal deflection system-Vertical I/p and sweep generator signal synchronization-Oscilloscope probes**:** 1:1 probes, attenuator probes, active probes, current probes- Oscilloscope controls-Measurement of voltage, frequency, phase and pulse- Multi I/p oscilloscopes: dual beam, dual trace- Sampling oscilloscopes- Digital storage oscilloscopes.

**UNIT-V: SIGNAL GENERATORS AND ANALYZERS**

Low-frequency signal generators- Function generators- Pulse generators- RF signal generators- Frequency synthesized signal generator- Heterodyne wave analyzer- Harmonic distortion analyzers- Spectrum analyzer (Basics only).

**UNIT-VI: FREQUENCY AND TIME MEASUREMENTS**

Time & frequency standards- Frequency measurement- time base - Period measurement- Measurement errors.

**TEXT BOOKS:**

1. Modern Electronic Instrumentation and Measurement Techniques- Albert D. Helfrick, Willium D. Cooper- PHI-2002
2. Electronic Instrumentation and Measurements- David A. Bell-PHI-2nd edition-2003.

**REFERENCES:**

1. A course in Electrical and Electronic Mesurements and Instrumentation- A.K. Sawhney- Dhanpati Rai&CO-7th edition-2005
2. Electronic Instrumentation- H Kalsi- TMH-3rd edition
3. Electronic Measurements and Instrumentation- Oliver and Cage- TMH

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## (A1003105)SENSORS AND SIGNAL CONDITIONING

**OBJECTIVE:**

At the end of the course the student is expected to understand

- General terminology of sensors
- Resistive sensors and their signal conditioning
- Reactance variation and electromagnetic sensors and their signal conditioning,
- Self generating sensors and their signal conditioning

**EXPECTED OUTCOMES**:

- Ability to understand and designing of resistive, reactance variation , self generating sensors and their signal conditioning.

**UNIT I: INTRODUCTION TO SENSOR-BASED MEASUREMENT SYSTEMS**

General concepts and terminology - Sensor classification- Static characteristics of measurement systems**:** accuracy, precision, sensitivity, linearity, threshold, resolution-Systematic errors-Random errors-Dynamic characteristics of measurement systems: zero-order, first-order, and second-order measurement systems and response to step, ramp and sinusoidal inputs.

**UNIT II: RESISTIVE SENSORS**

Potentiometers - Strain gages and types - Resistive temperature detectors (RTDs), - Thermistors - Magneto resistors - Light-dependent resistors (LDRs).

**UNIT III: SIGNAL CONDITIONING FOR RESISTIVE SENSORS**

Measurement of resistance - Voltage dividers - Wheatstone bridge: Balance and deflection measurements - Sensor bridge calibration, balance and compensation - Instrumentation amplifiers.

**UNIT IV: REACTANCE VARIATION AND ELECTROMAGNETIC SENSORS**

Capacitive sensors**:** variable & differential - Inductive sensors**:** Variable reluctance and eddy current sensors, LVDTs, Variable transformers (synchros and resolvers), Magneto elastic and magnetostrictive sensors - Electromagnetic sensors: Sensors based on faraday's law, Hall Effect sensors.

**UNIT V: SIGNAL CONDITIONING FOR REACTANCE VARIATION SENSORS**

Problems and alternatives- AC bridges- Carrier amplifiers, Detection & application to LVDTs

**UNIT VI: SELF-GENERATING SENSORS**

Thermoelectric sensors**:** Thermocouples, Piezoelectric and Pyroelectric sensors- Photovoltaic sensors- Electrochemical sensors.

**SIGNAL CONDITIONING FOR SELF-GENERATING SENSORS:** Offset and drifts in OP amps-Chopper and Auto zero amplifiers- Electrometer- Transimpedemce amplifiers-Charge amplifiers- Noise in amplifiers.

**TEXT BOOK:**

1) Sensors and Signal Conditioning: Ramon Pallás Areny, John G. Webster, 2nd edition, John Wiley and Sons, 2000.

**REFERENCES:**

1) Sensor Technology Hand Book-Jon Wilson ,Newne 2004
2) Instrument Transducers – An Introduction to Their Performance and Design – by Herman K.P. Neubrat, Oxford University Press.
3) Measurement System: Applications and Design – by E.O. Doeblin, McGraw Hill Publications.
4) Instrumentation Devices and Systems – by C.S.Rangan ,G.R.Sarma,V.S.V.Mani Tata McGraw Hill Publications.
5) A Course in Electrical and Electronic Measurements and Instrumentation –by A.K.Sawhney, Puneet Sawhney Dhanpat Rai & Co (P) Ltd.
6) Industrial instrumentation, principles and design- by Tattamanglam R. Padmanabhan- springer india-2005.

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## (A1004105)PROCESS CONTROL INSTRUMENTATION

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Process characteristics
- Control actions and types of controllers and their realization
- Optimum controller settings
- Final control elements
- Multiloop process control

**EXPECTED OUTCOMES:**

- Ability to understand the basics of process dyanamics, controllers, settings, valves and multiloop process control.

**UNIT-I: PROCESS CHARACTERISTICS:**Process variables- Process degrees of freedom- Characteristics of physical systems**:** Electric systems**,** liquid systems, gas systems, thermal systems- Elements of process dynamics- Mathematical modeling of liquid process, gas process, flow process, thermal process.

**Text book: Automatic process control- By Donald P. Eckman- Wiley Eastern-1985**

**UNIT-II: CONTROLLER PRINCIPLES:** Basic concepts of process control - Control system parameters- Controller Modes- Discontinuous Controller Modes – Continuous Controller Modes- Composite Control Modes- Problems.

**Text Book: Process control Instrumentation Technology- by Curtis D Johnson- PHI-1996**

**UNIT- III: REALIZATION OF CONTROLLERS:** Electronic controllers to realize various control actions: ON/OFF, P, I, D, PI, PD, and PID- Problems.

**Text Book: Process control Instrumentation Technology- by Curtis D Johnson- PHI-1996**

**UNIT- IV: OPTIMUM CONTROLLER SETTINGS:** Evaluation criteria- 1/4$^{th}$ decay ratio- Time integral performance criteria**:** IEA, ISE, ITAE- Tuning of controllers by process reaction curve method- Continuous cyclic method.

**Text book: Stepanopoulos, "Chemical process control: An introduction, theory and practice- PHI**

**UNIT- V: FINAL CONTROL ELEMENTS: Actuators:** Electro pneumatic, Electric - Control valve Principle- Control valve types and Characteristics –Characteristics and applications of Globe, Butterfly, Diaphragm and Ball valves- Control valve sizing**.**

**Text books: 1. Automatic process control- By Donald P. Eckman- Wiley Eastern-1985**
**2. B.Liptak, Instrument Engineers hand book; Process control**

**UNIT- VI: MULTILOOP PROCESS CONTROL:** Feed forward control- Ratio control- Cascade control – Multivariable control examples: distillation column and boiler operation.

**Text book: Stepanopoulos, "Chemical process control: An introduction, theory and practice- PHI**

**TEXT BOOKS**:

1. Automatic process control- By Donald P. Eckman- Wiley Eastern-1985
2. Process control Instrumentation Technology- by Curtis D Johnson- PHI-1996

**REFERENCES:**

1. Peter Harriot, " process control"- TMH- 1991
2. Patranabis. D, " principles of process control", TMH, 1981
3. Stepanopoulos, "Chemical process control: An introduction, theory and practice- PHI.
4. Coughnaoner and Koppel, "Process systems analysis and control"- TMH, 1991.
5. B.Liptak, Instrument Engineers hand book Process control.
6. Programmable logic controllers (section- 4)( for 2$^{nd}$ unit) - by L.A Bryan and E.A. Brayan-2$^{nd}$ edition- Industrial text company publication, Atlanta, Georgia, USA
7. Lessons In Industrial Instrumentation(for units 2 & 5)-By Tony R. Kuphaldt- Version 0.4 – Released January 11, 2009.

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## (A1005105)Lab VIEW (AUDIT COURSE)

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Basics of labview
- Implementing a VI
- Relating data
- Storing measurement data
- Data acquisition
- Design techniques

**EXPECTED OUTCOMES:**

- Ability to understand and the labview and to interface with the external world.

**UNIT –I: BASICS OF LABVIEW**

Introduction- Components of LabVIEW- Owned and free labels- Tools and other pallets- Arranging Objects- Pop-Up menus- color coding- code debugging- and context help.

**UNIT –II: IMPLEMENTING A VI**

Front panel design- LabVIEW data types- For loop- while loop- timing a VI- case structures- iterative data transfer.

**UNIT-III: RELATING DATA**

Arrays- Clusters- type definitions.

**UNIT-IV: STORING MEASUREMENT DATA**

File I/O- High-level file I/O- low-level file I/O- modularity- creating Sub VI's.

**UNIT-V: DATA ACQUISITION**

Introduction- classification of signals- guidelines- practical Vs Ideal interfacing- Measurement and Automation explorer- Use of Simple VI's- Use of DAQmx.

**UNIT-VI: DESIGN TECHNIQUES**

Sequential programming- State programming- state machines- parallelism.

**TEXT BOOKS:**

1) Sanjay Gupta & Joseph John, Virtual Instrumentation Using LabVIEW, TMH, New Delhi.
2) Jovitha Jerome, Virtual Instrumentation Using LabVIEW, PHI, New Delhi.
3) Gary Johnson, Richard Jennings, LabVIEW graphical programming, McGraw-Hill

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## (A0499105)LINEAR IC APPLICATIONS LAB

**List of Experiments:- ( Minimum Ten Experiments should be conducted)**

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
5. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
6. Function Generator using OP AMPs.
7. IC 555 Timer – Monostable Operation Circuit.
8. IC 555 Timer – Astable Operation Circuit.
9. Schmitt Trigger Circuits – using IC 741 and IC 555.
10. IC 565 – PLL Applications.
11. IC 566 – VCO Applications.
12. 4 bit DAC using OP AMP.

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## (A0481105)DIGITAL IC APPLICATIONS USING VHDL LAB

Simulate the internal structure of the following Digital IC's using VHDL and verify the operations of the Digital IC's (Hardware) in the Laboratory

**Minimum 10 experiments**

1) Logic Gates- 74XX
2) Half Adder, Full Adder
3) Half Subtractor, , Full Subtractor
4) Ripple Carry Adder
5) 3-8 Decoder -74138
6) 8-3 Encoder- 74X148
7) 8 x 1 Multiplexer -74X151

4 bit Comparator-74X85

8) D Flip-Flop 74X74
9) JK Flip-Flop 74X109
10) Decade counter-74X160
11) Universal shift register -74X194

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## (A1091105)SENSORS AND TRANSDUCERS LAB

List of experiments: (Minimum of 10 Experiments to be conducted, Optionally LabVIEW may be used for implementing the experiments)

1. Measurement of Physical variables based on change in resistance.
    a) Strain (Strain Gauge)
    b) Temperature (RTD, Thermistor)
2. Measurement of Physical variables based on induced emf - LVDT
3. Measurement of Physical variables based on change in dielectric - Capacitive pick up.
4. Measurement of Pressure using Bourdon tube
5. Measurement of Vibration using Acceleration transducer.
6. pH Measurement.
7. Measurement of Speed using Digital Stroboscope.
8. Conversion of D'Arsonal Galvanometer into DC meter (Voltage & Current).
9. Measurement of R, L, C and Q using Q meter.
10. Measurement of R, L and C using Bridge circuits.
11. Conversion of D'Arsonal galvanometer into Ohm Meter.
12. Conversion of D'Arsonal galvanometer into AC meter (Current & Voltage).

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## (A0013105)MANAGERIAL ECONONICS & FINANCIAL ANALYSIS

**OBJECTIVES**

- To understand the principles of and techniques of managerial economics.
- To understand the business organizations.
- To understand the financial accounting and analysis.
- To understand maintain a particular product at the lowest cost while meeting the specifications of the customer

**EXPECTED OUTCOMES:**

- Students will able to analyze the demand in the present market.
- Students will able to how to precise the production cost.
- Students will able to know the price output decisions are made in markets.
- Students will able to maintain the books by using the financial accounting

**UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS:**

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

**UNIT II: ELASTICITY OF DEMAND:**

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

**UNIT III: BUSINESS & NEW ECONOMIC ENVIRONMENT:**

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

**UNIT IV: CAPITAL AND CAPITAL BUDGETING:**

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

**UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING:**

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

**UNIT VI: FINANCIAL ANALYSIS THROUGH RATIOS:**

Computation, Analysis and Interpretation of Liquidity Ratios (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 BOOKS:**

1) Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2) Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

**REFERENCES:**

1) Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2) H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3) Suma Damodaran, Managerial Economics, Oxford University Press.
4) Lipsey & Chrystel, Economics, Oxford University Press.
5) S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6) Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7) Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8) Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9) S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10) Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11) Dwivedi:Managerial Economics, 6th Ed., Vikas.

**Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.**

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## (A0505104)COMPUTER ORGANIZATION

**OBJECTIVES:**

- To understand the structure, function, characteristics and performance issues of computer systems.
- To understand the design of the various functional units of digital computers
- To understand I/O transfer mechanism, design of I/O circuit interfaces and example bus standards (like PCI, SCSI, USB)
- To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro programmed approaches)
- To understand the different types of memory and how they are related.
- To learn basics of Parallel Computing and Pipelining.

**EXPECTED OUTCOMES:**

- Students will learn about computer performance, computer design, and tradeoffs between cost and performance as well as between hardware and software.
- Students will formulate and solve problems, understand the performance requirements of systems.
- Students will learn to communicate effectively and learn to think creatively and critically, both independently and with others.
- Students will learn about all the detailed design issues and circuits of each unit.

**UNIT-I: BASIC STRUCTURE OF COMPUTERS:** Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

**DATA REPRESENTATION:** Fixed Point Representation. Floating – Point Representation. Error Detection codes.

**UNIT-II: REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS:** Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

**BASIC COMPUTER ORGANIZATION AND DESIGN**: Instruction codes, Computer Registers, Computer instructions, Instruction cycle, Memory- reference instructions, Input – Output and Interrupt.

**CENTRAL PROCESSING UNIT**: Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Reduced Instruction set computer.

**UNIT-III: MICRO PROGRAMMED CONTROL:** Control memory, Address sequencing, micro program example, design of control unit, Hard wired control, Micro programmed control.

**COMPUTER ARITHMETIC:** Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations, Decimal Arithmetic unit.

**UNIT-IV: THE MEMORY SYSTEM:** Basic concepts, semiconductor RAM memories, Read-only memories, Cache memories, performance considerations, Virtual memories, secondary storage, Introduction to RAID.

**UNIT-V: PIPELINE AND VECTOR PROCESSING:** Parallel processing, Arithmetic pipeline, Instruction Pipeline, RISC Pipeline, Vector processing, Array Processors.

**UNIT-VI: MULTI PROCESSORS:** Characteristics of Multi Processors, Inter Connection Structures, Inter Processor Arbitration; Inter Processor Communication & Synchronization, Cache Coherence

**TEXT BOOKS:**

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M. Moris Mano, IIIrd Edition, Pearson/PHI

**REFERENCES:**

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

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## (A0417106)DIGITAL SIGNAL PROCESSING

**OBJECTIVES:**

- At the end of the course, the student should be able to:
- Program a DSP chip to filter signals using either assembly language or a C compiler for the chip. This filter could be a FIR or IIR filter. The student should understand how design algorithms for implementation.
- Understand how digital to analog (D/A) and analog to digital (A/D) converters operate on a signal and be able to model these operations mathematically.
- Use Z transforms and discrete time Fourier transforms to analyze a digital system.
- Design and understand simple finite impulse response filters
- Understand stability of FIR filters
- Quantization of different types of FIR filters (FIR)
- e) Choose the best filter effects and noise
- Pole-zero design of simple filters using real data
- Window method design structure for implementation

**EXPECTED OUTCOMES:**

- Ability to describe the Sampling Theorem and how this relates to Aliasing and Folding.
- Ability to determine if a system is a Linear Time-Invariant (LTI) System and Take the Z-transform of a LTI system.
- Ability to determine the frequency response of FIR and IIR filters.
- Ability to understand the relationship between poles, zeros, and stability and determine the spectrum of a signal using the DFT, FFT, and spectrogram.
- Ability to Design, analyze, and implement digital filters in Mat lab.

**UNIT I: SIGNALS & SIGNAL PROCESSING**

Characterization and classification of signals, Typical signal processing operation, Examples of Typical signals, Typical signal processing applications,

**TIME DOMAIN REPRESENTATIONS OF SIGNALS AND SYSTEMS**: Discrete-time signals, operations on sequences, the sampling process, discrete time systems, time domain characterization of LTI discrete time systems, state space representation of LTI discrete time systems, Random signals,

**UNIT II: TRANSFORM DOMAIN REPRESENTATIONS OF SIGNALS**

The discrete time Fourier transform, Discrete Fourier transform, Discrete Fourier transform properties, Computation of the DFT of real sequences, Linear convolution using the DFT, The z-Transform, region of convergence of a rational z-transform, The inverse z-Transform, Properties of the z-Transform, Transform domain representations of random signals.

**UNIT III: TRANSFORM DOMAIN REPRESENTATIONS OF LTI SYSTEMS**

The frequency response, The transfer function, Types of transfer functions, All pass transfer function, Minimum phase and maximum phase transfer functions, Complimentary transfer functions, Digital two pairs, Stability test, Discrete time processing of random signals.

**UNIT IV:DIGITAL FILTER STRUCTURES**:

Block diagram representation, Signal flow graph representation, Equivalent structures, Basic FIR digital filter structures, Basic IIR filter structures, State space structures, All pass filters, Tunable IIR digital filters, Cascaded lattice realization of IIR and FIR filters, Parallel all pass realization of IIR transfer functions, Digital sine-cosine generator, Computational complexity of digital filter structures, Review of sampling continues time signals.

**UNIT V: DIGITAL FILTER DESIGN**

Preliminary considerations, Impulse invariance method of IIR filter design, Bilinear transform method of IIR filter design, Design of digital IIR notch filters, Low pass IIR digital filter design examples, Spectral transformations of IIR filters, FIR filter design based on truncated Fourier series, FIR
Filter design based on frequency sampling approach, Computer aided design of digital filters.

**UNIT VI: BASIC CONCEPTS OF MULTIRATE SIGNAL PROCESSING AND APPLICATIONS**

Decimation, Interpolation, Implementation of Sampling rate conversion, DSP Applications: Dual tone multi frequency signal detection, Spectral analysis using DFT, Short term discrete Fourier transform, musical sound processing.

**TEXT BOOKS:**

1. Digital Signal Processing A Computer based approach by Sanjit K.Mitra, Tata McGraw Hill, 1998.
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI
4. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M. Bhaskar, TATA McGraw Hill, 2002

**REFERENCE BOOKS:**

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006

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## (A0421106)MICRO PROCESSORS AND INTERFACING

**OBJECTIVE:**

At the end of the course the student is expected to learn the

- The structure and programming of 8 bit and 16 bit processor
- Different modes of operation of 8086
- Interfacing of memory components with 8086
- Interfacing of 8255, 8237 with 8086
- Features of advanced microprocessors like 80283, 80386

**EXPECTED OUTCOMES:**

The students will be able to

- Write programs for different applications
- Decide the optimum mode of operation of 8086 for a application
- Interface different peripheral devices like Key board, Display, stepper motor to 8086 through 8255
- Interface memory to increase the storage capacity as required by the application
- Compare the performance of advanced microprocessors with 8086

**UNIT- I: INTRODUCTION**

Introduction of Microprocessors- Evolution- The Processor 8086: Register Organization, Architecture, Signal Description, Memory Organization, Bus operation Minimum mode and Maximum mode and timing diagrams.

**UNIT- II: ASSEMBLY LANGUAGE PROGRAMMING**

Addressing modes- Instruction set- Assembler directives- Assembly language programs involving logical, branch and call instructions- sorting- evaluation of arithmetic expressions- string manipulation- Simple Programs

**UNIT- III: SPECIAL ARCHITECTURAL FEATURES**

Introduction to stack- Stack Structure- Interrupts and Interrupts service routines, Interrupt cycle, non mask able interrupt, Mask able interrupt- Procedures and macros- Simple Programs.

**UNIT- IV: BASIC PERIPHERALS AND THEIR INTERFACING**

Memory Interfacing: Semiconductor and Dynamic RAM, PIO 8255, Modes of operation of 8255-Interfacing Analog to Digital Data Converters- Interfacing Digital to Analog Converters- Stepper motor interfacing.

**UNIT- V: SERIAL DATA TRANSFER SCHEMES**

Asynchronous and synchronous data transfer schemes- 8251 USART architecture and interfacing- TTL to RS232C and RS232C to TTL conversion- Sample program of serial data transfer- Introduction to high-speed serial communications standards- USB.

**UNIT-VI: SPECIAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES AND INTERFACING**

Programmable interval timer 8253: architecture and Signal description, control word register, operating modes and interfacing- Programmable Interrupt Controller 8259: architecture and signal description, interrupt sequence, command words, modes of operation and interfacing- Key board/display controller 8279: architecture and Signal description, modes of operation and interfacing- DMA controller 8257: architecture and Signal description, DMA transfers and operations- Programmable DMA interface 8237.

**TEXT BOOKS:**

1) Advanced microprocessor and peripherals-A.K. Ray and K.M. Bhurchandi, TMH, 2000.
2) Microprocessors Interfacing-Douglas V. Hall, 2007.

**REFERENCES:**

1) The 8088 and 8086 Microprocessors-PHI, 4th Edition, 2003.
2) Micro computer system 8066/8088 family Architecture, programming and Design-By Liu and GA Gibson, PHI, 2nd Ed.

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## (A1006106)COMPUTER AIDED PROCESS CONTROL

**OBJECTIVES:**

At the end of the course the student is expected to learn the

- The internal structure of Personal computer in terms of its peripherals
- Data acquisition using standard cards
- PC programming considerations using command line

**EXPECTED OUTCOMES:**

The students will be able to

- Decide which resources of PC suits a application
- Configure PC for interfacing with external environment
- Program PC for the application

**Unit-1: INTRODUCTION TO COMPUTERS (Elementary level treatment)**

Personal computer, operating system, I/O ports, plug-in-slots, PCI bus, operator interface- Computer interfacing for data acquisition and control- Interfacing input signals, output system with continuous actuators. PC expansion systems- plug in data acquisition boards**: T**ransducer to control room, Back plane bus, VXI.

**Unit-II: INTRODUCTION TO COMPUTER CONTROL**

Role of computers in the control of industrial processes (plants) - Elements of computer controlled plant- classification**:** Batch, continuous, supervisory and direct digital controls- Architecture**:** Centralized, Distributed and Hierarchical systems- Man machine or Human computer interface (HCI).

**Unit- III: BUILDING BLOCKS OF COMPUTER CONTROL LOOP**

Process related variables- Computer networks- Topologies- Communication in Distributed control systems- Smart sensors- Field bus.

**Unit-IV: CONTROL SYSTEM DESIGN**

Heuristics-Structural controllability and Relative gain array- Controller tuning**:** P, PI, PID and Ziegler- Nicholas method- Controller design**:** Regulator design and other design considerations.

**Unit- V: DESIGN OF DIGITAL CONTROLLERS**

Computer control loop- Zero-order hold equivalence (ZOH) - First order system with time delay- Converting continuous time controller to discrete time domain- Dead beat and Dahlin's algorithms.

**Unit- VI: DESIGN OF ADVANCED CONTROLLER**

Feed forward controller**:** Block diagram, Static and dynamic FFC- Predictive control**:** model based and multi variable systems- Adaptive control**:** Adjustment, schemes and techniques- Algorithm for process with dead time- Smith predictor (SP) , Analytical predictor (AP).

**TEXT BOOKS**:

1. Computer aided process control- S.K. Singh, PHI 2004
2. Computer control processes- M. Chindambaram, Narosa pub 2003

**REFERENCES**:

1. Computer based industrial control- Krishnakant, PHI 1997
2. Computer process control- Deshpande P.B and Ash R.H – ISA pub-1995
3. Chemical process control: An introduction to theory and practice- Stephanopulos, PHI, New Delhi, 1999.
4. Real time control: An introduction- S.Bennett- Pearson education, India.

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## (A1007106)BIO-MEDICAL INSTRUMENTATION

**OBJECTIVES:**

At the end of the course the student is expected to learn the

- Introduction biomedical instrumentation system and bio electrodes
- Cardiac, neuro an respiratory instrumentation
- Medical imaging principles

**EXPECTED OUTCOMES:**

- The student will be able to understand the principles of biomedical instrumentation system and physiology, anatomy of cardiac, neuro and respiratory systems and fundamentals medical imaging.

**UNIT-I: INTRODUCTION**

Components of Medical Instrumentation System- Physiological systems of the body- Problems, encountered with measurements from human beings - levels of structural organization of the human body-Organization of cell- Resting membrane potential-Generation of Action Potential and conduction through nerve cell.

**UNIT-II: BIO ELECTRODES**

Electrode theory- Bio potential Electrodes**:** external electrodes, internal electrodes- Biochemical electrodes**:** reference electrodes, ph electrode, blood gas electrodes.

**UNIT-III: CARDIAC INSTRUMENTATION**

Cardiovascular system- Electrical Conduction system of the heart- Cardiac cycle- Blood pressure and Blood flow measurements- The ECG**:** Einthoven triangle, Standard 12-lead configurations-Interpretation of ECG waveforms with respect to electro mechanical activity of the heart- ECG recorder principles.

**UNIT-IV: NEURO- MUSCULAR INSTRUMENTATION**

Nervous system**:** anatomy, structure, functions, organization - neuronal communication- Brain**:** anatomy, organization - EEG and EMG**:** electrode placement, recorder principles, interpretation of waveforms.

**UNIT-V: RESPIRATORY INSTRUMENTATION**

Mechanism of respiration- lung volumes and capacities - Spirometry- ventilators.

**UNIT-VI: PRINCIPLES OF MEDICAL IMAGING (elementary treatment)**

X-ray imaging**:** Digital radiography , Principles of computed tomography (CT) - Ultrasound imaging –- Radionuclide imaging: SPECT and PET - Principles of MRI , Basic MRI system.

**TEXT BOOKS:**

1) Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J.Weibell, E.A. Pfeiffer, PHI.
2) Principles of Medical Imaging, K.Kirk Shung, Benjamin Tsui and Michael. B. Smith, Academic Press Inc., New York.

**REFERENCES:**

1) Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.
2) Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E.Baker, John Wiley and Sons.
3) Introduction to Biomedical Equipment Technology, Joseph J Carr, John M.Brown, 4th Edition Pearson Education, Singapore, 2001.
4) Human physiology: from cells to system- by Lauralee Sherwood, 6th edition, Thomson Brooks/Cole.

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## (A1209104)JAVA PROGRAMMING
**(AUDIT COURSE)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- It provides the students with an excellent choice for beginning to learn programming using the java programming language.
- The courses teach the significance of object-oriented programming language and the steps required to create simple java technology programs.
- It allows the users to build graphical user interfaces and handle various events.

**EXPECTED OUTCOMES:**

- Use the java programming language to build object-oriented programs and applications.
- Design, code, compile, run and debug the computer programs using object oriented programming language.
- Understand and use the core concepts of an object-oriented language.
- After completing this course, participants should be able to: Understand OOPS Concepts.. Data Types and Operators in Java Thread concepts Packages & Interfaces Develop GUI using Java. Understanding the packages present and Java applications.

**UNIT – 1 (6 Hrs)**

Introduction: What is a Computer?, Programs, Operating Systems, Java WWW and Beyond, The Java Language Specification, API, JDK and IDE, A Simple Java Program , Creating Compiling and Executing a Java Program

Elementary Programming: Writing simple programs, Identifiers, Variables, Assignment Statements and Assignment Expressions, Constants, Numeric Data Types and Operations, Numeric Type conversions, Character Data Type and Operations, String Type

**UNIT – 2 (10 Hrs)**

Selections: Boolean Data Type and Operations, if statements, switch statements, conditional expressions, operator precedence and associativity

Loops: while, do-while, for, nested

Methods: defining a method, calling a method, void method, passing parameters by values, modularizing code, overloading methods, scope of variables, Math class

**UNIT – 3 (10 Hrs)**

Arrays: Basics, Copying arrays, passing arrays to methods, returning an array from a method, variable-length argument lists, searching and sorting arrays, Arrays class, Two-Dimensional Arrays, Multidimensional Arrays

Objects and Classes: Defining classes for Objects, Constructors, Accessing objects via Reference Variables, Class usage from the Java library, Static Variables, Constants and Methods, Visibility Modifiers, Encapsulation, Passing Objects to Methods, Array of Objects

**UNIT – 4 (8Hrs)**

Strings and Text I/O: String class, Character class, StringBuilder/StringBuffer class, Command-line Arguments, File class, File Input and Output

Thinking in Objects: Immutable Objects and classes, Scope of Variables, this reference, class abstraction and Encapsulation

**UNIT – 5 (8 Hrs)**

Inheritance and Polymorphism: Superclasses and Subclasses, Extending JFrame class, super keyword, Overriding Methods, Overriding vs Overloading, Object class and its methods, Polymorphism, dynamic binding, and generic programming, protected data and methods

**UNIT – 6 (8 Hrs)**

**Applets:** Applet class, JApplet class, HTML File and the <applet> tag, Enabling Applets to Run as Applications

Exception Handling: Overview, Advantages, Exception types, Understanding Exception Handling, finally clause, usage of exceptions, rethrowing exceptions

**TEXT BOOK:**

1) Introduction to Java Programming, 7th edition, By Y Daniel Liang, Pearson Education.

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## (A1092106)PROCESS CONTROL INSTRUMENTATION LAB

**List of Experiments: (Minimum 10 experiments should be conducted)**

1. Measurement and control of Flow.
2. Measurement and control of Level.
3. Measurement and control of Temperature.
4. Servo and regulator operation- Speed and Position control of DC servo motor.
5. Realization of control actions: Pneumatic controllers, Hydraulic controllers.
6. Realization of Electronic controller-ON/OFF, PI, PD, PID.
7. Process tuning – Process reaction curve method.
8. Process tuning – continuous and damped oscillation method.
9. Electro pneumatic converter- I/P, P/I
10. Control valve characteristics (ON-OFF, Linear and Equal Percentage).
11. Multi loop control systems – Ratio Control.
12. Multi loop control systems – Cascade Control.

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## (A0093105)PROFESSIONAL COMMUNICATION AND SOFT SKILLS LAB (PROS LAB)

**Introduction**

The **Professional Communication and Soft Skills Lab** has been introduced at the III B. Tech level to navigate the students towards the appropriate career orientation. At this stage it is imperative for the student to prepare for the ever growing competition in the job market. In this scenario, the student needs to improve his/her Communication and soft skills in an effective manner to cope up the global trends.

**Objective**

Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

**Syllabus**

The following modules are prescribed for the Professional Communication and Soft Skills Lab.

**Week –I Professional Spirit**

- Motivation & Self Esteem - Questionnaire on self analysis
- Activity- G.D on Personal goals and career objectives
- Case Study – Profile of a successful person

**Week –II Concept of Communication -I**

- Principles – barriers - Strategies -Analysis through video clipping
- Activity- Elevator pitch (Tell me about yourself )
- Reading Comprehension- 1
- Case study : news reviews

**Week –III Concept of Communication -II**

- Non verbal communication – kinesics – paralinguistic elements - Analysis through video clipping
- Activity- Elevator pitch (Tell me about yourself)
- Vocabulary: idioms & phrases

**Week –IV Concept of Communication -III**

- Listening Skills – ROAR Technique – Chinese Pictograph
- Activity- Debate with analysis on Non verbal cues, Gestures & postures
- Reading Comprehension-2
- Case study : TV Interviews/ Movie

**Week –V Professional Communication -I**

- Group Discussion- Modalities, Process and evaluation
- Activity- Group Discussion
- Vocabulary – Foreign –Derived words

**Week –VI Professional Communication -II**

- Writing Skills –Letters, Emails & Resume Writing
- Activity- Letter writing and Resume Writing practice
- Reading Comprehension-3
- Analysis of Sample Letters / Memos/ Resume s

**Week –VII Job Skills I**

- HR Interview Strategies, Questions with analysis - Analysis through video clippings(Typical HR interviews)
- Vocabulary: Technical Jargon
- Activity- Group Discussion / Debate

**Week –VIII Job Skills II**

- Telephone Interview Strategies - On line interview Tips -Activity- Mock Interview
- Reading Comprehension-4

**Week –IX Job Skills III**

- Technical Presentation skills
- Activity- Group Discussion Practice

**Week –X Soft skills I**

- Reading Skills – SQR3 technique – Bloom's Taxonomy
- Technical Presentation Practice - PPTs

**Week –XI Soft skills II**

- Job Etiquettes
- Communication Project Reviews
- Activity- Group Discussion Practice

**Week –XII Soft skills III**

- Team communication
- Mock CAT/ GRE Test
- Activity -Mock Interview

**Minimum Requirements**

The English Language Lab shall have two parts:

The Computer aided Language lab for 60 students with 60 systems, one master console. LAN facility and English Language Skills Lab with movable Chairs and audio aids with a P.A system, a TV, A digital stereo-audio and video system, Camcorder etc.

**Prescribed software**: Department in-built data, K-Van Solutions and Globarena Ltd.

**TEXT BOOKS**:

1. Cornerstone: Developing Soft Skills by Robert M. Sherfield, Rhonda J. Montgomery and Patricia G. Moody, published by Pearson Education.
2. Resume's and Interviews by M.Ashraf Rizvi, Tata Mc Graw- Hill, 2008

**REFERENCES:**

1. The ACE of Soft Skills by Gopal Ramesh and Mahadevan REamesh, Pearson Education, 2010
2. How to Do Well in GDs and Interviews by Dorling Kindersdley ( India ) Pvt. Ltd., Licencees of Pearson Education in South Asia.
3. Technical Writing by Sharon J.Gerson and Steven M.Gerson , published by Pearson Education
4. Professesional Presentations by Malcolm Goodale , published by Cambridge University Press.

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## (A0587108)JAVA PROGRAMMING LAB

1. Write a Java program using the method of overloading.
2. Write a Java program to calculate the area of rectangle using parameterized constructor.
3. Write a Java program that displays the number of characters, lines and words in a text file.
4. Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, cand use the quadratic formula. If the discriminant b2-4ac is negative, display a message stating that there are no real solutions.
5. Write a Java program that checks whether a given string is a palindrome or not.
6. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers
7. Write a Java Program for function overriding.
8. Write a java program for operator overloading.
9. Write a Java Program for inheritance concepts
10. Write a Java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.
11. Write a Java program for sorting a given list of names in ascending order.
12. Write a Java program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
13. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
14. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

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## (A1008107)MICROELECTRONICS AND VLSI TECHNOLOGY

**OBJECTIVE**

At the end of the course the student is expected to understand

- ICTechnologies-MOS,PMOS,NMOS,CMOS and BI-MOS circuits.
- Basic electrical properties of MOS and Bi CMOS circuits.
- VLSI circuit design processes.
- Gate level, subsystem VLSI design.
- Semiconductor Integrated circuit design, VHDL synthesis and CMOS Testing

**EXPECTED OUTCOMES:**

- Ability to design and implement MOS, PMOS, CMOS, NMOS and BiMOS circuits.
- Ability to work on IC technologies.
- Ability to design gate level, subsystem level VLSI design, Ability to synthesis and test CMOS circuits

**UNIT- I: INTRODUCTION**

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Integrated Resistors and Capacitors.

**UNIT- II: BASIC ELECTRICAL PROPERTIES**

Basic Electrical Properties of MOS Circuits: $I_{ds}$-$V_{ds}$ relationships, MOS transistor threshold Voltage, gm, gds; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

**UNIT- III: VLSI CIRCUIT DESIGN PROCESSES**

MOS Layers, Stick Diagrams, **Design Rules and Layout:** Lambda based CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates.

**UNIT- IV: BASIC CIRCUIT CONCEPTS**

Sheet Resistance $R_S$ and its concept to MOS, Area Capacitances of layers, standard unit of capacitance Cg , area capacitance calculations, The Delay unit, Inverter delays , estimation of CMOS inverter delay, Wiring Capacitances, Choice of layers.

**UNIT- V: DESIGNING ARITHMETIC BUILDING BLOCKS**

**Introduction**; **The Adders**: Definition, The Full adder: Circuit design consideration, The Binary adder: Logic design consideration; **The Multiplier**: Definition, Partial product generation, Partial product accumulation, Final addition, Multiplier summary.

Introduction to FPGAs,CPLDs architectures and Standard Cells.

**UNIT- VI: VALIDATION AND TEST OF MANUFACTURED CIRCUITS**

**Introduction**; **Test procedure**; **Design for Testability**: Issues in design of testability, AdHoc testing, Scan based test, Boundary scan design, Built in self test (BIST). **Test Pattern Generation:** Fault models, Path sensitizing, automatic test pattern generation (ATPG) and Fault simulation.

**TEXTBOOKS:**

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
2. Digital Integrated Circuits – A design perspective, John M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic Pearson Education, 2rd Edition.

**REFERENCES:**

1. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.
4. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

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## (A1009107)PRINCIPLES OF COMMUNICATIONS

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Types of communication
- Fourier transform for various signals
- Need for modulation and different types modulation techniques.
- Different types of digital communication
- Different types of digital modulation techniques.
- Information and error control coding.

**EXPECTED OUTCOMES:**

On successful completion of this module students will be able to

- Differentiate between analogue and digital communications systems
- List key milestones in the history of communications and assess both their social and technological implications.
- Explain the basic structure of modern communication systems and distinguish between the various systems.
- Describe the characteristics of signals commonly encountered in communications systems

**UNIT I**

**Introduction**: Block diagram of Electrical communication system, Radio communication: Types of communications, Types of signals: Analog, pulse and digital.

**Amplitude Modulation**: Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM: Diode detector, Product demodulation for DSB SC & SSB SC.

**UNIT II**

**Angle Modulation**: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Comparison of FM & PM.

**UNIT III**

**Pulse Modulations**: Overview of Sampling theorem, PAM, regeneration of base band signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

**UNIT IV**

**Digital Communication**: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM.

**UNIT V**

**Digital Modulation**: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

**UNIT VI**

**Information Theory**: Concept of information, rate of information and entropy, Source coding for optimum rate of information, coding efficiency, Shanon-Fano and Huffman coding.

**Error control coding**: Introduction, Error detection and correction code.

**TEXT BOOKS:**

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

**REFERENCES**

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

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## (A0426107)DIGITAL IMAGE PROCESSING

**UNIT I**
Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Gray level to binary image conversion. Sampling and quantization. Relationship between pixels. Imaging Geometry.

**UNIT II**
Image Transforms 2-D FFT , Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform.

**UNIT III**
Enhancement in Spatial Domain: Point processing. Histogram processing. Spatial filtering.
Enhancement in frequency domain: Image smoothing, Image sharpening, Basics of color image processing.

**UNIT IV**
Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT V**
Image segmentation Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation.

**UNIT VI**
Image compression Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression.

**TEXT BOOK:**

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education,2nd Education, 2002.

**REFERENCES:**

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.
5. Digital image processing by S.Jayaraman, S.Esakkirajan & T.Veera Kumar, Tata McGraw Hill, 2010.

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## (A1010107)ANALYTICAL INSTRUMENTATION

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Conductivity and PH meters and dissolved oxygen analysers
- Gas Analysers of thermal conductivity type
- Principles and applications of liquid and gas chromatography
- The working principles and instrumentation for UV,Visible,IR,Flame emission,atomic absortion and atomic emission of single and double beams and their sources and detectors, Principles and instrumentation associated with NMR and ESR, Nuclear radiation detectors.

**EXPECTED OUTCOMES:**

- Ability to design and implement conductivity and ph meters.
- Ability to analysis and record the gas and liquid chromatography.
- Ability to work on UV, visible and IR spectophotometers.
- Ablity to record flame photoeters.
- Ability to design instrumentation system for nmr spectrophotometer

**UNIT I: PH AND CODUCTIVITY & DISSOLVED COMPONENT ANALYSER**

Conductivity meters - PH meters - Dissolved oxygen, hydrogen analyzers - sodium analyzer - silica analyzer.

**UNIT II: GAS ANALYSERS**

Thermal conductivity types - CO monitor – NOX analyzer – H2S analyzer – Theory and problems on Beer-Lamberts law.

**UNIT III: CHROMOTOGRAPHY**

Gas chromatography, liquid chromatography (HPLC): their principles, description of basic parts, applications and instrumentation.

**UNIT IV: SPECTROPHOTOMETERS**

UV, visible, IR, FTIR, atomic absorption, atomic emission, and flame spectrophotometers (single beam and double beam): their principles, description of basic parts, applications and instrumentation.

**UNIT V: PRINCIPLES OF NUCLEAR MAGNETIC RESONANCE**

NMR, ESR, and Mass spectrophotometers**:** their principles, description of basic parts, applications and instrumentation.

**UNIT VI: NUCLEAR RADIATION DECTORS**

Fundamentals of nuclear radiation- ionization chamber – GM counter – proportional counter – solid state detectors.

**TEXT BOOK:**

1. Hand book of Analytical instruments- by Khandpur. TMH

**REFERENCES:**

1. Instrumental methods of analysis- by Willard H.H, Merrit L.L, Dean J.A and Seattle F.L- CBS publishing and distributors.
2. Instrument technology- by Jones B.E, Butterworth scientific publications, London,1987.
3. Mechanical and industrial measurements- by Jain R.K, khanna publishing, New Delhi, 2/e, 1992.
4. Principles of instrumental analysis- by Skoog D.A and West D.M- Holt Sounder publication, Philadelphia, 1985.
5. Instrumental analysis- by Mann C.K, Vickerks T.J & Gullick W.H- Harper and Row publishers, New York, 1974.
6. Modern optical methods of analysis- by Euegene D Olsen –Mc Graw-Hill Book Company.

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## (A1011107)FIBER OPTICS AND LASER INSTRUMENTATION

**(ELECTIVE-I)**

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Optical fibers and their properties, sources and detectors
- Fiber optic sensors
- Laser fundamentals, instrumentation ,applications and holography.

**EXPECTED OUTCOMES:**

- Ability to understand the properties of optical fibers and the sensors and laser fundamentals, applications ,measurements and holography.

**UNIT-I: OPTICAL FIBERS AND THEIR PROPERTIES**

Principles of light propagation through a fiber - Different types of fibers and their properties – Numerical aperture-Transmission characteristics of optical fiber- signal distortion – transmission losses- absorption-scattering.

**UNIT-II: FIBER OPTIC SOURCES AND DETECTORS**

Introduction to Optical sources - LED, Injection laser diode (ILD)**:** structures, types, characteristics, Applications –Detectors- p-i-n diode, APD**:** structures, types, characteristics, applications.

**UNIT-III: FIBER OPTIC SENSORS**

Fiber optic instrumentation system – classification of fiber-optic sensors- Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope.

**UNIT-IV: LASER FUNDAMENTALS**

Fundamental characteristics of laser-Optical resonator- Threshold condition- PI- condition for oscillation- cavity configurations-Laser modes- -Q-switching and mode locking.

**UNIT-V: LASER INSTRUMENTATION**

Laser for measurement of distance, length, velocity, acceleration, current and voltage – Industrial applications of lasers - Medical application of lasers – laser and tissue interaction**.**

**UNIT-VI: HOLOGRAPHY**

Principle of Holography--Holographic interferometer and applications –Holography for non destructive testing.

**TEXT BOOKS:**

1. An Introduction to Optical fibers. - Allen H.C. McGraw Hill, Singapore, 1993
2. Lasers- by M.N Avadhanulu, S. Chand publishers

**REFERENCES:**

1. Fiber optics and optoelectronics- by R.P Khare, oxford.
2. Lasers and their applications- by M.J. Beesly, Taylor and Fransis
3. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K.,Plenum Press, New York.
4. Lasers and Optical Engineering – by Das P., Springers International StudentsEdition, 1991.
5. Optical Electronics – by Ghatak A.K. and Thyagarajan K., Foundation Books,1991.
6. Laser and Applications – by Guimarass W.O.N. and Mooradian A., SpringerVerilag, 1981.

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## (A1012107)DIGITAL CONTROL SYSTEMS
**(ELECTIVE-I)**

**ABJECTIVES:**

At the end of the course the student is expected to understand

- Sampling and reconstruction of signals
- Z-transforms
- Z-plane analysis of discrete time control system
- State space analysis of discrete time control systems
- Controllability and observability of DTS
- Stability analysis of DTS
- Design of DTCS by conventional methods, design of state feedback controllers and observers

**EXPECTED OUTCOMES:**

At the end of the course the student will be

- Ability to reconstruction of signals.
- Ability to representation of DTCS using state space analysis.
- Ability to design DTCS by using conventional methods.
- Ability to design state feedback controllers and observers.

**UNIT I: INTRODUCTION**

Introduction - Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion - Review of Sampling Theory – Selection of sampling period –
Z-Transformation - Linear Transformation – Pulse Transfer Function – Data holds –Response of open loop and closed loop systems – Modified Z Transformation

**UNIT II: STATE SPACE ANALYSIS OF SAMPLE DATA SYSTEMS**

Introduction – State Space Representation of discrete time systems - State transition matrix and it's Properties - Methods for Computation of State Transition Matrix – similarity transformation – Cayley Hamilton Theorem – State equations for sampled data system

**UNIT III: CONTROLLABILITY, OBSERVABILITY AND STABILITY ANALYSIS**

Concepts of Controllability and Observability - Tests for controllability and Observability. Duality between Controllability and Observability - Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci - Constant damping ratio loci - Stability Analysis of closed loop systems in the Z-Plane - Jury stability test – Stability Analysis by use of the Bilinear Transformation - Routh Stability criterion.

**UNIT IV: DESIGN OF DISCRETE TIME CONTROL SYSTEM BY ONVENTIONAL METHODS**

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane (r-plane) – Lead - Lag and Lead-Lag compensators - digital PID controllers.

**UNIT V: DESIGN OF DIGITAL CONTROLLER**

Control algorithms – Dead beat algorithm - Dahlin's algorithm - Kalman's algorithm – Smith Predictor algorithm.

**UNIT VI: 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 BOOKS:**

1. Deshpande.P.B, and Ash.R.H, 'Computer Process Control', ISA Publication.
2. K. Ogata, Discrete-Time Control systems, Pearson Education/PHI.

**REFERENCES:**

1. Gopal.M, 'Digital Control Engineering', New Age International Pvt Ltd, New Delhi.
2. B.C. Duo, Digital Control Systems, Oxford University Press.

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## (A1013107)POWER PLANT INSTRUMENTATION

**(ELECTIVE-I)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Overview of power plant
- Parameters and measurements
- Controls of combustion of boiler, turbines and other controls

**EXPECTED OUTCOMES:**

- Ability to understand the various controls of power plants.

**UNIT I: AN OVERVIEW OF POWER PLANT**

Brief survey of methods of power generation- Hydrothermal, nuclear, solar, wind- Importance of instrumentation for power generation- Thermal power plants: building blocks, details of boiler processes, PI diagram of boiler, cogeneration.

**UNIT II: PARAMETERS AND MEASUREMENTS-1**

Electrical measurements: current, voltage, power, frequency, power factor, Trivector meter.

**UNIT III: PARAMETERS AND MEASUREMENTS-1**

Non-electrical parameters: flow of feed water, fuel, air and steam with correction factors for temperature- pressure- temperature- level radiation detectors- smoke density measurements- dust monitor.

**UNIT IV: COMBUSTION CONTROL IN BOILERS**

Combustion control- control of main header pressure, air fuel ratio control- furnace draft and excessive air control- drum level (three element control) main and reheat steam temperature control- burner tilting up- bypass damper- super heater.

**UNIT V: OTHER CONTROLS**

Spray and gas recirculation controls- BFP recirculation control- Hot well and deaerator level control- pulverizer control- computers in power plants.

**UNIT VI: TURBINE MONITORING AND CONTROL**

Condenser vacuum control- gland steam exhaust pressure control- speed, vibration, shell temperature monitoring and control- lubricating oil temperature control- Hydrogen- generator cooling system.

**TEXT BOOKS:**

1. Modern power station practice, Vol. 6, Instrumentation, controls and testing- pergamon press, oxford, 1971.
2. Power plant technology- Wakil M.M, Mc Graw Hill.

**REFERENCES:**

1. Standard boiler operations- questions and answers- Elonka S.M and Kohal A.L, TMH, New Delhi,1994

**IV B.Tech I-Sem (EIE)**

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## (A1014107)EMBEDDED SYSTEM DESIGN USING MICROCONTROLLERS

**(ELECTIVE-II)**

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Introduction to embedded systems
- 8051 instruction set, counters, timers and interfacing
- Introduction to 16- bit microcontrollers

**EXPECTED OUTCOMES:**

- Ability to understand the 8051 and interfacing.

**UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS**

Introduction, embedded controller, concept of microcontroller, comparison of microprocessor and microcontroller, Intel 8051 microcontroller architecture, pin diagram, special function registers, external memory interface with 8051, operation of I/O ports.

**UNIT-II: INSTRUCTION SET OF 8051**

Data exchange, byte level logical operations, bit level logical operations, rotate and swap operations, instruction affecting flags, incrementing, decrementing, arithmetic operations, jump and recall instruction, assembly language programming of 8051 Calls and subroutines, interrupts and returns

**UNIT-III: COUNTERS AND TIMERS IN 8051**

Counters and timers in 8051, timer modes, Serial data input, output , serial data modes, interrupts, timer flag interrupt, serial port interrupt, external interrupts, software generated interrupt control, Addressing modes, external data moves, code memory, read only data moves. Push and Pop.

**UNIT- IV: INTERFACING**

LCD interfacing, Keyboard interfacing, External Memory interfacing, RTC Interfacing, ADC, DAC interfacing.

**UNIT-V: APPLICATIONS**

Applications: stepper motor control, speed/position control of ac/dc motors, control of physical parameters like temp, pressure, flow, level and humidity.

**UNIT-IV: INTRODUCTION TO 16-BIT MICROCONTROLLER**

Intel MCS-96 family, architecture, special interference to member with on chip EPROM, ADC, PWM etc.

**TEXT BOOKS:**

1. Muhammad A. Mazidi, Janice G. Mazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems, PHI/ Pearson.
2. Kenneth J. Ayala, The 8051 Microcontroller, Thomson Delmar Learning.

**REFERENCES:**

1. V. Udayashankara, M S Mallikarjunaswamy, 8051 Microcontroller Hardware, Software and Applications, TMH.
2. Todd D. Morton, Embedded Microcontroller, Pearson.

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## (A0511105)COMPUTER NETWORKS

**(ELECTIVE-II)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Introduction to CN
- Data link layer
- Network layers 1,2, Transport layer

**EXPECTED OUTCOMES:**

- Ability to understand the fundamentals of computer networks and different layers.

**UNIT** I: **INTRODUCTION TO COMPUTER NETWRORKS**

OSI and TCP/IP models, Examples of Networks: Novell Networks, Arpanet. Network Topologies: WAN, LAN, MAN.

**Physical Layer:** Transmission media: copper, twisted pair, fiber optic. Switching and encoding, ISDN and ATM.

**UNIT II**: **DATA LINK LAYER**

Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Data link layer in HDLC, Internet, and ATM.

**UNIT III: MEDIUM ACCESS CONTROL SUBLAYER**

The Channel allocation Problem, Multiple Access protocols: ALOHA, Carrier sense multiple accesses; MAC addresses, IEEE 802.X Standard Ethernet, wireless LANS. Bridges.

**UNIT IV**: **NETWORK LAYER-I**

Virtual circuit and Datagram subnets; Routing algorithms: shortest path routing, Flooding, Broad cast, Multi cast, Dynamic routing: Distance vector routing, Hierarchical routing.

**UNIT V:NETWORK LAYER-II**

Congestion, General Principles of Congestion Control, Congestion Control prevention policies, Congestion Control Algorithms. Network layer in the internet: IP addresses, IPv4, IPv6 protocol, interior and exterior routing algorithms. Network layer in the ATM Networks.

**UNIT VI: TRANSPORT LAYER**

Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

**The Application Layer**: Introduction to Network security, Introduction to DNS, Electronic mail, World Wide Web.

**TEXT BOOKS:**

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

**REFERENCES:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

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## (A1015107)DIGITAL SYSTEM DESIGN

**(ELECTIVE-II)**

**OBJECTIVES:** At the end of the course the student is expected to understand

- Sequential designing
- Fault modeling and test generation
- Test pattern generation
- Fault diagnosis and sequential circuits
- PLA testing
- Asynchronous sequential machine

**UNIT I**

**SEQUENTIAL CIRCUIT DESIGN**: Design of Iterative circuits, Design of sequential circuits using ROMs and PLAs, Sequential circuit design using CPLD, FPGAs.

**UNIT II**

**FAULT MODELING** AND **TEST GENERATION**: Fault classes and models, Fault diagnosis of Combinational circuits Using Path Sensitization technique, Boolean difference method, Kohavi algorithm.

**UNIT III**

**TEST PATTERN GENERATION**: D–algorithm, Random testing, Transition counts testing, Signature analysis and testing for bridging faults.

**UNIT IV**

**FAULT DIAGNOSIS IN SEQUENTIAL CIRCUITS**: State identification and fault detection experiment, Machine identification, Design of fault detection experiment.

**UNIT V**

**PLA TESTING**: Fault models, Test generation and Testable PLA design.

**UNIT VI**

**ASYNCHRONOUS SEQUENTIAL MACHINE**: Fundamental mode model, Flow table, State reduction, Minimal closed covers, Races, Cycles and hazards.

**TEXTBOOKS:**

1. Kohavi – "Switching & finite Automata Theory" (TMH)
2. N. Biswas – "Logic Design Theory" (PHI)
3. Parag K. Lala – "Fault Tolerant & Fault Testable Hardware Design" (PHI)

**REFERENCES:**

1. Charles H. Roth Jr. – "Fundamentals of Logic Design".

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## (A1016107)EMBEDDED 'C'

**(AUDIT COURSE)**

**OBJECTIVES:**

At the end of the course the student is expected to understand

- RTOS
- ARM processor
- Embedded C
- Embedded tools
- Design examples

**EXPECTED OUTCOMES:**

- Ability to understand the fundamentals of embedded system, RTOS, ARM processor and embedded C and tools and designing the embedded system.

**UNIT I: INTRODUCTION TO EMBEDDED SYSTEMS**

Fundamentals of Embedded System- Definition, Purpose of Embedded System, real life examples of embedded systems, future of embedded systems, Hardware and Software Components, Classification of Embedded Systems- Small, Medium and Large Scale Embedded System, System On-Chip.

**UNIT II: REAL TIME OPERATING SYSTEMS [RTOS]**

Brief history of Operating System: XP, UNIX and LINUX-Commands, Shells; Real-Time Operating System-Definition, Special Characteristics of Real-Time Systems, a brief evolutionary history. Hardware Architectures Software architectures (concepts of interrupt driven activation, need for real time monitor, pseudo parallelism) of Real Time systems;

**Kernel**: Overview, Architecture, Scheduling algorithms, Objects, Applications

**UNIT III**: **ARM PROCESSOR**

Introduction to ARM processor – Its features, Architecture, Registers, Instruction set and Addressing Modes functions and Peripheral devices; of ARM Processor. Example programs.

**UNIT IV: EMBEDDED 'C'**

Introduction, Purpose of the Standard, Guiding Principles, Comparison with 'C'; General Rules- Line Width Braces Parentheses, Common Abbreviations;

**Data Types**: -Naming Conventions, Fixed-Width Integers and Signed Integers, Floating Point, Structures and Unions;

**Modules**-Naming Conventions, Header Files, Source Files, File Templates, Procedures -Naming Conventions, Functions, Function-Like Macros, Tasks,

**Variables**-Naming Conventions, Initialization, Variable Declarations; Expressions and Statements, If-Else Statements, Switch Statements Loops, Unconditional Jumps. Preprocessor directives, Modifiers, Command line Arguments.

**UNIT V**: **EMBEDDED TOOLS**

Debugging Techniques, Compilers, Cross compilers, Global cross compilers, Command line arguments.

**Keil**: Introduction, features, Development tools, Testing sample programs.

**UNIT VI**: **DESIGN EXAMPLES**

Traffic light, UART, Water tank, Remote Access, Home Automation.

**TEXT BOOKS:**

1. Real-Time Concepts for Embedded system-Qing Li, Caroline Yao.
2. Embedded system Architecture, Programming and Design-Raj Kamal, Second Edition, TMH Companies.
3. Embedded C coding Standard –Michael Barr from Neutrino.

**REFERENCES:**

1. Embedded/ Real-Time Systems – KVKK Prasad, Dreamtech Press, 2005.
2. An Embedded Primer – David E. Simon, Pearson Edition,2005
3. Computer as Components, Principles of Embedded Computing System Design. – Wayne Wolf, 2nd Edition.

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## (A0498105)MICROPROCESSR AND MICROCONTROLLER LAB

**Introduction to TASM/MASM and KEIL**
**Write program for 8086 and 8051 for implementing using Assembly /C**

1. Data Transfer and Arithmetic Instructions - Block move, Exchange, Sorting, Finding largest element in an array- Addition/subtraction, multiplication and division, square.
2. Counters
3. Boolean & Logical Instructions (Bit manipulations)
4. Conditional CALL & RETURN
5. Code conversion: BCD – ASCII; ASCII – Décimal; Décimal - ASCII; HEX - Decimal and Decimal – HEX
6. Programs to generate delay, Programs using serial port and on-Chip timer /counter

**II. INTERFACING:**
**Write Assembly / C programs to interface 8051 chip to develop embedded solutions**

1. Alphanumeric LCD panel.
2. External ADC and Temperature control interface to 8051
3. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to 8051; change the frequency and amplitude
4. Stepper and DC motor control interface to 8051

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## (A1093107)ANALYTICAL AND PC BASED INSTRUMENTATION LAB

**List of Experiments: (Minimum 10 experiments should be conducted)**

1. Gas chromatography.
2. Spectrometer: UV and VIS spectrometer.
3. Flame photometer.
4. Measurement of calorific value.
5. Photo electric calorimeter
6. Nuclear Radiation detector.
7. Interfacing of ADC to PC and observe the data.
8. Interfacing of DAC to PC and generate various types of signals.
9. GPIB interface – master to slave data transfer.
10. GPIB interface – slave to slave data transfer.
11. Automatic Bottle Filling Station using PLC
12. Level Monitoring and Control using PLC. (AB)

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## (A1017108)INDUSTRIAL ELECTRONICS

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Regulated power supplies
- SCR and applications
- Choppers, DIAC and TRIAC, DC and AC motor speed control using drives

**EXPECTED OUTCOMES:**

- Ability to understand the SCR, DIAC, TRIAC, choppers and dc and ac motor speed control using drives

**UNIT I: 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. Switched Mode voltage regulator-Comparison of Linear and Switched Mode Voltage Regulators- Servo Voltage Stabilizer- IC Voltage regulators.

**UNIT II: SCR**

Structure, Principles of operation and characteristics of SCR - Triggering of Thyristors - Commutation Techniques of Thyristors (operation with waveforms only)**:** Class A, B, C, D, E and F - Ratings of SCR.

**UNIT III: APPLICATIONS OF SCR IN POWER CONTROL**

Converters**:** Single phase half wave and Full wave converters with RL load– Inverters**:** Single Phase (voltage) half bridge and full bridge inverters – Static circuit breakers (DC&AC).

**UNIT IV: CHOPPERS, DIAC AND TRIAC**

Choppers**:** Introduction, Principle of operation (step down & step up), control strategies, configurations (operation with waveforms only) - Diac and Triac: Structure, Principles of operation and characteristics– Triacs**:** Triggering modes, Firing Circuits, Commutation (operation with waveforms only).

**UNIT V: DC MOTOR SPEED CONTROL**

Methods of speed control (armature and field control) - single phase separately excited drives and three phase separately excited drives - closed loop motor control system (two quadrant of operation).

**UNIT VI: AC MOTOR SPEED CONTROL**

Methods of speed control (voltage & frequency) – speed control by variation of stator voltage using SCRs, variable frequency AC motor drive **,** Variable voltage and frequency controllers.

**TEXTBOOKS:**

1. Industrial and Power Electronics – G.K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.
2. Power electronics- By P.S Bimbra
3. Fundamentals of electrical drives- by Gopal K.Dubey, 2nd edition, Narosa publications house, New Delhi.

**REFERENCES:**

1. Thyristors and applications – M. Ramamurthy, East-West Press, 1977.
2. Power electronics, M.D Singh, TMH.
3. Power electronics- by P.C. Sen., TMH, 1999.

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## (A1018108)DISTRIBUTED CONTROL SYSTEM, NETWORKS AND PROTOCOLS
**(ELECTIVE-III)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Data network fundamentals
- Internet working
- DCS
- HART protocol
- Field bus

**EXPECTED OUTCOMES:**

Ability to understand the data network fundamentals ,DCS and HART protocols

**UNIT I: DATA NETWORK FUNDAMENTALS**

Network hierarchy and switching- open system interconnection model of ISO- Data link control protocol- HDLC – Media access protocol- command response- Token passing- CSMA/CD, TCP/IP.

**UNIT II: INTERNET WORKING**

Bridges- Routers- Gate ways- Standard ETHERNET and ARCNET configurations- Special recruitment for networks used for control.

**UNIT III: DISTRIBUTED CONTROL SYSTEM**

Evolution- Different architectures- Local control unit – Operator interface- Displays- Engineering interface.

**UNIT IV: DCS CASED SUTDY**

Study of any one popular DCS available in market (Honeywell) – Factors to be considered in selecting DCS- Case studies in DCS.

**UNIT V: HART PROTOCOL**

Introduction – Evolution of signal standard- HART communication protocol – Communication modes- HART networks- Control system interface- HART commands- HART field controller implementation – HART and OSI model.

**UNIT VI: FIELD BUS**

Introduction – General field bus architecture- Basic requirements of filed bus standard – Field bus topology- Interoperability- Interchangeability.

**TEXT BOOKS:**

1. Computer networks- by A.S. Tanenbaum, 3rd edition, PHI, 1996
2. Distributed control system- by Michael P. Lucas- Van Nastrand Reinhold Company, New York, 1986.

**REFERENCES:**

1. HART application guide- HART communication foundation, 1999.
2. Process industrial instrument and controls handbook- Mc-Graw Hill, New York, 1998.

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## (A1019108)ROBOTICS AND AUTOMATION
**(ELECTIVE - III)**

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Basic concepts
- Sources, sensors, manipulators, actuators and grippers.
- Symbolic modelling, kinematics

**EXPECTED OUTCOMES:**

- Ability to understand the basic concepts robotics and modeling and kinematics.

**UNIT I: BASIC CONCEPTS**

Automation and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system, Dynamic stabilization of Robotics.

**UNIT II: POWER SOURCES AND SENSORS**

Hydraulic, Pneumatic and electric drivers – Determination HP of motor and gearing ratio, variable speed arrangements, Path Determination - Machinery Vision – Ranging – Laser – Acoustic, Magnetic Fiber Optic and Tactile Sensor

**UNIT III: MANIPULATORS**

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators.

**UNIT IV: ACTUATORS AND GRIPPERS**

Pneumatic, Hydraulic Actuators-Stepper Motor Control Circuits-End Effecter-Various types of Grippers, Design consideration.

**UNIT V: SYMBOLIC MODELING**

Differential transformation and manipulators, Jacobians – problems. **Dynamics:** Lagrange – Euler and Newton – Euler formations – Problems.

**UNIT VI: KINEMATICS**

Forward and Inverse Kinematic Problems- Solutions of Inverse Kinematic problems, Multiple Solution-**Path Planning:** Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

**TEXT BOOKS:**

1. Industrial Robotics, Groover M P, Pearson Education.
2. Robotics, Fu K S, McGraw Hill.

**REFERENCES:**

1. Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)
2. Robotics and Control , Mittal R K & Nagrath I J TMH.
3. An Introduction to Robot Technology, P. Coiffet and M. Chaironze , Kogam Page Ltd. 1983 London.
4. Robotic Engineering, Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence, Asada and Slow time , Wiley Inter-Science
6. Introduction to Robotics, John J Craig , Pearson Edu.
7. Robot Dynamics and Control by Mark W. Spong and M. Vidyasagar, John Wiley & Sons.

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## (A1020108)ARTIFICIAL NEURAL NETWORKS
**(ELECTIVE-III)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Introduction to ANN
- Models
- Feed forward and counter propagation networks
- Association memory networks

**EXPECTED OUTCOMES:**

Ability to understand the fundamentals of neural networks, feed forward and counter propagation networks, association memory networks

**UNIT-I: INTRODUCTION TO ARTFICIAL NEURAL NETWORKS**

Introduction, Artificial neural networks- Historical development of neural network-biological neural networks, comparison between brain and the computer-comparison between artificial and biological neural networks-network architecture, setting the weights- Activation functions-learning methods.

**UNIT-II: FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWROKS**

Introduction, McCulloh-pitts neuron models, Architecture- learning rules**:** Hebbain learning rule, perceptron learning rule, delta learning rule (widrow- half rule or least mean square rule), competitive learning rule, out star learning rule, Boltzman learning, memory based learning.

**UNIT-III: FEED FORWARD NETWORKS**

Introduction- single layer perceptron architecture, algorithm, application procedure, perceptron algorithm for several output classes, perceptron convergence theorem- brief introduction to multilayer perceptron networks, back propagation network(BPN), generalized delta learning rule, back propagation rule, architecture, training algorithm, selection parameters, learning in BPN- radial basis function network (RBFN), architecture, training algorithm for an RBFN with fixed centre.

**UNIT-IV: COUNTER PROPOGATION NETWORKS**

Winner take-all learning, out star learning- kohonen self organizing network- Grossberg layer network- full counter propagation network, architecture, training phases of full CPN, training algorithm, application procedure-forward only CPN, architecture, training algorithm, applications.

**UNIT-V: ASSOCIATIVE MEMORY NETWROKS-I**

Types- Architecture- Continuous and discrete Hopfield networks, energy analysis, storage and retrieval algorithms, problems with Hopfield networks.

**UNIT-VI: ASSOCIATIVE MEMORY NETWORKS- II**

Boltzman machine- bidirectional associative memory (BAM) - Adaptive resonance theory networks introduction, architecture, algorithm.

**TEXT BOOKS:**

1. Introduction to artificial neural systems- J.M.Zurada., Jaico publishers, 3rd edition.
2. Elements of artificial neural networks- Kisan Mehotra, Chelkuri K. Mohan and Sanjay Ranka, Penram international.

**REFERENCES:**

1. Artificial neural networks- Simon Haykin, Pearson education, 2nd edition.
2. Fundamentals of neural networks- Laurence Fausett, Pearson education, 1st edition.
3. Artificial neural networks- B.Yegnanarayana, PHI, India.

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## (A0231108)ELECTRICAL DRIVES AND CONTROL
**(ELECTIVE-IV)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Introduction to drives
- Phase control dc motor drives
- Design of controllers
- Phase controlled and frequency controlled induction motor drives

**EXPECTED OUTCOMES:**

Ability to understand the fundamentals of drives and phase controlled dc motor drives, phase and frequency controlled induction motor drives.

**UNIT-I: ELECTRICAL DRIVES- AN INTRODUCTION**

Electrical drives- advantages of electrical drives- parts of electrical drives: electrical motors, power modulators, sources, control unit- choice of electrical drives- status of DC and AC drives.

**UNIT-II: PHASE CONTROLLED DC MOTOR DRIVES-I**

Introduction-principles of DC motor speed control**:** fundamental relationship, field control, armature control, armature and field control, four quadrant operation- Phase controlled converters**:** Single phase, three phase, control unit, modeling of three phase converters, current source, half controlled converter, converter with freewheeling, configuration for a four quadrant DC motor drive.

**UNIT-III: PHASE CONTROLLED DC MOTOR DRIVES-II**

Steady state analysis of three phase converter- controlled DC motor drives**:** Average analysis, steady state solution, including harmonics, critical triggering angle, and Discontinuous current conduction- two quadrant three phase converter controlled DC motor drives.

**UNIT-IV: DESIGN OF CONTROLLERS**

Transfer function of subsystem**:** DC motor and load, converter, current and speed controllers, current feedback, and speed feedback- Design of controllers**:** current controller, speed controller-problems.

**UNIT-V: PHASE CONTRLOLLED INDUCTION MOTOR DRIVES**

Introduction- stator voltage control**:** Power circuit and gating, reversible control, steady state analysis, approximate analysis, torque speed characteristics with phase control, Interaction of the load, closed loop operation, efficiency- Problems.

**UNIT-VI: FREQUECY CONTROLLED INDUCTION MOTOR DRIVES**

**Voltage source:** Cycloconverter control- closed loop speed control and converter rating for VSI and cycloconverter induction motors.

**Current source:** variable frequency control from a current source- current source inverter control- closed loop speed control of CSI drives- comparison of CSI and VSI drives.

**TEXT BOOKS:**

1. Electric motor drives: modeling, analysis and control- Krishnan.R. Prentice-Hall India. 2007.
2. Fundamentals of electric drives- Gopal K.Dubey, Narosa publishing House, New Delhi, 2005.

**REFERENCES:**

1. Electric drives- N.K.De and P.K.Sen, PHI, India.
2. A first course on electric drives- S.K.Pillai, New Age International (P) Ltd.
3. Fundamentals of electric drives- Mohd. AEL, Sharkawi, Vikas publishing house.
4. Power electronic drives of ac control- BK Bose.

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## (A1021108)TELEMETRY AND TELECONTROL

**(ELECTIVE-IV)**

**OBJECTIVE:**

At the end of the course the student is expected to understand

- Principles, symbols and codes
- Frequency division and time division multiplexed systems
- Telemetry and telecontrol methods

**EXPECTED OUTCOMES:**

Ability to understand the principles of frequency division and time division multiplexed systems and telemetry and telecontrol methods

**UNIT-I: TELEMETRY PRINCIPLES**

Introduction, the basic system -classification**:** Non electrical telemetry systems, voltage and current telemetry systems, frequency telemetering- power line carrier communication.

**UNIT-II: SYMBOLS AND CODES**

Bits and symbols-Time function pulses-line and channel coding-modulation codes-inter symbol interference.

**UNIT-III: FREQUECY DIVISION MULTIPLEXED SYSTEMS**

FDM**:** An introduction, IRIG standards, FM and PM circuits-The receiving end-PLL.

**UNIT-IV: TIME DIVISION MULTIPLEXED SYSTEMS**

Introduction-TDM PAM systems, PAM/PM system and TDM-PCM systems-PCM reception-Differential PCM-Modems: Introduction, QAM, Protocols.

**UNIT-V: TELMETRY SYSTEMS**

**Satellite telemetry**: General consideration, TT&C service, digital transmission system, satellite telemetry and communication.

**Optical telemetry:** Optical fiber cable, Sources and detectors, transmitter and receiving circuits.

**UNIT-VI: TELECONTROL METHODS**

Analog and digital techniques in telecontrol, telecontrol apparatus - Remote adjustments, Guided and regulation-Telecontrol using information theory.

**TEXT BOOKS:**

1. Telemetry principles- D.Patranabis, Tata McGraw Hill, 2004.
2. Telecontrol methods and application of telemetry and remote control- Swoboda G., Reinhold publishing corporation, London, 1991.

**REFERENCES:**

1. Handbook of telemetry and remote control- Gruenberg.L, McGraw-Hill, New York, 1987.
2. Telemetry engineering- Young R.E., Little books Ltd, London, 1988.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG & TECHNOLOGY, NANDYAL

AUTONOMOUS

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

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## (A0434108) DSP PROCESSORS ARCHITECTURE & APPLICATIONS

**(ELECTIVE-IV)**

**OBJECTIVE:**

**At the end of the course the student is expected to understand**

- Computational Accuracy in DSP Implementation
- Architectures for Programmable DSP Devices
- Execution control and pipelining
- Programmable Digital Signal Processors
- Implementation of Basic DSP Algorithms
- Implementation of FFT Algorithms, Interfacing memory and IO Pheripherals to Programmable DSP

**EXPECTED OUTCOMES:**

**At the end of the course the student will be able to**

- Implement and execution of Programable DSP Processors
- Implement basic DSP and FFT Algorithms
- Interface memory and IO peripherals to programmable DSP.

**UNIT I: ARCHITECURE OF DSP PROCESSOR (TMS320C5X)**

Introduction, Bus structure, Central arithmetic Logic Unit(CALU),Auxiliary Register ALU (ARAU),Index Register(INDX),Auxiliary Register Compare Register(ARCR),Block Move address Register(BMAR)Block Repeat Registers(RPTC,BRCRPASR,PAER), Parallel Logic Unit(PLU),Memory- Mapped Registers ,Program Controller, Some flag in the status registers

**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.

**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: IMPLEMENTATIONS OF BASIC DSP ALGORITHMS**

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters,

**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, Computation of the signal spectrum.

**UNIT VI: Applications of programmable DSP Devices**

DSP based Biotelemetry receiver, A speech processing system, An Image processing system

**TEXT BOOKS:**

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.

**REFERENCES:**

1. Digital Signal Processing – Jonathan Stein, John Wiley, 2005.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

**IV B.Tech II-Sem (EIE)**

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## (A1022108)PROGRAMMABLE LOGIC CONTROLLERS (AUDIT COURSE)

**OBJECTIVES:**

At the end of the course the student is expected to understand

- Contact and coil I/O programming
- Large process ladder diagram construction
- Timer functions and industrial applications
- PID controllers
- applications

**EXPECTED OUTCOMES:**

Ability to write ladder logic programme for an application

**UNIT- I: PROGRAMMABLE LOGIC CONTROLLER BASICS**

Definition- Overview of PLC systems- Differences between PC and PLC – I/O modules- Power supplies- General PLC programming procedure- Programming on/off outputs- Creating ladder diagrams from process control descriptions.

**UNIT- II: PLC BASIC FUNCTIONS**

Register basics- Timer functions- Counter function – Examples

**UNIT- II: PLC INTERMEDIATE FUNCTIONS**

Arithmetic functions- number comparison functions- SKIP and MCR functions- Data move functions, utilizing digital bits, sequencer functions, matrix functions

**UNIT- IV: PLC ADVANCED FUNCTIONS**

Analog PLC operation- Networking of PLC- PLC PID functions- Alternate programming language of PLC- Auxiliary commands & functions- PLC installation, trouble shooting and maintenance.

**UNIT-V: CONTROLLING A ROBOT**

Basic two-axis Robot with a PLC sequencer control, three-axis Robot control with PLC.

**UNIT-VI: APPLICATIONS**

Boiler control using PLC- Ratio control- role of PLC in power plant

**TEXT BOOKS:**

1 Programmable logic controllers, principles and applications, John W. Webb, Ronald A. Reis, Pearson education, 5th edition.
2 Computer control of process- M. Chidambaram, Narosa, 2003

**REFERENCES**:

1. Frank D Petruzella, " programmable logic controllers", Mc GraHill, New York, 1997
2. John Park and Steve Mackay, "practical data acquisition for instrumentation and control systems".
3. Krishna Kanth, " computer based industrial control", PHI-1997.