ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

Electronics and Instrumentation Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2015-2016)

VALLURUPALLI NAGESWARA RAO VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institute, Accredited by NAAC with 'A' Grade
NBA Accreditation for CE, EEE, ME, ECE, CSE, EIE, IT B.Tech. Programmes
Approved by AICTE, New Delhi, Affiliated to JNTUH
Recognized as "College with Potential for Excellence" by UGC
Vignana Jyothi Nagar, Pragathi Nagar, Nizampet (S.O), Hyderabad – 500 090, TS, India.
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Vision and Mission of the Institute

VISION

To be a World Class University providing value-based education, conducting interdisciplinary research in cutting edge technologies leading to sustainable socio-economic development of the nation.

MISSION

- To produce technically competent and socially responsible engineers, managers and entrepreneurs, who will be future ready.
- To involve students and faculty in innovative research projects linked with industry, academic and research institutions in India and abroad.
- To use modern pedagogy for improving the teaching-learning process.

Vision and Mission of the Department

VISION

A resource center of academic excellence for imparting quality technical education, meeting the need of students at National and International levels and imbibing strong ethical values, to improve the standards of the society.

MISSION

- To impart quality education in the domain of Electronics and Instrumentation Engineering by implementing learner centric processes.
- To provide industry specific best of breed laboratory practices to promote diverse collaborative research for meeting the changing societal needs.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

HYDERABAD

An Autonomous Institute

ACADEMIC REGULATIONS FOR B.TECH. PROGRAMME

(Applicable for Students admitted from the academic year 2015-2016)

1. Programmes of study

- The following four year B.Tech. degree programmes of study are offered at VNR VJIET from the academic year 2017-2018.

Branch Code	Branch
01	Civil Engineering
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
10	Electronics and Instrumentation Engineering
12	Information Technology
24	Automobile Engineering

- **'ENGLISH'** language is used as the medium of instruction in all the above programmes.

1.1 Eligibility Criteria for Admission

The eligibility criteria for admission into engineering programmes shall be as mentioned below:

- The candidate shall be an Indian National / NRI
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted

- The candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission recognized by BIE, Telangana State

1.1.1 Seats in each programme in the Institution are classified into **Category A** and **Category B** as per the G.Os.

Category – A Seats:

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

Category - B Seats:

These seats shall be filled by the Institute as per the G.Os issued by the State Government from time to time.

1.1.2 Category: Lateral Entry

The candidate shall be admitted into the Third Semester, (2nd year, 1st semester) based on the rank secured by the candidate in Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET.

2. Distribution and Weights of Marks

i. The performance of a student in each semester shall be evaluated subject –wise with **a maximum of 100 marks for theory and 100 marks for practical subjects.** In addition, an Industry oriented mini-project, seminar, comprehensive viva-voce and project work shall be evaluated for **100, 100, 100 and 200 marks** respectively.

ii. For theory subjects, the distribution shall be **40 marks for Mid-term Evaluation** and **60 marks for the Semester End Examination**.

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Mid-Term Evaluation (40 M):

Mid-term evaluation consists of mid-term examination (30 M) and assignment/test (10 M).

- **Mid-term examination (30 M):**

- For theory subjects, two mid examinations shall be conducted in each semester as per the academic calendar. Each mid examination shall be evaluated for 30 marks.
  PART-A 3 X 2M = 6 M (one question from each UNIT)
  PART-B 3 X 8 M = 24 M (three internal choice questions one from each UNIT shall be given, the student has to answer one question from each UNIT)

- 80 % weightage for better mid-term examination and 20% weightage for the other mid examination shall be used and calculated as the final mid-term examination marks for each subject.

➢ **Assignment/objective exam/ case study/course project (10 M):**

- Two assignment/objective exam/ case study/course project shall be given to the students covering the syllabus of First Mid and Second Mid Examinations respectively and evaluated for 10 marks each.
- The first assignment shall be submitted before first mid examination and second assignment shall be submitted before second mid examination.
- The average of 2 assignments shall be taken as final assignment marks.

iii. For practical subjects, there shall be a **continuous evaluation during the semester for 40 marks and 60 marks for semester end examination**. Out of the 40 marks, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and **15 marks for practical examination** and **15 marks for laboratory record.**

NOTE: **1. Any student who shall remain absent for any assignment/Mid-term examination for any reason what so ever, shall be deemed to have secured 'zero' marks in the test/examination and no makeup test/examination shall be conducted.**

2. Evaluation guidelines available with respective HOD's.

iv. For the subjects having design and / or drawing, (such as Engineering Graphics, Geometrical Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc.,) the distribution shall be **40 marks for internal evaluation (20 marks for day-to-day work and 20 marks for Mid examination (**the average of the two examinations shall be taken into account**) and 60 marks for semester end examination.**

NOTE: Evaluation guidelines available with respective HOD's.

v. There shall be an **industry-oriented mini-project**, in collaboration with an industry of their specialization, to be taken up during the summer vacation after III year II semester examination. The **industry oriented mini project shall be evaluated during the IV year I semester.** The industry oriented mini project shall be submitted in report form and presented before a committee, which shall evaluate it for **100 marks.** The committee shall consist of Head of the Department, the supervisor of mini project and a senior faculty member of the department. There shall be **no mid-term assessment for industry oriented mini project. However, attending the shadow engineering program or any such other programme, in lieu thereof, is a pre-requisite for evaluating industry-oriented mini project.**

NOTE: Evaluation guidelines available with respective HOD's.

vi. There shall be a **seminar presentation in IV year II semester**. For the seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by a departmental committee consisting of the Head of the department, seminar supervisor and a senior faculty member. **The seminar shall be evaluated for 100 marks based on the report and presentation made.**

NOTE: Evaluation guidelines available with respective HOD's.

vii. There shall be a **comprehensive viva-voce in IV year II semester**. The comprehensive viva-voce shall be conducted by a committee consisting of the Head of the Department and three senior faculty members of the Department **after submitting the filled and duly signed M.T.P record**. The comprehensive viva-voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. programme of study. The comprehensive viva-voce shall be evaluated **for 100 marks** by the committee. There shall be **no Mid-term assessment for the comprehensive viva-voce.**

Evaluation:-

a. Objective type examination – 50 marks. (Two hours test)
b. Committee evaluation – 50 marks.

NOTE: Evaluation guidelines available with respective HOD's

viii. The **project work** shall be started by the student in the beginning of the IV year I semester. Out of a total of **200 marks** for the project work, **80 marks shall be for mid-term evaluation** and **120 marks for the semester end examination**. The viva-voce shall be conducted by a committee comprising an external examiner, Head of the Department, the project supervisor and one senior faculty. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The mid-term evaluation shall be on the basis of three seminars conducted during the IV year II semester for 80 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department.**

NOTE: Evaluation guidelines available with respective HOD's

3. Semester End Examination (60 M):

(a) Theory Courses

Question paper pattern for semester end examination (60 Marks) consists of two sections i.e., Part-A and Part-B.

PART-A:

- Shall consist of 10 questions of 02 marks each. (10X2M = 20M)
- There shall be 02 questions from each unit.
- All the questions are compulsory.

PART-B:

- Shall consist of 05 questions of 08 marks each. (05X8M = 40M)
- There shall be 01 question from each unit with internal choice.

(b) Practical Courses

Each laboratory course shall be evaluated for 60 marks. The semester end examination shall be conducted by two examiners, one Internal and other external concerned with the subject of the same / other department / Industry. The evaluation shall be as per the standard format.

(c) Supplementary Examinations

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

4. Attendance Requirements

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

ii. Shortage of attendance in aggregate **up to 10% (attendance of 65% and above and below 75%)** in a semester may be condoned by the **Institute Academic Committee based on the rules prescribed by the Academic Council of the Institute from time to time.**

iii. A student shall not be permitted to write the semester end examination and not promoted to the next semester unless he/she satisfies the attendance requirement of the present semester, as applicable. He/She may seek re-admission for that semester when offered next, if not promoted to the next semester.

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

v. Students whose shortage of attendance is not condoned or who have not paid the stipulated fee or who have not cleared any other due to the Institute in any semester are not eligible to writer semester end examination of that semester.

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Regulation No.4**.**

i. A 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/she secures **not less than 35% (21 out of 60 marks) of marks in the semester end examination and a minimum of 40% of marks in the sum total of the mid-term evaluation and semester end examination taken together.**

ii. For promotion from II year II semester to III year I semester, the student needs to have 50% of credits up to II year II semester which includes

- Two regular and two supplementary examinations of I B Tech. I semester.
- Two regular and one supplementary examinations of I B Tech. II semester
- One regular and one supplementary examinations of II year I semester.
- One regular examinations of II year II semester.

iii. For promotion from III year II semester to IV year I semester, the student needs to have 50% of credits up to III year II semester which includes

- Three regular and three supplementary examinations of I B Tech. I semester.
- Three regular and two supplementary examinations of I B Tech. II semester
- Two regular and two supplementary examinations of II year I semester.
- Two regular and one supplementary examinations of II year II semester.
- One regular and one supplementary examination of III year I semester.
- One regular examination of III year II semester.

iv. A student shall register and put up minimum academic requirement in all **188 credits and earn atleast 180 credits for the award of B.Tech. degree.** The grade obtained for the minimum credits shall be considered for the calculation of CGPA.

v. The students shall take one open elective subject each from the lists given in open elective-1 and open elective-2. The selected subjects shall not belong to their own branch.

vi. The student shall be qualified in **two certificate courses** during his/her course of study.

vii. "Gender Sensitization" is compulsory value added course as per the JNTUH procds. No. A1/2557/XXII SCAS/2015(2), dated 19.11.2015.

viii. Students who fail to earn atleast 180 credits as indicated in the course structure **within eight academic years counting** from the year of their admission shall **forfeit their seat** in B.Tech. programme and their **admission stands cancelled.**

6. Course pattern

i. The entire programme of study is of four academic years. **All I, II, III and IV years are of semester pattern.**

ii. A student eligible to appear for the semester end examination in a subject, but absent or has failed in the semester end examination may reappear for that subject in the supplementary examination whenever conducted.

iii. When a student is detained due to shortage of attendance in any semester, he/she shall seek readmission into that semester when it is offered next, **with the academic regulations of the batch into which he/she gets readmitted and has to obtain the degree within 8 academic years from the year of his/her original admission.**

iv. When a student is detained due to lack of credits in any year, he/she may be eligible for promotion to the next year after obtaining the required number of credits and fulfillment of the academic requirements.

7. Award of B.Tech. Degree and Class

A student shall be declared eligible for the award of the B. Tech. degree if he/she fulfils the following academic regulations:

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

ii. Registered for **188 credits** and secured a minimum of **180 credits with compulsory subjects as listed in the following Table.**

Table: Compulsory Courses

S. No.	Courses Particulars
1.	All Practical Courses
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work
6.	Engineering Graphics / Engineering Drawing / Machine Drawing

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

8. CGPA System:

Method of awarding absolute grades and grade points in four year B.Tech. degree programme is as follows:

- Absolute Grading Method is followed, based on the total marks obtained in mid-term and semester end examinations.
- Grades and Grade points are assigned as given below.

Marks Obtained	Grade	Description of Grade	Grade Points(GP) Value Per Credit
>=90	O	Outstanding	10.00
>=80 and <89.99	A+	Excellent	9.00
>=70 and <79.99	A	Very Good	8.00
>=60 and <69.99	B	Good	7.00
>=50 and <59.99	C	Fair	6.00
>=40 and <49.99	D	Pass	5.00
<40	F	Fail	--
Not Appeared the Exam(s)	N	Absent	

- **The student is eligible for the award of the B.Tech. degree with the class as mentioned in the following table.**

CGPA	Class
>= 7.5	First Class with Distinction
>= 6.5 and <7.5	First Class
>= 5.5 and < 6.5	Second Class
>=5.0 and < 5.5	Pass Class

➢ **Calculation of Semester Grade Points Average (SGPA):**

The performance of each student at the end of the each semester shall be indicated in terms of SGPA. The SGPA shall be calculated as below:

$$\mathbf{SGPA} = \frac{\textbf{Total earned weighted grade points in a semester}}{\textbf{Total credits in a semester}}$$

$$\mathbf{SGPA} = \frac{\sum_{i=1}^{p} \mathbf{C_i} * \mathbf{G_i}}{\sum_{i=1}^{p} \mathbf{C_i}}$$

Where Ci = Number of credits allotted to a particular subject 'i'

Gi = Grade point corresponding to the letter grade awarded to the subject 'i'

i = 1,2,…..p represent the number of subjects in a particular semester

Note: SGPA is calculated and awarded for the candidates who pass all the courses in a semester.

- **Calculation of Cumulative Grade Point Average (CGPA):**

  The CGPA of a student for the entire programme shall be calculated as given below:

  - Assessment of the overall performance of a student shall be obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all subjects during the course of study.

$$\mathbf{CGPA} = \frac{\textbf{Total earned weighted grade points for the entire programme}}{\textbf{Total credits for the entire programme}}$$

$$\mathbf{CGPA} = \frac{\sum_{j=1}^{m} \mathbf{C_j} * \mathbf{G_j}}{\sum_{j=1}^{m} \mathbf{C_j}}$$

Where Cj = Number of credits allotted to a particular subject 'j'
Gj = Grade Point corresponding to the letter grade awarded to that subject 'j'
j = 1,2,….m represent the number of subjects of the entire program.

- Grade lower than D in any subject shall not be considered for CGPA calculation. The CGPA shall be awarded only when the student acquires the required number of credits prescribed for the program.

- **Grade Card**

  The grade card issued shall contain the following:

a) The credits for each subject offered in that semester

b) The letter grade and grade point awarded in each subject

c) The **SGPA/CGPA**

d) Total number of credits earned by the student up to the end of that semester.

9. Withholding of Results

If the student has not paid dues to the Institute, or if any case of indiscipline is pending against him, the result of the candidate may be withheld. The award or issue of the Provisional Certificate and the Degree may also be withheld in such cases.

10. Transitory Regulations

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subjects in place of repeated subjects as decided by the Chairman of the BoS of the respective departments. He/She shall be admitted under the regulation of the batch in which he/she is readmitted.

11. Minimum Instruction Days

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

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

13. The decision of the Institute Academic Committee shall be final in respect of equivalent subjects for those students who are transferred from other colleges. The transfer of students from other college or from this institute is to be approved by the Governing Council of the Institute.

14. General

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

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

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

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

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

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

A student shall be declared eligible for the award of the B. Tech. degree if he/she fulfils the following academic regulations:

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

ii. Registered for **138 credits** and secured a minimum of **130 credits with compulsory subjects as listed in the following Table.**

Table: Compulsory Courses

S. No.	Courses Particulars
1.	All Practical Courses
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work
6.	Engineering Graphics / Engineering Drawing / Machine Drawing

iii. A student who **fails to earn a minimum of 130 credits** as indicated in the course structure **within six academic years** from the year of their admission shall **forfeit his/her seat in B.Tech. programme and his admission stands cancelled.**

iv. The same attendance regulations are adopted as that of B.Tech. four year degree course.

v. For promotion from III year II semester to IV year I semester, the student needs to have 50% of credits up to III year II semester which includes

- Two regular and two supplementary examinations of II B Tech. I semester
- Two regular and one supplementary examinations of II B Tech. II semester
- One regular and one supplementary examinations of III B.Tech. I semester
- One regular of examinations of III year II semester

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

16. Malpractice Rules

Disciplinary Action for Malpractices/Improper Conduct in Examinations

S. No.	Nature of Malpractices/Improper conduct If the candidate:	Punishment
1.	(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form	Expulsion from the examination hall and cancellation of the performance in that subject only.

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

		examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he shall be handed over to the police and a case is registered against him.
4.	Smuggles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester and supplementary examinations The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant–	In case of students of the college, they shall be expelled from

	Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and they shall forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations including supplementary Examinations. The continuation of the course by the candidate is subject to the academic

		regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in any of clauses 6 to 8.	If the student belongs to the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College shall be handed over to police and, a police case shall be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining

		examinations of the subjects of that series of the semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the academic council of the Institute for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments shall be given to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee shall meet and discuss/question the candidate and based on the evidences, the committee shall recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved, through the Principal, to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators, examiners valuing examination papers and preparing / keeping records of documents related to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and

all concerned at the examinations shall be viewed seriously and recommend for award of appropriate punishment after thorough enquiry.

4) Based on the explanation by the party involved and recommendations of the committee action may be initiated.

5) Malpractice committee:

i.	Dean, Academics	Chairman
ii.	Controller of Examinations	Convener
iii.	Invigilator	Member
iv.	Chief Examiner of the subject/subject expert	Member
v.	Concerned Head of the Department	Member

Program Education Objectives (PEOs)

I. To provide students with a solid foundation in Mathematics, Sciences, Electronics, and Instrumentation Engineering which prepares students for wide range of career opportunities in Industries, Research, and Academics.

II. To train the students with good engineering breadth to comprehend, analyse, innovate, and design new products in core and multidisciplinary domain, to provide technical solutions and services to the needs of the society.

III. To provide students with an academic environment of excellence, proactiveness, and lifelong learning for successful professional career.

IV. To inculcate professional and ethical attitude, effective presentation skills and enhanced ability to work in multidisciplinary teams to pursue complex, open-ended investigations and Research

V. To motivate students towards becoming entrepreneurs, collaborators, and innovators, leading, or participating in efforts to address social, technical, and business challenges.

Program Outcomes (POs)

The program demonstrates that the graduate is able to

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environ mental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, bei ng able to

comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING

I YEAR I SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5BS11	Advanced Calculus	3	0	3
5BS21	Engineering Physics	3	0	3
5BS01	English	3	0	3
5CS01	Computer Programming	3	1	4
5CE03	Environmental Studies	3	0	3
5ME19	Engineering Drawing	2	4	4
5BS02	English Language Communication Skills Laboratory	0	3	2
5CS51	Computer Programming Laboratory	0	3	2
5ME53	IT and Engineering Workshop	0	3	2
Total		**17**	**14**	**26**

I YEAR II SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5BS12	Ordinary Differential Equations and Laplace Transforms	3	0	3
5BS13	Computational Methods	3	0	3
5EE01	Circuit Theory	3	1	4
5BS23	Advanced Engineering Physics	3	0	3
5BS32	Engineering Chemistry	3	0	3
5IT02	Data Structures	3	1	4
5BS25	Engineering Physics and Engineering Chemistry Laboratory	0	3	2
5IT52	Data Structures Laboratory	0	3	2
Total		**18**	**8**	**24**

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING

II YEAR I SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5BS15	Fourier and Complex Analysis	3	0	3
5EC01	Electronic Devices and Circuits	3	1	4
5EE21	Principles of Electrical Engineering	3	0	3
5EI01	Sensors and Signal Conditioning	3	1	4
5EI02	Electronic Measurements	3	1	4
5EI51	Sensors and Measurements Laboratory	0	3	2
5EC51	Electronic Devices and Circuits Laboratory	0	3	2
5EE61	Electrical Engineering Laboratory	0	3	2
Total		**15**	**12**	**24**
#5BS04	Gender Sensitization #	-	3	2

II YEAR II SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5EE08	Control Systems	3	1	4
5EI03	Signals And Systems	3	0	3
5EI04	Pulse and Digital Circuits	3	0	3
5EC04	Electronic Circuit Analysis	3	0	3
5EC03	Switching Theory and Logic Design	3	0	3
5EI52	Pulse and Digital Circuits Laboratory	0	3	2
5EC63	Electronic Circuits Analysis Laboratory	0	3	2
5EC52	Basic Simulation Laboratory	0	3	2
Total		**15**	**10**	**22**

*** T/P/D: Tutorial/Practical/Drawing Practice**
 # Value added Course

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING

III YEAR I SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5EI05	Industrial Instrumentation	3	0	3
5BS41	Business Economics and Financial Analysis	3	0	3
5EI06	Linear and Digital IC Application	3	0	3
5EI07	Bio-Medical Instrumentation	3	0	3
	Open Elective I	3	0	3
5IT04	Computer Organization	3	0	3
5EI54	Linear and Digital IC Application Laboratory	0	3	2
5EI53	Industrial Instrumentation Laboratory	0	3	2
Total		**18**	**6**	**22**

Open Elective I:

Course Code	Course Name	Course Offered By the Department
5CE71	Disaster Management	CIVIL
5EE71	Renewable Energy Technologies	EEE
5ME71	Digital Fabrication	ME
5EC71	Principles of Electronic Communications	ECE
5CS71	Object Oriented Programming Through Java	CSE
5EI71	Principles of Measurements And Instrumentation	EIE
5IT71	Cyber Security	IT
5AE71	Principles of Automobile Engineering	AE
5BS71	Professional Ethics and Human Values	H&S

III YEAR II SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5EC10	Digital Signal Processing	3	1	4
5EC09	Micro Processors and Micro Controllers	3	0	3
	Open Elective II	3	0	3
5EI08	Process Control Instrumentation	3	1	4
5BS42	Management Science	3	0	3
5EC56	Micro Processors and Micro Controllers Laboratory	0	3	2
5BS03	Advanced English Communication Skills Laboratory	0	3	2
5EI55	Process Control Instrumentation Laboratory	0	3	2
Total		**15**	**11**	**23**

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

Open Elective - II

Course Code	Course Name	Course Offered By the Department)
5CE72	Introduction To Geographical Information System	CIVIL
5EE72	Energy Auditing Conservation and Management	EEE
5ME72	Optimization Techniques	ME
5EC72	Introduction To Micro Processors and Controllers	ECE
5EC95	Wireless Communications and Networks	ECE
5CS72	Open Source Technologies	CSE
5EI72	LabVIEW Programming	EIE
5EI79	Fundamentals of Robotics	EIE
5IT72	Relational Database Management Systems	IT
5AE72	Modern Automotive Technologies	AE
5BS72	Entrepreneurship	H&S

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING

IV YEAR I SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5EI09	Virtual Instrumentation	3	1	4
5EI10	Analytical Instrumentation	3	0	3
5EI11	PC Based Instrumentation	3	0	3
5EI 73 5EE79 5IT 08 5EI 74	**Elective-1** Instrumentation Practices in Industries Digital Control Systems Operating Systems Principles and Applications of Nanotechnology	3	0	3
5IT 06 5EC12 5EI75 5EE80	**Elective-2** Computer Networks VLSI Design Robotics and Applications Artificial Neural Networks and Fuzzy Logic	3	0	3
5EI56	Virtual Instrumentation Laboratory	0	3	2
5EI57	Analytical Instrumentation Laboratory	0	3	2
5EI58	Process Control Automation Laboratory	0	3	2
5EI91	Industry Oriented Mini Project	0	4	2
Total		**15**	**14**	**24**

IV YEAR II SEMESTER **COURSE STRUCTURE**

Course Code	Course Name	Lectures	T/P/D	Credits
5EI12	Fiber Optic and Laser Instrumentation	3	0	3
5EI 76 5EI 77 5EC14 5EC80	**Elective-3** Power Plant Instrumentation Micro Electro Mechanical Systems Embedded Real Time Operating Systems DSP Processors and Architectures	3	0	3
5EI78 5EC79 5EC73 5EC84	**Elective-4** Pharmaceutical Instrumentation Internet of Things Digital Image Processing Ad-hoc Wireless Networks	3	0	3
5EI92	Technical Seminar	0	3	2
5EI93	Comprehensive Viva-Voce	0	0	2
5EI94	Project Work	0	20	10
Total		**9**	**23**	**23**

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

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech EIE I sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS11) ADVANCED CALCULUS

Prerequisites: Differentiation, Integration

Course Objectives:

- **Understand** the Taylor's theorem and its application to maxima and minima of f(x,y)
- **Understand** the process of curve Tracing.
- **Understand** multiple integrals and its applications
- **Apply** integral theorems of vector calculus.

Course Outcomes:

After completion of the course the student is able to:

- **Solve** problems involving the maxima and minima of f(x,y).
- **Trace** curvesusing basic characteristics.
- **Evaluate** integrals using special functions and change of variables.
- **Evaluate** vector integrals.

UNIT I CALCULUS OF ONE AND SEVERAL REAL VARIABLES

Mean value theorems **–** Role's Theorem, Lagrange's Mean value theorem Cauchy's Mean value theorem **,** Taylor's expansion and McLaurin's expansion of functions (without proofs). Partial differentiation, partial derivatives of first and second order in terms of partial derivatives, change of variables , Jacobian, Taylor's theorem of two variables(without proof). Maxima and Minima of two variables, Langrange's method of undetermined multipliers.

UNIT II CURVE TRACING AND RELATED APPLICATIONS

Radius of Curvature of curves in Cartesian, parametric and polar coordinates. Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardiode, Lemniscate).

UNIT III MULTIPLE INTEGRALS

Beta, Gamma and Error functions, Introduction of Multiple integrals , evaluation of double and triple integrals, change of order of integration change of variables , Cylindrical and Spherical polar coordinates.

UNIT IV VECTOR DIFFERENTIAL CALCULUS

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical & physical interpretation, Directional derivatives, and vector identities (without proofs).

UNIT V VECTOR INTEGRAL CALCULUS

Line integrals and application to Work done and Circulation, Scalar potential function, Surface integrals and Volume integrals, Gauss divergence theorem, Green's theorem , Stokes' theorem (theorems without proof).

TEXT BOOKS:

1. Higher Engineering Mathematics – by B. S. Grewal,*Khanna publishers*
2. Calculus and Analytic Geometry *by* Thomas and Finney, 9th edition; *Publisher: Pearson Education*.

REFERENCES BOOKS:

1. Advanced Engineering Mathematics *by* Erwin Kreyszig, 8th edition; *Publisher: John Wiley*.
2. Advanced Engineering Mathematics by Peter 'O' Neil, publisher: Cengage Learning.
3. Advanced Engineering Mathematics *by R.K.Jain and S.R.K.Iyengar; Narosa Publications*

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech EIE I Sem

L	T/P/D	C
3	0	3

(5BS21) ENGINEERING PHYSICS

(Common for all Branches)

Course Objectives

- To **supplement and enhance** the knowledge of basic concepts in physics essentially required in the study of interaction of light with matter and behavior of a particle quantum mechanically.
- To **Study and understand** various phenomena of light- Interference, Diffraction, Dispersion and total internal reflection.
- To **learn and enhance** the basic concepts in physics required to deal with large number of particles and behavior of an electron in metals.
- **To understand** the basic principles and working of lasers and optical fibers.
- To **learn** simple applications of these concepts and principles in engineering and technology**.**

Course Outcomes:

After completion of the course the student is able to

- Realize influence of diffraction and resolvability in optical elements.
- Recognize importance of interference in thin films.
- Distinguish LASER light from ordinary light and describe propagation of light through Optical fiber by Total Internal reflection.
- Illustrate behavior of a particle in one dimensional potential box.
- Understand behavior of electron in a periodic potential in real crystal and classify Solids based on conduction**.**

UNIT I

INTERFERENCE:

Introduction, Superposition principle, Resultant amplitude, Coherence - Methods to obtain coherent sources, Interference, Young's Double Slit Experiment, interference thin films by reflection, Newton's rings Experiment-Formation of Rings and Experimental Method, Characteristics of rings, Applications.

UNIT II

DIFFRACTION:

Introduction, Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Phasors approach). Diffraction at double slit, circular aperture, and multiple slits (grating)(Qualitative Approach)-Width of Principal Maxima and Dispersion, Resolution of spectral lines, Rayleigh criterion, and resolving power of grating.

UNIT III

LASERS AND OPTICAL FIBERS:

Introduction, Characteristics of Lasers, Spontaneous and Stimulated Emission of radiation, Meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Laser,Principle of optical fiber and Properties, Acceptance angle and acceptance cone, Numerical aperture, Types of fibers based on refractive index profiles, Qualitative analysis of attenuation in optical fibers, Application of Lasers and Optical fibers.

UNIT IV

ELEMENTS OF QUANTUM MECHANICS:

Waves and particles, DeBroglie hypothesis, Matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle- Applying it to Non existence of electron in Nucleus and Single slit Experiment, Schrodinger Wave Equation – Wave function and its Physical Significance, Particle in one dimensional potential box(wave functions, probability densities and energy states),Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (non-mathematical treatment).

UNIT V

ELECTRON THEORY OF METALS:

Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Electrical conductivity & Ohm's law, Electrical Resistivity of Metals (Qualitative), Electron in a periodic potential, Bloch Theorem, Kronig-Penney model (non-mathematical treatment), Origin of energy band formation in solids, Classification of materials into conductors, semiconductors & Insulators and Concept of effective mass of an electron.

TEXT BOOKS:

(1) Physics vol.2, by Halliday, Resnick and Krane; John Wiley & Sons
(2) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons

REFERENCES:

(1) Optics by Ghatak and Thyagarajan, Tata Mc Graw
(2) Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
(3) Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons
(4) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.

(5) Engineering Physics by G Sahashra Buddhe; University Press

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech (Common to all branches)	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS01) ENGLISH

Introduction

This is the age of information and communication technologies. Engineers and technical professionals need to convey technical information in English for various purposes.

Besides learning general English as an international language, engineering students need to be equipped with adequate writing ability so that they can communicate technical information clearly on at least a basic level. A good English writing proficiency can be a contributing factor to professional recognition and career prospects. This course teaches those writing strategies that scientists, engineers, and others will need in order to write successfully on the job. It initiates the students into Technical Writing. The purposes of technical writing are to inform and persuade. This program aims to train students in writing clear, concise and effective English and also develop their reading skills.

This Syllabus is therefore, a Pragmatic English Writing and Reading Program for engineering students with intermediate proficiency. The program covers a syllabus outline and instructional approaches on basic writing and reading skills with particular reference to technical writing.

Course Objectives:

- To equip the students with all the LSRW skills for academic writing and speaking.
- To equip the students with basic grammar, infrastructural patterns, reading techniques and grammatical constructions required in technical writing as well as oral communication.
- To acquaint the students with the writing process in preparation for academic and workplace writing.
- Equip the students with the concept of coherence and cohesion for meaningful and coherent communication.

Course Outcomes:

After going through this course the student will be able to

- Comprehend technical writing produced in the engineering profession
- Understand the writing process and create logical paragraphs
- Use infrastructural patterns in writing and speaking
- Students communicate coherently orally and in writing.

Methodology

A Task-based, process oriented methodology will be used by the teachers to give a practical orientation to the teaching of language. An inductive approach will be used to demonstrate the use of language in context. This should enable the students to internalize the language structures and vocabulary used in context. Students will be exposed to numerous examples and ample practice will be given in the contextual use of language structures.

Unit I : Review of Grammar

i) Common Errors v) Use of Articles and Prepositions
ii) Subject-Verb Agreement vi) Conjunctions
iii) Adverbs vii) pronoun reference
iv) Transitional elements

Unit II : Prose 1

- Heaven's Gate by Pico Iyer
- The Connoisseur by Nergis Dalal

Unit III : Reading and Writing Skills

- Reading Comprehension -- Skimming & scanning
- Reading Comprehension -- Intensive & extensive reading
- Paragraph Writing
- Letter Writing
- Memo Writing

Unit IV : Prose 2

- The Cuddalore Experience by Anu George
- The Odds Against Us by Satyajit Ray

Unit V : Writing Skills

1. Comparison and Contrast Pattern
2. Cause and Effect Pattern
3. Classification
4. Analogy (Introductory Level)
5. Problem-Solution Pattern

TEXT BOOKS

1. **Enjoying Everyday English** by A. Ramakrishna Rao
2. **Effective Technical Communication** by Ashraf Rizvi
3. **Technical Writing Process and Product** by Gerson Sharon J. and Steven Gerson 3rd edition, New Jersey: Prentice Hall 1999

REFERENCES

1. M. Raman and S. Sharma, 2004; Technical Communication : Principles and Practices, OUP, (Indian Edition)

2. Blanton, L.L. 1993; Composition Practice, Book 4 ,Second Edition, Heinle & Heinle Publishers, pp. 54
3. Georges, T.M. 1996; A course in Analytical Writing for Science and Technology,
4. http://www.mspiggy.etl.noaa.gov/write/

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I Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**4**

(5CS01) COMPUTER PROGRAMMING

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

Course objectives

- To **Relate** basics of programming language constructs and problem solving techniques
- To **classify** and implement derived data types
- To **analyze** and develop effective modular programming
- To **construct** mathematical problems and real time applications using C language

Course Outcomes

After completion of the course student is able to

- **Develop** algorithm, flow chart and pseudo code for a given mathematical problems
- **Write, compile and debug** programs using different programming constructs in C language.
- **Usage of** different Basic and derived data types in C.
- **Design** programs using modular structures

UNIT- I

Computer fundamentals-Hardware, software, computer language , translators, Program Development steps-Algorithms, Pseudo code, flow charts, basic Linux commands ,Introduction to C Language – History, Simple C Program, Identifiers, Basic data types, user defined data types, Variables, Constants, type qualifiers, Managing Input / Output, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Simple C Programming examples.

UNIT – II

Selection Statements – if and switch statements, Repetitive statements – while, for, do-while statements, C Programming examples, other statements related to looping – break, continue, go to, C Programming examples.

UNIT – III

Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, C programming examples.

Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication, Standard functions, Storage classes-auto, register, static, extern, scope rules, arrays to functions, recursive functions, example C programs.

UNIT – IV

Strings – Basic concepts, String Input / Output functions, arrays of strings, string handling functions, strings to functions, C programming examples

Derived types – Structures – Basic concepts, nested structures, arrays of structures, structures and functions, unions, bit fields, C programming examples.

UNIT – V

Preprocessor Directives, Pointers – Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self-referential structures , example C programs.

TEXT BOOKS:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan, E.V.Prasad,Richard F.Gilberg.
2. How To Program:C, Dietel & Dietel, Seventh Edition,PHI

REFERENCES:

1. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie.
2. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994.
3. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.
4. Let Us C Yashavantkanetkar BPB.

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I Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5CE03) ENVIRONMENTAL STUDIES

Course Objectives

- **Recognize** the importance of environment and ecosystem
- **Identify &Analyze** human activities and its impact on environment.
- **List and understand** about the importance of natural resources, Biodiversity & effect of environment pollution
- **Understand** about environmental regulations ,economy and environment interaction

Course Outcomes

After completion of the course the student is able to:

- **Acquire** the knowledge about importance of environment & ecosystem
- **Develop** skills in understanding of various environmental problems
- **Find** the solution and strategies to protect the Environment
- **List & Distinguish** various organizations, regulations for environment protection

UNIT-I

Environmental Studies:

Introduction, Definition, scope and importance.**Ecosystems**: Introduction, types, characteristic features, structure and functions of ecosystems. Bio-geo-chemical cycle, Classification of Ecosystem.

Bio-diversity and its conservation- Value of bio-diversity, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – In-situ and Ex-situ conservation.

UNIT-II

Natural Resources: classification of Resources, Land resources, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation, food resources, food miles.

Mining and dams – benefits & effects, Water resources, Use and over - utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Conflicts over Water, Energy resources.

UNIT-III

Environmental pollution and its control: Classification of pollution and pollutants, Air pollution, Causes, Effects, Control measures, ambient air quality standards, water pollution causes, effects, control measures, water quality standards, Marine pollution causes, effects & control measures, noise pollution causes, effects and control measures, land pollution causes, effects and control measures, solid waste management, e-waste management.

UNIT-IV

Global environmental problems and global efforts: Nuclear hazards, Nuclear Pollution, Global warming, Acid rains, ozone layer depletion, over population, hazardous waste. Clean development mechanism, green building, carbon credits, carbon trading.

International Conventions/protocols: UNEP, UNFCC, Earth summit, Kyoto protocol, Montreal protocol and Stockholm declaration.

UNIT-V

Environmental policy, legislation, rules and regulations : National Environmental Policy Environmental Protection act, Legal aspects Air (Prevention anc Control of pollution) Act-1981, Water(Prevention and Control of pollution) Act-1974, Water pollution Cess Act-1977, Forest Conservation Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules .

Economy and Environment, The economy and environment interaction, Economics of development, preservation and Conservation, Sustainability: theory and practices.

Environmental Impact Assessment, Rain water harvesting, cloud seeding and watershed management.

TEXT BOOKS

1. Environmental Science by Y.Anjaneyulu, B S Publications, 2004.
2. Environmental studies by Deeksha dave, Cengage learning India Pvt. Ltd, 1st edition, 2011.
3. Environmental Science and Technology by M. Anji Reddy, B S Publications, 2010.

REFERENCE BOOKS

1. Environmental Studies for UG Courses, Bharucha Erach, UGC Publications, Delhi, 2004.
2. Environmental Encyclopedia by Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.
3. Environmental sciences and Engineering by P.Venugopal Rao, PHI Learning Pvt. Ltd.,

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I Year B.Tech EIE I sem	**L**	**T/P/D**	**C**
	2	**4**	**4**

(5ME19) ENGINEERING DRAWING

Course Prerequisites: Geometrical construction

Course Objectives:

- Understand the Usage of Drawing Instruments & Auto Cad Commands.
- Understand the Construction Method for Drawing Engineering Curves.
- Understand the Concept of Principal of Projections of Lines, Planes and Solids.
- Understand the Conversion of Isometric to Orthographic Projections and Vice-Versa.

Learning Outcomes:

After going through this course the student will be able to

- Apply Auto Cad Commands to Construct Engineering Curves.
- Draw the Projections of Lines, Planes and Solids with different Positions.
- Construct different positions of Lines, Planes and Solids in Auto Cad Software.
- Visualize the Objects in the Conversion Process of Isometric Projections to Orthographic projections and Vice-Versa.

UNIT – I

Introduction to Engineering Drawing; Introduction to AutoCAD; Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves.

UNIT – II

Projections of points; Projections of lines and planes – inclined to one plane and inclined to both the planes.

UNIT – III

Projections of solids: Prism, Pyramid, Cylinder, Cone - axis inclined to one plane and inclined to both the planes.

UNIT – IV

Isometric projections of lines, planes and simple solids.

UNIT – V
Conversion of orthographic views into isometric views and vice-versa.

TEXT BOOKS
1. Engineering Drawing By N.D.Bhatt.
2 Engineering Graphics By K.L. Narayana & P.Kannayya.

REFERENCES
1. Engineering Drawing and Graphics: Venugopal/ New age
2. Engineering Drawing: Johle / TMH

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech (Common to all branches)	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5BS02) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

The English Language Communication Skills Lab aims to provide practice in all the four skills of LSRW, with a special emphasis on listening and speaking skills.

Course Objectives:

- Provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play and situational dialogue.
- Provide practice in word usage, grammatical construction, structural patterns, and improve comprehension abilities in the students.
- Train students to use neutral pronunciation through phonetic sounds, symbols, stress and intonation.
- Enable students to transfer information from verbal to graphic representation and vice versa.

Course Outcomes:

After going through this course the student will be able to

- Comprehend spoken and written discourse.
- Speak fluently with neutral pronunciation and exhibit interpersonal skills.
- Write accurately, coherently and lucidly making appropriate use of words depending on context and present data clearly.
- Introduce oneself to people and be able to speak extempore.

UNIT I

Computer Aided Language Lab:

- Grammar : Nouns and Pronouns; Articles; The Present Tense
- Vocabulary: Lesson 1
- Listening Comprehension

Communication Skills Lab: Introduction of Self and others

UNIT II

Computer Aided Language Lab:

1. Grammar: Concord; Adjectives; The Past Tense
2. Vocabulary: Lesson 2
3. Listening Skills

Communication Skills Lab: Seeking and Giving Information, Giving and Taking Instructions

UNIT III

Computer Aided Language Lab:

Grammar --- Adverbs, Conjunctions, Prepositions; The Future Tense

- Vocabulary: Lesson 3

- Telephoning Skills

Communication Skills Lab: Role Play/ Situational Dialogues

UNIT IV

Computer Aided Language Lab:

1. Grammar ---- Active and Passive Voice
2. Vocabulary: Lesson 4
3. Listening Comprehension

Communication Skills Lab: **i) JAM**/ Short Talk ii) Information Transfer a) Interpretation of Graph

UNIT V

Computer Aided Language Lab:

1. Introduction to Technical Writing

A. Definition of a Technical Term
B. Description of a Mechanism
C. Description of a Technical Process

2. Vocabulary: Lesson 5

Communication Skills Lab : Presentation Skills: Oral Presentation

Computer Aided Language Lab Requirements:

The English Language Lab shall have two parts:

i) The Computer aided Language Lab for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.

ii) The Communication Skills Lab with conference tables and movable chairs for 30 students and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and a camcorder

- **System Requirement (Hardware component):**
  Computer network with Lan with 30 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

iv) Suggested Resources:

Software consisting of the prescribed topics elaborated above may be procured and used. Additionally, the abundantly available online resources may also be used.

List of suggested software:

- **Tense Busters (5 Levels)**
- **Walden Educare**
- **Oxford Advanced Learner's Compass**, 7th Edition

- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5CS51) COMPUTER PROGRAMMING LABORATORY

(Common to EEE, ECE & EIE)

Course objectives

- **Gain** a working knowledge of C programming to write modular, efficient and readable C programs by Identifying the structural elements and layout of C source code.
- **Declare** and **manipulate** single and multi-dimensional arrays of the C data types and derived data types like structures, unions.
- **Use** functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.
- **Manipulate** character strings in C programs. Utilize pointers to efficiently solve problems

Course Outcomes:

After completion of the course student is able to

- **Apply** and practice logical ability to solve the problems using C
- **Understand** C programming development environment.
- **Analyzing** the complexity of problems , modularize the problems into small modules and convert them into programs.
- **Document** and **present** the algorithms flow charts and programs .

Week 1

a. Basic Linux commands

b. Simple C programs -to implement basic arithmetic operations – sum, average, product, smallest, largest of the numbers, difference, quotient and remainder of given numbers etc.

Week 2

Programs on if, else-if, nested if, else if ladder - largest and smallest of given numbers, to find the grade of a student based on marks, roots of a quadratic equation etc.

Week 3

a. Programs on switch-case – to check the type of a given character, to find the grade of a student etc.

b. Programs on while and do-while- to find factorial, Fibonacci series, GCD, sin(x), cos(x) series , to check whether a given number is an Armstrong, Palindrome, Perfect, number conversion, and Prime number etc.

Week 4
Programs on for loop- sum of n natural numbers, factorial, sin(x), to generate Pascal's triangle etc.

Week 5
a. Programs on nested loops – check for Fibonacci prime, Pyramids of numbers, generation of prime numbers in the given range, multiplication table etc.
b. programs using break, go to, continue.
Week 6
a. Programs on 1-D array-finding Minimum and maximum element ,Sorting and Searching etc.
b. Programs on 2-D array – Sum, product and Multiplication of two Matrices etc.

Week 7
a. Programs on Functions-Implementation of user defined functions categories, passing of arrays to functions etc.
b. Programs on recursion - factorial of a given integer, GCD of two given integers etc.

Week 8
a. Programs on String handling functions-Copying, reverse, substring, concatenation.
b. Programs on structure and unions.

Week 9
Midterm exam

Week 10
Programs using pointers- pointer basic operations

Week 11
Programs on pointers towards structures,

Week 12
Programs on pointers to arrays

Week 13
Programs on pointers to strings

Week 14
Programs on pointers to functions

Week 15
Programs on preprocessor directives

Week 16
Internal Lab Exam

TEXT BOOKS:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan,E.V.Prasad,RichardF.Gilberg
2. How To Program:C, Dietel & Dietel, Seventh Edition,PHI

REFERENCES:

1. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie.
2. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994.
3. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.
4. Let Us C Yashavantkanetkar BPB

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech EIE – I Sem

L	T/P/D	C
0	3	2

(5ME53) IT AND ENGINEERING WORKSHOP

Course Prerequisites: Basic knowledge about different Trades, computer hardware, Operating System, different trades in mechanical engineering.

Course Objectives:

- To study/demonstrate the concepts of computer w.r.t. it's hardware.
- To install the operating system and perform various tasks
- To conduct the experiments related to production engineering technology.
- To demonstrate the usage of power tools, CNC lathe and machine shop for different exercises

Course Outcomes:

After going through this course the student will be able to

- Identify, assemble and dissemble the given configuration of a computer.
- Install the operating system in the given configuration of a computer and execute commands for LINUX Operating System
- To develop components using the techniques of carpentry, tin smithy, forging, etc. listed in trades for exercises.
- To work out the given models in machine shop and CNC lathe.

IT WORKSHOP

1. Computer Hardware: Identification of Peripherals
2. Study of UPS and SMPS
3. Assembling and disassembling of a PC
4. Simple diagnostic exercises – Related to hardware
5. Installation of Windows Operating System
6. Installation of Linux Operating System
7. Linux Basic Commands
8. Simple diagnostic exercises –Related to Operating System

TEXTBOOKS:

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by Davis Anfinson and Ken Quamme CISC Press, Pearson Education.
2. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

ENGINEERING WORKSHOP

TRADES FOR EXCERCISES

At least **two** exercises from each trade:

1. Carpentry
2. Tin-Smithy
3. Fitting
4. Welding
5. Electrical Wiring

TRADES FOR DEMONSTRATION and EXPOSURE:

1. Power tools in construction, wood working, electrical engineering and mechanical engineering.
2. Machine shop.
3. CNC Lathe
4. 3D Printing

TEXT BOOKS:

Workshop Manual *by* P.Kannaiah and K.L.Narayana; *Publisher: Scitech*.

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I Year B.Tech EIE II Sem,	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS12) Ordinary Differential Equations and Laplace Transforms
(Common to all branches)

Course prerequisites: Differentiation and Integration

Course Objectives:

- Understand the methods of solving first order differential equations and learn about its applications to basic engineering problems.
- Understand the methods of solving higher order differential equations and learn about its applications to basic engineering problems.
- Understand the method of series solutions of second order ordinary differential equations.
- Apply the convolution theorem to evaluate Laplace Transform of the functions.

Course Outcomes:

Students will be able to

- Solve the problems in first order differential equations.
- Solve the problems in second order differential equations.
- Obtain the series solutions of second order ordinary differential equations.
- Learn Laplace Transform as a tool.

UNIT I

Ordinary Differential Equations of First Order and Their Applications:

Differential equations of first order and first degree - Exact differential equation , Linear and Bernoulli differential equation , Applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories and basic circuits(L-R Circuits, R-C Circuits).

UNIT II

Differential Equations of Higher Order and Their Applications:

Differential equations of higher order - homogeneous and non-homogenous type, differential equations of second order and higher order with constant coefficients with right hand side term of the type e^{ax} sin (ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x) and method of variation of parameters, applications to spring mass system ,Simple harmonic motion and L-C-R Circuits.

UNIT III

Differential Equations with Variable Coefficients:

Euler-Cauchy's 2^{nd} order differential equations, Series solutions of second order Ordinary Differential Equations, Regular point, Regular singular point, Frobineous Method.

UNIT IV

Laplace Transforms:

Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms, Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function).

UNIT V

Inverse Laplace Transforms:

Inverse Laplace transform of functions using partial fractions, Convolution theorem (statement only). Solving linear differential equations and Integro-differential eqations using Laplace transform.

TEXT BOOKS:

1. Higher Engineering Mathematics – B. S. Grewal,Khanna publishers.
2. Advanced Engineering Mathematics *by R.K.Jain and S.R.K.Iyengar; Narosa Publications.*

REFERENCES:

1. Advanced Engineering Mathematics *by* Erwin Kreyszig, 8th Edition; *Publisher: John Wiley.*
2. Advanced Engineering Mathematics *by* Peter V. O'Neil, 9th Edition; *Publisher: Cengage Learning*
3. A First Course in Differential Equations *by* Dennis G. Zill; *Publisher: Brooks Cole* publiers.

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I Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS13) COMPUTATIONAL METHODS

Course Prerequisites: Elementary transformations of matrices, differentiation and integration.

Course Objectives:

- Understand the numerical methods for non linear systems, evaluating definite integrals and solving Ordinary Differential Equations.
- Understand various methods of interpolation and application.
- Understand the Echolen form and Normal form of a matrix and its applications in solving linear system of equations.
- Solving system of linear equations using Jacobi and Gauss-Seidal methods.

Course Outcomes:
After completion of the course the student is able to

- Apply the numerical methods to find a root of algebraic and transcendental equations.
- Apply the numerical methods to find the solutions of ordinary differential equations.
- Find the rank using Echelon form, Normal form and compute eigen values.
- Solve linear equations using Jacobi method and Gauss-Seidal method

UNIT I
Solutions of non-linear systems:
Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – bisection method, the method of false position, Fixed point iterative method , Newton - Raphson method, and their order of convergence.

UNIT II
Interpolation:
Introduction; Errors in polynomial interpolation; Finite differences; Forward differences; Backward differences; Central differences; Symbolic relations and separation of symbols; Differences of a polynomial; Newton's formulae for interpolation; Central difference interpolation formulae; Gauss's central difference formulae and Lagrange's interpolation formulae.

UNIT III
Numerical differentiation and Integration:
Numerical differentiation based on interpolation, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, and Simpson's 3/8 rule, Gaussian quadrature 2 & 3 point formulae.

Numerical solutions of ordinary differential equations:
Solution of initial value problems by Taylor's series - Picard's method of successive approximations, Euler's method, and Runge - Kutta methods.

UNIT IV
Matrices:
Elementary Transformations, Rank of matrix, Echelon and Normal forms, Consistency of linear simultaneous equations, Eigen values and eigen vectors and their properties, Caley – Hamilton theorem (without proof), Quadratic forms - reduction of quadratic form to canonical form by linear(congruent) and orthogonal transformations.

UNIT V
Complex Matrices and Iterative Methods for Real Systems:
Unitary, Hermitian and skew – Hermitian matrices. Iterative methods for solving a system of linear equations (Jacobi method, Gauss-Seidal algorithm) and Power method to find largest and smallest eigen values.

TEXT BOOKS:
1. Numerical Methods in Engineering and Science–B.S. Grewal, 3rd edition Publisher: Khanna Publishers
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K.Iyengar; Narosa Publications.

REFERENCES:
1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition; Publisher: John Wiley and Sons.
2. Elementary Numerical Analysis – an algorithmic approach -Samuel D. Conte and Carl De Boor (2006); 3rd edition; Publisher: Tata McGraw Hill

(Beyond Syllabus: Types of errors and analysis)

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I Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**1**	**4**

(5EE01) CIRCUIT THEORY
(Common to EEE, ECE & EIE)

Pre-requisites: Mathematics, Physics

Course Objectives

- To **understand** the basic concepts of Circuit Analysis.
- To **analyze** single phase ac circuits and magnetic circuits.
- To **apply** Network Theorems for Circuit Analysis.

Course Outcomes:

After the completion of the course students will be able to

- Apply basic network reduction techniques for analysis of electrical circuits.
- Analyze ac circuits along with resonance and locus diagrams.
- Appreciate the application of network theorems and topology solutions.

UNIT–I:

INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular). Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation. Nodal analysis, Mesh analysis, Super Node and Super Mesh analysis of Networks with Independent and Dependent voltage and current sources.

UNIT–II:

MAGNETIC CIRCUITS:

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits

UNIT–III:

SINGLE PHASE A.C CIRCUITS:

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor, Real and Reactive powers – J-notation, Complex and Polar forms of representation, Complex power.

UNIT-IV:

LOCUS DIAGRAMS AND RESONANCE

Locus diagrams – series R-L, R-C, R-L-C and parallel combination with variation of various parameters – Resonance – series, parallel circuits, concept of band width and Q factor.

UNIT–V:

NETWORK TOPOLOGY AND NETWORK THEOREMS

Definitions – Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks - Duality and Dual networks. Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Tellegen's, Millman's and Compensation theorems for d.c. and a.c. excitations.

TEXT BOOKS:

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th Edition.
2. Network Analysis by A. Sudhakar, Shyammohan Palli, Mc Graw Hill Company,
3. Circuit Theory by A. Chakrabarti, Dhanipat Rai and Co., 6th Edition.

REFERENCE BOOKS:

1. Network Analysis by M. E Van valkenburg, PHI.
2. Linear circuit analysis (time domain phasor, and Laplace transform approaches) by RAYMOND A.DECARLO and PEN-MIN-LIN, Oxford University Press.2nd Edition, 2004.
3. Network Theory by N.C. Jagan and C.Lakshminarayana, B.S Publications.
4. Electrical Circuit theory by K. Rajeswaran, Pearson Education 2004.
5. Basic Circuit analysis by D.R, Cunningham and J.A Stuller, Jaico Publications.

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I Year B.Tech EIE II Sem	L	T/P/D	C
	3	0	3

(5BS23) ADVANCED ENGINEERING PHYSICS

Course Objectives:

- To **learn** basic structures and classifications of solids.
- To **study** nature of dielectric, magnetic and conducting properties of materials.
- To **visualize** different kinds of materials in engineering and technology.

Course Outcomes:
After completion of the course the student is able to:

- Identify different types of crystals, their defects and importance of X-ray studies in crystals.
- Recognize materials' magnetic, dielectric and conducting behavior.
- Show case some applications of crystals and different kinds of materials in engineering.

SYLLABUS

UNIT I

SEMICONDUCTOR PHYSICS
Fermi level in Intrinsic and Extrinsic semiconductors, Intrinsic semiconductor and carrier concentration, Extrinsic semiconductor and carrier concentration, Equation of continuity, Direct and indirect band gap semiconductors, Hall Effect, Formation of p-n junction, Open circuit p-n junction, Energy diagram of diode, I/V characteristics of p-n junction diode, Diode equation.

UNIT II

CRYSTAL STRUCTURES
Space lattice, Unit cell, Lattice parameter, Crystal systems, Bravais lattice, Atomic radius, Co-ordination number, Structures and Packing fractions of Simple Cubic, Body Centered Cubic, Face Centered Cubic, Hexagonal closed packed & diamond Cubic Crystals.

UNIT III

DIRECTIONS, PLANES AND X-RD
Miller Indices for Crystal planes and directions, Inter planar spacing of orthogonal crystal systems, Diffraction of X-rays by crystal planes and Bragg's law, Bragg's Diffractometer, Applications of X-ray diffraction.

DEFECTS IN SOLIDS

Imperfections in crystals, Point defects (Vacancies, Interstitial and Impurities), Schottky and Frenkel defects (with mathematical treatment), Line imperfections, Edge and Screw dislocation, Burger vector, Surface defects and volume defects (Qualitative Treatment).

UNIT IV

MAGNETIC PROPERTIES OF MATERIALS

Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility, Origin of magnetic moment, Bohr magneton, Classification of magnetic materials (Dia, Para and Ferro), Domain theory of ferromagnetism - Necessity, Formation, Hysteresis curve, Soft and Hard magnetic materials, Ferrites and their applications.

UNIT V

DIELECTRIC PROPERTIES

Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic and Orientation Polarization – Molor Polarization and Experimental determination of Molor Polarization, Calculation of Polarizibilities, Internal fields – Claussius – Mossotti equation, Piezo and Ferro electricity

SUPERCONDUCTORS

Experimental survey and superconductivity phenomenon, Meissner effect, Critical fields and Persistent currents, Type I and Type II superconductors, London equations, Flux quantization, BCS Theory, Applications of Superconductors.

TEXT BOOKS

1. Introduction to Solid State Physics by Charles Kittel , Publishers: John Wiley & Sons
2. Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd

REFERENCES

1. Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
2. Engineering Physics by G Sahashra Buddhe; University Press
3. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
4. Engineering Physics by M.R.Srinivasan, New Age Publishers
5. Solid State Physics by M.A. Wahab.

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I Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS32) ENGINEERING CHEMISTRY

Pre-requisites: Basic knowledge of mathematics and chemistry.

Course Objectives

- **Understanding** the concept of generating electricity by batteries.
- Conceptual **knowledge** of corrosion science.
- **Acquiring** the knowledge of preparation, properties and usage of polymers.
- **Applying** the concept of hardness to analyze various boiler troubles in steam generation.
- **Familiarize** the features of carbon nanotubes, composites and self- healing materials.

Course Outcomes

After the completion of the course student will be able to

- Interpret the chemical applications of the various types of batteries used in the present day world.
- Acquire the knowledge of corrosion for protecting structures and safeguarding the economy.
- Evaluate the suitability of various polymers for different applications.
- Analyze and compare the different softening techniques of water.
- Summarize the applications of carbon nanotubes, composites and self- healing materials.

UNIT I

BATTERIES AND FUEL CELLS

Electrochemistry-definition, types of cells- differences between electrolytic and electrochemical cells, conditions of reversibility, principle of batteries, Primary cells-(Dry cell, Mercury battery) and secondary cells -lead-acid cell; Ni-Cd cell; lithium- ion cells (intercalated); Fuel cells : methanol – oxygen fuel cell, advantages of fuel cells; Solar cells - principle and applications.

UNIT II

CORROSION AND ITS CONTROL

Introduction; Causes and effects of corrosion; Theories of corrosion – chemical and electrochemical corrosion (reactions); Types of corrosion (Differential aeration corrosion: pitting, crevice and waterline corrosion, Differential metal corrosion: galvanic corrosion) ;

Factors affecting corrosion – nature of metal (position of metal in galvanic series-differences between electrochemical & galvanic series; passivity; purity of metal; nature of oxide film; nature of corrosion product), and nature of environment (effect of temperature; effect of pH; humidity; formation of oxygen concentration cells).
Corrosion control methods – cathodic protection-sacrificial anode and impressed current cathodic protection.
Surface coatings –differences between galvanizing and tinning; cladding; electroplating (copper plating),Paints - constituents and functions.

UNIT III

POLYMERS

Plastics - Thermoplastic resins, and Thermosetting resins, fabrication of plastics –compression, injection. Preparation, properties, and engineering applications of PE, PVC, Teflon, Bakelite, Nylon and Kevlar.
Rubber -Processing and vulcanization, preparation, properties, and engineering applications of Buna-S; Butyl rubber and Thiokol rubber**.**

UNIT IV

WATER AND ITS TREATMENT

Introduction; Hardness - causes, expression of hardness, units, types of hardness, numerical problems.Estimation of temporary & permanent hardness of water by EDTA method (no numerical problems).Boiler troubles - scale & sludge formation, caustic embrittlement, boiler corrosion, priming & foaming. Softening of water by zeolite and ion exchange process (no numerical problems), Desalination processes -reverse osmosis.

UNIT V

SMART MATERIALS

Nanomaterials -Introduction; preparation and applications of nanomaterials with special reference to carbon nanotubes.
Composites**-**Need for composites, classification based on reinforcing material (Fiber reinforced composites –glass, carbon and aramid), applications of composites.
Self-healing materials**-** Definition, features, principle of self-healing materials and their applications.

TEXT BOOKS

1. Text Book of Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain & Monica Jain, Publisher: Dhanpatrai Publishing Company.

REFERENCES

1. Text Book of Engineering Chemistry by S.S. Dhara & Mukkanti; Publisher: S.Chand & Co.
2. Engineering Chemistry by O G Palanna; McGraw Hill Edu.Pvt.Ltd.
3. Text Book of Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan;
   Publisher: Vikas Publishers.
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi, Cengage Learning Publications.

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I Year B.Tech EIE II Sem

L	T/P/D	C
3	1	4

(5IT02) DATA STRUCTURES

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

Course Objectives

- To **summarize** efficient storage mechanisms of data for an easy access.
- **Implementation** of various basic and advanced data structures.
- To **introduce** various techniques for representation of the data in the real world.
- To **develop** application using data structures.

Course Outcomes

After completion of the course the student is able to:

- **Explore** and **analyze** the working of linear data structures like list, stack and variation of queue in both static and dynamic implementation.
- Relate and **demonstrate** the application of linear data structures.
- **Illustrate** and implement basic nonlinear data structures like trees, graphs and other operations.
- **Identify** and implement basic and advanced comparison based sorting and searching techniques.

UNIT I

File Management

File I/O – Basic concepts, text files and binary files, file input / output operations, file status functions (error handling), C programming examples, Command-Line Arguments

Data Structures – Introduction to Data Structures, abstract data types, Dynamic Memory Allocation

UNIT II

Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT III

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation.

Queues-operations, array and linked representations. Circular Queue operations, Dequeues, applications of queue.

UNIT IV

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals.

Graphs – Definitions, Graph representations, Graph traversals.

UNIT V

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort,
Searching-linear and binary search methods.

TEXT BOOKS

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Data Structures Using C (Paperback) by Aaron M. Tenenbaum

REFERENCE BOOKS

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

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I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5BS25) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LABORATORY

ENGINEERING PHYSICS LAB LABORATORY

Course Objectives:

- To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion.
- To understand the periodic motion and formation of standing waves and to know the characteristics of the capacitors and resistors.
- To compare the experimental results with the class room learning.

Course Outcomes:

After completion of the course the student is able to:

- Demonstrate the optical phenomena with formation of Newton Rings, and formation of spectra with a grating and a prism.
- Illustrate periodic motion by measuring rigidity modulus of a material and formation of standing waves by Melde's apparatus and also discharging of a capacitor.
- Correlate the experimental results with the class room learning.

Any Eight Experiments from the following:

1. Dispersive Power of the material of a Prism using Spectrometer
2. Diffraction Grating (both with Laser and non laser source)
3. Single Slit with laser light
4. Newton Rings
5. Finding thickness of a thin wire or sheet by forming a wedge shaped film
6. Energy gap of a semiconductor material
7. To determine the rigidity modulus of material of a wire
8. Melde's experiment
9. Sonometer Experiment
10. AC frequency by sonometer method
11. Numerical Aperture and Acceptance angle of an optical fiber cable
12. Attenuation and Bending losses in optical fiber
13. Stewart Gee's experiment
14. Characteristics of LED/Laser Diode.
15. Photo cell/ Solar Cell
16. C circuit

REFERENCES:

1. Essential Practical Lab Manual in Physics: by Dr.P.Raghavendra Rao,P.Pavankumar and B.Ashok (inhouse document)
2. Engineering Physics Practicals by B.Srinivasa Rao, V.K.V.Krishna and K.S.Rudramamba, University Science Press, New Delhi

ENGINEERING CHEMISTRY LABORATORY

Pre-requisites: Basic knowledge of Volumetric Analysis and Mathematics.

Course Objectives:

- Familiarize the preparation of solutions and operation of instruments
- Conduct of experiment, collection and analyzing the data
- Summarizing the data and find the applicability of the experiment to common society

Course Outcomes:

- Understanding the preparation of standard solutions and handling of instruments
- Knowledge of experimentation and recording the data
- Interpretation of results to real world scenario

LIST OF EXPERIMENTS

1. **Titrimetry:** Estimation of hardness of water by EDTA method.
2. **Conductometry:** Conductometric titration of acid vs base.
3. **Colorimetry:** Estimation of copper by colorimetric method.
4. **pH metry:** Determination of pH of sample solutions.
5. Determination of viscosity of sample oil by Redwood Viscometer.
6. **Preparations:** Soap and Nanoparticles.

TEXT BOOKS:

1. Laboratory Manual on Engineering Chemistry by S.K.Bhasin and Sudha Rani; Publisher: Dhanpat Rai.
2. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari and Jyotsna Cherukuri; Publisher: VGS Book Links.

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I Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5IT52) DATA STRUCTURES LABORATORY
(Common to EEE, ECE, CSE, EIE& IT)

Course Objectives:

- To **understand** storage mechanism and implement related programs
- To **develop** skills to design and analyze simple linear and nonlinear data structures
- To **strengthen** the ability to identify and apply the suitable data structure for the given real world problem
- To **gain** knowledge in practical applications of data structures

Course Outcomes:

After completion of the course the student is able to:

- **Implement** storage mechanism and to implement related programs
- **Design and analyze** the time and space efficiency of the data structure
- **Identity** the appropriate data structure for given problem
- Gain practical **knowledge** on the application of data structures

Week 1:	1.	Programs on files-Implementation of file handling functions, file error handling.
Week 2:	2.	Programs on command line arguments.
	3.	Programs on dynamic memory allocation.
	4.	Write a program to perform creates, insert, delete and search operations in Single Linked List.
Week 3:	5.	Write a program to perform create, insert , delete and search operations in Circular Linked List
Week 4:	6.	Write a program to perform create, insert and deletion operations in Double Linked List
Week 5:	7.	Write a program to implement stack using Arrays
	8.	Write a program to implement stack using Linked List
Week 6:	9.	Write a program to convert infix expression to postfix expression using stack
	10.	Write a program to evaluate postfix expression
Week 7:	11.	Programs using recursion

12. Write a program to convert infix expression to prefix expression using stack

Week 8:
13. Write a program to implement Linear queue using Array
14. Write a program to implement Linear queue using Linked List

Week 9:
15. Write a program to implement insertions and deletions in a Circular Queue.
16. Write a program to implement insertions and deletions in a Dequeue.

Week 10: Midterm Exam

Week 11:
17. Write a program to implement Linear search, Binary search
18. Write a program to implement Bubble sort, Selection sort

Week 12:
19. Write a program to implement Insertion sort
20. Write a program to implement Merge sort

Week 13:
21. Write a program to implement Quick sort.

Week 14:
22. Implementation of a binary tree representation using Arrays
23. Write a program to implement tree traversals.

Week 15:
24. Implementation of a Graph representation using Adjacency Matrix
25. Write a program to implement graph traversals.

Week 16: Final Internal Lab Exam

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Data Structures Using C (Paperback) by Aaron M. Tenenbaum

REFERENCES:

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

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	T	/P/D	C
II Year B. Tech EIE I Sem	**3**	**0**	**3**

(5BS15) FOURIER AND COMPLEX ANALYSIS
(Common to ECE, EIE)

Pre-requisites

- Integral and Differential calculus

Course objectives

- Compute Fourier coefficients.
- Distinguish between Cauchy's integral theorem and Cauchy's integral formula.
- Apply Taylor's Series and Laurent series to expand complex functions.
- Understand the idea of a conformal mapping.

Course outcomes

After Completion of the course the student is able to

- Solve problems using Fourier series.
- Apply Cauchy-Riemann equations to study analyticity of functions.
- Evaluate contour integrals using Residue theorem.
- Map the image of the given curve under the given transformation.

UNIT I

Fourier Series and Fourier Transforms:

Fourier Series : Fourier Series of periodic functions, Euler's formulae, Fourier series of even and odd functions having arbitrary periods, half range Fourier series.

Fourier Transforms: Fourier transform, Sine and Cosine transforms, properties and its applications.

COMPLEX ANALYSIS

UNIT II

Functions of a complex variable:

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.

UNIT III

Elementary functions and Integration of complex function:

Exponential, trigonometric, hyperbolic functions and their properties. z^c and Log(z), principal value. Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem ,Cauchy's integral formula.

UNIT IV

Power series and Residues:

Radius of convergence , Expansion in Taylor's series and Laurent series. Singular point, Isolated singular point, pole of order m , essential singularity. Residues – Evaluation of residue, Residue theorem, Evaluation of real integrals .

UNIT V

Conformal mapping:

Transformation of e^z, log(z), z^2 , z^n (n positive integer), Sin z, cos z, z + a/z. Basic transformations : Translation, rotation, inversion. Bilinear transformation - fixed point, cross ratio, properties, invariance of circles, determination of bilinear transformation mapping three given points to three assigned points.

TEXT BOOKS:

1. Higher Engineering Mathematics – B. S. Grewal
2. Complex Variables & Its Applications- Churchill and Brown, (1996), International Edition, McGraw Hill.

REFERENCES

1. Advance Engineering Mathematics - Peter O'Neil,(2000),5th Edition, Cengage Learning
2. Schaum's Outline Of Complex Variables - Murray.R.Spiegel,(2011), 2nd Edition, Tata McGraw Hill.

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(5EC01) ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE & EIE)

Pre-requisites: Semiconductor physics, mathematics.

Course Objectives

- To **learn** principle of operation, construction and characteristics of various electronic devices.
- To **study** operation and characteristics of Rectifiers with filters.
- To **understand** the analysis of small signal low frequency amplifiers.
- To **provide** the concepts involved in design of electronic Circuits.

Course Outcomes

After Completion of the course the student is able to

- Understand the operation and characteristics of various electronic devices.
- Develop few applications using electronic devices.
- Analyze small signal model for BJT and FET amplifiers.

UNIT I

p-n Junction Diode and Applications :Review of Semi-Conductor Materials, Theory of p-n Junction, p-n Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristics, Ideal and Practical Diode Equivalent Circuits, Static and Dynamic Resistance levels , Transition and Diffusion Capacitances.

The p-n diode as a rectifier, Half wave Rectifier, Full wave rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor filters, Capacitor filters, L- Section Filters, Π- section filters, Comparison of Regulation Characteristics of different Filters, Breakdown Mechanisms in Semi-Conductor Diodes, Zener Diode Characteristics, Shunt Voltage Regulation using Zener Diode.

UNIT II

Transistors, Biasing and Stabilization :The Bipolar Junction Transistor(BJT), Transistor Current Components, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, Transistor as an Amplifier, BJT Specifications, Principle of series voltage regulators.

The DC and AC Load lines, Quiescent operating Point, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector-Emitter Feedback Bias, Voltage Divider Bias,

Bias Stability, Stabilization Factors, Stabilization against variations in $V_{BE,}$ βand I_{CO}. BiasCompensation using Diodes, Thermistors and Sensistors, Thermal Runway, Thermal Stability.

UNITIII

Small signal low frequency BJT Amplifiers:Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifiers CE, CC, CB configurations using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of CB, CE, CC configurations in terms of A_I, R_i, A_V, R_O.

UNITIV

FET, Biasing and Amplifiers:Construction and operation of Junction Field Effect Transistor (JFET), Volt-Ampere characteristics - Drain and transfer Characteristics, FET as Voltage Variable Resistor, Biasing FET, The JFET Small Signal Model, FET Common Source Amplifier, Common Drain Amplifier, Construction and operation of MOSFET , MOSFET Characteristics in Enhancement and Depletion modes. Comparison of BJT and FET amplifiers.

UNITV

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode and schotky barrier diode. Principle of Operation and Characteristics of UJT, UJT Relaxation Oscillator. Principle of Operation of SCR, Schockley diode Diac and Triac. Principle of Operation of Semiconductor Photo Diode, PIN Diode, Photo Transistor ,LED and LCD.

TEXT BOOKS

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit, Tata McGraw Hill, 2nd Edition, 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 11th Edition, 2006.

REFERENCES

1. Integrated Electronics - J.Millman and Christos.C.Halkias, and Satyabratha, Jit Tata McGraw Hill, 2ndEdition,2008.
2. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th Edition,2004.
3. Electronic Devices and Circuits- S. S Salivahanan, N. Sursh Kumar, A. Vallava Raju,2nd Edition., TMH,2010.
4. Electronic Devices and Circuits – David A Bell, Oxford University Press, 5th edition (2008)

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(5EE21) PRINCIPLES OF ELECTRICAL ENGINEERING
(Common to ECE & EIE)

Pre-requisites: Circuit Theory, Mathematics

Course Objectives

- To **analyze** transient response of circuits with dc excitation
- To **understand** two port network parameters, filters and attenuators
- To **know** about performance of DC machines
- To **understand** the operation of transformers and AC machines

Course Outcomes

After completion of the course the student is able to:

- Analyze transient response of circuits
- Evaluate two port parameters and design simple filters
- Appreciate the working of DC machines
- Understand the operation of transformers and AC machines.

UNIT I

Transient Analysis (First and Second Order Circuits)

Transient Response of RL, RC and RLC Circuits for DC excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.

UNIT II

Two Port Networks

Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems.

UNIT III

Filters and Symmetrical Attenuators

Classification of Filters, Classification of Pass band and Stop band, Characteristic Impedance in the Pass and Stop Bands,Constant-k and m-derived filters-Low Pass Filter and High Pass Filters (both qualitative and quantitative treatment); Band Pass filter and Band Elimination filters (qunatitaive treatment only), Illustrative Problems. Symmetrical Attenuators – T-Type Attenuator, p-Type Attenuator, Bridged T-type Attenuator, Lattice Attenuator.

UNITIV

DC Machines

DC Generators:Principles of Operation of DC Generator, construction, EMF equation, Types of Generators, Magnetization, Internal and external Characteristics of DC Generators.

DC Motors:DC Motors, Types of Dc Motors, Characteristics of Dc Motors, Losses and Efficiency, Swinburne's Test, Speed Control of Dc Shunt Motor- Flux and Armature Voltage control methods.

UNIT V

Transformers and AC Machines

Transformers and Their Performance:Principle of Operation of Single Phase transformer, Types, Constructional Features, Phasor Diagram on No Load and Load, Equivalent Circuit, Losses, Efficiency and Regulation of Transformer, OC and SC Tests, Predetermination of Efficiency and Regulation, Simple Problems.

AC Machines - Three Phase Induction Motor: Principle of operation of three phase induction motors- Slip ring and Squirrel cage motors –Slip_Torque characteristics.

Alternators: Principle of operation –Types - EMF Equation- Predetermination of regulation by Synchronous Impedance Method- OC and SC tests.

TEXT BOOKS

1. Principles of Electrical Engineering- A.Sudhakar, ShyammohanS.Palli, TMH publications
2. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, TMH publications.
3. Network analysis and Synthesis- C L Wadhwa, New Age International Publishers.

REFERENCES

1. Networks, Lines, and Fields – John.D.Ryder, PHI publications.
2. Engineering Circuit Analysis – W.H.Hayt and J.E Kemmerly and S.M.Durbin, TMH publications.
3. Circuit Theory by Chakrabarti, DhanpatRai and Co.
4. Network Analysis – N.C.Jagan and C.LakshmiNarayana, BS publications.
5. Network Analysis – A.Sudhakar, ShyammohanS.Palli, TMH publications.

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(5EI01) SENSORS AND SIGNAL CONDITIONING

Pre-requisites: Physics, Mathematics

Course Objectives

- To **provide** basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
- To **provide** better familiarity with the Theoretical and Practical concepts of Transducers.
- To **provide** familiarity with different sensors and their application in real life.
- To **provide** the knowledge of various measurement methods of physical parameters like velocity, acceleration, torque, pressure, flow, temperature etc. and their relevance to Industry.

Course Outcomes

After completion of the course the student is able to:

- **Identify** suitable sensors and transducers for real time applications.
- **Translate** theoretical concepts into working models.
- **Design** the experimental applications to engineering modules and practices.
- **Design** engineering solution to the Industry/Society needs and develop products.

Unit I

Introduction to measurement systems

General concepts and terminology, measurement systems, sensor classifications: Analog Input and Output, Digital Input and Output, general input-output configuration, methods of correction.

Passive Sensors

Resistive Sensors: Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs),Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers.

Capacitive Sensors: Variable capacitor and Differential capacitor.

Inductive Sensors: Reluctance variation sensors, Eddy current sensors, Linear variable differential transformers (LVDTs), Magneto elastic sensors, Electromagnetic sensors - Sensors based on Faraday's law of Electromagnetic induction, Touch Sensors: Capacitive, Resistive, Proximity Sensors.

Unit II

Self-generating Sensors

Thermoelectric Sensors: Thermocouples, Thermo electric effects, Common thermocouples, Practical thermocouple laws, Cold junction compensation in thermocouples circuits.

Piezoelectric Sensors: Piezoelectric effect, piezoelectric materials, applications.
Pyroelectric Sensors: Pyroelectric effect, pyroelectric materials, Radiation laws: Plank, Wein and Stefan-Boltzmann, Applications.
Photovoltaic Sensors: Photovoltaic effect, materials and applications.
Hall Effect Sensors

Unit III
Digital Sensors
Position Encoders, Incremental position encoders, absolute position encoders, Variable frequency sensors-Quartz digital thermometers, vibrating cylinder sensors, SAW sensors, Digital flow meters. Sensors based on MOSFET Transistors, Charge coupled Sensors.

Smart Sensors
Definition of a Smart sensor, Smart sensor systems, Characteristics, Architectures, buses and interfaces, Smart sensors for electrical and non-electrical variables: Pressure and Temperature. Standards for Smart Sensors.

Unit IV
MEMS Sensors and Applications
MEMS Overview: Unique Characteristics of MEMS, Typical Application Areas of MEMS, MEMS Accelerometer, Optical MEMS, MEMS as a switch, MEMS Micro actuators. Principles of micro sensors: MEMS for Pressure, Force and Temperature Measurement.

Unit V
Signal conditioning: Voltage dividers, Wheatstone Bridge, Instrumentation amplifier and linearization of resistive bridge sensor, Electrostatic shield, Noise elimination using filters.
Introduction to Resolver-to-Digital Converters and Digital-to-Resolver converters: Introduction to Synchros and Resolvers. Synchro-to-Resolver converters, Digital-to-Resolver converters, Resolver-to-Digital Converters.

TEXT BOOKS

1. Sensors and Signal Conditioning, Ramon Pallas-Areny, John G.Webster,2nd Edition.
2. Sensors and Transducers: D. Patranabis, TMH 2003.

REFERENCES

1. Microsensors, MEMS and Smart Devices: Julian Garder, Vijay K. Varadan, John Wiley & Sons Ltd. (2006).
2. Sensor Technology Hand Book – Jon Wilson, Newne 2004.
3. Instrument Transducers – An Introduction to their Performance and design – by Herman K.P.Neubrat, Oxford University Press.
4. Measurement system: Applications and Design – by E.O.Doeblin, McGraw Hill Publications.
5. Electronic Instrumentation by H.S.Kalsi.

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(5EI02) ELECTRONIC MEASUREMENTS

Pre-requisites: Mathematics, Circuit Theory.

Course Objectives

- **Understand** different measurement methods and errors associated with them.
- **Know** the different standards and calibration methodologies adopted in the measurement systems
- **Know** different AC and DC bridges for the measurement of R, L and C.
- **Know** different types of Oscilloscopes and Analyzers (Analog and Digital).
- **Acquire** clear concepts about the DC and AC voltage and current measurements

Course Outcomes

After completion of the course the student is able to:

- **Understand** the different methods of measurement
- **Calibrate** different instruments.
- **Design**bridges circuits for the measurement of unknown R,L and C.
- **display and analyze**any complex waveforms through analog and digital techniques.

UNIT I

Introduction to measurements

Physical measurement.Forms and methods of measurements.Measurement errors.Statistical analysis of measurement data.Probability of errors.Limiting errors. Standards.Definition of standard units.International standards.Primary standards.Secondary standards.Working standards.Voltage standard.Resistance standard.Current standard.Capacitance standard.Time and frequency standards, Standards for Mass, Length and Volume, Standards of Temperature and Luminous Intensity, IEEE Standards.

UNIT II

Testing and calibration

Traceability.Measurement reliability.Calibration experiment and evaluation of results.Primary calibration.Secondary calibration.Direct calibration.Indirect calibration.Routine calibration. Calibration of a voltmeter, ammeter and an oscilloscope: case study.

UNIT III

Voltage and current measurements

DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Ohm meter, Digital Voltmeters, Range Extension of Ammeters & Voltmeter, Digital Multimeter

Frequency Counters: Basic Principle, errors associated with counter, Different modes of operations: Frequency, Time, Time Period, Average time period, Totalizing, Frequency synthesizer, Wave meters, Wave Analyzers, Output Power meter.

UNIT IV

Bridges

AC Bridges – measurement of inductance:- Maxwell's bridge, Anderson bridge, Hays Bridge measurement of capacitance:-Schering bridge, measurement of impedance: – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and grounding, Q-meter.

UNIT – V

Oscilloscopes

CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits.

Analyzers

Spectrum analyzers, Different types of spectrum analyzers, Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture. Scalar and Vector network analyzers.

TEXT BOOKS

1. Electronic Instrumentation – HS Kalsi, Tata Mc Graw Hill, 2004..
2. Electronic Instrumentation and measurements techniques by Helfrick and W.D.Cooper.,PHI publications.

REFERENCES

1. Principles of measurement systems, John P. Bentley: 3rd edition, Addison Wesley Longman, 2000.
2. Measuring Systems, Application and Design : E.O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements : Shawney, Khanna Publ.
4. Electronic Instrumentation and measurements : David A. Bell, 2nd Edition,PHI, 2003.
5. Electronic instruments and instrumentation Technology, M.M.S. Anand: Prentice-Hall of India,2004.

Subject Practice: EDA tools**.**

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(5EI51) SENSORS AND MEASUREMENTS LABORATORY

Course Objectives

- To **acquire** hands on experience in active and passive sensors/transducers.
- To **understand** different signal conditioners
- To **design** basic measuring devices like bridges

Course Outcomes

After completion of the course the student is able to:

- **Appreciate** the use of sensors
- **Identify** the sensors required for any specific application.
- **Design** simple measuring devices .
- **Develop** simple measuring systems employing appropriate sensors.

List of Experiments: (Minimum 12 experiments to be conducted)

1. Measurement of Load using Strain Gauge bridge
2. Measurement of Temperature using Thermistor, RTD and Thermocouple
3. Measurement of Displacement using LVDT, use of LVDT for Capacitance measurement
4. Measurement of L,C and R using Bridges and comparing them with Q-Meter
5. Extension of range of DC Ammeter, converting it into Voltmeter
6. Extension of range of AC Voltmeter, converting it into Ammeter
7. Construction of Series and Shunt type Ohm meters using PMMC
8. Measurement of Resistance using Wheatstone Bridge / Kelvin Bridge
9. Measurement of Capacitance using Schering's Bridge
10. Measurement of Inductance using Maxwell's Bridge
11. Characteristics of Opto-Electric Transducers (Photo Transistor, Photo Diode and LDR)
12. Pressure measurement through Bourdon Tube
13. Radiation and optical Pyrometers
14. Characteristics of pH sensors
15. Characteristics of Conductivity sensors.
16. Characteristics of DO sensors

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(5EC51) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

(Common to EEE, ECE & EIE)

Pre-requisites: Semiconductor physics, Electronic Devices and Circuits Concepts

Course Objectives

- To **identify** various components and testing of active devices.
- To **study** and operation of millimeters, function generators ,regulated power supplies and CRO
- To **know** the characteristics of various active devices.
- To **study** frequency response Amplifier.

Course Outcomes

After Completion of the course the student is able to

- Apply various devices to real time problems.
- Compute frequency response of various amplifiers.

Part A: (Only for viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE(in 2 lab sessions):

1. Identification, Specification, testing of R,L,C components (color codes), Potentiometers (SPDT, DPDT, and DIP, Coils, Gang Condensers, Relays, Bread Board, PCB's
2. Identification, Specification, testing of Active devices : Diodes, BJT, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of:
    - Multimeters (Analog and Digital)
    - Function Generator
    - Regulated Power Supplies
    - CRO

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

1. Forward and Reverse Bias V-I characteristics of PN junction Diode.
2. Zener diode V-I characteristics and Zener diode as voltage regulator.
3. Half Wave, and Full wave with and without filters.
4. Characteristics of a BJT under CE configuration and calculation of h-parameters.
5. Characteristics of a BJT under CC configuration and calculation of h-parameters.
6. Characteristics of a BJT under CB configuration and calculation of h-parameters.
7. FET characteristics under CS configuration.
8. Frequency response of CE Amplifier.
9. Frequency response of CC Amplifier.
10. Frequency response of CS FET Amplifier.
11. SCR characteristics.
12. UJT characteristics and Relaxation Oscillator.

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(5EE61) ELECTRICAL ENGINEERING LABORATORY

(Common to ECE & EIE)

Pre-requisites: Circuit Theory, Principles of Electrical Engineering

Course Objectives

- The theoretical concepts of KVL and KCL are verified experimentally
- The transient behavior of RLC networks are studied practically
- The network theorems are verified experimentally
- The performance and efficiency / regulation of electrical machines are determined experimentally (under various operating conditions)

Course Outcomes

After completion of the course the student is able to:

- Apply the network theorems in the domain applications
- Practically study the transient behavior of the RLC networks
- Find the applications of the electrical machines with the experimental determination of the performance of the machines.
- Find the difference between Generator and Motor performance and characteristics

PART- A

1. Verification of KVL and KCL.
2. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
3. Time response of first order RC/RL network for periodic non-sinusoidal inputs time constant and steady state error determination.
4. Two port network parameters –Z and Y-parameters
5. Two port network parameters – ABCD and h-parameters
6. Verification of Superposition and Reciprocity theorems.
7. Verification of maximum power transfer theorem. Verification on DC and AC Excitation with resistive and Reactive loads.
8. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
9. Constant –k Low Pass Filter and High Pass Filter- Design and Test.

PART- B

1. Magnetization characteristics of D.C Shunt generator, Determination of critical field resistance.
2. Swinburne's Test on Dc shunt machine. (Predetermination of efficiency of a given Dc Shunt machine working as motor and generator)
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. OC and SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Load Test on single Phase Transformer.
6. Speed Control of DC shunt Motor – flux and armature voltage control methods.

Note: Any 12 of the above experiments, 6 from each part to be conducted.

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(5BS04) GENDER SENSITIZATION

(Common to All Branches)

Course Objectives:

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

Course Outcomes:

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

UNIT I

UNDERSTANDING GENDER:

Gender: Why Should We Study It? (Towards a word of Equals: Unit-1)

Socialization: Making Women, Making Men (Towards a word of Equals:

Unit-2)

Introduction, Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together as Equals (Towards a world of Equals: Unit-12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters, Mothers and Fathers.

Further Reading: Rosa Parks-The Brave Heart.

UNITII
GENDER AND BIOLOGY:
Missing Women: Sex Selection and Its Consequences (Towards a word of Equals: Unit-4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (Towards a word of Equals: Unit-10)
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our health (Towards a word of Equals: Unit-13)

UNIT III
GENDER AND LABOUR:
Housework: the Invisible Labour (Towards a word of Equals: Unit-3)
"My Mother doesn't Work.""Share the Load."
Women's Work: Its Politics and Economics (Towards a word of Equals: Unit-7)
Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

UNIT IV
ISSUES OF VOILENCE:
Sexual Harassment: Say No! (Towards a word of Equals: Unit-6)
Sexual Harassment: not Eve-Teasing-Coping with Everyday Harassment-Further Reading: "Chupulu".
Domestic Violence: Speaking Out (Towards a word of Equals: Unit-8)
Is Home a Safe Place?-When Women Unite [Film]. Rebuilding Lives. Further Reading: New Forums for Justice.
Thinking about Sexual Violence (Towards a word of Equals: Unit-11)
Blaming the Victim-"I fought for my Life..."- Further reading: The Caste Face of Violence.

UNIT V
GENDER AND STUDIES:
Knowledge: Through the Lens of Gender (Towards a word of Equals: Unit-5)
Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.
Whose History? Questions for Historians and Others (Towards a word of Equals: Unit-9)
Reclaiming a Past. Writing Other Histories. Further Reading. Missing Pages from Modern Telangana History.

Essential Reading: all the Units in the Textbook, "Towards a word of Equals: A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Malkote, Vasudha Nagaraj, Asma rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is Interdisiplinary Course, Resouse Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

REFERENCE BOOKS:

1. Sen, Amartya. “More than One Million Women are Missing.” New York Review of Books 37.20 (20 December 1990). Print. ‘We Were Making History...’ Life Stories of Women in the Telangana People’s Struggle. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri. “By the Numbers: Where Indian Women Work.” Women’s Studies Journal (14 November 2012) Available online at : http://blogs.wsj.com/India real time/2012/11/14/by-the-numbers-where-India-women-work/>
3. K. Satyanarayana and Susie tharu(Ed) Steel Nibs are Sprouting: New Dalit Writing from South India Dossier 2: Telugu and Kannada http://harpercollins.co.in/BookDetail.asp?Book Code =3732
4. Vimala . “Vantillu (The Kitchen)”. Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women’s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. “ We Were Making History.....’Life Stories of Women in the Telangana People’s Struggle. New Delhi: Kali for Women, 1989.
7. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012.
8. Jayaprabha, A. “Chupulu (Stares)”, Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayan and Anupam Manuhaar. “Women and wage Discrimination in India: A Critical Analysis.”International Journal of Humanities and Social Science Invention 2.4 (2013).
10. Gautam , Liela and Gita Ramaswamy. “A ‘conversation’ between a Daughter and a Mother.”Broadsheet on Contemporary Politics, Special issue on Sexuality and Harassment: gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma rasheed. Hyderabad: Anveshi Research Center for Women’s Studies, 2014.
11. Abdulali Sohaila “I Fought For My Life ...and Won. “Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). “Community, Gender and Violence Subaltern Studies XI’
    Permanent Black and ravi Dayal Publishers, New Delhi, 2000.
13. K. Kapadia. The Violence of Development: the Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the Self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf. A Room of One’s Own. Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997

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(5EE08) CONTROL SYSTEMS

(Common to EEE, ECE & EIE)

Pre-requisites: Basic concepts of Mathematics and Signal concepts

Course Objectives

- To **understand** the different ways of system representations such as Transfer Function representation and state space representations and Should able to assess the system dynamic response
- To **assess** the system performance using time domain analysis and should know how to improve it
- To **assess** the system performance using frequency domain analysis and should know how to improve it
- To **design** various controllers and compensators to improve system performance

Course outcomes

After completion of the course the student is able to:

- Know how to improve the system performance by selecting a suitable controller and/or compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications Example: Power Systems, Electrical drives etc…)
- Test system Controllability and Observability using state space representation and applications of state space representation to various systems.

UNIT I

INTRODUCTION

Concepts of Control Systems- Open Loop and Closed Loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential Equations, Impulse Response and Transfer Functions - Translational and Rotational mechanical systems

UNIT II

TRANSFER FUNCTION REPRESENTATION AND TIME RESPONSE ANALYSIS

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

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of Proportional Derivative, Proportional Integral systems.

UNIT III

STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

ROOT LOCUS TECHNIQUE

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT IV

FREQUENCY RESPONSE AND STABILITY ANALYSIS IN FREQUENCY DOMAIN

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase Margin and Gain Margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis.

UNIT V

CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Compensation techniques – Lag, Lead and Lead-Lag compensators design in frequency Domain, PD, PI and PID Controllers.

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS

1. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition.
2. Automatic Control Systems 8th edition by B. C. Kuo 2003– John wiley and sons.

REFERENCES

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engineering. by NISE, John wiley, 3rd Edition.
4. Modelling and Control of Dynamic Systems by Narciso F. Macia George J. Thaler, Thomson Publishers.
5. Modern Control System Theory by M.Gopal, New age international publishers, Revised second edition.

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II Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI03) SIGNALS AND SYSTEMS
(Common to ECE & EIE)

Pre-requisites: Basics of mathematical concepts

Course Objectives
Student will be able to

- **Understand** various fundamental characteristics of signals and systems.
- **Study** the importance of transform domain.
- **Analyze** and design various systems.
- **Study**the effects of sampling.

Course Outcomes
After completion of the course the student is able to:
- Classify the signals and systems and determine the response of the systems.
- Analyze the spectral characteristics of signals and systems
- Design the continuous-time and discrete-time systems

UNIT I
Representation of Signals
Continuous time and Discrete Time signals, Classification of Signals – Periodic and aperiodic, even and odd, energy and power signals, deterministic and random signals, complex exponential and sinusoidal signals. Concepts of Impulse function, Unit step function, Signum function. Various operations on Signals.

Signal Transmission through Linear Systems
Classification of Continuous time and discrete time Systems, impulse response, Response of a linear 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 Paley -Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT II
Signal Analysis
Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Closed or complete set of orthogonal functions

Fourier Series Representation of Periodic Signals

Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum, Gibb's Phenomenon.

UNIT III

Fourier Transforms

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signals, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms

Laplace Transforms

Concept of region of convergence (ROC) for Laplace transforms. Properties of ROC. Relation between Laplace Transforms and Fourier transform of a signal. Introduction to Hilbert Transform.

UNIT IV

Convolution and Correlation of Signals

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Properties of Convolution, Concepts of correlation, properties of correlation.Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation.

Sampling Theorem

Representation of continuous time signals by its samples - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals.

UNIT V

Z –Transforms

Basic principles of z-transform, region of convergence, properties of ROC, Properties of z-transform , Poles and Zeros. Inverse z-transform using Contour integration, Residue Theorem, Convolution Method and Partial fraction expansion.

TEXT BOOKS

1. Signals, Systems and Communications - B.P. Lathi, BS Publications, 2009.
2. Signals and Systems – Alan V.Oppenheim, Alan S.Willsky and S.Hamid Nawab,2nd Edition, PHI.

REFERENCE BOOKS

1. Signals and Systems- A.Anand Kumar, 2nd Edition, PHI,2012
2. Signals and Systems -Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley.
3. Signals and Systems- Cengage Learning, Narayana Iyer, 2011.
4. Signals, Systems and Transforms –C.L.Philips,J.M Parr and Eve A. Riskin,3rd Edition, Pearson, 2004 .
5. Signals and Systems Schaum's Outlines - HWEI P. HSU , Tata Mc Graw Hill, 2004.

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II Year B. Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI04) PULSE AND DIGITAL CIRCUITS
(Common to ECE & EIE)

Pre-requisites: Electronic Devices andCircuits

Course Objectives
Student will be able

- To **provide** knowledge of Pulse and Wave shaping circuits.
- To **analyze** and **design** BJT switching circuits
- To **Analyze** and **Design** the Sweep generators for various applications.
- To **Analyze** and **Design** of the logic gates and sampling gates using discrete components.

Course Outcomes
After completion of the course the student is able to:

- Design linear and non-linear wave shaping circuits.
- Apply theswitching and logic concepts in digital circuits.
- Design non-sinusoidal waveform generators.

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

UNIT II
NON-LINEAR WAVE SHAPING
Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT III

SWITCHING CHARACTERISTICS OF DEVICES

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

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Applications of sampling gates.

LOGIC GATES

Relaxation of logic gates Using Diodes and Transistors: AND, OR, NOT, NAND and NOR gates using Diodes& Resistors

UNIT IV

MULTIVIBRATORS

Design and Analysis of Bistable, Monostable, Astable Multivibrators (Collector coupled). Analysis of Schmitt trigger using transistors, Hysteresis. Applications of multivibrators.

UNIT V

TIME BASE GENERATORS

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

SYNCHRONIZATION AND FREQUENCY DIVISION

Principles of Synchronization, Pulse synchronization of Relaxation devices, Frequency division in sweep circuits, Astable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

TEXT BOOKS

1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, McGraw-Hill, 1991.
2. Pulse and Digital Circuits – A. Anand Kumar, PHI.

REFERENCE BOOKS

1. Pulse and Digital circuits – M.S. Prakash Rao, Mc. Graw Hill
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn.., 2002 .
3. Wave Generation and Shaping L. Strauss.
4. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

Practice: Subject practice through Multisim software

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II Year B. Tech EIE II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EC04) ELECTRONIC CIRCUIT ANALYSIS
(Common to ECE & EIE)

Pre-requisites: Electronic Devices and Circuits

Course Objectives
Student will be able to

- **Explain** the operation, design and Analysis of multistage amplifiersusing BJT and MOSFET.
- **Design** high frequency BJT amplifiers and analysis of MOS amplifiers.
- **Understand** the concepts of feedback amplifiers and Oscillators
- **Design** large signal and tuned amplifiers.

Course Outcomes
After completion of the course the student is able to:

- Design amplifier circuits.
- Design various feedback amplifiers and power amplifiers.
- Apply the knowledge of Tuned amplifiers andpower supplies.

UNIT I
Multistage Amplifiers
Introduction, Methods of inter-stage coupling, n-stage cascaded amplifier, Equivalent circuits, Miller's Theorem, Frequency effects, Amplifier analysis, High input resistance Transistor Circuits, Darlington Pair, Two-stage RC-coupled JFET amplifier (in Common Source configuration).

UNIT II
BJT Frequency Response of Amplifiers
Frequency response of BJT amplifier, Analysis at low and high frequencies, Effect of coupling and bypass capacitors, Hybrid-π Common Emitter transistor model, CE short circuit gain, CE current gain with resistive load, Single-stage CE transistor amplifier response.

MOS Amplifiers

Basic Concepts, MOS Small signal Model, Common source amplifier with Resistive load, Diode connected load, and current source load, Source follower, Common Gate stage Cascode and Folded Cascode Amplifier and their frequency response. Basic MOS differential amplifier(Qualitative analysis) Basic CMOS circuit.

UNIT III

Feedback Amplifiers and Oscillators

Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, Effect of feedback on amplifier characteristics, voltage series, voltage shunt, current series and current shunt feedback configurations, Illustrative problems.

Classification of oscillators, Conditions for oscillations, RC phase shift oscillator, Wien bridge oscillator, Generalized analysis of LC oscillators – Hartley and Colpitts oscillators, Piezoelectric crystal oscillator, Stability of oscillators.

UNIT IV

Power Amplifiers

Classification of power amplifiers, Class A large-signal amplifiers, Series-fed and transformer-coupled Class A audio power amplifier, Efficiency of Class A amplifier , Class B amplifier, Transformer-coupled Class B push-pull amplifier, Complementary-symmetry Class B push-pull amplifier, Efficiency of Class B amplifier, Distortion in power amplifiers, Thermal stability and Heat sinks

UNIT V

Tuned Amplifiers

Introduction, Small signal single tuned amplifiers, Double-tuned amplifiers , Effect of cascading single and double tuned amplifiers on bandwidth, Stagger-tuned amplifier and Class-C tuned amplifiers(Qualitative analysis). Power supply requirements, Introduction and classification of Power Supplies.

TEXT BOOKS

1. Integrated Electronics - Jacob Millman and Christos C. Halkias, , Tata McGraw-Hill Education, 2008.
2. Electronic Circuit Analysis - S. Salivahanan, N. Suresh Kumar, , Tata McGraw-Hill Education, 2nd edition, 2012.

REFERENCES

1. Design of Analog CMOS Integrated Circuits - Behzad Razavi, Tata McGraw-Hill Education, 2008
2. Electronic Devices and Circuit Theory - Robert L.Boysted , Louis Nashelisky, Pearson Education , 9th edition, 2008. (ISBN: 978-81-219-2450-4)
3. Introductory Electronic Devices and Circuits, Robert T. Paynter, Pearson Education, 7th edition, 2010.
4. Micro Electronic Circuits – Sedra and Smith, Oxford University Press, 5th edition, 2009.

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II Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EC03) SWITCHING THEORY AND LOGIC DESIGN
(Common to EEE, ECE & EIE)

Pre-requisites: Basic Electronics

Course Objectives
Student will be able

- To **understand** the concepts of number systems, codes and design of various combinational and synchronous sequential circuits
- To **learn** various methods to minimize the Boolean expressions for reducing the number of gates and cost
- To **realize** logic networks, digital computers using PROM, PLA, PAL devices.
- To **design** state machines and ASM charts

Course Outcomes
After completion of the course the student is able to:

- Represent Digital data in various formats
- Design and implement combinational and sequential circuits with minimized logic
- Design ASM charts for digital systems

UNIT I

NUMBER SYSTEMS AND CODES: Philosophy of number systems – complement representation of negative numbers-binary arithmetic-binary codes. -error detecting & error correcting codes –hamming codes.

BOOLEAN ALGEBRA: Fundamental postulates of Boolean algebra - Basic theorems and properties, Boolean functions and representations: SOP, POS, Truth table, Canonical and Standard forms-Algebraic simplification, Digital logic gates, properties of XOR gates –universal gates-Multilevel NAND/NOR realizations.

UNIT II

SWITCHING FUNCTIONS:

MINIMIZATION OF SWITCHING FUNCTIONS: Karnaught-Map method-upto 5 variables, 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, Half adder, Full adder, ripple carry adder, carry look ahead adder, BCD adder, Half subtractor, Full subtractor, Binary adder/subtractor. Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT IV

SEQUENTIAL CIRCUITS – I: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of Synchronous and Asynchronous Counters, Shift registers, Serial binary adder, sequencedetector.

UNIT V

SEQUENTIAL CIRCUITS - II: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table. Introduction to ASM charts, simple examples, system Design using data path and control subsystems, ASM charts for Flip Flops and Binary multiplier

TEXT BOOKS

1. Switching & Finite Automata theory – Zvi Kohavi, TMH,2nd Edition.
2. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.

REFERENCE BOOKS

1. An Engineering Approach To Digital Design – Fletcher, PHI. Digital Logic – Application and Design – John M. Yarbrough, Thomson.
2. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
3. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006
4. Modern Digital Electronics by R.P JAIN, TMH

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II Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI52) PULSE AND DIGITAL CIRCUITS LABORATORY

Course Objectives

Student will be able

- To **demonstrate** the various wave shaping circuits
- To **demonstrate** generation of various non-sinusoidal waveforms.
- To **demonstrate** functionality of various logic gates.
- To **analyze** dynamic response of electronic switch

Course Outcomes

After completion of the course the student is able to:

- **Design** function generator to generate various waveforms (Square, Pulse and Sweep)
- **Design** the logic gates and Flip Flops
- **Design**Multivibrators and Sweep Circuits
- **Design** electronic switch.

List of Experiments (Minimum 12 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 and Some applications.
6. Study of Flip-Flops and 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.
14. PCB Design using ORCAD Software

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II Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EC63) ELECTRONIC CIRCUIT ANALYSIS LABORATORY

Course Objectives:

- To **design and simulate** various BJT and FET Voltage and Power amplifiers.
- To **design and simulate** various BJT Feedback amplifiers.
- To **design and simulate** various BJT Oscillators.

Course Outcomes:
After completion of the course the student is able to:

- **Apply** the concepts of amplifiers in the design of Public Addressing System
- **Analyze** the amplitude and frequency response of different amplifiers
- **Design** various wave form generators
- **Design** stable system using feedback concepts.

List of Experiments

Design and simulation of the following circuits using simulation software and implementation through hardware.

1. Common Emitter Amplifier with & without emitter bypass capacitor.
2. Common source Amplifier.
3. Two stage RC coupled BJT Amplifier.
4. Darlington pair.
5. Current shunt and voltage series feedback amplifier.
6. Cascode amplifier.
7. Wien bridge Oscillator using transistors
8. RC phase shift Oscillator using transistors.
9. Hartley and colpitt's Oscillator using transistors.
10. Class A power Amplifier (Transformer less and with transformer load).
11. Class B Complementary Symmetry Amplifier.
12. Class C Tuned Amplifier.
13. MOS Amplifier.

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II Year B. Tech EIE IISem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EC52) BASIC SIMULATION LABORATORY
(Common to ECE & EIE)

Pre-requisites: Basic concepts of Mathematics and Signal and systems

Course Objectives
Student will be able

- To **learn** basic Operations on Matrices
- To **model** generation of various signals
- To **simulate** operations on signals and systems.
- To **simulate** various random variables' generation and processes

Course Outcomes
After completion of the course the student is able to:

- Analyze various types of signals and perform various operations on them.
- Apply the knowledge of signals and sequences for finding response of a system

List of Experiments (Minimum 12 experiments to be conducted)

1. Basic Operations on Matrices
2. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations 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 / Sequence and Real and imaginary parts of Signal.
5. Convolution between Signals and Sequences.
6. Auto Correlation and Cross Correlation of 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 realiazability 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 the Zeros and Poles and Plotting the Pole-Zero maps in S plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis and PSD, Probability Distribution Function.
14. Sampling theorem Verification.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal, masked by noise using Correlation.
17. Verification of Weiner – Khinchine Relations.
18. Checking a Random Process for Stationary in Wide sense.

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III Year B.Tech EIE ISem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI05) INDUSTRIAL INSTRUMENTATION

Course Objectives

- **Understand** the basic knowledge of the physical parameters like Pressure, Temperature, flow, level, density and viscosity employed in different Industries.
- **Grasp** sound knowledge about various techniques used for the measurement of industrial parameters.
- **Understand** the construction and working of measuring instruments.
- **Analyze** need and necessity of measuring instruments.

Course Outcomes

After completion of the course the student is able to:

- **Acquire** adequate knowledge about process transducers
- **Acquire** adequate knowledge about the temperature standards, thermocouples and pyrometry techniques.
- **Study** area flow meters, mass flow meters and calibration.
- **Understand** various types of level measurements adopted in industry environment.

UNIT I

METROLOGY

Measurement of length - Gauge blocks – Plainness – Area using Simpson's rule, Planimeter – Diameter – Roughness – Angle using Bevel protractor, sinebars and Clinometer – Mechanical, Electrical, Optical and Pneumatic Comparators. Optical Methods for length and distance measurements using Optical flats and Michelson Interferometer.

VELOCITY AND ACCELERATION MEASUREMENT

Relative velocity – Translational and Rotational velocity measurements – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods.
Accelerometers-different types, Gyroscopes-applications.

UNIT II

FORCE MEASUREMENT

Force measurement – Different methods –Gyroscopic Force Measurement – Vibrating wire Force transducer.

PRESSURE MEASUREMENT

Basics of Pressure measurement –Manometer types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gauge, Knudsen Gauge, Momentum Transfer Gauge, Thermal Conductivity Gauge, Ionization Gauge, Dual Gauge Techniques, Deadweight Gauges, Hydrostatic Pressure Measurement

UNIT III

FLOW MEASUREMENT AND LEVEL MEASUREMENT

Flow Meters- 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.

Basic Level measurements – Direct, Indirect, Pressure, Buoyancy, Weight, Capacitive Probe methods

UNIT IV

DENSITY, VISCOSITY AND OTHER MEASUREMENTS

Density measurements – Strain Gauge load cell method – Buoyancy method - Air pressure balance method – Gamma ray method – Vibrating probe method.

Units of Viscosity, specific gravity scales used in Petroleum Industries, Different Methods of measuring consistency and Viscosity –Two float viscorator –Industrial consistency meter.

Sound-Level Meters, Microphones, Humidity Measurement

UNIT V

CALIBRATION AND INTERFACING

Calibration using Master Sensors, Interfacing of Force, Pressure, Velocity, Acceleration, Flow, Density and Viscosity Sensors, Variable Frequency Drive

TEXT BOOKS

1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Principles of Industrial Instrumentation – Patranabis D. TMH. End edition 1997

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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III Year B. Tech EIE ISem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS41) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives

- To **explain** different forms of organizing private and public sector business enterprises and to analyze the significance of Business Economics in solving the problems of business enterprise. Also to define and analyze the concepts of Demand, Elasticity of Demand and Demand Forecasting Methods.
- To **analyze** the various types of costs and to determine the level of output at which there is neither profit nor loss. To estimate capital requirements and to describe various sources of mobilizing funds. Also to identify least cost combinations of inputs produce desired quantity of output.
- To **describe** the features of different market structure and pricing strategies.
- To **explain** the basic accounting concepts and conventions. To elaborate the importance of finance function for evaluating the economic status of a business unit.

Course Outcomes

After completion of the course the student is able to:

- Select the suitable form of business organization which meets the requirement of selected business also perform decision – making function effectively in an uncertain frame work by applying concepts of Managerial Economics. Meet and manipulate the demand efficiently and plan the future course of action.
- Apply right kind cost to reduce cost by paying attention towards the costs which can be reduced. Take decision whether to buy or produce? Reduce the cost of capital by selecting best source of fund mobilization and select best investment opportunity which yields higher rate of return.
- Fix the right price which can best meets the predetermined objectives of the business firm under different market conditions. Able to select best combination of inputs to produce required quantity of output.
- Prepare books of accounts and know over all financial position of the business enterprise which enables the concerned to take appropriate measures to improve the situation. Also interpret the financial position from difference angles and initiates the measures/ efforts in that direction.

UNIT I

BUSINESS AND 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 II

INTRODUCTION TO BUSINESS ECONOMICS AND DEMAND ANALYSIS

Definition; Nature and scope of managerial economics - demand analysis determinants; Law of demand and its exceptions.

ELASTICITY OF DEMAND AND DEMAND FORECASTING

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, and Judgmental approach to demand forecasting.

UNIT - III

COST ANALYSIS

Cost concepts - Opportunity cost, Fixed vs. Variable costs, Explicit costs vs. Implicit costs, and Out of pocket costs vs. Imputed costs; Break-even analysis (BEA) - determination of break-even point (simple problems), managerial significance, and limitations of BEA.

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 - IV

THEORY OF PRODUCTION

Production function - isoquants and isocosts, least cost combination of inputs, and laws of returns; Internal and external economies of scale.

MARKET STRUCTURES

Types of competition; Features of perfect competition, Monopoly, and Monopolistic competition; Price-output determination in case of perfect competition and Monopoly.

PRICING POLICIES AND METHODS

Cost plus pricing; Marginal cost pricing; Sealed bid pricing; Going rate pricing, Limit pricing, Market skimming pricing, Penetration pricing, Two-part pricing, Block pricing, Bundling pricing, Peak load pricing, Cross subsidization.

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.

FINANCIAL ANALYSIS THROUGH RATIOS

Computation; Analysis and interpretation of liquidity ratios - current ratios, and quick ratio; Activity ratios - Inventory Turnover ratio, and Debtor Turnover ratio; Capital structure ratios – Debt-Equity ratio, and Interest Coverage Ratio; Profitability ratios - Gross profit Ratio, Net Profit Ratio, Operating Ratio, P/E ratio, and EPs.

TEXT BOOKS

1) Managerial Economics and Financial Analysis by Aryasri, Tata McGraw Hill, 2009.
2) Managerial Economics by Varshney & Maheswari, Sultan Chand, 2009

REFERENCE BOOKS

1. Financial Accounting for Management: An analytical perspective by Ambrish Gupta, Pearson Education, 2010.
2. Managerial Economics by H. Craig Peterson & W. Cris Lewis, Prentice Hall of India.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI06) LINEAR AND DIGITAL IC APPLICATIONS

(Common to EEE, ECE & EIE)

Course Objectives

- **Study** about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.
- **Analyze** and know the design concepts of various applications of ICs.
- **Describe** the Analog to Digital and Digital to Analog conversion techniques
- **Study** the design concepts of Digital circuits using ICs and its applications.

Course Outcomes

After completion of the course the student is able to:

- Analyze the characteristics of analog ICs and logic families.
- Design applications using analog ICs.
- Design applications using digital ICs

UNIT I

INTEGRATED CIRCUITS : Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

OP-AMP APPLICATIONS: Basic applications of Op-amp, Instrumentation amplifier, ac amplifier,
V to I and I to V converters, Sample and Hold circuits, Log and antilog amplifier, Precision rectifiers, Differentiators, Integrators, Peak detector, Comparators.

UNIT II

ACTIVE FILTERS and OSCILLATORS: Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC and Wien Bridge, Waveform generators – triangular, square wave and VCO.

UNIT III

SPECIAL ICs: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL-Introduction, block schematic, principles and description of individual blocks of 565, Introduction to voltage regulators.

D-A AND A- D CONVERTERS : Introduction, basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel

comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

UNIT IV

LOGIC FAMILIES : Classification of Integrated circuits, comparison of TTL and CMOS logic families, standard TTL NAND Gate- Analysis and characteristics, TTL open collector O/Ps, Tristate TTL, MOS and CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS and CMOS driving TTL .

UNIT V

COMBINATIONAL CIRCUITSAPPLICATIONS OF TTL74XX SERIES: Code Converters, Decoders, De-multiplexers, Encoders, priority Encoders, multiplexers and their applications, Priority Generators. Arithmetic circuit ICs-parallel binary Adder/Subtractor circuits using 2's-Complement system. Digital comparator circuits.

SEQUENTIAL CIRCUITS : RS, JK, JK Master Slave, D and T Type Flip-Flops & their conversions, Design of Synchronous and Asynchronous counters, Decade counter, shift registers.

TEXT BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2008.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCES

1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits:4/e William D Stanley PEI 2009.
3. Op-Amps and Linear ICs – Ramakanth A. Gayakwad, PHI, 1987
4. Operational Amplifiers and Linear Integrated Circuits by K.Lal Kishore - Pearson education, 2008.
5. Modern Digital Electronics RP Jain 4/e TMH 2010.

Practice: Subject Practice through Multisim and Pspice.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI07) BIO-MEDICAL INSTRUMENTATION

(Common to ECE & EIE)

CourseObjectives

- **Identify**significant biological variables at cellular level and ways to acquire different bio-signals.
- **Elucidate** the methods to monitor the activity of the heart,brain, eyes and muscles.
- **Introduce** therapeutic equipment for intensive and critical care.
- **Outline** medical imaging techniques and equipment for certain diagnosis and therapies.

Course Outcomes

After completion of the course the student is able to:

- **Understand** biosystems and medical systems from an engineering perspective.
- **Identify** the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG.
- **Understand** the working of various medical instruments and critical care equipment.
- **Know** the imaging techniques including CT,PET, SPECT and MRI used in diagnosis of various medical conditions.

UNIT I: Bio Potential Signals and Electrodes

Bio-signals and their characteristics, Organization of cell, Nernst equation of membrane, Resting and Action potentials.

Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems.

Bio-potential electrodes – Body surface recording electrodes, Internal electrodes, micro electrodes.

Bio-chemical transducers – reference electrode, the pH electrodes, Blood gas electrodes.

UNIT II: Cardiovascular Instrumentation

Heart and cardiovascular system Heart electrical acvitity, blood pressure and heart sounds.

Cardiovascular measurements electro cardiography – electroeardiogram, ECG Amplifier, Electrodes and leads, ECG recorder principles.Types of ECG recorders. Principles of blood pressure and blood flow measurement.

UNIT III: Neurological Instrumentation

Neuronal communication, electro encepherogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, pre-amplifiers and amplifiers

EMG block diagram and Stimulators

UNIT IV: Equipments for Critical Care

Therapeutic equipment - Pacemaker, Defibrillator, Shortwave diathermy, Hemodialysis machine. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneumotachograph, Ventilators.

UNIT V: Principles of Medical Imaging

Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography, Introduction to Telemedicine.

TEXT BOOKS

1. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 2003.
2. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

REFERENCES

1. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
2. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
3. Introduction to Biomedical equipment technology-by Joseph Carr and Brown.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Open Elective– I	**3**	**0**	**3**

(5CE71) DISASTER MANAGEMENT

Course Objectives

- **Understand** the difference between a hazard and disaster
- **Know** about various disasters and their impacts
- **Understand** Different approaches of disaster risk reduction
- **Understand** Disaster risks in India

Course Outcomes

After completion of the course the student is able to:

- Acquire the knowledge disaster Management
- Understand the vulnerability of ecosystem and infrastructure due to a disaster
- Acquire the knowledge of Disaster Management Phases
- Understand the hazard and vulnerability profile of India

UNIT-1

Introduction to disaster

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)

UNIT-II

Disasters: Classifications, Causes, Impacts (including social, economic, political, environment, health, psychosocial, etc.)

Differential impacts-in terms of caste, class, gender, age, location, disability Global trends in disasters. Urban disaster, pandemics, complex emergencies, Climate change

UNIT-III

Approaches to disaster Risk reduction

Disaster cycle-its analysis, phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural measures, roles and responsibilities of community. Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, center and other stake-holders.

UNIT-IV

Inter-relationship between Disaster and Development

Factors affecting Vulnerabilities, differential impacts, impact of development projects such as dams, embankments, change in land-use etc. Climate change Adaption. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT-V

Disaster Risk Management in India

Hazard and vulnerability profile of IndiaComponents of Disaster relief: Water, food, sanitation, shelter, health, waste managementInstitutional arrangements (Mitigation, Response and Preparedness, DM Act Policy, Other related polices, plan, programmes and legislation)

Project Work :(Field Work, Case Studies):

The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard.

Suggested Reading list:

1. Alexander David, Introduction in 'Confronting Catastrophe', oxford University press, 2000
2. Andharia J. Vulnerability in disaster Discourse, JTCDM, Tata Institute of Social Sciences working paper no.8, 2008
3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disaster, Rutledge.
4. Coppola P Damon, 2007. Introduction to International Disaster Management.
5. Carter, Nick 1991.Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
6. Cuny,F.1983. Development and Disasters, Oxford University Press
7. Govt.of India; Disaster Management Act 2005,Government of India, New Delhi.

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III Year B.Tech EIE – I sem	**L**	**T/P/D**	**C**
Open Elective-I	**3**	**0**	**3**

(5EE71) RENEWABLE ENERGY TECHNOLOGIES

Course Objectives:

• To provide necessary knowledge about the modeling, design and analysis of various PV systems

• To show that PV is an economically viable, environmentally sustainable alternative to the world's energy supplies

• To understand the power conditioning of PV and WEC system's power output

Course Outcomes:

After Completion of the course the student is able to

• Model, analyze and design various photovoltaic systems

• Know the feasibility of various storage systems

• Design efficient stand alone and grid connected PV and WEC power systems

UNIT I

Introduction to photovoltaic (pv) systems:

Historical development of PV systems- Overview of PV usage in the world Photovoltaic effect-conversion of solar energy into electrical energy.

Solar cells and arrays

Behavior of solar cells-basic structure and characteristics: types - equivalent circuit-modeling of solar cells including the effects of temperature, irradiation and series/shunt resistances on the open-circuit voltage and short-circuit currentSolar cell arrays- PV modules-PV generators-shadow effects and bypass diodes- hot spot problem in a PV module and safe operating area-Terrestrial PV module modelingInterfacing PV modules with different loads.

UNIT II

Energy storage alternatives for pv systems

Methods of Energy storage –Pumped Energy Storage – Compressed Energy Storage – Storage batteries- lead-acid- nickel cadmium-nickel-metal-hydride and lithium type batteries. Small storage systems employing ultra capacitors- properties- modeling of batteries.

UNIT-III

Wind Energy Conversion systems (WECS)

Basic Principle of WECS, Nature of Wind, Wind survey in india, Components of WECS, Power Vs Speed, TSR, Maximum Power operation, WECS- Trade off- Control Requirements, Basic Principle of Induction generator for WECS

UNIT-IV

Converters for PV and Wind

AC-DC Rectifier, DC-AC inverter (Basic operation) Grid interface voltage and frequency control, Battery charger (Basic operation)

Power conditioning of PV systems

Array Design, Sun Tracking, Single axis-Dual Axis, Maximum Power point Tracking- PO method- IC method

UNIT-V

Stand Alone systems:

PV Stand Alone, Electric Vehicle, Wind stand Alone, Standalone Hybrid systems- Hybrid with diesel, Hybrid with Fuel cell- Mode controller- Load sharing, systems sizing, wind farm sizing- Power and Energy estimates, , Residential systems, PV water pumping, PV powered lighting-

TEXT BOOKS

1. Patel M. R., "Wind and Solar Power Systems Design, Analysis, and Operation", CRC Press, New York, 2nd Edition, 2005
2. Goetzberger, Hoffmann V. U., "Photovoltaic Solar Energy Generation", SpringerVerlag,Berlin, 2005.

REFERENCES

1. Komp R.J., "Practical Photovoltaics: Electricity from solar cells", Aatec Publications,Michigan, 3rd Edition, 2001.
2. Castaner L., Silvestre S., "Modeling Photovoltaic Systems Using PSpice", John Wiley & Sons, England, 2002.
3. Jenny Nelson, "The physics of solar cells", Imperial College Press, London, 2004.

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Open Elective – I	**3**	**0**	**3**

(5ME71) DIGITAL FABRICATION

Course Objectives:

- Understand the need of digital fabrication
- Understand about Two dimensional layer by layer techniques
- Know about extrusion based systems, post processing and the software issues involved in digital fabrication
- Know the applications of digital fabrication

Course Outcomes:

After going through this course the student will be able to

- Understand the importance of digital fabrication
- Identify different techniques involved in two dimensional layering
- Analyze the software issues involved in digital fabrication and know about extrusion based systems and post processing
- Apply the knowledge gained in the digital fabrication

UNIT I:

Introduction to Additive Manufacturing: Introduction to AM, AM evolution, Classification of Additive Manufacturing, Distinction between AM & CNC Machining, Advantages of AM

UNIT II:

Two- Dimensional Layer- by Layer Techniques: Stereolithography (SL), Solid Foil Polymerization (SFP), Selective Laser Sintering (SLS), Selective Powder Building (SPB), Ballistic Particle Manufacturing (PM).

UNIT III:

Extrusion Based Systems: Introduction, basic principles, Fused Deposition Modeling, Materials, Limitations of FDM

Post Processing: Introduction, Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements.

UNIT IV:

Software Issues for Additive Manufacturing: Introduction, Preparation of CAD Models: The STL file, Problems with STL files, STL file manipulation, Beyond the STL file, Additional software to assist AM

UNIT V:

AM Applications

Applications in design, Applications in Engineering Analysis and Planning
Medical Applications: Customized Implants and Prosthesis
Aerospace applications and Automotive Applications
Other Applications: Jewelry Industry, Coin Industry, Tableware Industry.

Text Books:

1. Ian Gibson, David W Rosen, Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer 2010.
2. Chuaa Chee Kai, Leong Kah Fai, "Rapid Prototyping: Principles & Applications", World Scientific, 2010.

Reference Books:

1. Ali K.Karmani, Emand Abouel Nasr, "Rapid Prototyping: Theory and Practice", Springer 2006.
2. Andreas Gebhardt, Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Hanser Publishers, 2013.
3. Hopkinson, N.Haque, and Dickens Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Taylor and Francis, 2007.

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III Year B. Tech EIE I Sem	**L**	**T/P/D**	**C**
Open Elective –I	**3**	**0**	**3**

(5EC71) PRINCIPLES OF ELECTRONIC COMMUNICATIONS
(Qualitative Analysis only)

Course Objective:

- To make students **understand** different types of communication.
- To make students **understand** different modulation technique
- To make students **understand** basics of wireless communications.
- To make students **understand** basics of cellular communications.

Course Outcome:
After completion of the course the student is able to:

- Analyze the techniques used for signal modulation and demodulation.
- Distinguish the need for PPM, PWM, Multiplexing.
- Learn basics of wireless networks.
- Understand the fundamental concepts of Cellular & Mobile communications

UNIT I

Introduction

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

Analog Modulation

Need for modulation, Types of Analog modulation, Amplitude Modulation, Angle Modulation: Frequency & Phase modulations. Generation and Demodulation techniques.Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT II

Pulse Modulations

Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

UNIT III

Digital Communication

Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison. Digital Modulation : ASK, FSK, PSK, DPSK, QPSK demodulation, offset and non-offset QPSK, coherent and incoherent reception, Modems.

UNIT IV

Introduction to Wireless Networking

Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT V

Cellular Mobile Radio Systems

Introduction to Cellular Mobile System, concept of frequency reuse, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems. Cell splitting.

Handoffs and Dropped Calls

Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

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.
3. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002,PHI.

Reference Books

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2ndEd. 2004.
3. Wireless Communication and Networking – William Stallings, 2003, PHI.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Open Elective - I	**3**	**0**	**3**

(5CS71)Object Oriented programming Through JAVA

CourseObjectives:

- **Implement**Different object-oriented Concepts in Java.
- **Develop** the concepts of Multi-Threading and IO-Streams
- **Construct** GUI models.

CourseOutcomes:

After completion of the course the student is able to:

- Write Java programs using various programming constructs using java.
- Solve different mathematical problems using OOP Paradigm
- Design and analyze the solutions for Thread and I/O management Concepts.
- Implement the Applications involving GUI models and Events.

UNIT-I Fundamentals of Object Oriented programming:

Object oriented paradigm - Basic concepts of Object Oriented Programming - Benefits of OOP - Applications of OOP

Java Evolution: Java Features - How Java differs from C and C++ - Java and Internet - Java and World Wide Web - Web Browsers - Hardware and Software Requirements - Java Environment. Overview of Java Language: Simple Java Program - Java Program Structure - Java Tokens- Java Statements - Implementing a Java Program - Java Virtual Machine - Constants - Variables - Data types - Scope of Variables-Symbolic Constants-Type Casting and type promotions – Operators, Operator Precedence and Associativity - Control Statements – break - continue- Arrays-Multi dimensional arrays, Wrapper Classes - Simple examples.

UNIT-II Classes:

Classes and Objects - Constructors – methods - this keyword – garbage collection- finalize - Overloading methods and constructors - Access Control- Static members – nested and inner classes – command line arguments - variable length arguments.

Inheritance: Forms of inheritance – specialization, specification, construction, extension, limitation, combination, benefits and costs of inheritance. Super uses- final - polymorphism, method overriding - dynamic method dispatch –abstract classes – exploring String class.

UNIT-III Packages and Interfaces:

Defining and accessing a package – understanding CLASSPATH – access protection importing packages – Interfaces - Defining and implementing an interface, Applying interfaces, Variables in interfaces and extended interfaces. Exploring java.lang and java.util packages.

Exception Handling-Fundamentals, usage of try, catch, multiple catch clauses, throw, throws and finally. Java Built in Exceptions and creating own exception subclasses.

UNIT – IV Multithreaded Programming:

Java Thread life cycle model – Thread creation - Thread Exceptions - Thread Priority – Synchronization - Messaging - Runnable Interface - Interthread Communication - Deadlock - Suspending, Resuming and stopping threads.

I/O Streams: File – Streams – Advantages - The stream classes – Byte streams – Character streams.

UNIT – V Applet Programming:

How Applets differ from Applications - Applet Life Cycle - Creating an Applet - Running the Applet- Designing a Webpage - Applet Tag - Adding Applet to HTML file - More about Applet Tag - Passing parameters to Applets - Aligning the display.

Event handling: basics of event handling, Event classes, Event Listeners, delegation event model, handling mouse and keyboard events, adapter classes, AWT Class hierarchy - AWT Controls - Layout Managers and Menus, limitations of AWT.

TEXT BOOKS:

1. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi.
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons

REFERENCE BOOKS:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Open Elective - I	**3**	**0**	**3**

(5EI71) PRINCIPLES OF MEASUREMENT AND INSTRUMENTATION

Course Objectives

- To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
- To provide better familiarity with the concepts of Sensors and Measurements.
- To provide the knowledge of various measurement methods of physical parameters like velocity, acceleration, force, pressure and viscosity.

Course Outcomes

After Completion of the course the student is able to

- Able to identify suitable sensors and transducers for real time applications.
- Able to translate theoretical concepts into working models.
- Able to understand the basic of measuring device and use them in relevant situation.
- Able to estimate the errors in measurement by means of calibrating the different instruments against the standards.

UNIT I

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

Standards. Definition of standard units. International standards. Primary standards. Secondary standards. Working standards. Voltage standard. Resistance standard. Current standard. Capacitance standard. Time and frequency standards.

UNIT II

PASSIVE SENSORS

Resistive Sensors: Potentiometers, Strain Gages, Resistive TemperatureDetectors (RTDs),Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers , **Capacitive Sensors:** Variable capacitor, Differential capacitor, **Inductive Sensors:** Reluctance variation sensors, Eddy current sensors

UNIT III

METROLOGY

Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge blocks. Optical Methods for length and distance measurements.

VELOCITY AND ACCELERATION MEASUREMENT

Relative velocity – Translational and Rotational velocity measurements – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods.
Accelerometers- different types, Gyroscopes-applications.

UNIT IV

FORCE AND PRESSURE MEASUREMENT

Gyroscopic Force Measurement – Vibrating wire Force transducer.
Basics of Pressure measurement –Manometer types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement

UNIT V

FLOW, DENSITY AND VISCOSITY MEASUREMENTS

Flow Meters- Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, Density measurements – Strain Gauge load cell method – Buoyancy method.
Units of Viscosity, Two float viscorator –Industrial consistency meter

TEXT BOOKS

1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Principles of Industrial Instrumentation – Patranabis D. TMH. End edition 1997

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. Electronic Instrumentation by H.S.Kalsi.

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III Year B.Tech I Semester	**L**	**T/P/D**	**C**
Open Elective - I	**3**	**0**	**3**

(5IT71) CYBER SECURITY

Course Objectives:

- **Identify** the key components of cyber security in network
- **Describe** risk management processes and practices
- **Define** types of service delivery process and storage management process
- **Access** additional external resources to supplement knowledge of cyber forensics and laws

Course Outcomes:

After completion of the course the student is able to

- **Categorization** of cyber-crime and an understanding social, political, ethical and psychological dimensions cyber security
- **Demonstrate** cyber offenses tools, methods used in cyber crime
- **Document** an appropriate procedure of Risk Management and Security Standards
- **Understanding** computer forensics and analyzing them

UNIT-I

INTRODUCTION TO CYBER CRIME: Introduction Cybercrime: Definition and Origins of the word, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, E-mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Salami Attack/ Salami Technique, Data Diddling, Forgery, Web Jacking, Newsgroup Spam/ Crimes Emanating from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking, Online Frauds, Pornographic Offenses, Software Piracy, Computer Sabotage, E-Mail Bombing/Mail Bombs, Usernet Newsgroup as the Source of Cybercrimes, Computer Network Intrusions, Password Sniffing, Credit Card Frauds, Identity Theft, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, Hacking and the Indian Law(s), A Global Perspective on Cybercrimes, Cybercrime and the Extended Enterprise.

UNIT-II

CYBER OFFENSES: HOW CRIMINALS PLAN THEM: Introduction, Categories of Cybercrime, How Criminals Plan the Attacks, Reconnaissance, Passive Attacks, Active Attacks, Scamming and Scrutinizing Gathered Information, Attack (Gaining and Maintaining the System Access), Social Engineering, Classification of Social Engineering, Cyber stalking, Types of Stalkers, Cases Reported on Cyber stalking, How Stalking Works?, Real-Life Incident of Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The fuel for Cybercrime,

Botnet, Attack Vector, Cloud Computing, Why Cloud Computing?, Types of Services, Cybercrime and Cloud Computing.

UNIT-III

TOOLS AND METHODS USED IN CYBER CRIME: Introduction, Proxy Servers and Anonymizers, Phishing, How Phishing Works, Password Cracking, Online Attacks, Offline Attacks, Strong, Weak and Random Passwords, Random Passwords, Keyloggers and Spywares, Software Keyloggers, Hardware Keyloggers, Antikeylogger, Spywares, Virus and Worms, Types of Viruses, Trojan Horses and Backdoors, Backdoor, How to Protect from Trojan and Backdoors, Steganography, Steganalysis, Dos and DDos Attacks, Dos Attacks, Classification of Dos Attacks, Types of Levels of Dos Attack, Tools Used to Launch Dos Attacks, DDos Attacks, How to protect from Dos/DDos Attacks, SQL Injection, Steps for SQL Injection Attack, How to Prevent SQL Injection Attacks.

UNIT-IV

UNDERSTANDING COMPUTER FORENSICS: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, The Rules of Evidence, Forensics Analysis of E-Mail, RFC2822, Digital Forensics Life Cycle, The Digital Forensics Process, The Phases in Computer Forensics/Digital Forensics, Precautions to be Taken when Collecting Electronic Evidence, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Typical Elements Addressed in a Forensics Investigation Engagement Contract , Solving a Computer Forensics Case, Computer Forensics and Steganography, Rootkits, Information Hiding, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Technical Challenges: Understanding the Raw Data and its Structure, The Legal Challenges in Computer Forensics and Data Privacy Issues, Special Tools and Techniques, Digital Forensics Tools Ready Reckoner, Special Technique: Data Mining used in Cyber forensics, Forensics Auditing.

UNIT-V

CYBERCRIME AND CYBERTERRORISM: SOCIAL, POLITICAL, ETHICAL and PSYCHOLOGICAL DIMENSIONS: Introduction, Intellectual Property in the Cyberspace, Copyright, Patent, Trademarks, Trade Secret, Trade Name, Domain Name, The Ethical Dimension of Cybercrimes, Ethical Hackers: Good Guys in Bad Land, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals, Inside the Minds and Shoes of Hackers and Cybercriminals, Hackers and Cybercriminals: Evolution of Technical prowess and Skills, Ethical Hackers, Sociology of Cybercriminals, Personality Traits of Cybercriminals and Younger Generation's views about Hacking, Information Warfare: Perception or An Eminent Reality?, Cyberwar Ground is HOT, Cyber Jihadist on the Rise.

TEXT BOOKS:

1. Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley.

REFERENCES:

1. Management of Information Security, M. E. Whitman, H. J. Mattord, Nelson Education, CENGAGE Learning, 2011, 3rd Edition.
2. Guide to Computer Forensics and Investigations, B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition

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III Year B.Tech EIE ISem	**L**	**T/P/D**	**C**
Open Elective – I	**3**	**0**	**3**

(5AE71) PRINCIPLES OF AUTOMOBILE ENGINEERING

Course objectives:

- **Understand** the layout of an automobile and functionalities subsystems
- **Provide** overview on concepts of engine, cooling, lubrication and fuel systems
- **Present** constructional features and working of automotive driveline and running systems
- **Study** the fundamentals and principles of automotive electrical systems

Course outcomes:

After completion of the course the student is able to:

- Explain the functionalities of automotive systems and subsystems
- Give an overview on engine and engine subsystems.
- Describe working of automotive driveline and running systems
- Discuss the concepts of automotive starting, ignition and charging systems

UNIT I

INTRODUCTION: Classification of automobiles, layout of an automobile, automobile sub systems and their role. Types of chassis, role and requirement of a chassis frame, types of frames, materials, loading points and types of bodies.

UNIT II

ENGINE: Classification and components of an engine, principle and working of four stoke and two stroke SI and CI engines. Carburetor, diesel fuel injection and introduction to electronic fuel injection system. Cooling - Necessity of cooling, air-cooling and water cooling. Lubrication – Mist, splash and forced system.

UNIT III

DRIVE LINE: Clutches, principle, single plate clutch, multi plate clutch and centrifugal clutch. Gear box - Need, sliding mesh, constant mesh and synchromesh gear box. Propeller shaft, universal joint, differential, wheels and tyres.

UNIT IV

RUNNING SYSTEMS: Suspension systems – Objective, rigid axle and independent suspension system and torsion bar. Steering system – Layout, steering mechanism, steering geometry and steering gearboxes. Brake system –Principle, stopping distance, types of brakes and actuation.

UNIT V

ELECTRICAL SYSTEMS: Starting system - Principle, working of different starter drive units and solenoid switches. Ignition system **-** Conventional ignition system types, ignition advance and retarding mechanisms. Charging system - Alternatorprinciple, construction and working, cut-outs and regulators.

TEXT BOOKS:

1. Heinz Heisler, “Advanced Vehicle Technology”. Butterworth Heinemann Publishers, 2002.
2. Crouse W H, “Automobile Electrical Equipment” , McGraw Hill Book Co., Inc., New York 3rd edition,1986.

REFERENCES:

1. Garrett T K, Newton K. and Steeds W. “Motor Vehicle”, Butter Worths & Co. Publishers Ltd., New Delhi, 2001.
2. Kholi P L, “Automotive Electrical Equipment”, Tata McGraw Hill Co., Ltd., New Delhi, 1975.
3. Crouse W H, "Automotive Chassis and Body," McG raw Hill Book Co., 5th edition, 1976.
4. .Giri N K, Automotive Mechanics, Khanna Publications,2006.

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	L	T/P/D	C
III Year B.Tech. EIE I-Sem			
Open Elective - I	**3**	**0**	**3**

(5BS71) PROFESSIONAL ETHICS AND HUMAN VALUES

Introduction

Human values and ethics have a significant role to play in the betterment of our society. Ethics and values are a liberating force, enabling higher performance, better quality relationships and an expanded sense of purpose and identity. This syllabus aims to present a framework for understanding human values and their role in life, work, business and leadership. It aims to transform individuals from having self-focused, survivalist mindset that has scant regard for ethics, through to compliance with laws and conventions, and then to the aspiration to live a higher ethical and spiritual life.

It mainly focuses on improving the capacities of leadership /management through training in human values and professional ethics. It serves to contribute to good governance in the organizations and foster an environment that supports and encourages just practices and fairplay.

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
- To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

Course Outcomes:

After completion of the course the student is able to:

- Learn the moral issues and problems in engineering; find the solution to those problems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights

UNIT I

Introduction to Human Values and Ethics Human Values: Morals, Values and Ethics – Integrity – Work Ethic – ServiceLearning – Civic Virtue – Respect for Others – Living

Peacefully – caring – Sharing –Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

Introduction to Ethical Concepts: Definition of industrial ethics and values, Ethical rules of industrial worker- Values and Value Judgments -- Moral Rights and Moral rules 121 -- Moral character and responsibilities -- Privacy, confidentiality, Intellectual property and the law -- Ethics as law.

UNIT II

Understanding Engineering Ethics: Action Oriented- Ethical Vision- Indian Ethos- Ethics Defined-Engineering Ethics: Various Connotations of Engineering Ethics, Why Study Engineering Ethics?, Personal and Business Ethics-Ethics and the Law-Senses of 'Engineering Ethics' – Variety of moral issues –Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory –Gilligan's theory – Consensus and Controversy – Professions and Professionalism –Professional Ideals and Virtues – Theories about right action – Selfinterest –Customs and Religion – Uses of Ethical Theories -Engineering as a Profession -- Professional Societies -- Core Qualities of Professional Practitioners -- Professional Institutions, Operating in a Pluralistic Society - Environments and Their Impact - Economic Environment -- Capital Labor-- Price Levels -- Government Fiscal and Tax Policies – Customers -- Technology

UNIT III

Engineering as Social Experimentation – Comparison with Standard Experiments, Knowledge Gained Conscientiousness, Relevant Information, Learning from the Past, Engineers as managers, consultants, and Leaders, Accountability, Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law. Engineers and Managers -- Organizational complaint procedures - Government agencies Resolving Employee concerns – Limits on acceptable behavior in large corporations -- Ethical and legal considerations, Organizational responses to offensive behavior and harassment.

UNIT IV

Workplace Rights and Responsibilities Professional Responsibility: The basis and scope of Professional Responsibility -- Professions and Norms of Professional Conduct -- Ethical Standards versus Profession -- Culpable mistakes -- the Autonomy of professions and codes of ethics - - Employee status and Professionalism -- Central Professional Responsibilities of Engineers: The emerging consensus on the Responsibility for safety among engineers, Hazards and Risks. Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and reducing risk - Ethical standards vs. Professional conduct - Collegiality and Loyalty – Respect for Authority – Collective Bargaining –Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights –Employee Rights –

Intellectual Property Rights (IPR) – Discrimination - Organizational complaint procedures - Government agencies - Resolving Employee concerns.

UNIT V

Ethics in Global Context and Global Issues: Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers (IETE), India, etc.122

TEXT BOOKS:

1. Ethics in Engineering, Mike Martin and Roland Schinzinger, McGraw Hill. New York 1996.
2. Ethics in Engineering Practice and Research, Caroline Whitbeck, Elsevier.
3. Engineering Ethics, Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Prentice Hall of India, 2004.

REFERENCES:

1. Engineering Ethics, Charles D Fleddermann, Prentice Hall, New Jersey,2004 (Indian Reprint).
2. EngineeringEthics Concepts and Cases, Charles E Harris, Michael S Pritchard and Michael J Rabins,Thompson Learning, United States, 2000 (Indian Reprint now available).
3. Ethics and the Conduct of Business, John R Boatright, Pearson Education, New Delhi, 2003.
4. Fundamentals of Ethics for Scientists and Engineers, Edmund G Seebauer and Robert L Barry, Oxford University Press, Oxford, 2001.
5. Ethics in Engineering, Fourth Edition, Mike W. Martin, Rolan Schinzinger, Mc Graw Hill publishers
6. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
7. Ethics and Values in Industrial-Organizational Psychology, Joel Lefkowitz

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III Year B. Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5IT04) COMPUTER ORGANIZATION

(Common to ECE, CSE, EIE & IT)

Course Objectives

- To **understand** the basic structure and operation of a digital computer.
- To **analyse** the operations of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To **learn** the different ways of communicating with I/O devices and standard I/O interfaces.
- To **analyse** the hierarchical memory system including cache memories, secondary memory and virtual memory**.**

Course Outcomes

After completion of the course the student is able to:

- **Describe** the structure and functioning of a digital computer, including its overall system architecture, operating system, and digital components.
- **Understand** the impact of instruction set architecture on cost-performance of computer design
- **Differentiate** the applicability of single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures
- **Analyze** cost performance and design trade-offs in designing and constructing a computer processor including memory

UNIT I

BASIC STRUCTURE OF COMPUTERS: Introduction, Computer Evolution and performance, System Buses, bus Structures, Improvements in Chip Organization and Architecture, The evolution of the INTEL x86 architecture, Embedded system and the arm.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, and Arithmetic logic shift unit.

UNIT II

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, CISC and RISC.

UNIT III

THE MEMORY ORGANIZATION: The Computer System: Characteristics of Computer Memory Systems, The Memory Hierarchy Semiconductor Main Memory, SRAM and DRAM, External Memory, performance considerations, RAID, virtual memory, secondary storage.

MICROPROGRAMMED CONTROL: Control memory, address sequencing, micro program example, design of control unit, hardwired control, micro programmed control.

UNIT IV

COMPUTER ARITHMETIC: Addition and subtraction, multiplication algorithms, Division algorithms, floating-point arithmetic operations, Decimal arithmetic unit, Decimal arithmetic operations.

INPUT-OUTPUT ORGANIZATION: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.

UNIT V

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction pipeline, RISC pipeline Vector Processing, Array Processors.

TEXT BOOKS

1. Computer Organization and Architecture – William Stallings Sixth edition, Pearson/PHI
2. Computer System Architecture – M. Morris Mano, III edition, Pearson/PHI

REFERENCE BOOKS

1. Fundamentals of Computer Organization and Design, Sivarama Dandamudi
2. Computer organization – Carl Hamacher, Zvonks Vranesic, Safeazaky, V edition, Mc Graw Hill
3. Computer Architecture a Quantitative approach, John L. Hennessy and David A Patterson, Fourth edition Elsevier.
4. Computer Architecture Fundamentals and Principles of Computer Design, Joseph D/ Dumas II, BS Publication

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI54)LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

(Common to ECE & EIE)

Course Objectives

Student will be able to

- **Demonstrate** functionalities of analog and digital ics
- **Demonstrate** applications of analog and digital ics
- **Explore** usage of ASLKV2010 Starter Kit

Course Outcomes

After completion of the course the student is able to:

- Design various applications using Analog ICs.
- Verify the functionality of digital ICs

Note: Minimum of 12 experiments have to be conducted (Four from each part).

List of Experiments:

PART 1: To Verify the following Functions.

1. Adder, Subtractor, Comparator using IC 741 OP-AMP.
2. Square Wave Generator and Triangular Wave Generator using OP-AMP.
3. RC Phase Shift & Wien Bridge Oscillators using IC 741 OP-AMP.
4. 4-bit Digital to Analog converter.
5. Schmitt Trigger circuits using IC 741 & IC 555.
6. Voltage Regulator using IC 723, Three terminal voltage regulators-7805, 7809, 7912.

PART -2: To Verify the Functionality of the following 74 Series TTL ICs.

7. D-Flip- Flop – (74LS74) and JK Master-Slave Flip- Flop (74LS73).
8. Decade Counter (74LS90) and UP-DOWN Counter (74LS192).
9. Universal Shift registers – 74LS194/195.
10. 3- 8 Decoder – 74LS138.
11. 4-bit COMPARATOR -74LS85.
12. 8X1 Multiplexer– 74151 and 2X4 De-multiplexer- 74155.

PART - 3: Design of the Analog Systems using Analog System Lab Starter Kit (ASLKV2010 Starter Kit).

13. Negative Feedback Amplifier and Instrumentation Amplifier.
14. Regenerative Feedback system, Astable and Monostable Multivibrator.
15. Integrators and Differentiators
16. Analog Filters
17. Low Dropout (LDO)/Linear Regulator.

PRATICE:

Simulation through Workbench/ Multisim software, Xilinx /Altera tool boxes.

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III Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI53) INDUSTRIAL INSTRUMENTATION LABORATORY

Course Objectives

Student will be able to

1. **Understand** the basic knowledge of measurement of Velocity, Acceleration, Vibration, Humidity, Density, Viscosity, Sound Level and Intensity of Light.
2. **Understand** the construction, working and calibration of measuring instruments
3. **Understand** various Industrial Bus Protocols

Course Outcomes

After completion of the course the student is able to:

1. **Understand** the knowledge of measurement of various parameters.
2. **Understand** construction, working and calibration of measuring instruments and design .
3. **Analyze** various Industrial Bus Protocols
4. **Design** of signal conditioner for various sensors

Industrial Instrumentation:

1. Calibration of Pneumatic pressure to Current (P to I) and Current to Pneumatic Pressure (I to P) Converters
2. Measurement of RPM using opto-coupler and comparing it with stroboscope
3. Measurement of precision Angular Velocity and RPM of a rotating Disk
4. Measurement of Velocity, Acceleration and Vibration using Piezo- electric transducer
5. Measurement of Humidity
6. Measurement of intensity of Light
7. Measurement of Sound Level.
8. Measurement of Viscosity of Edible Oil using Redwood Viscometer
9. Measurement of Viscosity of Crude Oil using Saybolt Viscometer
10. Measurement of Density
11. MEMS based Accelerometer
12. Design of signal conditioner for MEMS based Accelerometer
13. MEMS based Gyroscope
14. Design of signal conditioner for MEMS based Gyroscope
15. Experiments based on Industrial Bus Protocols

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**1**	**4**

(5EC10) DIGITAL SIGNAL PROCESSING

(Common to ECE & EIE)

Pre-requisites: Signals and systems

Course Objectives

- **Understand** characteristics of discrete time signals and systems
- **Analyze and Process** signals using various transform techniques
- **Understand** various factors involved in design of digital filters and role of multi rate signal processing.
- **Understand** the effects of finite word length implementation**.**

Course Outcomes

After completion of the course the student is able to:

- Analyze and process signals in the discrete domain and transform domain
- Design filters to suit specific applications
- Design multi rate systems and represent numbers in digital scenario.

UNIT I

Introduction: Introduction to Digital Signal Processing. Applications of Z-Transforms : Solution of Linear constant coefficient difference equations, Block diagram representation of LCCD equations. System function, Frequency domain representation of discrete time signals and systems.

Discrete Fourier series: DFS representation of periodic sequences, Relation between Z-transform and DFS.

UNIT II

Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

Fast Fourier Transforms: Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III

IIR Digital Filters: Analog filter approximations- Butterworth and Chebyshev , comparison of Butterworth and Chebyshev filters. Design of IIR Digital filters from analog filters, Step and Impulse invariance transformation techniques, Bilinear transformation method. Spectral transformations (Analog to Analog).

Realization of IIR Filters: Direct, Canonic, Cascade, Parallel, Lattice and Ladder forms.

UNIT IV

FIR Digital Filters : Characteristics of linear phase FIR filters and its frequency response. Comparison of IIR and FIR filters.

Design of FIR filters : Fourier Method, Frequency Sampling method and windowing methods: Rectangular window, Hanning window, Hamming window, Bartlett window and Kaiser window.,

Realization of FIR Filters: Direct form, cascade realization and Linear phase Realization.

UNIT V

Multirate Digital Signal Processing: Introduction, Down sampling, Decimation, Up sampling, Interpolation, sampling rate conversion, Implementation of sampling rate conversion, Applications of Multirate Signal Processing.

Finite Word Length Effects: Limit cycles, Overflow oscillations, Round-off noise in IIR digital filters , Computational output round off noise, Methods to prevent overflow.

TEXT BOOKS

1. Digital Signal Processing: Principles, Algorithms and Applications – John G.Proakis, D.G.Manolakis, 4th Edition, Perason/PHI, 2009.
2. Digital Signal Processing – A Pratical Approach – Emmanuel C.Ifeacher, Barrie. W. Jervis, 2nd Edition, Pearson Education, 2009.

REFERENCES

1. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing- Fundamentals and Applications – Li Tan, Elsevier, 2008.
3. Fundamentals of Digital signal Processing using MatLab- Robert J.Schilling, Sandra L.Harris,Thomson , 2007.
4. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya,TMH, 2009.
5. Fundamentals of Digital Signal Processing - Loney Ludeman, John Wiley,2009.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EC09) MICROPROCESSORS AND MICROCONTROLLERS

(Common to EEE, ECE & EIE)

Pre-requisites: Digital fundamentals, Computer Organization

Course Objectives

- To **understand** characteristics and architectures of various microprocessors and microcontrollers.
- **Understand** basic programming concepts and software tools
- **Learn** various interfacing circuits necessary for various applications
- To **learn** various interfacing concepts.

Course Outcomes

After completion of the course the student is able to:

- Understand the architecture of microprocessor/ microcontroller and their operation
- Demonstrate programming skills in assembly language for processors and Controllers
- Analyze various interfacing techniques and apply them for the design of processor/ controller based systems

UNIT I

Introduction to 8085 Microprocessor, Architecture of 8086 Microprocessor, Addressing modes of 8086, Instruction set of 8086, Assembler directives, simple assembly language programs, procedures, and macros. Pin diagram of 8086-Minimum mode and maximum mode of operation.

UNIT II

Memory and I/O organization of 8086, 8255 PPI – various modes of operation and interfacing to 8086, D/A and A/D converter to 8086 using 8255, memory interfacing to 8086.

UNIT III

Serial Communication standards, serial data transfer schemes, 8251 USART architecture and interfacing, RS-232, IEEE 488 standards. Interrupt structure of 8086, Interrupt Vector Table. Need for 8259 Programmable Interrupt Controller.

UNIT IV

Introduction to Microcontrollers, 8051 Microcontroller Architecture, I/O ports, memory organization, counters and Timers, Serial data Input/Output, Interrupts. Addressing modes, Instruction set of 8051, Simple programs.

Timer, serial port and Interrupts programming: Programming 8051 timers/counters, 8051 serial port programming, programming timer interrupts, programming External hardware interrupts, programming serial communication interrupts.

UNIT V

Interfacing to 8051: A/D and D/A Converter, Stepper Motor Interface, Key Board Interfacing, LCD Interfacing.

ARM Processor: Fundamentals, Registers, current program status register, pipeline, Exceptions, Interrupt and the vector table.

TEXT BOOKS

1. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
2. The 8051 microcontrollers and Embedded systems- Mazidi and mazidi, PHI, 2000.

REFERENCE BOOKS

1. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007.
2. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd edition.
3. Advanced microprocessors and Peripherals – A.K.Ray and K.M.Bhurchandi, TMH, 2000.
4. Micro Computer System 8086/8088 Family Architecture Programming and Design – By Liu and GA Gibson PHI, 2nd Edition.
5. The 8085 Microprocessor : Architecture Programming and Interfacing – K.Uday Kumar, B.S Umashankar, Pearson , 2008.

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III Year B.Tech EIE II Sem	L	T/P/D	C
Open Elective - II	3	0	3

(5CE72) INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEM

Course Objectives

- To **describe** and **define** various concepts of Remote Sensing and GIS.
- To enable the students to **analyze** data using GIS.
- To make the students **appraise** the importance of accuracy in GIS.
- To enable the students to **apply** GIS knowledge in solving various problems in real world scenario.

Course Outcomes

After completion of the course the student is able to:

- Students will be able to **describe** different concepts and terms used in GIS
- Students will be able to **compare** and process different data sets
- Students will be able to **evaluate** the accuracy and **decide** whether a data set can be used or not.
- Students will be able **demonstrate** various applications GIS.

UNIT I:

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co-ordinate systems, Map projections, Map transformation, Geo-referencing,

UNIT II:

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization

Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT III:

Spatial Data input and editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques

UNIT IV: Implementing a GIS and Advanced GIS

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS

Advanced GIS: WebGIS concept**,** webGIS fundamentals, Potential of web GIS, Server side strategies, client side strategies, mixed strategies, webGIS applications

UNIT V: Applications of GIS

GIS based road network planning, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications, Mineral mapping using GIS.

Text Books:

1. Introduction to Geographic Information systems by Kang-tsung Chang, McGrawHill Education (Indian Edition), 7th Edition, 2015.
2. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, Wiley Publishers, 2012.
3. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication, 3rd Edition, 2010.

References:

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Revised Edition, 2011.
2. Textbook of Remote Sensing and Geographical Information systems by M.Anji Reddy, B.S.Publications, 4th Edition, 2012.
3. Textbook of Remote Sensing and Geographical Information systems by Kali Charan Sahu, Atlantic Publishers and Distributors, 1st Edition, 2007.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective – II	**3**	**0**	**3**

(5EE72) ENERGY AUDITING, CONSERVATION AND MANAGEMENT

Course Objectives

- To **understand** the necessity of conservation of Energy.
- To **know** the methods of Energy management.
- To **identity** the factors to increase the efficiency of electrical equipment.
- To **know** the benefits of carrying out energy Audits.

Course Outcomes:

After completion of the course the student is able to:

- To conduct Energy Audit of industries.
- To manage energy Systems
- To specify the methods of improving efficiency of electric motor.
- To improve power factor and to design a good illumination system
- To calculate pay back periods for energy saving equipment.

Unit I Basic principles of Energy audit

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

Unit II Energy management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manager, Qualities and functions, language, Questionnaire - check list for top management

Unit III Energy efficient Motors

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

Unit IV Power Factor Improvement, Lighting and energy instruments

Power factor – methods of improvement, location of capacitors, p.f with non-linear loads, effect of harmonics on p.f. , p.f motor controllers - Good lighting system design and practice, lighting

control, lighting energy audit - Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, flux meters, tongue testers ,application of PLC's

Unit V Economic aspects and analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

REFERENCES:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
2. Energy management handbook by W.C.Turner, John wiley and sons
3. Energy management and good lighting practice: fuel efficiency- booklet12-EEO

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective – II	**3**	**0**	**3**

(5ME72) OPTIMIZATION TECHNIQUES

Course Prerequisites: Mathematics, Operation Research

Course Objectives:

- To **understand** the classification of optimization techniques and its practical use.
- To **understand** about the optimization of one dimensional optimization methods.
- To **know** about constrained minimization methods.
- To **understand** Geometric and dynamic programmings

Course Outcomes:

Students will be able to:

- Apply the different types of optimization techniques for different purposes.
- Formulates and solve the problems by using one dimensional unconstrained minimization methods.
- Formulates and solve the problems (industrial/research) by using the geometric programming.
- Formulate and solve the industrial problems by using the dynamic programming methods.

UNIT I

Introduction: Engineering Applications; Statement of the Optimal Problem: Classification; Optimization Techniques. Classical Methods: Single Variable Optimization; Multivariable Optimization without any Constraints with Equality and Inequality Constraints.

UNIT II

One-Dimensional Minimization Methods: Uni-model Function; Elimination Methods – Dichotomous Search, Fibonacce and Golden Section Methods; Interpolation Methods – Quadratic and Cubic Interpolation Methods.

UNIT III

Unconstrained Minimization Methods: Univariate, Conjugate Directions, Gradient and Variable Metric

Methods.Constrained Minimization Methods: Characteristics of a constrained problem; Direct Methods of feasible directions; Indirect Methods of interior and exterior penalty functions.

UNIT IV

Geometric Programming: Formulation and Solutions of Unconstrained and Constrained geometric programming problems.

UNIT V

Dynamic Programming: Concept of Sub-optimization and the principle of optimality; Calculus, Tabular and Computational Methods in Dynamic Programming; An Introduction to Continuous Dynamic Programming.

TEXT BOOKS:

1. Optimization (Theory & Applications) – S.S. Rao, Wiley Eastern Ltd., New Delhi.
2. Optimization Concepts and Applications in Engineering - Ashok D.Belegundu and Tirupathi R Chandrupatla -- Pearson Education.

REFERENCES:

1. Optimization: Theory and Practice, C.S.G. Beveridge and R.S. Schechter, MGH, New York.
2. Genetic Algorithms in search, Optimization and Machine, Goldberg D. E., Addison-Wesley-NewYork.
3. Optimization for Engineering Design Algorithms and Examples, Kalyanamoy Deb, Prentice Hall of India.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective – II	**3**	**0**	**3**

(5EC72) INTRODUCTION TO MICROPROCESSORS AND CONTROLLERS

Course Objectives:

- **Differentiate** various number systems
- **Develop** simple application using 8085 microprocessors
- **Develop** simple applications using 8051 microcontrollers

Course outcomes:

After completion of the course the student is able to:

- Understand basic computing concepts
- Know architecture of 8085 microprocessors and 8051 Microcontrollers
- Interface peripherals to microprocessor
- Program internal resources of 8051 microcontroller

UNIT I Introduction to Computing

Numbering and Coding Systems: Binary, Decimal, Hexadecimal and conversions, Binary and Hexadecimal Arithmetic, Complements, Alphanumeric codes. Digital Premier, Inside the Computer

UNIT II8085 Microprocessor

Features, Architecture and operation of 8085, Programming Model, External Memory for 8085

UNIT III Programmable Peripheral Devices

Programmable Peripheral Interface (8255), USART (8251), Programmable Interval Timer (8253) and interfacing.

UNIT IV8051 Microcontrollers

Microcontrollers and Embedded Processors, Overview of the 8051 family, Architecture and Programming Model of 8051, Timers and Counters, parallel and serial ports, Interrupts, Special Function Register formats, Internal Memory Organization

UNIT V Applications

8051 Programming in C: Data types for the 8051, programs for IO operations, programs on Timer operations, Serial IO ports, and interrupts, Case Study: DC Motor Control

TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with the 8085/8080A, Gaonkar
2. The 8051 Microcontroller and Embedded Systems: Using Assembly and C, 2nd Edition, Muhammad Ali Mazidi,Janice Gillispie Mazidi, Rolin D. McKinlay

REFERENCE BOOKS:

1. The 8051 Microcontroller : programming, architecture by Ayala & Gadre, Cengage Publications
2. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.

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III Year B.Tech II Sem	**L**	**T/P/D**	**C**
Open Elective - II	**3**	**0**	**3**

(5EC95) WIRELESS COMMUNICATIONS AND NETWORKS

Prerequisite: Computer Networks

Course Objectives:

- Understand fundamentals of wireless communications
- Know basics of wireless networks
- Differentiate fixed IP and Mobile IP
- Learn design of basic wireless LAN network

Course outcomes:

After Completion of the course the student is able to

- Understand the fundamental concepts of Cellular communications
- Differentiate various multiple access techniques
- Learn wireless protocols used in wireless Networks
- Understand mobile IP requirements

UNIT I

WIRELESS COMMUNICATIONS & SYSTEM FUNDAMENTALS:

Introduction to wireless communications systems, examples, comparisons & trends. Cellular concepts-frequency reuse, strategies, interference & system capacity, trunking and grade of service, improving coverage &capacity in cellular systems.

UNIT II

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION:

FDMA, TDMA, SSMA (FHMA/CDMA/Hybrid techniques), SDMA technique (AS applicable to wireless communications). Packet radio access-protocols, CSMA protocols ,reservation protocols ,capture effect in packet radio , capacity of cellular systems .

UNIT III

WIRELESS NETWORKING:

Introduction, differences in wireless & fixed telephone networks, traffic routing in wireless networks – circuit switching, packet switching X.25 protocol. Wireless data services – cellular digital packet data (CDPD), advanced radio data information systems, RAM mobile data (RMD). Common channel

signaling (CCS), ISDN-Broad band ISDN & ATM, Signalling System no .7(SS7)-protocols, network services part, user part, signaling traffic, services and performance.

UNIT IV

MOBILE IP AND WIRELESS APPLICATION PROTOCOL:

Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.

UNIT V

WIRELESS LAN TECHNOLOGY:

Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

BLUE TOOTH: Overview, Radio specification, Base band specification, Links manager Specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

TEXTBOOKS:

1. Wireless Communication and Networking – William Stallings, PHI, 2003.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn.,2002.
3. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy,Pearson Education, 2002.

REFERENCES:

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999Page 26 of 38

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective – II	**3**	**0**	**3**

(5CS72)OPEN SOURCE TECHNOLOGIES

Course Objectives

- **Understand** Perl, Python, PHP and Ruby to new situations and learn from the experience.
- **Assist** Perl programmer or database administrator to compile large programming set.
- **Incorporate** PHP into HTML files, Write basic PHP scripts, Process form input, Write and use functions.
- **Apply** advanced techniques, tools, and methodologies that can be used to build complex, scalable, PHP applications.

Course Outcomes

After completion of the course the student is able to:

- Apply regular expressions to tokenize and validate data in a variety of languages
- Utilize Ruby to solve a wide range of text processing problems
- Understand the nuances and differences in a web based environment as compared to more traditional environments
- Distinguish variety of languages to develop interactive web applications

UNIT I

Introduction to PERL

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance Perl - finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT II

PHP Basics

PHP Basics- Features Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures . Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT III

Advanced PHP Programming

PHP and Web Forms, Files, PHI3 Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHI3, Sending Email using PHP, PHI3Encryption Functions, the Merypt package, Building Web sites for the World - Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text. Generate Binary Files, Set the desired language within your scripts. Localizing Dates, Numbers and Times.

UNIT IV

Python

Introduction to Python language, Python-syntax, statements, functions,Built-in-functions and Methods, Modules in python, Exception Handling, Integrated Web Applications in Python - Building Small, Efficient Python Web Systems ,Web Application Framework.

UNIT V

Ruby

Basics of Ruby, classes, objects and variable, arrays, Exception Handling ,threads, Regular Expressions, Strings, Objects in Ruby

TEXT BOOKS:

1. Programming Perl Larry Wall, T.Christiansen and J.Orwant, O'Reiily,SPD.
2. Guide to Programming with Python, M.Dawson, Cengage Learning.
3. The Ruby Programming Language 1st Edition by David Flanagan
4. Professional PHP Programming by Jesus M. Castagnetto , Harish Rawat , Deepak T. Veliath (WROX publication)

REFERENCES:

1. Perl Power, J.P.Flynt, Cengage Learning.
2. Perl by Example, E, Quigley, Pearson Education.
3. Programming Ruby: The Pragmatic Programmer's Guide, by Pragmatic Dave Thomas, Andy Thomas.
4. Professional PHP6 by WROX publication

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective - II	**3**	**0**	**3**

(5EI72) LabVIEW PROGRAMMING

Course Objective

- Understand the new concept in measurement and automation.
- Understand how to control an external measuring device by interfacing a computer.
- Competent in data acquisition and instrument control.
- Program for networking and other applications like Digital image processing control system and signal processing.

Course Outcome
After Completion of the course the student is able to

- Develop a Virtual Instrument using LabVIEW to communicate with real world.
- Identify salient traits of a virtual instrument and incorporate these traits in their projects.
- Experiment, analyze and document in the laboratory prototype measurement
- Develop program for application like networking, Digital image processing ,control system, etc

UNIT I
Virtual Instrumentation
Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Active X Programming.

UNIT II
Structures and sequence
Controlling program execution with structures: While and For loops, Shift registers, Case and Sequence structure and Sub VI

UNIT III
Composite Data and Displays
Arrays and Structures: Two dimension array, Auto Indexing to set the for loop count, Building arrays with auto indexing, Array Acrobats, Polymorphism, Cluster Order, Cluster to pass data, Bundling and unbundling cluster, Interchangeable arrays and cluster , Error Cluster and Error handling functions:
Chart update modes, Single Plot chart, Wiring multiple plot chart, Single Plot verus Multiple plot data types, The X scroll bar, clearing the chart, Stacked and overlaid plots, Multiple Y

scales and chart history lengths.: Activity: Temperature monitor, Graphing a sine wave, XY plot to plot a circle, Temperature analysis and 3D graphs.

UNIT IV

Strings, File output and Signal Measurements and generation

Single line strings, online string updation, Scroll bar, Writing and reading a measurement file, Writing and reading from a spread sheet, Computer to real world interface using LabVIEW, Creating Ni DAQ Task in Measurement and Automation Explorer (MAX), Generating code from MAX, DAQ timing and trigger, Multichannel and continuous acquisition, Streaming Data file and Counting frequency and events.VI Chassis requirements. Common Instrument Interfaces: Current loop, RS 232C/RS485,GPIB.

UNIT V

Applications

Networking basics for office & Industrial applications, VISA and IVI, VI toolsets, Distributed I/O modules, Development of Control system, Industrial Communication, Image acquisition and processing

TEXT BOOKS

1. Gary Johnson, LabVIEW Graphical Programming, 2nd edition,McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997.

REFERENCES

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes,2000.

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III Year B.Tech II Sem	**L**	**T/P/D**	**C**
Open Elective - II	**3**	**0**	**3**

(5EI79) FUNDAMENTALS OF ROBOTICS

Course Objectives

The course is intended for students to:

- Understand the Robot coordinate system and control system
- Learn different types of Robot sensors and actuators
- Identify different types of Robot grippers and their applications.
- Acquire Knowledge on kinematics and vision systems used for different Robots

Course Outcomes

After completion of the course the student is able to:

- Gain knowledge about basic concepts of robots.
- Appreciate the usage of different actuators, sensors and grippers in Robotics.
- Analyze the direct and the inverse kinematic problems.
- Able to identify the applications of Machine Vision in Robotics.

UNIT I:

Basic Concepts:

An over view of Robotics, classification of Robots, Robot Components, Robot degrees of freedom, Robot Joints, Robot Coordinates, Robot reference frames, Programming modes, Robot Characteristics.

UNIT II:

Sensors:

Sensor characteristics, Position sensors, Velocity sensors, Acceleration sensors, Force and Pressure sensors, Torque sensors, Microswitches, Light and infrared sensors, Touch and tactile sensors, Proximity sensors, Range finders.

Unit III:

Actuators and Grippers:

Characteristics of actuating system, Comparison of actuating systems, Hydraulic actuators, Pneumatic devices, Electric motors, Magneto-strictive actuators, Shape-Memory Metals, Electro-active Polymer Actuators.

Classification of Grippers, Drive system for Grippers, Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Adhesive Grippers, Hooks and Scoops, Gripper Force analysis and design, Active and Passive Grippers.

UNIT IV:
Kinematics:

Robots as Mechanisms, Matrix Representation, Homogeneous Transformation Matrices, Representation of Transformations, Inverse of Transformation Matrices, Forward and Inverse Kinematics with Equations.

UNIT V:
Vision:

Image acquisition, Illumination Techniques, Imaging Geometry, Basic Relationships between Pixels, Segmentation, Description, Segmentation and Description of 3-D Structures, Recognition, Interpretation.

TEXT BOOKS

1. Saeed B. Niku ,Introduction To Robotics : Analysis, Control, Applications ,Wiley, 2nd Edition .
2. Deb.S.R, "Robotics technology and flexible Automation", John Wiley

REFERENCES

1. Mikell P Groover, Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, "Industrial Robotics, Technology programming and Applications", McGraw Hill, 2012.
2. K.S.Fu, R.C.Gonzalez, C.S.G Lee, "Robotics- Control ,Sensing ,Vision and Intelligence ",McGraw-Hill International Edition.
3. Klafter. R.D, Chimielewski. T.A, Negin. M, "Robotic Engineering–An integrated approach", Prentice Hall of India, New Delhi

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III Year B.Tech EIE IISem	**L**	**T/P/D**	**C**
Open Elective - II	**3**	**0**	**3**

(5IT72) RELATIONAL DATABASE MANAGEMENT SYSTEMS

Course Objectives:

- To **describe** database management systems (DBMS) concepts and relational data model.
- To **employ** DBMS concepts to organize, maintain and retrieve information efficiently and effectively from a DBMS.
- To **discuss** the concepts of transactions and transaction processing systems
- To **examine** the issues and techniques relating to concurrency and recovery in multi-user database environments

Course Outcomes:

After completion of the course the student is able to:

- **Describe** the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- **Employ** the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
- **Analyse** and **apply** normal forms for real time database applications.
- **Evaluation** of transaction properties and file organization methods

UNIT-I

Introduction to Databases and Database Management System - Database system Applications - Advantages of DBMS over File System - Data Models – Instances and schema - View of Data - Database Languages -DDL-DML - Database Users and Administrator - Database System Structure.

UNIT-II

Database Design and ER diagrams – Attributes and Entity Sets – Relationships and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features- Database Design with ER model - Database Design for Banking Enterprise

UNIT – III

Introduction to the Relational Model – Structure of RDBMS - Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data - Relational Algebra and Calculus.

Introduction to SQL- Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations - Join operations - Sub queries and correlated queries, SQL functions , views ,Triggers, Embedded SQL.

UNIT – IV

Functional Dependencies– Introduction , Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies- Schema Refinement in Database Design- Problems Caused by Redundancy – Decompositions – Problem Related to Decomposition –- Lossless Join Decomposition – Dependency Preserving Decomposition - FIRST, SECOND, THIRD Normal Forms – BCNF – – Multi valued Dependencies – Fourth Normal Form.

UNIT-V

Transaction concept- Transaction state- Implementation of atomicity and Durability- Concurrent executions – Serializability, Recoverability

File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B^+Tree Index files, B- tree index files

TEXT BOOKS

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 and 5 Units)
2. Introduction to Database Systems, C.J.Date, Pearson Education (4^{th} Unit)

REFERENCE BOOKS

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghu ramakrishnan, Johannes Gehrke, TATA Mc Graw Hill(1,2,3 and 5 Units)
3. Data base Systems design, Implementation, and Management, Peter Rob and Carlos Coronel 7th Edition.
4. Data Base Systems using Oracle : A simplified guide to SQL and PL /SQL, Shah, PHI

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	L	T/P/D	C
III Year B.Tech EIE II Sem			
Open Elective – II	**3**	**0**	**3**

(5AE72) MODERN AUTOMOTIVE TECHNOLOGIES

Course Objectives:

- **Provide** an overview on advanced engine control system concepts
- **Study** the concepts and drivetrain configurations of electric and hybrid electric vehicles
- **Present** principle, working and automotive applications of fuel cell and solar technology
- **Awareof**intelligent vehicle technologies like navigation, safety, security and comfort systems

Course Outcomes:

After completion of the course the student is able to:

- Apply advanced engine control system concepts in engineering
- Discuss electric and hybrid electric drivetrain technologies and drivetrain components
- Describe automotive applications of fuel cell and solar technology
- Appreciate the technological advancements driver assistance systems

UNIT I

ADVANCED ENGINE CONTROLS: Concept of an electronic engine control system, electronic fuel injection - throttle body fuel injection, multi point fuel injection, gasoline direct injection, common rail direct injection, electronic ignition control, engine mapping, on-board diagnostics – engine control module and powertrain control module.

UNIT II

ELECTRIC AND HYBRID VEHICLES: Electric vehicles -Layout of an electric vehicle, performance, energy consumption, advantage and limitations. Hybrid electric vehicles - Concepts, types of hybrid drive train architecture, merits and demerits.

UNIT III

FUEL CELL AND SOLAR VEHICLES: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

UNIT IV

TELEMATICS AND COMFORT SYSTEMS: Global positioning system, geographical information systems, navigation system, automotive vision system, adaptive cruise control system, active suspension system, power steering and power windows.

UNIT V

SAFETY AND SECURITY SYSTEMS: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti lock braking systems, traction control system, electronic immobilizers, remote keyless entry, smart card system, number plate coding.

TEXT BOOKS:

1. William B Riddens, “Understanding Automotive Electronics”, 5th edition, Butter worth Heinemann Woburn,1998.
2. Mehrdad Ehsani, Yimin Gao, sebastien E. Gay and Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2005.
3. Ljubo Vlacic, Michel Parent and Fumio Harashima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001.

REFERENCES:

1. “Automotive Hand Book” Robert Bosch, SAE, 5th edition, 2000.
2. Iqbal Husain, “Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
3. “Navigation and Intelligent Transportation Systems – Progress in Technology”, Ronald K Jurgen, Automotive Electronics Series, SAE, USA, 1998.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Open Elective – II	**3**	**0**	**3**

(5BS72) ENTREPRENEURSHIP

Course Objectives:

- To introduce basics of entrepreneurship development and the skills set required for innovation.
- To Understand changing business trends to enhance decision making skills.
- To learn analytical and conceptual skills of identifying opportunities and check on their feasibility for start-ups.
- To motivate the engineers to choose entrepreneurship as a career for personal and societal growth.

Course Outcomes:

After completion of the course the students are able:

- To identify business opportunities and equip themselves in preparing business plans
- To analyze and evaluate different proposals and its requirements for start-up's.
- To pitch the ideas to launch their own venture.
- To assess the impact of competition and find methods to overcome the problems in business.

UNIT I: Entrepreneurial Skills-Opportunities

Entrepreneurship as a career, Personality and Skill Set of Entrepreneur, The Wisdom of Five WHY's and in action, Value and Growth-Stories of Successful Enterprises.

Innovation and Entrepreneurship: Three Learning Milestones of Innovation: Use of Minimum Viable Product-Startup's must tune the baseline towards the ideal-Pivot or Persevere.

UNIT II: Changing Business Environment-Role of Entrepreneur
The Role of Quality and Design, Beyond "The right place at the right time", Current trends in Business, Entrepreneurial Management.

UNIT-III: **Origins Of Lean Start-up-Business Plans**
The Concept of Vision to Steering: From Start-Define-Learn-Experiment to Leap-Test-Measure-Pivot.

UNIT-IV: **Validation of Projects and Products**
Projects Evaluation by Budgeting Techniques, Value vs Waste, Analogs and Antilogs, Analysis Paralysis, Why first products are not meant to be perfect-Experiences, Forecasting and Experimenting of Products.

UNIT-V: **Start-up Methods and Understanding Competition**
Accelerating Start-up's, optimization versus learning, Kanban Diagram of work as it progresses from stage to stage, the value of three A's: Actionable, Accessible and Auditable, Engines of growth to determine product/market fit, adopting smaller batches, reasons for Failures in Start-up's, Pricing Strategies Based On Competition

TEXT BOOKS:

1. Eric Ries, "The Lean Startup", Crown Business, New York. v.3.1.
2. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.
3. S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2001.

REFERENCES:

1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra ,2nd Edition ,2005.
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai -1997.
4. Arya Kumar. Entrepreneurship. Pearson. 2012
5. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

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III Year B.Tech EIE II Sem **L T/P/D C**

3 1 4

(5EI08) PROCESS CONTROL INSTRUMENTATION

Course Objectives

Student will be able to

- **Identify** and monitor process parameters of various processes.
- **Understand** the principles of controllers, degrees of freedom, and control valves.
- **Recognize** these principles written in form of mathematical equations for various control applications.
- **Apply** these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical process control problems.

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow, level, pressure, temperature problems.
- Conduct experiments in pipe flows and open-channel flows and interpreting data from model studies to prototype cases. Documenting them in engineering reports.
- Understand the possible disasters caused by an incorrect Design/Analysis in hydraulic, pneumatic engineering system.
- Apply multiloop control systems in various process industries.

UNIT I

Process Dynamics

Process variables – Load variables – Dynamics of simple pressure, flow, level and temperature process – interacting and non-interacting systems – continuous and batch process – self-regulation – Servo and Regulator operation - problems.

UNIT II

Control Actions and Controllers and Types of Controllers

Basic control actions – characteristics of two position, three position, Proportional, Single speed floating, Integral and Derivative control modes – PI, PD, PID control modes – Problems -types

of controllers -Pneumatic, Hydraulic and Electronic Controllers to realize various control actions.

UNIT III

Controller Settings and Tuning of Controllers

Evaluation criteria – 1/4th decay ratio, I AE, ISE,ITSE, ITAE - determination of optimum settings for mathematically described process using time response and frequency response-tuning of controllers- process curve reaction method – continuous oscillation method – damped oscillation method – problems.

UNIT IV

Final Control Elements and Control Valves

I/P Converter , P/I converter - pneumatic, electric and hydraulic actuators – valve Positioned - Control valves – characteristic of control valves – valve body – Globe, Butterfly, diaphragm, Ball valves – Control valve sizing – Cavitations, flashing - problems.

UNIT V

Multiloop Control System

Feed forward control – Feed Forward Feedback Controller (FFFBC) – Ratio control – Cascade control – Split range – Multivariable control and examples from distillation column, Boiler system and heat exchanger.

TEXT BOOKS

1. Automatic Process Control – by Eckman D.P. Wiley Eastern Ltd., New Delhi, 1993.
2. Process Control Instrumentation technology by Curtis.D.Johnson, Edition 8,PHI Publishers

REFERENCES

1. Chemical Process Control : An introduction to Theory and Practice – by Stephanopoulos, Prentice Hall, New Delhi, 1999
2. Process Control, Third Edition – Liptak B.G., Chilton Book Company, Pennsylvania, 1995
3. Process control – by Pollard A., Heinemann Educational Books, London,1971.
4. Process Control – Harriott P. , TMH, 1991
5. Process Control – by Patranabis.

Practice: Subject practice through LabVIEW software.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5BS42) MANAGEMENT SCIENCE

Course Prerequisites: Business Economics and Financial Analysis

Course Objectives

- **Understand** the principles, functions, theories and practices of different management areas and to provide them with practical exposure to cases of success/failure in business.
- **Expose** with a systematic and critical understanding of organizational theory, structures and design.
- **Comprehend** conceptual models of strategic management and to familiarize with the tools of operations and project management.
- **Understand** the role of human relations in the management of operations and to provide basic insights into contemporary management practices.

Course outcomes

After completion of the course the student is able to:

- Function effectively in multidisciplinary teams to accomplish a common goal of organizations.
- Apply theories to improve the practice of management.
- Appreciatethe management challenges associated with high levels of change in the organizations.
- Develop global vision and management skills at both a strategic level and interpersonal level.

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 experiments; Maslow's theory of human needs; Douglas McGregor's theory X and theory Y; Herzberg's two-factor theory of motivation; System and contingency approach to management; Planning – meaning, significance, and types of plans; Decision making and steps in decision making process; Leadership styles; Social responsibilities of management.

Organizing - Meaning, and features; Process of organization; Principles of organization; Elements of organization; Organization chart; Span of control - Graicunas formulae;

Centralisation and decentralization; Types of mechanistic and organic structures of organisation - line organization, line and staff organization, functional organization, committee organization, matrix organization, virtual organisation, cellular organisation, team structure, boundaryless organization, inverted pyramid structure, and lean and flat organization structure; Their merits, demerits and suitability.

UNIT II

Human resources management

Concepts of HRM; Basic functions of HR manager - human resource planning (definition; objectives; process), recruitment (definition; sources; techniques), selection (definition; process), induction and orientation, training and development (definition; need; methods), employee exit process, employee relations management, employee compensation and benefits administration, job evaluation (objectives; process; methods), and performance appraisals (objectives; process; methods).

UNIT III

Strategic management

Mission; Goals; Objectives; Policy; Strategy; Programmes; Elements of corporate planning process - environmental scanning; value chain analysis, BCG matrix, generic strategy alternatives, SWOT analysis, and steps in strategy formulation and implementation; Balance score card; Capability maturity model (CMM)/ People capability maturity model(PCMM).

UNIT IV

Operations management

Plant location; Types of plant layout; Methods of production – job, batch, and mass production; Work study-basic procedure involved in method study and work measurement.

Materials management

Objectives; Need for inventory control; EOQ, ABC Analysis; Purchase procedure; Value analysis; JIT, Six sigma; TQM; Supply chain management; Stores management and stores records.

Marketing

Functions of marketing; Marketing mix, and marketing strategies based on product life cycle; Channels of distribution.

UNIT V

Project management – network analysis

Network analysis; Programme evaluation review technique - PERT (probability of completing the project within given time); Critical path method - CPM (Identifying critical path); Project cost analysis; Project crashing; Simple problems.

TEXT BOOK

1. Management Science *by* Aryasri; *Publisher: Tata McGraw Hill, 2009.*
2. Management *by* James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R. Gilbert 6th Ed; *Publisher: Pearson Education/Prentice Hall.*
3. Principles and Practice of Management - L.M. Prasad; *Publisher: Sultan Chand Publications, New Delhi.*

REFERENCES

1. Principles of Marketing: A South Asian Perspective *by* Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan ul Haque , 2010, 13th Edition, *Publisher: Pearson Education/ Prentice Hall of India*.
2. A Handbook of Human Resource Management Practice *by* Michael Armstrong, 2010; *Publisher: Kogan Page Publishers*.
3. Quantitative Techniques in Management *by* N.D. Vohra, 4th edition, 2010; *Publisher: Tata McGraw Hill*.
4. Operations Management: Theory and Practice *by* B. Mahadevan, 2010; *Publisher: Pearson Education*.
5. Strategic Management *by* V.S.P. Rao and V. Hari Krishna, 2010; *Publisher: Excel Books*.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EC56) MICROPROCESSORS AND MICROCONTROLLERS LABORATORY
(Common to EEE, ECE & EIE)

Pre-requisites: Programming concepts, Instruction sets

Course Objectives

- Devices and circuits to microprocessors and microcontrollers.
- **Design** and develop both the hardware and software for microprocessor /microcontroller based systems.
- To **provide** practical introduction to microcontrollers and microprocessors, assembly language programming techniques and interfacing
- **Connect** peripheral
- **Interpret** specifications for any microprocessor or peripheral chip

Course Outcomes

After completion of the course the student is able to:

- Enhance programming skills for simple and complex tasks used in various engineering disciplines.
- Apply the knowledge of interfacing techniques to design processor/ controller based systems

Note: Minimum of 12 experiments have to be conducted (Four from each part).

List of Experiments:

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086 / 8051.
7. Interfacing stepper motor to 8086 / 8051.
8. Programming using arithmetic, logical and bit manipulation instructions of 8051.
9. Program and verify Timer/ Counter in 8051.

10. Program and verify Interrupt handling in 8051
11. UART Operation in 8051.
12. Communication between 8051 kit and PC.
13. Interfacing LCD to 8051.
14. Interfacing Matrix / Keyboard to 8051.

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5BS03)ADVANCED ENGLISH COMMUNICATION LABORATORY

Introduction This course aims to offer students a practical approach to Technical Writing, and provide a relevant, contemporary and authoritative introduction to the dynamic field of technical communication that prepares them for Workplace Communication. Each unit in the syllabus is devised so as to include a writing component as well as an oral component.

Course objectives:

- **enable** the students to create clear, accurate, and succinct content to write business letters, resume, SOP, Proposals and Technical Reports for academics as well as for workplace
- **enable** students to adjust technical content to meet the needs of a specific target audience
- **groom** students to speak accurately and fluently and prepare them for real world activities through behavioral skills.
- **train** students in soft skills through role play and group discussion to improve their EQ.

Course Outcomes:

Students will be able to:

- **summarize** and synthesize information and produce technical writing that is required in academics as well as in the engineering profession
- **write** covering letters, resume, SOP, Project Proposals and Technical Reports
- **speak** fluently and address a large group of audience and participate in debates and discussions.
- **negotiate** terms, manage complex situations through interpersonal skills, persuade people and make quick decisions.

Methodology

Writing Component

A Process- Genre methodology will be used in teaching the technical genres. This method would enable students to understand the use of particular lexico-grammatical patterns required of in the context of technical writing. They would learn to use language to express the particular communicative intent that is required of in the context of writing these genres.

Syllabus Outline

UNIT I

- Oral Communication :Talking About Yourself
- Applications and Covering letters
- Resume Writing

- Verbal Ability: Vocabulary (Technical and Non-Technical) reading and listening (analysis and reasoning)

UNIT II

- Oral Communication: Making Presentations
- Writing an SOP
- Summarizing and Synthesizing Information

UNIT III

- . Oral Communication: Group Discussions
- Writing Abstracts

UNIT IV

- Oral Communication : Debate
- Writing Reports

Unit V

Soft Skills

REQUIRED TEXT AND MATERIALS

1. Ashraf Rizvi, M (2005). Effective Technical Communication, Tata Mc Graw Hill Publishing Company Limited, New Delhi.
2. Anderson, Paul V. (2003). Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed..) (pp. 457-473). Boston: Heinle.
3. William S. Pfeiffer, (2012) Technical Communication: A Practical Approach (7th ed.) Longman

REFERENCES

1. Burnett, Rebecca. Technical Communication. 5th Ed., Heinle, 2001.
2. Gerson Sharon J. and Steven Gerson : Technical Writing Process and Product. 3rd edition, New Jersey: Prentice Hall 1999
3. Markel, Mike**.** Technical Communication: Situations and Strategies (8th EDITION (2006-2007)
4. R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Third Edition, TMH, 2002. (Indian Edition)
5. M. Raman and S. Sharma, Technical Communication : Principles and Practices, OUP, 2004. (Indian Edition)

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III Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI55) PROCESS CONTROL INSTRUMENTATION LABORATORY

Course Objectives

- **Identify** and obtain process parameters of various processes in the prototype model.
- **Understand** the working of Actuators, Converters, Controllers and Control Valves.
- **Acquire** the working knowledge of different controller types, modes of control actions, tuning of controllers and control schemes.
- **Learn** systematic engineering methodologies to solve practical process control problems.

Course Outcomes

After completion of the course the student is able to:

- **Do** mathematical modeling of different process to analyze its time response.
- **Apply** the control system knowledge to monitor and control industrial parameters like flow, level, pressure, temperature, pH problems.
- **Identify** optimal values for PID controller and realize Electronic, Pneumatic and Hydraulic Control actions for different applications.
- **Learn** to apply software tools typically used by process control professionals.

List of Experiments

1. Realization of PID control actions and time response analysis with electronic controllers for First and Second Order Systems Using Process Controller Simulator.
2. Effect of ON-OFF, P, PI, PD and PID controller on Liquid Level Process Dynamics.
3. Temperature control process with PID Control Action.
4. Servo and Regulator operation for Set point tracking and Disturbance Rejection for DC Servo Motor.
5. Realization of control actions with Pneumatic and Hydraulic Actuation.
6. Optimum Controller settings with Process reaction curve tuning method Using Process Controller Simulator.
7. Optimum Controller settings with continuous and damped oscillation tuning method Using Process Controller Simulator.
8. Effect of ON-OFF, P, PI, PD and PID controller on Flow Process Dynamics.
9. Experimental analysis of Control valve characteristics (Different types).
10. Realization of Feed forward control System for Flow-Level Process Station.
11. Multi loop control systems for Flow-Level Process Station using Ratio Control.
12. Multi loop control systems for Flow-Level Process Station using Cascade Control.
13. Mathematical Modeling and Time Response Analysis of Interacting and non interacting system.
14. Neutralization of waste water using PID controller for pH Control System.

PRACTICE: Simulation through Lab VIEW software.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**1**	**4**

(5EI09) VIRTUAL INSTRUMENTATION

Course Objectives

Student will be able to

- **Develop** virtual instruments for specific application using LabVIEW software.
- Ease the programming required to make computer interact with real world.
- To **acquire**, **analyze** and **display** the throughput of any compactible system.
- Knowledge to **connect** with third party software and hardware

Course Outcomes

After completion of the course the student is able to:

- Create Virtual Instrument using LabVIEW software for Control system, Signal Processing and Image processing applications.
- Create effective Virtual Instrument that shall use minimum memory space and work effectively with any processor.
- Interface the computer with DAQ to monitor, process and control real world applications
- Analyze the throughput using the tools in LabVIEW software

UNIT I

Virtual Instrumentation:

An introduction

Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming..

UNIT II

VI programming techniques

VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, mathscript .

UNIT III

VI Interface requirements

Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI, VISA and IVI, Data Acquisition Hardware

UNIT IV

Application of Virtual Instrumentation

Application of Virtual Instrumentation: Instrument Control using RS-232C and IEEE488, Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, Active X programming, Publishing measurement data in the web.

UNIT V

VI toolsets

Distributed I/O modules, Control Design and Simulation, Digital Signal processing tool kit, Image acquisition and processing, Motion control

TEXTBOOKS

1. LabVIEW Graphical Programming, Gary Johnson, Second edition, McGraw Hill, Newyork, 1997.
2. LabVIEW for everyone, Lisa K. wells & Jeffrey Travis Prentice Hall, New Jersey, 1997.

REFERENCES

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.
2. Rick Bitter ,LabVIEW advanced programming technique, 2nd Edition, CRC Press,2005
3. Jovitha Jerome, Virtual Instrumentation using LabVIEW, 1st Edition, PHI, 2001.

WEB RESOURCES

www.ni.com
www.ltrpub.com

PRATICE: Subject practice through LABVIEW software.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI10) ANALYTICAL INSTRUMENTATION

Course Objectives

Student will be able to

- Students will be introduced to a whole array of modern analytical instrumentation with the goal of providing them with the tools with which they can further their applied research.
- The emphasis will be a "hands-on" approach with sample preparation, theory, application, method development, data analysis and interpretation being key elements.
- **Interpret** data derived from any of the above mentioned spectroscopic instruments
- **Appreciate** the basic concept, principles and terms of chromatography

Course Outcomes

After completion of the course the student is able to:

- **Understand** the principles,procedures and applications of Analytical Instrument and analytical techniques
- **Use** statistical method for evaluating and interpreting data
- **Appreciate** the basic principles of spectroscopy and chromatography techniques.
- **Integrate** different analytical techniques to solve analytical and bio-analytical problems

UNIT I

Electrochemical Instruments

Basic concepts of Analytical Instrumentation, Electro chemical instruments- pH meter, Conductivity meter, Dissolved oxygen analyzers, sodium analyzers, silica analyzers

UNIT II

Spectrophotometers-I (Absorption)

Concepts of Spectrometry, Beer- Lambert's law-Derivation of Beer Lamberts Law- Problems associated with the Law. UV, VIS spectrophotometers – single beam and double beam instruments – Instrumentaion associated with the above spectrophotometers – sources and detectors.

IR Spectrometers – sources and detector, Instrumentation associated with the above spectrophotometers, FTIR. Interpretation and Analysis.

Spectrophotometers-II (Emission)

Flame emission and Atomic emission spectrophotometers – Sources for Flame Photometers, Online calorific value measurements**.**

UNIT III

Gas and Liquid Chromatographs

Chromatography – types- Basic principles of gas chromatography, liquid chromatography (HPLC) ---- different types of columns, detectors, recorders and associated equipment for Gas and Liquid Chromatographs and their applications,Interpretation and Analysis.

Principles of Nuclear Magnetic Resonance

Instrumentation associated with NMR spectrophotometer – Introduction to mass spectrophotometers, Introduction and Working Principle of Electron Spin Resonance (ESR),Interpretation and Analysis.

UNIT IV

Gas Analyzers-I

Analysis using Thermal conductivity principle, Katharometer – oxygen analyzers using paramagnetic principle, H_2S analyzer system.

Gas Analyzers-II

CO monitors, NO_x analyzers, Industrial analyzer circuits, Pollution Monitoring systems

UNIT V

Thermal Analyzers

Differential Scanning Calorimetry (DSC), Derivative Thermo Gravimetric Analyzers(DTGA).

Nuclear Radiation Detectors

Gas filled Detectors- GM counters, Scintillation counter, Ionization chamber, Proportional counter, solid state detector.

TEXT BOOKS

1. Handbook of Analytical Instrumentation, R.S. Khandpur, TMH.
2. Instrumental Method of Analysis- by Willard.H.H, Merrit L.L,Dean, D.VanNostrand, CBS publishing and Distributors, 6/e, 1995.

REFERENCES

1. Process Measurement and Analysis- by B.G. Liptak, CRC Press
2. Principles of Instrumental Analysis- by Skoog D.A and West D.M, Holt Sounder publication,Philadelphia,1985
3. Instrument Technology- by Jones B.E, Butterworth Scientific Publications, London, 1987.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI11) PC BASED INSTRUMENTATION

Course Objectives

Student will be able to

- It is to **provide** and **ensure** a comprehensive understanding of using personal computers in measurement and control instrumentation.
- **Learn** the process of collecting information/ data through PC from real world sources.
- **Learn** remote and networked data acquisition and operating system.
- **Learn** programmable logic controllers, and its application.

Course Outcomes

After completion of the course the student is able to:

- Understand the main functional units in a PC and be able to explain how they interact. They should know different bus types, and on this basis be able to distinguish account for different generations of PCs.
- Understand the basics of PLC and its programming.
- Apply different PLC functions to applications.
- Learn the basics of SCADA.

UNIT I

Review of Computer Instrument Communication:

Personal Computer, Overview of operating System, I/O Ports, Plug-in-slots, PCI bus, Operators Interface. Computer Interfacing for Data Acquisition and Control – Interfacing Input Signals, Output system with continuous actuators. Data Acquisition and Control using Standard Cards: PC expansion systems, Plug-in Data Acquisition Boards; Transducer to Control room, Backplane bus – VXI.

UNIT II

Programmable logic controller (PLC) basics:

Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.

Basic PLC programming:

Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

UNIT III

PLC intermediate and advanced functions

Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC,

UNIT IV

Application of PLC

Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating

Related Topics

Alternate programming languages. Auxiliary commands and functions.PLC installation, troubleshooting and maintenance. Field bus: Introduction, concept. HART protocol: Method of operation, structure, and applications. Smart transmitters, smart valves and smart actuators.

UNIT V

SCADA BASICS

Computer Process interface for Data Acquisition and control – Computer control loops.– Supervisory Digital Control (SCADA) - introduction and brief history of SCADA – SCADA Hardware and software – Landlines for SCADA – use of modems in SCADA – SCADA with LAN

TEXT BOOKS

1. Programmable Logic Controllers – Principles and Applications, John. W .Webb Ronald A Reis , Fourth edition, Prentice Hall Inc., New Jersey, 1998.
2. Computer Control of Processes – M.Chidambaram. Narosa 2003

REFERENCES

1. Introduction to Programmable Logic Controllers - Gary Dunning Thomson Delmar Learning Second Edition Second reprint 2003.
2. PC Based Instrumentation and Control Third Edition by Mike Tooley ; Elsevier.
3. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control.
   By Kevin James; Elsevier.
4. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
5. Programmable Logic Controllers, Second edition, Frank D. Petruzella,Mc Graw Hill, Newyork, 1997.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective I	**3**	**0**	**3**

(5EI73) INSTRUMENTATION PRACTICES IN INDUSTRIES

Course Objectives

Student will be able to

- **Identify** and quantitatively estimate different materials required for the manufacturing of Cement, Pulp, Paper, food, Power and pharmacy.
- **Understand** the principles of different manufacturing processes.
- **Recognize** these principles written inform of mathematical & chemical equations.
- **Apply** these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical industrial problems.

Course Outcomes

After completion of the course the student is able to:

- **Apply** fundamental knowledge of chemistry & instrumentation to modeling and analysis of different Industrial engineering.
- **Understand** disasters caused by an incorrect analysis/design indifferent Industrial engineering system.
- Students will **demonstrate** a working knowledge of the basic principles of measuring techniques.
  and demonstrate technical knowledge and skills in the calibration and use of equipment used in different industrial process measurement and control.
- Students will **demonstrate** a working knowledge of safety practices and skills in trouble-shooting problems used in the measurement and control in industrial processes

UNIT I

Cement Industries

Corrosion Analyzer Porositester Compressive strength measurement, Blast Furnace Temperature Measurement using Radiation Pyrometers.

UNIT II

Pulp and Paper Industries

Manufacture of pulp: Raw materials, Pulping processes, Craft pulping, Soda pulping, Sulfite pulping, Semi chemical pulping, Mechanical and Thermo mechanical Pulping.

Manufacture of paper: Wet Processing, Fourdrinier Machine, Coated Papers, Special Papers.

Wet-end Instrumentation:

Pressure: Force Balanced, Bell and Limp or Slack type systems

Temperature: Liquid in Glass, Thermal bulbs, Resistance Bulbs

Liquid Density and Specific Gravity: Fixed Volume, Differential Pressure, Nuclear Radiation

Level: Liquid Level- Continuous Purge Instrument, Diaphragm box, Float and Cable, Capacitive.

Solid Level- Diaphragm solids.

Flow: Tapered tube & float type meter, Cylinder & Piston type meter, Weir and Flumes

Consistency: Atmospheric with Driven and Atmospheric with Stationary Sensors.

pH: pH Electrode system, types of electrodes.

Oxidation Reduction Potential (ORP): ORP Electrode system, electrode holders.

Freeness: Continuous Sample and Intermittent Sample Systems.

Dry-end Instrumentation:

Moisture: Conductivity, Resistance, Capacitance, Hygroscopic, Infrared Absorption type systems

Basis Weight: Transmission type, On-Machine type, Off-Machine type and Backscatter type systems

Caliper or Thickness: Contacting type- Electrical, Mechanical and Electro Mechanical, Non-Contacting type

UNIT III

Petroleum Industries

Unit Operations: Distillation, Drying Separation Measurements in refineries petrochemical industries –Differential pressure transmitter, Thermocouples Infrared Pyrometer, Mass flow meters, Potentiometric level Transmitter, Vacuum Measurement, Near Infrared Analyzer, Hydro Carbon Dew point meter IR Spectrometry, Mass Spectrometry, Flame Ionization Detectors, Chromatography.

UNIT IV

Nuclear Power Plant

Introduction, The power plant scheme, Pressure, flow and level measurement, Vibration and expansion measurements, Analysis of impurities in cooling water, Flue Gas analysis, Ultrasonic Thermometry, Radiation Pyrometry, Emittance measurement.

UNIT V

Food Processing and Allied Industries

Chromatography, Spectrometry – Mass Spectrometer, Toxicity meter.

TEXT BOOKS

1. Chemical Process Industries, Austin G.T. Shreeves, McGraw-Hill International student edition, Singapore, 1985
2. Pulp and Paper Industry Technology & Instrumentation, Sankaranarayana, P.E., Kothari's Deskbook.

REFERENCES

1. An Introduction to Paper Industry Instrumentation, John R Lavigne, Miller Freeman Publications, Califirnia, 1985 Series.
2. Process measurement and analysis, Liptak B.G., Third edition, Chilton book Company, 1996.
3. Mearsurement and Control in Papermaking, Robert J. McGill, Adam Hilger Limited, Bristol, 1980.
4. Process/ industrial instruments and controls hand book, Gregory K. McMillan, Doig;as M. Considine.
5. Instrumentation in process industries, Liptak B.G., Chilton book Company, 1994.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective I	**3**	**0**	**3**

(5EE79) DIGITAL CONTROL SYSTEMS

Course Objectives

Student will be able

- To facilitate the knowledge of basic of digital control system for the real time analysis
- To analyze and design the controllers for digital sytems.
- To provide comprehensive knowledge of concepts of stability analysis and design of discrete time systems.
- To expose the students to the concepts of optimal control for discrete domain

Course Outcomes

After completion of the course the student is able to:

- To **expose** the students to the concepts of Digital control systems.
- To **provide** adequate knowledge of discrete systems in state variable analysis.
- To **teach** about the concept of stability analysis and design of discrete time systems.
- To **provide** comprehensive knowledge of optimal control.

UNIT I

SAMPLING AND RECONSTRUCTION

Introduction, sample and hold operations, sampling theorem, Reconstruction of original signal from sampled signal.

THE Z – TRANSFORMS

Introduction, Linear difference equations, pulse response, Z – Transforms, Theorems of Z – Transforms, the inverse Z – Transforms, Modified Z- Transforms

Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM

Z-Transform method for solving difference equations; Pulse transfer function, Pulse transfer function of closed loop system, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane: primary strips and complementary strips.

UNIT II

STATE SPACE ANALYSIS

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

CONTROLLABILITY AND OBSERVABILITY

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

UNIT III

STABILITY ANALYSIS

Stability Analysis of closed loop systems in the Z-Plane.Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. Stability analysis using Liapunov theorems.

UNIT IV

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers. Design of digital control through deadbeat response method.

UNIT V

STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

LINEAR QUADRATIC REGULATORS

Introduction to adaptive controls, Min/Max principle**,** Linear Quadratic Regulators, Kalman state estimation through Kalman filter.

TEXT BOOKS

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

REFERENCE BOOKS

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal, New age international publishers

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective I	**3**	**0**	**3**

(5IT08) OPERATING SYSTEMS

(Common to ECE, CSE, EIE& IT)

Course Objectives

Student will be able to

- **Analyze** the tradeoffs inherent in operating system design.
- **Summarize** the various approaches to solving the problem of mutual exclusion in an operating system.
- **Evaluate** the trade-offs in terms of memory size (main memory, auxiliary memory) and processor speed.
- **Understand** disk storage strategies and file strategies with protection and security issues.

Course Outcomes

After completion of the course the student is able to:

- **Identify** System calls and **evaluate** process scheduling criteria of OS.
- **Develop** procedures for process synchronization and scheduling services of an OS.
- **Distinguish** disk access, file systems supported by an OS.
- **Extend** operating systems virtual memory, protection and security aspects.

UNIT I

Computer System and Operating System Overview: Overview of Computer System hardware, Operating System Objectives and functions, Evolution of operating System, Example Systems. Operating System Services, System Calls, System Programs.

Process Management: Process Description, Process Control Block, Process States

UNIT II

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.

Concurrency: Cooperating Processes, Inter-process Communication, Principles of Concurrency, Mutual Exclusion, Software and hardware approaches, Semaphores, Monitors, Message Passing, Classic problems of synchronization.

UNIT III

Principles of deadlock: System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlocks, Dining philosopher's problem.

UNIT IV

Memory Management: Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.

Secondary storage structure: Disk structure; Disk scheduling, Disk management, Swap-space Management, RAID structure, Stable-storage Implementation, Tertiary-Storage Structure

UNIT V

File Management: File system-File concepts, Access methods, Directory structure, File system mounting, File sharing and Protection. Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance

Protection & Security: Protection mechanisms, OS Security issues, threats, Intruders, Viruses, Case studies: windows, Unix, Linux.

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems - Internal and Design Principles, Stallings, Fifth Edition-2005, Pearson education/PHI

REFERENCE BOOKS

1. Operating System A Design Approach-Crowley,TMH.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.
3. "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003 - Pramod Chandra P. Bhat.
4. Operating Systems – A concept based approach – DM Dhamdhere – 2nd Edition TMH

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective I	**3**	**0**	**3**

(5EI74) PRINCIPLES AND APPLICATION OF NANOTECHNOLOGY

Course Prerequisites: Engineering Physics, Engineering Chemistry, Electronic Devices & Circuits

Course Objectives

- **Introduce** the multidisciplinary nature of nanotechnology and its applications
- **Outline** various nanomaterials and methods manipulating these materials for wide variety of applications
- **Introduce** Instrumentation for nanoscale measurements
- **Enumerate** specific applications of nanotechnology to electronics and medicine

Course Outcomes

After completion of the course the student is able to:

- Evaluate the design considerations for nanoscale materials, devices, and structures in a wide variety of applications
- Gain theoretical knowledge to synthesize, manipulate, characterize, and use nanomaterials for typical applications
- Appreciate the need for specialized metrology for nanoscale measurements and familiarize with various commonly used equipment
- Identify the applications of nanotechnology to electronics with focus on the use of III-V compounds and carbon nano-tubes and Learn the advancements in the field of medicine due to the advent of nanotechnology.

UNIT I

INTRODUCTION TO NANOTECHNOLOGY

Introduction & History: Overview of atomic physics; Chemistry of atoms and molecules; Overview of quantum mechanics; Feynman's perspective of nanoscience; Social impact of nanotechnology; Motivation, Top-down vs. Bottom-up approaches

Applications: Electronics, instrumentation, medicine, aerospace, and material science.

Considerations: Size constraints on measurements; Constraints of thin-film structures, constraints due to dimensions of nanostructures; Optical, Electronic, and Magnetic Properties at Nanoscale

UNIT II

NANOMATERIALS AND FABRICATION

Introduction to Nanomaterials: Metal Nanomaterials, Semiconductor nanomaterials, Quantum Dots, Quantum Wells, 2-terminal Quantum Wires, Buckyballs, Carbon Nanotubes, Nano Peapods, Nano Rods, Polymer-based Nanostructures, Gold Nanostructures: Nano-rods, Nano-cages, Nano-shells

Fabrication Techniques: Top-down approach – Nanolithography, CVD; Bottom-up approach – sol-gel process, chemical synthesis, wet deposition techniques, Self-assembly and Layer-by-layer assembly (LbL)

UNIT III

NANOSCALE MEASUREMENTS

Instrumentation: Principle of working, Operational aspects, Limitations, and Applications for: SEM, TEM, STM, SPM, AFM, Fluorescence microscopy

UNIT IV

NANOELECTRONICS

Materials: Graphene, Boron Nitride Nano-mesh, III-V compounds: GaAs, GaN, AlGaN, InGaAs, High-K/Metal-Gate applications for non-Si nanoelectronics

Devices: Silicon nanowires, Carbon Nanotubes, III-V Quantum Wells, Ballistic deflection transistors (BDT)

Applications: Printed electronics, Molecular electronics, Spintronics, Nanoelectronic displays, Memory devices, Electronics modelled after living systems

UNIT V

NANOMEDICINE

Nanoprinting of DNA, RNA, and proteins; Site-directed drug delivery: Discovery, delivery, and controlled drug release; Cytotoxicity of Nanoparticles; Nanotechnology in regenerative therapy; Nanotechnology in cancer treatment; NEMS sensors and biosensors; Lab on a Chip (LoC)

TEXTBOOKS

1. Poole, C.; Owens, F., “Introduction to Nanotechnology”, *Wiley*, 2007 (ISBN: 978-8126510993)
2. Ramachandra, M.S.; Singh, S., “Nano Science and Nanotechnology: Fundamentals to Frontiers”, *Wiley India Pvt. Ltd.*, 2013 (ISBN: 978-8126542017)
3. Pradeep, T., “Nano: The Essentials: Understanding Nanoscience and Nanotechnology”, *McGraw Hill India*, 2007 (ISBN:978-0070617889)

REFERENCE BOOKS

1. Bhushan, B. (Ed.), “Springer Handbook of Nanotechnology”, *Springer*, 2006 (ISBN: 978-3540298557)
2. Theodore, L., “Nanotechnology: Basic Calculations for Engineers and Scientists”, *Wiley India Pvt. Ltd.*, 2011 (ISBN: 978-8126529667)
3. Varghese, T.; Balakrishna, K.M., “Nanotechnology: An Introduction to Synthesis, Properties and Applications of Nanomaterials”, *Atlantic*, 2012 (ISBN: 978-8126916382)

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective -II	**3**	**0**	**3**

(5IT06) COMPUTER NETWORKS

(Common to ECE,CSE, EIE& IT)

Course Objectives

- **Analyze** the terminology and concepts of the OSI and TCP-IP reference model.
- **Examine** various error correction and error detection methods.
- **Learn** addressing mechanisms efficiently to build a network.
- **Understand** and **predict** the Pros and cons of existing protocols and its working procedures.

Course Outcomes

After completion of the course the student is able to:

- **Demonstrate** the Layered Architecture (OSI and TCP-IP reference models) of Computer Networks.
- **Apply** all the error correction and detection mechanisms.
- **Implement** the Addressing mechanisms to assign IP addresses to network efficiently.
- **Design** and **formulate** new protocols or reproduce the existing protocols for efficient working of computer networks.

UNIT I

Data communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN

Physical layer: Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT II

Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.

Medium Access sub layer: ALOHA, CSMA/CD, LAN - Ethernet IEEE 802.5 - IEEE 802.11, Random access, Controlled access, Channelization,

UNIT III

Network layer: Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

UNIT IV

Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, Qos, Integrated Services, Differentiated Services, QoS in Switched Networks.

UNIT-V

Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan , Fourth Edition TMH,2006.
2. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

REFERENCE BOOKS

1. Data communications and computer Networks, P.C .Gupta, PHI.
2. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
3. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
4. Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose&Keith W. Ross,3rd Edition, Pearson Education.
5. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective II	**3**	**0**	**3**

(5EC12)VLSI DESIGN

(Common to EEE, ECE& EIE)

Pre-requisites: Electronic Devices and circuits, Digital IC Concepts

Course Objectives

- To **learn** the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- To **study** the concepts of stick diagrams and layouts with the knowledge of MOS layers through design rules.
- To **study** gate level design of subsystems, integrated circuits
- To **learn** concepts of PLD's, design capture tools and CMOS testing.

Course Outcomes

After completion of the course the student is able to:

- Understand IC Fabrication process steps required for various MOS circuits
- Analyze electrical properties and layout flow for circuit level and gate level models
- Design and test VLSI circuits.

UNIT I

INTRODUCTION: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS ,CMOS and BiCMOS Circuits: I_{DS}-V_{DS} relationships, MOS transistor threshold Voltage, g_M, g_{DS}, figure of merit w_o, Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pull-down ratio(Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

UNIT II

VLSI CIRCUIT DESIGN PROCESSES: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts , CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

UNIT III

GATE LEVEL DESIGN AND LAYOUT: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS , Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance R_S and its concept to MOS, Area Capacitance Units, Calculations, The delay unit T, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT IV

SUBSYSTEM DESIGN: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial-Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements.

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN: PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Programmable Logic Array Design Approach.

UNIT V

VHDL SYNTHESIS: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

CMOS TESTING : CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Over view of Chip level Test Techniques and System-level Test Techniques, Layout Design for Improved Testability.

TEXTBOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Dougles and A. Pucknell, PHIEdition, 2005.
2. Modern VLSI Design –Wayne Wolf, Pearson Education , 3rd Edition, 1997.
3. CMOS VLSI Design – A circuits and systems perspective, Neil H.E Weste , David Harris , Ayan Banerjee,pearson ,2009.

REFERENCE BOOKS

1. CMOS logic circuit Design – John P. Uyemura , Springer , 2007
2. VLSI DESIGN – K.Lal Kishore , VSV Prabhakar – I.K..International ,2009
3. VLSI Design – A.Albert Raj, Latha PHI, 2008.
4. Introduction to VLSI Design- Mead and Convey , BS Publcations, 2010.
5. VLSI Design – M. Michal Vai, CRC Press, 2009.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective II	**3**	**0**	**3**

(5EI75) ROBOTICS AND APPLICATIONS

Course Objectives

Student will be able to

- **Classification** by coordinate system and control system
- **Acquire Knowledge**on Different types Power Sources and Sensors
- **Classification** of Manipulators, Actuators and Grippers
- **Acquire Knowledge** on kinematics and Applications of different Robots

Course Outcomes

After completion of the course the student is able to:

- **Acquire knowledge** on different types of Power Sources (actuators) and Sensors, Classification Of Manipulators, Actuators and Grippers
- **Acquire knowledge** on different applications of various types of robots.
- **Analyze** the direct and the inverse kinematic problems and calculate the manipulator dynamics
- Able to **identify** the applications of robots in different process operations.

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UNIT I: Basic Concepts & Power Sources

Fundamentals:

An over view of Robotics, classification of Robots, Robot Components, Robot degreesof freedom, Robot Joints, Robot Coordinates, Robot reference frames, Programming modes, Robot Characteristics.

Actuators:

Characteristics of activating system, comparison of activating system Hydraulic devices, Pneumatic devices, electric motors, magnetostrictive actuators.

UNIT II: Sensors, Manipulators and Grippers

Sensors: Sensors characteristics, Position sensors, velocity sensors, acceleration sensors, torque sensors, micro switches, lighten infrared sensors, touch and tactile sensors, proximity sensors, range finders.

Grippers: Robot end effectors, Classification, drive system for Gripper, Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Adhesive Grippers, Hooks, Scoops and other Miscellaneous Devices, Gripper force Analysis and Gripper Design, Active and passive Grippers.

UNIT III: Kinematics

Matrix representation of translational and Rotational motion – Homogeneous Transformation-DH representation of standard configuration Robots- Inverse Kinematics.Joint space vs. Cartesian space-Basics of Trajectory planning in joint and Cartesian space.

UNIT IV: Low level and high level vision

Image acquisition, Illumination Techniques, Imaging Geometry, Some Basic Relationships between Pixels, Segmentation, Description, Segmentation and Description of 3-D Structures, Recognition, Interpretation.

UNIT V: Robot Applications

Material Transfer and Machine loading/unloading: General Considerations in Robot Material Handling, Material Transfer application, Machine loading and unloading. Liquid handling and pumping.

Processing operations: Spot welding, Continuous Arc Welding, Spray Coating, other processing operations using Robots.

Assembly and Inspection: Assembly and Robot Assembly automation, Parts Presentation methods, Assembly operations, compliance and the Remote Center Compliance (RCC) Device, Assembly system configuration, Adaptable-Programmable assembly system, Designing for Robotic Assembly, Inspection Automation.

TEXT BOOKS

1. Mikell. P, Weiss .G.M, Nage.l R.N and Odraj .N.G, "*Industrial Robotics"*,McGraw Hill Singapore, 1996.
2. Ghosh, "*Control in Robotics and Automation: Sensor Based Integration"*,Allied Publishers, Chennai, 1998.

REFERENCES

1. Deb.S.R, "*Robotics technology and flexible Automation"*, John Wiley, USA1992.
2. Asfahl. C.R, "*Robots and manufacturing Automation"*, John Wiley, USA 1992.
3. Klafter. R.D, Chimielewski. T.A, Negin. M, "*Robotic Engineering – An integrated approach"*, Prentice Hall of India, New Delhi, 1994.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
Elective II	**3**	**0**	**3**

(5EE80) ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC

(Common to EEE, ECE& EIE)

Course Objectives

- To **cater** the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- To **expose** the students to the concepts of feed forward neural networks and about feedback neural networks.
- To **teach** about the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control
- To **teach** the design of fuzzy logic controllers.

Course Outcomes

After completion of the course the student is able to:

- The concepts of feed forward neural networks and learning and understanding of feedback neural networks.
- Concept of fuzziness involved in various systems and fuzzy set theory.
- Comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic.
- Adequate knowledge of application of fuzzy logic control to real time systems.

UNIT I

INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Biological Neuron and organization of the brain, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model and Design of logic gates, Historical Developments, Potential Applications of ANN.

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics

(Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT II

SINGLE LAYER FEED FORWARD NEURAL NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem and concepts, Limitations of the Perceptron Model, Applications.

MULTILAYER FEED FORWARD NEURAL NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Learning Difficulties and Improvements.

UNIT III

ASSOCIATIVE MEMORIES

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Applications.

UNIT IV

CLASSICAL AND FUZZY SETS

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Operations, properties, fuzzy relations, membership functions.

FUZZY LOGIC SYSTEM COMPONENTS

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT V

APPLICATIONS

NEURAL NETWORK APPLICATIONS: Process identification, control, fault diagnosis and load forecasting.

FUZZY LOGIC APPLICATIONS: Fuzzy logic control, Design and Analysis

TEXT BOOKS

1. Neural Networks, Fuzzy logic, Genetic algorithm - synthesis and applications by Rajasekharan and Rai, PHI Publications.
2. Artificial neural networks by B.Yegnarayana, PHI publications.

REFERENCE BOOKS

1. Neural Networks by James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks by Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
5. Introduction to Artificial Neural Systems by J.M.Zurada, Jaico Publishing House.
6. Introduction to Neural Networks using MATLAB 6.0 by S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI56) VIRTUAL INSTRUMENTATION LABORATORY

Course Objectives

Student will be able to

- **Acquire** the concepts towards measurement and automation through LabVIEW.
- **Acquire** knowledge about how to control an external measuring device by interfacing a computer.
- Be **competent** in data acquisition and instrument control.
- **Provide** knowledge on developing different applications in Digital image processing ,control system, signal processing and simulation.

Course Outcomes

After completion of the course the student is able to:

- **Design** virtual instrument for any application
- **Acquire** ,analyze and display the result of any project performed
- **Suggest** a device to be interfaced based on the design constrains

List of Experiments

(Minimum 14 experiments should be completed)

1. Introduction to LabVIEW through examples-Front Panel, Block Diagram, Creating sub-VI using Icon and Connector Pane.
2. LabVIEW basic Programming through examples - Loops, Case Structures, Formula Node, Graphs, charts.
3. LabVIEW basic Programming through examples - Arrays, Clusters, Local & Global variables.
4. LabVIEW basic Programming through examples - File I/O, Strings, Event Structures.
5. Design a Level measurement VI with simulated sensor input (4 mA to 20 mA) that raise an alarm when the level crosses a fixed (user defined) limit.
6. Data Acquisition in LabVIEW - Acquiring analog signal from a function generator through NI-USB-6210 into LabVIEW using DAQ Assistant Express VI.
7. Plotting Dynamic Characteristics of a Spring-Mass Damper system using control Design & simulation module.
8. Design a Velocity controller for a DC Motor using PID toolkit and control design & simulation module.
9. Analysis of Sampling Theorem, Aliasing and Signal Reconstruction using LabVIEW DSP Module.

10. Design and Analysis of IIR and FIR filters using DFD tool kit in LabVIEW.
11. Noise Cancellation using Adaptive Filtering approach in LabVIEW.
12. Implementing a Digital filter system using LabVIEW DSP module and NI SPEEDY 33.
13. Finding the area of circular particles in a metal image using NI Vision assistant.
14. Free space optical communication using NI-ELVIS.
15. Measuring the characteristics of a low pass, high pass, and band pass filter using NI-ELVIS.

Lab VIEW: Control of real time process

16. LabVIEW based control to Flow process station
17. LabVIEW based control to Level process station
18. LabVIEW based control to Ratio and Cascade Control system process station.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI57) ANALYTICAL INSTRUMENTATION LABORATORY

Course Objectives

- To introduce the student to principles and theory of instrument analysis.
- To introduce the student to a whole array of modern analytical instruments .
- To emphasize a hands-on approach with sample preparation, application, method development, data analysis and interpretation being key elements.
- They can understand the applications and usage of Water quality , Air Quality ,Spectrometry, chromatography in real time industrial environments.

Course Outcomes

After completion of the course the student is able to:

- Develop an understanding of the range and theories of instrumental methods available in analytical instrumentation
- Apply knowledge pertaining to the appropriate selection of instruments for the successful analysis of complex mixtures
- develop an understanding of the role of the Instrumentation Engineer in measurement and problem solving in chemical analysis
- Expand skills in the scientific method of planning, developing, conducting, reviewing and reporting experiments

LIST OF EXPERIMENTS

1. Ambient and emission air monitoring using gas analyzer
2. Separation of different constituents in a mixture of chemical using chromatography
3. Identification of atoms and its concentration through absorption spectra with UV- VIS spectrophotometer.
4. Identification of chemical compound and its concentration using FTIR spectrometer.
5. Identification of atoms and its concentration through emission spectra using flame photometer.
6. Measurement of calorific value using digital bomb calorimeter
7. Determination of acid/alkaline nature of water using pH meter.
8. Food product quality determination using protein analyzers.
9. Qualitative analysis of milk –Milk Analyzer.
10. Determination of concentration of an unknown solution using colorimeter.
11. Radiation intensity measurement with varying distance and measurement of absorber thickness using nuclear radiation detector-G.M. counter.
12. Analysis of water quality using water purity meter
13. Measurement of TDS and conductivity of water using digital conductivity meter
14. Measurement of turbidity of water using digital turbidity meter.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI58) PROCESS CONTROL AUTOMATION LABORATORY

Course Objectives

- To make students **proficient** with PLC and SCADA programming
- To make students create **interface** between PLC and SCADA
- To make students **implement** PLC and SCADA for real time systems

Course Outcomes

After completion of the course the student is able to:

- **Write** PLC and SCADA programs for desired application.
- **Implement** PLC and SCADA control to real times systems.
- **Design** and **create** seamless interface between PLC and SCADA mincing the real industrial application.

PLC: Programming and applications

1. Overview of PLC systems, input/output modules, Power supplies and Isolators
2. Simulation: Creating Ladder diagrams for arbitrary applications
3. Basic Functions: register, timer, counter
4. Interfacing PLC with at least two real time process (Pressure Level)
5. Networking of PLC
6. Process Controllers and Loop Tuning using PLC

SCADA: Programming and Applications

1. Introduction to SCADA system, Industrial Application of SCADA
2. Remote Terminal Units programming
3. SCADA programming
4. Interfacing of SCADA and PLC
5. Remote Operation Monitoring using SCADA
6. Real time implementation of SCADA System to a process
   (DC Motor-RPM Control; Stepper Motor-Angular Displacement and Linear Displacement through Rack Pinion)
7. Implementation of SCADA interfaced PLCs to Flow Process Station
8. Implementation of SCADA interfaced PLCs to pH control system Process Station
9. Implementation of SCADA interfaced PLCs to split control system Process Station
10. Implementation of SCADA interfaced PLCs to Temperature Process Station
11. SCADA programming to simultaneously monitor and control the pH control system process Station, the split control system process Station and Temperature process station
12. Monitoring and evaluation of PLC network using SCADA.

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IV Year B.Tech EIE I Sem	**L**	**T/P/D**	**C**
	0	**4**	**2**

(5EI91) INDUSTRY ORIENTED MINI PROJECT

Course Objectives

- To make students learn about the Industrial Process
- To make students earn hands on experience in the Industrial Process

Course Outcomes

After completion of the course the student is able to:

- Understand the formulated industry / technical problem
- Analyze and / or develop models for providing solution to Industry / Technical problems
- Interpret and arrive at conclusions from the project carried out
- Demonstrate effective communication skills through oral presentation
- Engage in effective written communication through project report

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(5EI12) FIBER OPTIC AND LASER INSTRUMENTATION

Course Objectives

Student will be able to

- **Understand** the principles of optics and lasing action, Design of lasers.
- **Apply** the knowledge of Optics to fibers and understand the different industrial applications of Optical Fibers.
- **Learn** the various applications of Lasers in Instrumentation.
- **Understand** the Opto-Electronic devices and their principles of operation along with their applications.

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of Optics and lasers to design application specific optical fiber.
- Apply Lasers in Instrumentation for the measurement of Industrial parameters like Pressure, Temperature, and Level and find the solutions for the errors.
- Understand the advantages of using Lasers in the measurements.
- Understand the applications of Lasers in medicine.

UNIT I

Optical Fibers and Their Properties

Introduction to optical fiber - fiber characteristics - principles of light propagation through a fiber - Different types of fibers and their properties - Losses in the optical fiber - Dispersion - advantages and disadvantages of optical fibers.

UNIT II

Opto-Electronic Components

Optical sources: LED, LD - Optical detectors: PIN, APD - Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT III

Industrial Applications of Optical Fibers

Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and Strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications, Bio-Medical Applications in Endoscopy.

UNIT IV

Laser Fundamentals

Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Solid lasers, Gas lasers, Liquid lasers and Semiconductor lasers

UNIT V

Laser instrumentation

Industrial applications of lasers – Lasers for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect - Bio-medical applications ,Holography: Principle, Methods, Holographic Interferometers and applications.

TEXT BOOKS

1. 'Optical Fiber Communication – Principles and Practice', J.M. Senior, Prentice Hall of India, 1985.
2. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press

REFERENCES

1. Optical Fibre Communication and Sensors', M. Arumugam, Anuradha Agencies, 2002.
2. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
3. Optical Fibre Communication', G. Keiser, 'McGraw Hill, 1995.
4. Monte Ross, 'Laser Applications', McGraw Hill, 1968
5. 'Introduction to Opto Electronics', J. Wilson and J.F.B. Hawkes, Prentice Hall of India, 2001.

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Elective III	**3**	**0**	**3**

(5EI76) POWER PLANT INSTRUMENTATION

Course Objective:

Student will be able to

- **Understand**the working model of power plant
- **Understand**the necessity of a instrumentation engineer in a power plant
- **Understand**different components and their control in power plants.
- **Understand** various analyzers used in power plant

Course Outcome:

After completion of the course the student is able to:

- **Appreciate** the power generation technique used in different types of power plants
- **Appreciate** different parameters and their control in the power plant
- **Understand** and standby the saying "one watt saved = two watts generated".
- **Understand** the concepts of Nuclear power plants.

UNIT I

An Overview of Power Generation

Introduction-various sources of Electrical Energy - **Non-conventional Energy sources**- Wind power, solar power, tidal power, geothermal power, magnetohydrodynamic (MHD) Power, Fuel Cells, Biomass Power, **Conventional energy sources-** hydropower, nuclear power, gas power, steam power (Thermal Power), comparison of various conventional power plants, Importance of instrumentation and control in power Generation **–** Classification of Instruments in a power plant, objectives of Instrumentation and control.

Piping and Instrumentation diagram (P and I Diagram) – Examples of ISA Instrumentation diagram symbols, examples of SAMA instrumentation diagram symbols, examples of ISA and SAMA diagram, piping and instrumentation diagramming, Cogeneration of Power-back pressure turbine, pass-out turbine process heat unit, control rooms, thermal or boiler control room, electrical control room, plan of control rooms.

UNIT II

Instrumentation and Control in Water Circuit

Water circuit, boiler feed water circulation- natural circulation, forced circulation, combined circulation, **Measurements in Water Circuit-** Water Flow Measurement, Differential Pressure

transmitter (DPT), steam flow measurement, water and steam pressure measurements, water and steam temperature measurements, drum water level measurement.
Controls in water circuit-boiler drum level control, superheated steam temperature control, steam pressure control, **impurities in water and steam-** impurities in Raw Water, Effects of Impurities, Measurement of Impurities, feed water treatment.

UNIT III

Instrumentation and Control in Air-Fuel Circuit

Air-Fuel Circuit – Fuels, combustion air, flue gases, waste gases, **Measurements in Air-Fuel Circuit –** Measurement of flow/quantity, Measurement of Pressures, Measurement of Temperatures, Measurement of level.
Controls in Air-Fuel Circuit – Combustion control, furnace Draft Control, **Analytical Measurement –** Oxygen Measurement in Flue Gas, Measurement of carbon dioxide in flue gas, combustibles analyser ($CO+H_2$), Infrared flue gas analyser, smoke detector, dust monitor, closed circuit television, fuel analysers, chromatography, pollution monitoring instruments.

UNIT IV

Turbine Monitoring and Control

Introduction – Classification, instrumentation control points of View, Principal parts of steam turbines, **Turbine Steam Inlet System** – Inlet valve arrangements, inlet measurements, Governors, Turbine Measurements – Process Parameters, mechanical parameters, electrical parameters, Turbine control system **–** safety control systems, process control systems, **Lubrication for turbo-alternator –** Lubrication system, Controls in Lubrication system, **Turbo-Alternator Cooling System –** Lube Oil cooling system, Alternator/Generator cooling system.

UNIT V

Nuclear Power Plant Instrumentation

Introduction – Instrumentation and Control for Nuclear Power Plant - Important Components of I&C System - Evolution of I&C in NPP – Reactor Control **–** Methods of Control, Control loops, Functionsof control system, Pressurized water reactor (PWR) controls, boiler water reactor (BWR) controls, Liquid metal cooled reactor (LMCR) Control, role of reactor controls during start-up, normal operation and shut down.
Digital Architectures in Nuclear Power Plants- System-level Instrumentation and control architecture, safety related systems, non-safety-related systems, man machine interface system (MMIS), Instrumentation and controls architecture platform.
Radiation protection and monitoring – accident at three mile Island, USA, disaster at Chernobyl nuclear power plant, Ukraine, calamity at Fukushima, Daiichi nuclear power plant, Japan, Radiation Units, Biological Effects of Radiation, Radiation Monitoring, **Nuclear Reactor Safety** - Reactor protection system, Reactor Tripping, Engineered Safety Features, **Surveillance, Diagnostics and Prognostics** – Surveillance, Diagnosis, Prognosis.

TEXT BOOKS

1. Modern Power Station Practice, Volume.6, Instrumentation, Controls and Testing, Pergamon Press, Oxford, 1971.
2. Power Plant Technology, Wakil M.M., McGraw Hill.

REFERENCES

1. Standard Boiler operations-Questions and Answers., Elonka S.M and Kohal A.L.,– Tata McGraw Hill, New Delhi, 1994.
2. Power Plant Instrumentation by Prof. K. Krishna Swamy, Newage International Publisher.
3. Standard Boiler Operations - Questions and Answers – by Elonka S.M., andKohal A.L., TMH, New Delhi, 1994

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Elective III	**3**	**0**	**3**

(5EI77) MICRO ELECTROMECHANICAL SYSTEMS (MEMS)

Course Objectives

The course is intended for students to:

- **Acquire** knowledge about MEMS devices and their applications in various domains.
- **Understand** the techniques to fabricate MEMS devices.
- **Learn** the design considerations for MEMS devices and Microsystems.
- **Learning** to characterize Microsystems using optical and electron microscopy and other techniques.

Course Outcomes

After completion of the course the student is able to:

- **Apply** fundamental knowledge of physics and chemistry to design microsystems for various applications.
- **Select** appropriate tools and techniques considering particular practical need for a microsystem application.
- **Realize** the need for advancement of technology towards microsystems for better living in the society.
- **Understand** the need to keep oneself updated constantly to understand the ease of use of emerging technologies.

UNIT I

Fundamentals of MEMS

Overview of MEMS and Microsystems; Evolution of microfabrication; Applications of MEMS in optical devices (Micro-Opto-Electro-Mechanical Systems or MOEMS), healthcare and biomedicine (including Bio-MEMS and Bio-MOEMS), aerospace, telecommunications, consumer products, automotive, and industrial products; Working principles of microsystems: Microsensors – acoustic wave, bio-, chemical, optical, pressure, thermal; Microactuation – thermal, shape-memory alloys, piezoelectric, electrostatic; MEMS devices – Microgrippers; Micromotors; Microfluidics – Micropumps, Microvalves; Micro accelerometers

UNIT II

Materials for MEMS and Microsystems

Substrates and Wafers; Silicon as a Substrate, Silicon Compounds, Silicon piezoresistors, Non-silicon based materials: Gallium Arsenide, Gallium Nitride, Quartz, Piezeoelectric Crystals, Polymers.

Unit III

Basics of Micromanufacturing

Photolithography; Cleanroom Environment; Deposition techniques: Ion implantation, Diffusion, Vapour Deposition (PVD, CVD, PECVD), Oxidation, Epitaxial growth; Etching techniques: Chemical (Wet) Etching, Plasma (Dry) Etching

Design considerations; Process Design; Photomask layout using CAD; Mechanical design overview

UNIT IV

Fabrication of MEMS

Bulk micromachining, Surface micromachining, LIGA Process, Deep X-Ray Lithography (DXRL)

UNIT V

Characterization of MEMS

Characterization techniques: Principle of working and operation of: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM), X-Ray Diffraction (XRD), Optical microscope

TEXT BOOKS

1. Tai-Ran Hsu, “MEMS and Microsystems Design and Manufacture”, *Tata McGraw-Hill*, 2002 (ISBN: 978-0070487093)
2. N. Mahalik, “MEMS”, *McGraw-Hill Education (India) Pvt. Ltd.*, 2007 (ISBN: 978-0070634459)

REFERENCE BOOKS

1. Marc J. Madou, “Fundamentals of Microfabrication: The Science of Miniaturization”, *CRC Press*, 2002 (ISBN: 978-0849308260)
2. Stephen D. Senturia, “Microsystem Design”, *Springer*, 2004 (ISBN: 978-8181285461)
3. Ville Kaajakari, “Practical MEMS”, *Small Gear Publishing*, 2009 (ISBN: 978-0982299104)

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Elective III	**3**	**0**	**3**

(5EC14) EMBEDDED REAL TIME OPERATING SYSTEMS

(Common to EEE, ECE& EIE)

Pre-requisites: Microprocessor and Microcontrollers Concepts

Course Objectives

Student will be able to

- **Learn** the general embedded system concepts
- **Understand** design of embedded hardware and software development tools
- **Learn** the basics of OS and RTOS
- **Describe** key issues such as CPU scheduling, memory management, task synchronization, and file system in the context of real-time embedded systems.

Course Outcomes

After completion of the course the student is able to:

- Understand and design real time and non real time embedded systems
- Define the unique design challenges of real-time systems and program them.
- Understand unique characteristics of RTOS and use RTOS to build an embedded real-time system

UNIT I

FUNDAMENTALS OF EMBEDDED SYSTEMS

Definition – Classification of Embedded Systems - Processors in the system - Other Hardware units. Software components - Examples for embedded systems, Design issues and trends

UNIT II

EMBEDDED HARDWARE DEVELOPMENT ENVIRONMENT

Processor Architecture- Structured units of a processor - Processor selection factors. Common memory devices - Memory selection - Memory map - Internal devices & I/O devices, Serial devices - Parallel port devices, Timer and Counting devices - Direct memory access, Communication Interface Standards.

UNIT III

EMBEDDED SOFTWARE DEVELOPMENT ENVIRONMENT

Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems, Host and Target machines, Linkers/Locators for embedded software, getting embedded software into the target system, Testing on host machine.

UNIT IV

REAL TIME OPERATING SYSTEMS CONCEPTS -I

Typical OS structure - RTOS structure - The context of its use - Schedule management for multiple tasks - Scheduling in real time - RTOS task scheduling models – Round Robin, Round Robin with Interrupts, Priority driven- Preemptive and Non-preemptive scheduling

UNIT V

REAL TIME OPERATING SYSTEMS CONCEPTS -II

Tasks and Task states, Tasks and Data, Semaphores and shared data, Message queues, Mailboxes and Pipes, Timer functions, events, Memory management, Interrupt routines in an RTOS environment.

Case study of RTOS using MUCOS. Case study for RTOS based programming - Coding for Automatic Chocolate vending machine using MUCOS.

TEXT BOOKS

1. An Embedded Software Primer – David E. Simon, Pearson Ed., 2005.
2. Embedded systems - architecture, programming and design - Raj Kamal; Tata McGraw Hill

REFERENCES

1. Real time Systems", J. W. S. Liu, Pearson
2. The 8051 Microcontroller & Embedded Systems using Assembly and C by Ayala & Gadre, Cengage Publications

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Elective III	**3**	**0**	**3**

(5EC80)DSP PROCESSORS AND ARCHITECTURES

(Common to ECE& EIE)

Pre-requisites: Digital Signal Processing

Course Objectives

Student will be able to

- **Study** the Architectural details of TMS320C54xx DSPs and the concepts involved in execution control and pipelining
- **Analyze** the importance of numeric formats and sources of errors in DSP implementation
- **Understand** the concepts of Memory & I/O interfacing
- **Develop** various algorithms

Course Outcomes

- Design systems considering sampling rate
- Apply different DSP processor for various applications.
- Design and implement real time signal processing algorithms.

UNIT I

Introduction to DSP Processors

Digital Signal Processors, various architectures: VLIW Architecture, Multiprocessor DSPs, SHARC, SIMD, MIMD, RISC and CISC.

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branch effects, Interrupt effects,Pipeline Programming models.

UNIT II

Typical real-time DSP systems

Data representations and arithmetic, Analog - to – digital conversion process, Uniform and non-uniform quantization and encoding, Oversampling in A/D conversion, Digital to analog conversion process: signal recovery, the DAC, Anti-imaging filtering, Oversampling in D/A

conversion, Analog I/O interface for real-time DSP systems, sources of errors in DSP implementation, real time implementation considerations.

UNIT III

Fixed-Point DSP Processors

Architecture of TMS 320C 5X, C54X Processors, addressing modes, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors, speed issues.

UNIT IV

Memory and I/O Interfacing

External bus interfacing signals, Memory interface, Parallel I/O interface: Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Hardware interfacing, Multichannel Buffered Serial Port (McBSP), McBSP Programming, CODEC interface circuit.

UNIT V

Implementation of DSP algorithms

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX.

TEXT BOOKS

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processing A Practical approach, Second Edition, Emmanuel C. Ifeachor,Barrie W Jervis,Pearson Publications. 2002.

REFERENCES

1. Digital Signal processors Architectures, implementations and Applications-Sen M.Kuo, Woon-Seng S.Gan, Pearson Publications, 2009.
2. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar,TMH, 2004.
3. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.
4. DSP Processor Fundamentals, Architectures and Features – Lapsley, S. Chand, 2000.
5. “DSP Applications with TMS 320 Family”, K. Shin ,Prentice Hall, 1987.

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IV Year B.Tech EIEII Sem	**L**	**T/P/D**	**C**
Elective IV	**3**	**0**	**3**

(5EI78) PHARMACEUTICAL INSTRUMENTATION

Course Objectives
Student will be able to

- **Understand** the working pharmaceutical industry
- **Understand** the necessity of a instrumentation engineer pharmaceutical industry
- **Understand** different components and their control in pharmaceutical industry.

Course Outcomes
After completion of the course the student is able to:

- Appreciate the concept of analytical instrumentation learned during previous semester.
- Appreciate the necessity of homogenization of mixture and size reduction .
- Appreciate evaporation process involved in pharma industries.
- Appreciate distillation and filtration process involved in pharma industries .

UNIT I

Introduction: Pharma Industries Basic Processors and Instrumentation Techniques, Process Analysis Technology(PAT).

Filtration: Classification of Filtration, Mechanism of Filtration, Filter media, Filter Aids, Pre treatment of materials, small scale filtration methods, filtration equipment, filter presses, Leaf filters, stacked disc filters, meta filters, Rotary continuous filters, other methods, ceramic filters, seitz filters, sintered (fritted) Glass filters, Membrane filters, factors affecting the rate of filtration, filter operation, theory of filtration, Limitations of filter theory.

Centrifugation: General principles, theoretical aspects, classification, Laboratory equipment, Large scale equipment, Semicontinuous centrifuge, equipment with non-perforated basket, de laval clarifier, vertical solid bowl centrifuges, continuous centrifuges.

Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter, etc. Factors affecting filtration, mathematical problems on filtration, optimum-cleaning cycle in batch filters. Principles of centrifugation, industrial centrifugal filters, centrifugal filters, and centrifugal sedimeters.

UNIT II

Crystallization: Introduction, Crystal forms and crystal Habit, classification of crystallizers, tank crystallizers, agitated batch crystallizers, Swenson Walker Crystallizer, others, Krystal Crystallizer, Vacuum Crystallizer without External Classifying seed Bed, theoretical aspects of Crystallization, Calculation of yields, theory of Crystallization. The miers super saturation theory, limitations of themiers theory, rate of crystal growth, Caking of crystals.

Characteristics of crystals like; purity, size, shape, geometry, habit, forms, size and factors affecting it. Solubility curves and calculation of yields, Material and heat balances around Swenson Walker Crystallizer. Super saturation theory and its limitations, Nucleation mechanisms, crystal growth. Study of various types of crystallizers, tanks, agitated batch, single vacuum, circulating magma and crystal crystallizers. Caking of crystals and its prevention. Numerical problems on yields.

UNIT III

Humidity control and Refrigeration: Basic concepts and definition, wet bulb temperature, adiabatic cooling lines, use of Humidity chart, determination of humidity, air conditioning, humidification and humidifying equipment, dehumidifiers. Introduction, refrigeration equipment, coefficient of performance and refrigerants, Brine systems, refrigeration load, absorption systems.

Evaporation and Distillation Heat Processes: Factors affecting evaporation, study of evaporating stills and evaporating pans, heat transferring evaporators, vapor compression evaporators and evaporation under reduced pressure. Distillation: Importance of distillation in Pharmacy, methods of distillation. Brief introduction to freeze drying, sublimation, desiccation and exsiccation, efflorescence and its importance.

UNIT IV

Size Reduction and Separation

Introduction, mechanism and principles of size reduction, classification of size reduction equipment, law of size reduction, large equipment, mills using impact force for size reduction, cage mills, pin mills, fluid energy or jet mills, attrition and grinding mills tumbling mills. Ball mills and tube mills, practical size classifiers used with grinding mills, wet classifiers, non-rotary ball and bead mills, dry vs wet grinding, end runner mill, edge runner mills, disc attrition mills, dispersion and colloid mills, roller mills, size reduction combined with other operations, factors influencing choice of size reduction machinery, changes resulting in the material due to size reduction.

size separation sieving, Screening equipment, sedimentation, screen analysis Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill etc.

Various methods and equipments employed for size separation, centrifugal elutriation, microscopic methods.

UNIT V

Mixing and Homogenization

Introduction, equipment for4 mixing of miscible liquids, mixing of a soluble solid with a low viscon liquid etc., mixing solids with solids, equipment, consideration while choosing solids mixing equipment, theory of mixing, mixing solids with liquids, mixing miscible liquids, mixing viscous masses, mixing of immiscible liquids, equipment for emulsification.

Theory of mixing, solid solid, solid liquid and liquid liquid mixing equipment, double cone, twin-shell, silverson mixer, colloid mill, sigma blade mixer, planetary mixer, propeller mixer and turbine mixer. Semi solid mixing, Triple roller mill.

TEXT BOOKS

1. Pharmaceutical Engineering . K. Samba Murthy,
2. Pharmaceutical Engineering CVS Subhramanyam,.

REFERENCE BOOKS

1. Tutorial Pharmacy, S.J. Carter, Cooper and Gunn's, 6th ed., CBS publisher, Delhi.Perry's Handbook of Chemical Engineering.
2. Unit Operations by Mc Cabe & Smith.

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
Elective IV	**3**	**0**	**3**

(5EC79) INTERNET OF THINGS

(Common to EEE, ECE & EIE)

Course Objectives

- To understand the basics of Internet of Things
- To get an idea of some of the application areas where Internet of Things can be applied
- To understand the concepts of web and middleware for Internet of Things
- To understand the concepts of Cloud of Things with emphasis on Mobile cloud computing and IOT protocols

Course Outcomes

After Completion of the course the student is able to

- Identify and design the new models for market strategic interaction
- Design business intelligence and information security for Web
- Analyze various protocols for IoT and Design different models for network dynamics

UNIT I

Introduction

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user. Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security

UNIT II

IOT Protocols

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security.

UNIT III

Web of Things

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

UNIT IV

Integrated

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects – Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon

UNIT V

Applications

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

TEXT BOOKS

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011

REFERENCES

1. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012
2. The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
ElectiveIV	**3**	**0**	**3**

(5EC73) DIGITAL IMAGE PROCESSING

(Common to ECE, EIE & IT)

Pre-requisites: Digital Signal processing

Course Objectives

- To **introduce** fundamentals of digital image processing and study image transforms
- To **demonstrate** digital image processing techniques in spatial and frequency domains
- To **study** and **compare** various image compression algorithms
- To **study** advanced image analysis methods: image segmentation, morphological image processing, & image restoration

Course Outcomes

After completion of the course the student is able to:

- Acquire, represent the digital image and transforms
- Apply various intensity based image processing techniques
- Apply various pixel position based image processing techniques

UNIT I

Fundamentals of Image Processing: Digital Image Fundamentals, Basic steps of Image Processing System, Sampling and Quantization of an image, relationship between pixels, Imaging Geometry.

Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Haar Transform, Hadmard Transform, Hotelling Transform and slant transform.

UNIT II

Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

UNIT III

Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Edge Linking using Hough Transform, Thresholding, Region Based segmentation.

Wavelet based Image Processing: Introduction to wavelet Transform, Continuous wavelet Transform, Discrete wavelet Transform, Filter banks, Wavelet based image compression

UNIT IV

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, JPEG 2000 Standards.

UNIT V

Image Restoration: Image Restoration Degradation model, Algebraic approach to restoration, Inverse Filtering, Least Mean square filters.

Morphological Image Processing: Dilation and Erosion, Opening and closing, the hit or miss Transformation, Overview of Digital Image Watermarking Methods

TEXT BOOKS

1. Digital Image Processing- Rafael C. Gonzalez and Richard E.Woods, 3rd Edition, Pearson, 2008.
2. Digital Image Processing- S.Jayaraman, S Esakkirajan, T Veerakumar, TMH, 2010.

REFERENCES

1. Digital Image Processing-William K.Pratt, 3rd Edition, John Willey, 2004.
2. Fundamentals of Digital Image Processing-A.K.Jain, PHI, 1989.
3. Digital Image Processing using MATLAB - Rafael C. Gonzalez, Richard E.Woods and Steven L.Edding 2nd, TMH. 2010.
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyl, Cengage Learning,2008
5. Introduction to image Processing and Analysis – John C. Russ, J. Christian Russ,CRCPress, 2010

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IV Year B.Tech EIE IISem	**L**	**T/P/D**	**C**
Elective IV	**3**	**0**	**3**

(5EC84) AD-HOC WIRELESS NETWORKS

(Common to ECE & EIE)

Course Objectives

- To **learn** about fundamentals of Ad-hoc wireless networks.
- To **learn** about different types of MAC and ad-hoc routing protocols.
- Be **expose** to the TCP issues in Ad-hoc networks.
- **Learn** the architecture and protocols of wireless sensor networks.
- To **learn** about Qos and different power management schemes.

Course Outcomes

After completion of the course the student is able to:

- Explain the concepts, network architectures and applications of ad hoc wireless sensor networks
- Analyze the protocol design issues of ad hoc wireless sensor networks
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

UNIT I

INTRODUCTION

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II

MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III

ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV

WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V

WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TEXT BOOKS

1. C. Siva Ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, 2004.

REFERENCE BOOKS

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.
5. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(5EI92) TECHNICAL SEMINAR

Course Objectives

- To make students learn about the contemporary technologies and present effectively their study.

Course Outcomes

After completion of the course the student is able to:

- Identify a research topic related to advanced/state-of-the-art technologies.
- Collect the literature and comprehend/analyze critically the technological advancements.
- Demonstrate effective communication skills through oral presentation.
- Engage in effective written communication through seminar report.

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**0**	**2**

(5EI93) COMPREHENSIVE VIVA-VOCE

Course Objectives

- To make students review their learning of the past four years and instantaneously recollect and present their learnings.

Course Outcomes

After completion of the course the student is able to:

- Comprehend the fundamentals and technical knowledge in Electronics & Instrumentation Engineering and its allied fields.
- Apply and analyze Electronics & Instrumentation Engineering concepts in its allied fields.
- To assess effectiveness of the communication.

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IV Year B.Tech EIE II Sem	**L**	**T/P/D**	**C**
	0	**20**	**10**

(5EI94) MAJOR PROJECT

Course Objectives

- To make students learn about the Industrial Process and develop solutions.
- To make students prepare documents and present their solutions.

Course Outcomes

After completion of the course the student is able to:

- Identify and formulate the problem (Industry/technical/societal).
- Analyze, design, and develop a solution to industry/technical/societal problems
- Implement and execute the solution.
- Demonstrate effective communication skills through oral presentation.
- Engage in effective written communication through project report.