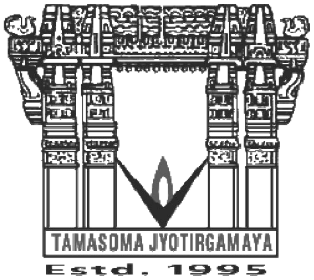
ACADEMIC REGULATIONS
COURSE STRUCTURE AND
DETAILED SYLLABUS

Electronics and Instrumentation Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2013-2014)



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institute

Approved by AICTE & Affiliated to JNTUH

Accredited by NBA and NAAC with 'A' Grade

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDERABAD
An Autonomous Institute
Approved by AICTE & Affiliated to JNTUH
Accredited by NBA and NAAC with 'A' Grade

ACADEMIC REGULATIONS FOR B.TECH. DEGREE COURSE

(Applicable for Students admitted from the academic year 2013-2014)

1. Courses of study

The following courses of study are offered at present for specialization for the B. Tech. Course:

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

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

1.1 .1 Seats in each programme in the Institution are classified into **Category A** and **Category B** as per the G.Os.

a) Category – A Seats

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

1.1.2 Category - B Seats

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

1.1.3 Category: Lateral Entry

The candidate shall be admitted into the Third Semester, (2^{nd} year, I^{st} Semester) based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET.

2. Distribution and Weightage of Marks

i. The performance of a student in each Semester shall be evaluated subject – wise with **a maximum of 100 marks for theory and 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 **30 marks for Mid Semester Evaluation** and **70 marks for the End Semester Examination.**

For theory subjects, two mid examinations will be conducted in each Semester as per the academic calendar. Each mid examination is evaluated for 25 marks.

For the Mid-Examination the Distribution of Marks (25 Marks) as follows

Part-A: - 4 Marks (4X1 Marks) Compulsory

6 Marks (3X2 Marks) Compulsory

Part-B:- 15 Marks (3X5 Marks) 3 out of 4 Questions

Assignment Test/Assignment: - Two assignments are to be given to students covering the syllabus of First Mid and Second Mid Examinations respectively and are evaluated for 5 marks each.

The first assignment shall be submitted after first mid examinations and second Assignment should be submitted after second mid examination.

At the end of the Semester, Internal Marks (Maximum 30) for the respective subject is assigned as follows:

(a) 25 marks: 80% from the best performed mid examination and 20% from the other mid examination.

(b) 5 marks: Average of the two assignments/assignment tests

iii. For practical subjects there shall be a continuous evaluation during the Semester for 30 **marks and 70 marks for end examination.** Out of the 30 marks, **day-to-day work in the laboratory shall be evaluated for 10**

marks, and 10 marks for practical examination and 10 marks for laboratory record.

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

B. If any student absent for mid exam due to Medical/Acute illness same may be reported in advance to Head of the Department in writing with a request to reconduct the mid-term examination. The committee consisting of HOD/Dean-Academics/Dean-Examinations will take the final decision on the conduct of mid-term examination.

iv For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc.,) the distribution shall be 30 **marks for internal evaluation (15 marks for day-to-day work and 15 marks for Mid examination (**the average of the two examinations will be taken into account**) and 70 marks for end semester examination.**

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 should be presented before a committee, which shall be evaluated for **100 marks.** The committee consists 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 is a pre – requisite for evaluating industry – oriented mini project.** Students should submit a report on learning outcomes of the shadow engineering and Engineer in Mirror. Every student should attend shadow engineering and Engineer in Mirror programme in an industry for not more than a week days during second year and third year respectively.

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**

will be evaluated for 100 marks based on the report and presentation made.

vii. There shall be a **Comprehensive Viva-Voce in IV year II Semester.** The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department **after submitting M.T.P record in complete.** The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated **for 100 marks** by the Committee. There will be **no Midterm assessment for the Comprehensive viva-voce.**

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, **60 marks shall be for Midterm Evaluation** and **140 marks for the Semester end Examination.** The viva-voce shall be conducted by a committee comprising of an external examiner, Head of the Department and 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 Midterm Evaluation shall be on the basis of three Seminars conducted during the IV year II Semester for 30 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.**

3. Semester end Examination

(a) Theory Courses

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

Question Paper Pattern is as follows

Part A:- 30 Marks Compulsory

5X1Marks (One question from each unit)

5X2Marks (One question from each unit)

5X3Marks (One question from each unit)

Part B:- 40 Marks (4 out of 6 questions) (At least one question from each unit)

(b) Practical Courses

Each lab course is evaluated for 70 marks. The examination shall be conducted by the laboratory teacher and another senior teacher concerned with the subject of the same/other department/Industry. One of examiner will be appointed by the Controller of Examinations in consultation with HOD as and when required and is evaluated as per standard format.

(c) Supplementary Examinations

Supplementary Examinations will be conducted for the current semester after the declaration of the results of the regular examination of that semester.

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 subjects** for Semester.

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

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

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

v. Students whose shortage of attendance is not condoned / not paid the stipulated fee in any Semester are not eligible to take their end semester examination of that Semester.

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item 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 design or drawing subject or project, if he secures **not less than 35% (25 out of 70 marks)** of **marks in the end examination and a minimum of 40% of marks in the sum total of the Midterm evaluation and end semester examination taken together.**

ii. A student shall be **promoted from II to III year** only if he fulfills the academic requirement of getting **50 credits from the examinations held upto II Year II Semester including Supplementary examinations of II B.Tech II Semester.**

iii. A student shall be **promoted from III year to IV year** only if he fulfills the academic requirement of getting a total of **75 credits from the examinations held upto III Year II Semester including Supplementary examinations of III B.Tech II Semester .**

Iv. **A** student shall register and put up minimum academic requirement in all 200 credits and earn atleast 192 credits. Marks obtained in these credits shall be

considered for the calculation of Cumulative Grade Point Average **(CGPA) and percentage of marks.**

v. The student should obtain two certificate courses during his/her course of study

vi. Students who fail to earn atleast 192 credits as indicated in the course structure **within eight academic years** from the year of their admission shall **forfeit their seat** in B.Tech. Course and their **admission stand Cancelled.**

6. Course pattern

i. The entire course 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 end semester examination in a subject, but absent or has failed in the end semester examination may reappear for that subject at the supplementary examination whenever conducted.

iii. When a student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester when it is offered next, **with the academic regulations of the batch into which he gets readmitted.**

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

Award of B.Tech. Degree and Class

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

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

ii) Registered for **200 credits** and secured a minimum of **192 credits with compulsory subjects as listed in Table.**

Table: Compulsory Subjects

Serial Number	Subject Particulars
1.	All Practical Subjects
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work

iii) The student should obtain two certificate courses during his/her course of study

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. Course.

7. CGPA System:

Method of awarding absolute grades and grade points:

The **absolute grading method** is followed, based on the total marks obtained in internal and external examinations. Grades and grade points are assigned as per the Table given below

B.Tech Program: The Absolute Grading Method is followed, based on the total marks obtained in internal and external 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	Remedial	
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 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 is indicated in terms of SGPA. The SGPA is calculated as below:

$$SGPA = \frac{Total\ Earned\ Weighted\ Grade\ Points\ for\ that\ Semester}{Total\ Credits\ for\ the\ Semester}$$

$$SGPA = \frac{\sum_{i=1}^{P} \mathbf{Ci} * \mathbf{Gi}}{\sum_{i=1}^{P} \mathbf{Ci}}$$

Where 'Ci' = Number of Credits allotted to particular subject 'I'
'Gi' = Grade Point corresponding to the letter grade awarded in that subject 'i"
'i"= 1,2,…..P represent the number of subjects for that particular semester
* **SGPA is calculated and awarded for the candidates who pass all the courses in a semester.**

Calculation of Cumulative Grade Point Average (CGPA) for Entire Programme. The CGPA is calculated as below:

Assessment of the overall performance of a student is 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.

$$CGPA = \frac{\sum_{i=1}^{m} Ci * Gi}{\sum_{i=1}^{m} Ci}$$

Where Ci= Number of credits allotted to a particular subject 'I"
Gi = Grade Point corresponding to the letter grade awarded in that subject 'i"
I= 1,2,….m represent the number of subjects of the entire program.
Grade lower than D in any subject is not considered for CGPA calculation. The CGPA is 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.
e) Award list indicating the marks awarded to the student.

8. Withholding of Results

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

9. **Transitory Regulations**

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

10. Minimum Instruction Days

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

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

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

13. 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 arises in the above rules and regulations, the decision of the Principal shall be final.

iv. The Chairmen 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.

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

(Applicable for students admitted from the academic year 2013-2014)

(i) Registered for 150 credits and secured a minimum of 142 credits with compulsory subjects as listed in table.

Table: Compulsory Subjects

Serial Number	Subject Particulars
1.	All Practical Subjects
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work

(ii) A student who fails to earn a minimum of 142 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

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

(iv) A student shall be promoted from Third year to Fourth year only on fulfilling the academic requirements of securing 50 credits from the examinations held upto III B.Tech II Semester including Supplementary Examinations.

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

15. Malpractice Rules

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1.	(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
	(b)Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book,	Expulsion from the examination hall and cancellation of the performance in

	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.	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 will 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 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 – 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	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.	
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.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not	If the student belongs to the college, expulsion from the examination hall and cancellation of the performance in

	connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year.
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 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 will meet and discuss/question the

candidate and based on the evidences, the committee will 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 valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

4) Based on the explanation and recommendation of the committee action may be initiated.

5) Malpractice committee:

i.	Principal	Chairman
ii.	Controller of Examinations	Convener
iii.	Invigilator	Member
iv.	Chief Examiner of the subject/subject expert	Member
v.	Concerned Heads of the Department	Member

PEO.1	Solve current and changing engineering problems with a solid foundation in Mathematics, Science and Technology.
PEO.2	Comprehend, analyze, design, and develop novel products and offer solutions for industry specific processes.
PEO.3	Adopt the learning culture needed for a successful professional career.
PEO.4	Demonstrate managerial and entrepreneurship skills essential for professional growth.
PEO.5	Observe moral values and professional ethics while developing innovative solutions to meet the industrial and societal needs.

a. Knowledge of Basic Sciences:

The students shall be able to apply the principles of Basic Sciences and Mathematical skills in learning in Basic Engineering subjects. The knowledge gained thus enables the students to apply them in learning the core branch viz. the Electronics and Instrumentation Engineering.

b. Computational Skills:

The students shall acquire Analytical Thinking; Problem solving abilities, get exposure to the modern computational procedures and apply them in the core Instrumentation Engineering.

c. Design and Development of Solutions:

The background knowledge gained, the Analytical and computational skills acquired by the students shall enable the students to apply them in the core Instrumentation Engineering to design Electronic circuits, highly sensitive sensors networks for monitoring and control of various physical, chemical, pharmaceutical and Industrial parameters and processes.

d. Conduct of Investigations into Complex Problems:

The students shall be able to apply the knowledge and adopt research methodologies for the modernization of existing designs of Instruments, design sophisticated instrumentation systems interfaced to dedicated embedded controllers or High-end computers. They shall be able to Acquire, Analyze, Interpret and Control any complex processes or problems in Industry and R&D.

e. Usage of Modern Tools:

The students gain expertise in the utilization of modern software tools like C, JAVA, Multisim, Signal and Image processing tools for applications in communications, Biomedical (ECG, EEG, MRI) etc; Hardware gadgets like the Digital Storage Oscilloscopes, Function Generators, Spectrum Analyzers; and ultra-sensitive instruments like the UV-VIS and Infra-Red Spectro-photometers, Chromatographs, Process control stations etc. for applications in Industry and R&D.

f. Engineers and Society:

The students of engineering should be motivated to utilize their Scientific, Technological, Computational and Instrumentation skills for the better addressing the societal needs. Design new sophisticated instruments for the high-end Research and Process Industries, Pharmaceutical, Bio-medical fields. They should utilize their expertise to develop indigenous technologies, instruments, gadgets, affordable by common people. Design inexpensive healthcare systems and extend the same to the remote areas through telemedical network system making use of INSAT facility.

g. Environment and Sustainability:

Instrumentation Engineering is a multi-disciplinary branch. The students shall be motivated to utilize their knowledge for design of highly sensitive and low energy consumption, low radiation emitting, lower environment polluting instruments, operating on renewable energy sources and implement all such measures to **sustain the quality of the environment.**

h. Ethics:

The students are motivated to follow a code of ethics and moral perspectives at the individual level as well as at the professional level to protect the interests of all the stakeholders, with a concern for societal responsibilities.

i. Individual and Team work:

Communication skills, Aptitude development programs, Team activities like POGIL, Seminar Presentations etc contribute greatly for the development of individual talents/skills. Involvement in Professional, Cultural, Sports activities provided in the institute shall also develop capabilities of a student to mold oneself as an Individual member, Team leader or an Organizer.

j. Communication Skills:

The intensity of inputs (Listening, Speaking, Reading and Writing Skills) inputs and trainings imparted through all these activities, the students shall acquire excellent communication skills both orally as well as writing. They shall be able to transform their innovative ideas into excellent technical reports for presentation/publication in seminars/journals.

k. Project Management and Finance:

The students shall be able to conceptualize ideas, formulate projects, visualize their execution and realized final product. The students shall demonstrate the skills required for drafting of proposals for projects with thorough understanding of the procurement plans (materials, software, hardware), project management and financial allocations and management during the execution of the project.

l. Life-Long learning:

The students shall be motivated to keep themselves in-tune with the contemporary changes in technological processes through life-long learning and also contribute their expertise for the benefit of the current stake holders and the society.

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

I YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13MTH001	Advanced calculus	3	1	3
13PHY001	Engineering Physics	3	1	3
13ENG001	English	3	0	3
13CSE001	Computer Programming	4	0	4
13CED004	Environmental Studies	3	0	3
13MED176	Engineering Drawing	2	4	4
13ENG101	English Language Communication Skills Lab	0	3	2
13CSE101	Computer Programming Lab	0	3	2
13MED103	IT And Engineering Workshop	0	3	2
Total		**18**	**15**	**26**

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

I YEAR II SEMESTER COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
13MTH002	Linear Algebra & Ordinary Differential Equation	3	1	3
13MTH003	Numerical analysis and Linear Programming	3	1	3
13EEE001	Circuit Theory	4	1	4
13PHY003	Advanced Engineering Physics	3	1	3
13CHE001	Engineering Chemistry	3	0	3
13ITD002	Data Structures	4	0	4
13EPC101	Engineering Physics And Engineering Chemistry Laboratory	0	3	2
13ITD102	Data Structures Laboratory	0	3	2
Total		**20**	**10**	**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**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13MTH009	Special functions and Complex Analysis	3	1	3
13ECE001	Electronics Devices and circuits	4	1	4
13EEE077	Principles of Electrical Engineering	4	0	4
13EIE002	Sensors and Signal Conditioning	4	0	4
13EIE003	Electronic Measurements	4	0	4
13EIE101	Sensors and Measurements Laboratory	0	3	2
13ECE101	Electronics Devices and Circuits Laboratory	0	3	2
13EEE177	Electrical Engineering Laboratory	0	3	2
Total		**19**	**11**	**25**

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

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13CMS001	Business Economics and Financial Analysis	4	0	4
13EIE001	Signals and Systems	4	1	4
13EIE004	Pulse and Digital Circuits	3	1	3
13ECE004	Electronic Circuit Analysis	4	1	4
13ECE003	Switching Theory and Logic Design	4	0	4
13EIE102	PDC Laboratory	0	3	2
13ECE103	Electronic Circuit Analysis Laboratory	0	3	2
13ECE102	Basic Simulation Laboratory	0	3	2
Total		**19**	**12**	**25**

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

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13EEE008	Control Systems	4	1	4
13EIE011	Virtual Instrumentation	3	1	3
13ITD005	JAVA Programming	3	1	3
13EIE006	Linear and Digital IC Applications	4	0	4
13ECE010	Digital Signal Processing	3	1	3
Open Elective				
13CSE012	Cyber Security	3	0	3
13CED037	Disaster Management			
13ITD011	Green IT			
13CSE030	Professional Ethics and Human Values			
13CSE016	Intellectual Property Rights			
13EIE104	Linear and Digital IC Applications Laboratory	0	3	2
13EIE108	Virtual Instrumentation Lab	0	3	2
13ITD104	JAVA Programming Lab	0	3	2
Total		**20**	**13**	**26**

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

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13EIE009	Industrial Instrumentation	4	1	4
13ECE009	Micro Processors and Micro Controllers	4	0	4
13EIE007	Bio-Medical Instrumentation	4	0	4
13ITD004	Computer Organization	3	1	3
13EIE008	Process Control Instrumentation	3	1	3
13ECE106	Micro Processors and Micro Controllers Laboratory	0	3	2
13ENG102	Advanced English Communication Skill Laboratory	0	3	2
13EIE105	Process Control Instrumentation Laboratory	0	3	2
Total		**18**	**12**	**24**

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

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

IV YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13EIE010	Analytical Instrumentation	4	0	4
13EIE012	PC Based Instrumentation	3	1	3
13EIE023	Embedded and Real Time Systems	3	1	3
Elective-I				
13ITD008	Operating system	3	1	3
13EIE013	Instrumentation Practices in Industries			
13CSE076	Relational Data Base Management Systems			
13EIE022	Digital Control Systems			
13EEE024	Artificial Neural Networks And Fuzzy Logic			
Elective-II				
13EIE018	Robotics and Automation	3	1	3
13EIE024	Principles of Communications			
13EIE015	Automation of Industrial Processes			
13EIE014	Industrial Electronics			
13ECE027	Basics in Nano Science and Technology			
13EIE107	Analytical Instrumentation Laboratory	0	3	2
13EIE110	Embedded Controller and Robotics Laboratory	0	3	2
13EIE111	Industrial Process Control Systems Laboratory	0	3	2
13EIE201	Industry Oriented Mini –Project	0	4	2
Total		**16**	**17**	**24**

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

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13CMS002	Management Science	4	0	4
Elective – III				
13EIE019	Fiber Optic and Laser Instrumentation	3	0	3
13EIE020	Micro Electromechanical Systems (MEMS)			
13EIE017	Telemetry and Telecontrol			
13ECE081	VLSI System Design			
13ECE025	Adhoc Wireless Networks			
Elective – IV				
13EIE021	Pharmaceutical Instrumentation	3	0	3
13ECE013	Digital Image Processing			
13EIE016	Power Plant Instrumentation			
13ECE007	Digital Communications			
13ECE021	DSP Processors and Architectures			
13EIE202	Technical Seminar	0	0	2
13EIE203	Comprehensive Viva Voce	0	3	2
13EIE204	Project Work	0	18	12
Total		**10**	**21**	**26**

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

Note: All End Examinations (Theory and Practical/ Drawing) are of three hours duration.

VNR Vignana Jyothi Institute of Engineering & Technology

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

(13MTH001) Advanced Calculus

Course prerequisites: Differentiation, integration

Course Objectives:

1. Understand Taylor's theorem and its application to maxima and minima of f(x,y)
2. Understand the process of curve sketching
3. Understand multiple integrals and its applications
4. Apply the integral theorems of vector calculus.

Course Outcomes:

Students will be able to

1. Solve problems involving the maxima and minima of f(x,y).
2. Apply the curve tracing concepts to find arc length of curves, surface area, volume of solids of revolution.
3. Evaluate the multiple integrals using appropriate change of variables.
4. Verify the integral theorems.

UNIT I

CALCULUS OF ONE AND SEVERAL REAL VARIABLES

Mean value thoerems – Rolle's Thoerem, 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 derivaties, Jacobian, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables(without proof) and its application. Maxima and Minima of two variables, Langrange's method of undetermined multipliers.

UNIT II

CURVE TRACING AND RELATED APPLICATIONS

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). Applications -finding area under the curves, Length of the curves, volume and surface area of solids of revolution

UNIT III

MULTIPLE INTEGRALS

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

Application to evaluation of plane areas, volumes and surface areas of solids of revolution.

UNIT IV

VECTOR DIFFERENTIAL CALCULUS

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical & physical interpretation, Directional derivatives, Properties.

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; Pearson Education.

REFERENCES :

1. Elementary Analysis: The Theory of Calculus by Kenneth Ross; Springer
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; John Wiley.
3. Advanced Engineering Mathematics by Peter 'O' Neil, publisher: Cengage Learning .
4. 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	**1**	**3**

(13PHY001)ENGINEERING PHYSICS

Course Objectives:

1. To supplement and enhance the basic concepts in Physics essentially required in the study of materials as well as interaction of light with matter, interaction of light with matter through physical phenomena like interference, diffraction and polarization.
2. To know and understand some important applications of lasers and optical fibers.
3. To learn the importance of wave and particle nature of light and to understand the behavior of an electron in one dimensional potential box.
4. To understand the effect of temperature on Fermi Dirac Distribution Function and also learn the behavior of an electron in a periodic potential, the new concept of Effective mass of an electron and to know the classification of materials into conductors, semiconductors and insulators.

Course Outcomes:

After completion of the course, the students will be able to:

1. Understand the Phenomenon of Interference, Diffraction& Polarization.
2. Learn the principle, working, construction and energy mechanism of various lasers and their applications, Explain the light signal propagation and attenuation through optical fiber.
3. Understand the differences between particle and wave nature, energy states in one dimensional potential box and also the Consequences of Heisenberg's Uncertainty principle.
4. Understand the one dimensional Schrodinger's wave equation and the effect of temperature on Fermi-Dirac Distribution, Kronig Penny model.

UNIT –1:

INTERFERENCE:

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment, interference in thin films by reflection, Newton's rings Experiment.

DIFFRACTION-I:

Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Qualitative and Quantitative (Phasors approach)).

UNIT -2

DIFFRACTION-II

Diffraction at double slit, circular aperture, and multiple slits (grating) (Qualitative Approach), Resolution of spectral lines, Rayleigh criterion, and resolving power of grating.

POLARIZATION

Polarization phenomenon, Brewster's Law and Malus law, examples, types of polarization, double refraction, Nicol prism, Quarter and Half wave plates.

UNIT -3:

LASERS:

Characteristics of Lasers – Spontaneous and Stimulated Emission of radiation, meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them — Ruby Laser – Helium-Neon Laser –Semiconductor Laser – Applications of lasers.

FIBER OPTICS:

Principle of optical fiber and properties – Acceptance angle and acceptance cone – Numerical aperture –Types of fibers and refractive index profiles – Qualitative analysis of attenuation in optical fibers –Application of optical fibers.

UNIT -4:

ELEMENTS OF STATISTICAL MECHANICS:

Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (non-mathematical treatment); Photon gas, Planck's law of black body radiation; Deduction of Wien's law and Rayleigh-Jeans law from Plank's law.

PRINCIPLES OF QUANTUM MECHANICS:

Waves and particles – De Broglie hypothesis - Matter waves - Davisson and Germer experiment –Heisenberg's uncertainty principle - Schrodinger Wave Equation – Wave function and its Physical Significance - Particle in one dimensional potential box(wave functions, probability densities and energy states).

UNIT -5

FREE ELECTRON FERMI GAS:

Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions, electrical conductivity & Ohm's law, Electrical Resistivity of Metals (Qualitative).

BAND THEORY OF SOLIDS:

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) Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
(3) Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons

REFERENCE BOOKS:

(1) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
(2) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.
(3) Optics by Ghatak and Thyagarajan, Tata Mc Graw
(4) Engineering Physics by G Sahashra Buddhe; University Press
(5) Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers.
(6) Introduction to Optical Communication by G. Keiser
(7) Quantum Mechanics by Gupta Kumar Sharma

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ENG001) 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. This Syllabus is therefore, a Pragmatic English Writing Program for engineering students with intermediate proficiency. The program covers a syllabus outline and instructional approaches on basic writing skills with particular reference to technical writing.

Course Objectives:

1. To equip the students with all the LSRW skills for academic writing and speaking.
2. To equip the students with basic grammar, infrastructural patterns and grammatical constructions required in technical writing as well as oral communication.
3. To acquaint the students with the writing process in preparation for academic and workplace writing.
4. 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

1. Comprehend technical writing produced in the engineering profession
2. Understand the writing process and create logical paragraphs
3. Use infrastructural patterns in writing and speaking
4. 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.

Syllabus Outline

Unit I : Review of Grammar

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

Unit II : Prose 1

1. Heaven's Gate by Pico Iyer
2. The Connoisseur by Nergis Dalal

Unit III Reading and Writing Skills

i) Reading Comprehension -- Skimming & scanning
ii) Reading Comprehension -- Intensive reading
iii) Reading Comprehension -- Critical Analysis
iv) Paragraph Writing
v) Letter Writing
vi) Memo Writing

Unit IV : Prose 2

1. The Cuddalore Experience by Anu George
2. The Odds Against Us by Satyajit Ray

Unit V : Advanced Writing Skills

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

Prescribed 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, http://www.mspiggy.etl.noaa.gov/write/

I Year B.Tech EIE – I Sem

L	T/P/D	C
4	0	4

(13CSE001) COMPUTER PROGRAMMING

Course objectives

1. Learn how to write modular, efficient and readable C programs
2. Declare and manipulate single and multi-dimensional arrays of the C data types.
3. Describe the techniques for creating program modules in C using functions and recursive functions.
4. Create and manage derived data types and perform operations on files.
5. Utilize pointers and dynamic memory allocation functions to efficiently solve problems

Course Outcomes:

Upon completion of the course, the students are expected to:

1. Write, compile and debug programs in C language.
2. Use different data types in a computer program.
3. Design programs involving decision structures, loops , arrays and functions.
4. Explain the difference between call by value and call by reference
5. Understand the dynamics of memory by the use of pointers.
6. Use different file operations to create/update basic data files.

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.

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

UNIT - III

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.

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

UNIT - IV

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

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

UNIT – V

Preprocessor Directives, Dynamic Memory Allocation.

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.

TEXT BOOKS:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan,E.V.Prasad,Richard F.Gilberg
2. C How to Program Paul Deitel and Harvey Deitel , PH.
3. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.

REFERENCES:

1. Let Us C Yashavant kanetkar BPB.
2. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie.
3. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994.

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

(13CED004)ENVIRONMENTAL STUDIES

Course Objectives:

1. Develop an understanding of the necessity of protection of environment
2. Develop an understanding of Natural resources
3. Develop an understanding of Biodiversity
4. Develop an understanding of Global Environmental problems and Environmental pollution

Course Outcomes:

After going through this course the student will be able to

1. Acquire the knowledge on environment
2. Acquire the knowledge of various Natural Resources
3. Develop skills in understanding of various environmental problems
4. Develop skills to protect the Environment

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 Eco system.

UNIT-II

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

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, 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 – Insitu and Ex-situ conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues,Nature of thermal pollution and nuclear hazards, Global warming, Acid rain,Ozone depletion., Environmental case studies.

UNIT-V

Environmental Problems in India,Drinking water, sanitation and public health,Effects of the activities on the quality of environment, Water scarcity and groundwater depletion,Controversies on major dams – resettlement and rehabilitation of people: problems and concerns,Rain water harvesting, cloud seeding and watershed management. Economy and Environment,The economy and environment interaction,Economics of development, preservation and conservation, Sustainability: theory and practices,Limits to growth,Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science - Y.Anjaneyulu, B S Publications.
2. Environmental studies-Deeksha dave, Cengage learning India Pvt. Ltd.,
3. Environmental sciences and Engineering - P. Venugopal Rao, PHI learning Pvt. Ltd.,
4. Environmental Science and Technology by M. Anji Reddy, B S Publications.

Reference books

1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al. , Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

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I Year B.Tech (Common to EEE, ECE, EIE, CSE, IT)	**L**	**T/P/D**	**C**
	2	**4**	**4**

(13MED176) ENGINEERING DRAWING

Course Prerequisites: Geometrical construction

Course Objectives:

1. Understand the usage of drawing instruments.
2. Understand the construction methods for drawing conic sections.
3. Identify the significance of curves in engineering practice like bridges, building, arches etc.
4. Understand first and third angle projections and methods.

Course Outcomes:

Students will be able to

1. Visualize the objects looking into projections.
2. Convert projections for isometric to orthographic and vice versa.
3. Work with Auto CAD for the above

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

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

(13ENG101) 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

1. Provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play and situational dialogue.
2. Provide practice in word usage, grammatical construction, structural patterns, and improve comprehension abilities in the students.
3. Train students to use neutral pronunciation through phonetic sounds, symbols, stress and intonation.
4. 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

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

Syllabus for Lab Sessions

Unit 1

Multimedia Lab

1. Grammar : Nouns and Pronouns; Articles; The Present Tense
2. Vocabulary Lesson 1
3. Listening Comprehension

Communication Skills Lab: Introduction of Self and others

Unit 2

Multimedia 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 3

Multimedia Lab

1. Grammar --- Adverbs, Conjunctions, Prepositions; The Future Tense
2. Vocabulary Lesson 3
3. Telephoning Skills

Communication Skills Lab: Role Play/ Situational Dialogues

Unit 4

Multimedia Lab:

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

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

Unit 5

Multimedia 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

Multimedia Lab Requirements

The English Language Lab shall have two parts:

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

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

iii) **System Requirement (Hardware component):**

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

i) P – IV Processor
ii) Speed – 2.8 GHZ
iii) RAM – 512 MB Minimum
iv) Hard Disk – 80 GB
v) Headphones of High quality

iv) Suggested Software:

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

List of Software:

- **Clarity Pronunciation Power –** part II
- **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 and Technology

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

(13CSE101) COMPUTER PROGRAMMING LABORATORY

Course Objectives

1. 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.
2. Declare and manipulate single and multi-dimensional arrays of the C data types and derived data types like structures, unions.
3. Use functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.
4. Manipulate character strings in C programs. Utilize pointers to efficiently solve problems
5. Allocate memory to variables dynamically and Perform operations on text and binary files.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. Understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
2. Design programs involving decision structures, loops ,arrays and functions.
3. Understand the dynamics of memory by the use of pointers.
4. Use different file operations to create/update basic data files.

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, pointers and functions etc

Week 11

Programs on pointers and structures, Pointers and arrays, pointers and strings.

Week 12

Programs on files-Implementation of file handling functions.

Week 13

a. Programs on files error handling.

b. Programs on Dynamic memory allocation

Week 14

Programs on command line arguments.

Week 15

Programs on preprocessor directives

Week 16

Internal Lab Exam

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13MED103) IT AND ENGINEERING WORKSHOP

Course Objectives:

1. To study/demonstrate the concepts of computer with respect to its hardware, operating system, assembling and disassembling.
2. To conduct the experiments related to production engineering technology.
3. To demonstrate the usage of power tools, CNC lathe and machine shop for different exercises

Course Outcomes:

Students will be able to:

1. Identify, assemble, dissemble, install and write commands for a given configuration of a computer.
2. To develop components using the techniques of carpentry, tin smithy, forging, etc. listed in trades for exercises.
3. To work out the given models in machine shop and CNC lathe.

IT WORKSHOP

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

TEXT BOOKS:

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

VNR Vignana Jyothi Institute of Engineering & Technology

I Year II sem, B.Tech– Common to all branches	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13MTH002) Linear Algebra & Ordinary Differential Equations

Course prerequisites: Matrices, Differentiation and Integration

Course Objectives:

1. Understand the Echolen form and Normal form of a matrix and its applications in solving linear system of equations.
2. Understand the methods of solving first order differential equations and learn about its applications to L-R and R-C circuits.
3. Apply the convolution theorem to evaluate Laplace Transform of the functions.
4. Apply Z-Transforms in solving the difference equations.

Course Outcomes:

Students will be able to

1. Find the rank using Echolen form and Normal form.
2. Solve the problems in first order and second order differential equations.
3. learn Laplace Transform as a tool.
4. Evaluate the Z-Transform of the given function.

UNIT-I :

LINEAR ALGEBRA – MATRICES

Rank of matrix, Hermitian and skew – Hermitian matrices, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Eigen values and eigen vectors , Diagonalisation of a matrix(including the case of repeated eigen values). Caley – Hamilton theorem (without proof), Quadratic forms - reduction of quadratic form to canonical form by linear transformation.

UNIT-II :

ORDINARY DIFFERENTIAL EQUATIONS 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-III :

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 ; Euler-Cauchy's 2^{nd} order differential equations, applications to spring mass system ,Simple harmonic motion and L-C-R Circuits.

UNIT-IV:

LAPLACE TRANSFORMS

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution theorem(statement only). Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

UNIT- V :

Z-TRANSFORMS

z-transform; Inverse z-transform; Properties, initial, and final value theorems; Convolution theorem(theorems without proofs); Difference equations; Solutions of difference equations using z-transform.

TEXT BOOKS :

1. Higher Engineering Mathematics – B. S. Grewal,Khanna publishers.
2. A First Course in Differential Equations by Dennis G. Zill; Publisher: Brooks Cole publiers.
3. Advanced Engineering Mathematics by R.K.Jain and S.R.K.Iyengar; Narosa Publications.

REFERENCES :

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8^{th} Edition; John Wiley.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9^{th} Edition; Cengage Learning

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

(13MTH003) NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

Course prerequisites : Elementary row transformations of matrices, differentiation and integration.

Course objectives:

1. Understand the numerical methods for non linear systems, evaluating definite integrals and ordinary differential equations.
2. Understand various methods of interpolation.
3. Understand the simplex method and methods to solve the transportation problem.

Course Outcomes:

Student will be able to

1. Apply the numerical methods to find a root of algebraic and transcendental equations.
2. Apply the numerical methods to find the solutions of ordinary differential equations.
3. Use simplex method procedure to optimize a linear function.
4. Solve transportation problems

UNIT I

Solutions of non-linear systems:

Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – the iteration method , the bisection method, the method of false position, ,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; Lagrange and Hermite 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.

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; Predictor Corrector methods - Adams Bashforth method- Adams Moulton method and Milne's method (without proofs).

UNIT IV

Linear programming

Basic concepts; problem formulation, graphical method, canonical and standard forms of LPP simplex method, Artificial variables technique- Big-M method,

UNIT V

Transportation problems:

Balanced and Unbalanced transportation problems- North-West corner rule, Least cost method, Vogel's approximation method (VAM) and MODI method.

TEXT BOOKS

1. Elementary Numerical Analysis – B.S. Grewal, 3rd edition Publisher: Khanna Publishers
2. Operations Research - Taha H.A, Publisher: Mcmillan Publishing:

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;: Tata McGraw Hill 3. Operations Research – by S.D. Gupta
3. Operations Research- Kantiswaroop , P.K Gupta and Manmohan, 4th edition, Sultan Chand & Sons.

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

(13EEE001) CIRCUIT THEORY

Course Objectives

1. To understand the basic concepts of Circuit Analysis.
2. To analyze single phase ac circuits and magnetic circuits.
3. To apply Network Theorems for Circuit Analysis.
4. To understand the graph theory and its properties of circuit

Course Outcomes

After the completion of the course students will be able to

1. Apply basic network reduction techniques for analysis of electrical circuits.
2. Analyze ac circuits along with resonance and locus diagrams.
3. Appreciate the application of network theorems and topology solutions.
4. Find concepts of magnetic circuits and electrical circuits

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.

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 – Nodal analysis, Mesh analysis, Super Node and Super Mesh analysis of Networks with Independent and Dependent voltage and current sources - 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.

REFERENCES

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	1	3

(13PHY003) ADVANCED ENGINEERING PHYSICS

Course Objectives:

1. To learn different semiconductors and to calculate their carrier concentration
2. To learn the structure of solids, crystal systems, packing and arrangement of particles in crystals, simple planes and directions in solids, defects in crystals
3. To learn the properties of magnetic materials and classification, Dielectric materials
4. To learn the concept and applications of superconductors

Course Outcomes:

After completion of the course, the students will be able to:

1. To identify different semiconductors and to calculate their carrier concentration.
2. Identify different crystal types various planes and directions in crystals and estimate one dimentional crystal defects
3. Learn the magnetic properties of materials classify the magnetic materials into Dia, Para and ferro.
4. Learn the characteristics, properties and applications of superconductors and magnetic materials

UNIT -1

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 -2:

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.

Bonding in solids:

Force and energy between two approaching atoms, primary and secondary bonds, binding energy and cohesive energy, Madelung constant, cohesive energy and Madelung constant for NaCl crystal

UNIT -3

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– Laue method – Powder method – 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 -4

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, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications.

UNIT -5

Dielectric Properties:

Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic and Orientation 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**

(13CHE001) Engineering Chemistry

Course Prerequisites: General Chemistry

Course Objectives:

1. Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
2. Knowledge of "Corrosion engineering education" and Usage of polymers in modern world as an integral part of every human's life.
3. Knowledge of purification techniques and various applications of soft water in industries.
4. Usage of nanomaterials as emerging scientific components with amazing potential applications in various fields.

Course Outcomes:

1. Visualize the chemical applications of electricity.
2. Prevention of corrosion of metals and applications of polymers from domestic articles to sophisticated scientific and medical instruments.
3. Benefits of treated water as source in steam generation and other fields like production of steel, paper, textiles, atomic energy etc.
4. The applicability and greater efficiency of using a material at nanoscale in different engineering fields.

UNIT I

Electrochemical cells and batteries

Conductance-factors effecting conductance, conductometric titrations; cells: types of cells, cell representation, electrode potential; Standard electrode potential; Electrochemical series; Nernst equation; Reference electrodes – hydrogen, calomel electrode; Ion selective electrodes (glass electrode & flouride electrode); Numerical problems.

Batteries

Primary and secondary cells (lead-acid cell; Ni-Cd cell; lithium cells); Applications of batteries; Fuel cells – methanol – oxygen fuel cells, advantages of fuel cells; Solar cells - principle, and applications.

UNIT II

Corrosion and its control

Introduction; Causes and effects of corrosion; Different types of corrosion; Theories of corrosion – chemical, electrochemical corrosion (reactions); Factors affecting corrosion

– nature of metal (galvanic series; over voltage; purity of metal; nature of oxide film; nature of corrosion product), and nature of environment (effect of temperature; effect of pH; humidity; effect of oxidant).Corrosion control methods – cathodic protection, sacrificial anode, and impressed current cathode; Surface coatings – methods of application on metals (hot dipping; galvanizing; tinning; cladding; electroplating), and organic surface coatings (paints - constituents and functions).

UNIT III

III a) Polymers

Introduction; Types of polymerization; Plastics - thermoplastic resins, and thermoset resins; Compounding & fabrication of plastics; Preparation, properties, and engineering applications of polyethylene, PVC, PS, Teflon, bakelite, nylon.

III b) Rubber

Natural rubber- processing, vulcanization; Elastomers (Buna-s; Butyl rubber; Thiokol rubbers); Fiber reinforced plastics (FRP) and their applications.

UNIT IV

Water

Introduction; Hardness - causes, expression of hardness, units, types of hardness, estimation of temporary & permanent hardness of water, and numerical problems; Boiler troubles – scale & sludge formation, caustic embrittlement, corrosion, priming & foaming; Softening of water (Internal & external treatment - lime soda, zeolite, ion exchange process, and numerical problems); Reverse osmosis and Electro dialysis (desalination processes).

UNIT V

Nanomaterials

Introduction; Preparation and applications of nanomaterials with special reference to carbon nanotubes.

Insulators

Classification of insulators; characteristics of thermal & electrical insulators and their applications; Superconductors - $YBa_2 Cu_3 O_{7-x}$; Applications of superconductors.

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

3 Text Book of Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan; 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**
	4	**0**	**4**

(13ITD002) DATA STRUCTURES

Course Objectives

1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures and to improve the logical ability.

Course Outcomes

After the completion of the course students will be able to

1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Apply concepts learned in various domains like DBMS, compiler construction etc.
4. Use linear and non-linear data structures like stacks, queues, and linked list.

UNIT-I

Data Structures – Introduction to Data Structures, abstract data types, Linear list – single 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 –II

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

UNIT-III

Queues-operations, array and linked representations. Circular Queue operations, Dequeue, 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 EIE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EPC101) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LABORATORY

Course Objectives

1. To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion.
2. To expose to the principle of superposition and resonance.
3. To demonstrate the formation of standing waves and to understand the mechanical wave behavior and to determine Rigidity Modulus of different material s of wires.
4. To demonstrate basic discharge phenomenon in capacitors and to know the characteristics of the circuit elements, like resistors, capacitors and inductors.

Course Outcomes

After the completion of the course students will be able to

1. Understand clearly the interference principle in wave theory of light and able to relate it to the formation of Newton Rings and Obtain a pure spectrum when light passes through prism
2. Understand the formation and propagation of mechanical waves
3. Study simple oscillations of a load attached to a string and relate it to nature of material of string
4. Understand the physical significance of time constant and related uses

List of Experiments

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's 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. RC circuit

Book: Essential Practical Lab Manual in Physics: by P.Raghavendra Rao

ENGINEERING CHEMISTRY LABORATORY

Course Prerequisites: General Maths, General chemistry.

Course Objectives:

1. Estimation of hardness of water is essential for drinking water and in industries to avoid boiler troubles.
2. Knowledge of instrumentation in Colorimeter, Redwood viscometer, Conductivity meter and pH meter.
3. Knowledge of preparation of soap.

Course Outcomes:

1. Understand the extent of hardness range present in a water sample and its consequences if used for various industrial operations.
2. Determination of strength of solutions ,pH of various solutions, lubricants usage in machinery to prevent wear and tear.
3. Understanding the composition of soap used for washings.

List of Experiments

1. Titrimetry

a) Estimation of hardness of water by EDTA method.

2. Instrumental methods

(i) Conductometry

a) Conductometric titration of strong acid vs strong base

(ii) Colorimetry

a)Estimation of copper by colorimetric method

(iii) pH metry

a)Titration of strong acid vs strong base by pH metry

3. Physical properties

a)Determination of viscosity of sample oil by Redwood viscometer.

4. Preparations:

a) Preparation of soap

b) Preparation of Nano particles.

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.

3. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri, VGS Book Links, Vijayawada.

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

(13ITD102)DATA STRUCTURES LABORATORY

Course Objectives

1. To develop skills to design and analyze simple linear data structures
2. To develop skills to design and analyze simple nonlinear data structures
3. To strengthen the ability to identify and apply the suitable data structure for the given real world problem
4. To gain knowledge in practical applications of data structures

Course Outcomes

After the completion of the course students will be able to

1. design and analyze the time efficiency of the data structure
2. design and analyze the space efficiency of the data structure
3. identity the appropriate data structure for given problem
4. Have practical knowledge on the application of data structures

TASK 1:

1. Write a program for creation, Search and Traversal of Single Linked List
2. Write a program to perform insertion and deletion operations in Single Linked List
3. Write a program to merge two single linked lists

TASK 2:

1. Write a program for creation, Search and Traversal of Circular Linked List
2. Write a program to perform insertion and deletion operations in Circular Linked List

TASK 3:

1. Write a program for creation, Search and Traversal of Double Linked List
2. Write a program to perform insertion and deletion operations in Double Linked List

TASK 4:

1. Write a program to implement stack using Arrays
2. Write a program to implement stack using Linked List

TASK 5:

1. Write a program to convert infix expression to postfix expression using stack
2. Write a program to evaluate postfix expression

TASK 6:

1. Programs using recursion
2. Write a program to convert infix expression to prefix expression using stack

TASK 7:

1. Write a program to implement Linear queue using Array
2. Write a program to implement Linear queue using Linked List

TASK 8:

1. Write a program to implement insertions and deletions in a circular Queue
2. Write a program to perform search and count operations in a circular queue

TASK 9:

1. Write a program to implement insertions and deletions in a Dequeue
2. Write a program to perform search and count operations in Dequeue

TASK 10:

1. Write a program to implement Linear search
2. Write a program to implement Binary Search

TASK 11:

1. Write a program to implement Selection sort
2. Write a program to implement Bubble sort
3. Write a program to implement Insertion sort

TASK 12:

1. Write a program to implement Merge sort
2. Write a program to implement Quick sort

TASK 13:

1. Implementation of a binary tree representation using Arrays
2. Write a program to implement tree traversals.

TASK 14:

1. Implementation of a Graph representation using Adjacency Matrix
2. Write a program to implement graph traversals.

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

(13MTH009) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

Course Prerequisites: Integral and Differential calculus

Course objectives:

1. Identify the difference of power series and Frobenius method
2. obtain the solutions of Bessel and Legender equations.
3. Distinguish Cauchy's integral theorem and Cauchy's integral formula.
4. Apply Taylor's Series and Laurent series to expand the function.
5. Understand the idea of a conformal mapping

Course outcomes:

Students will be able to

1. Solve Second order Differential Equations with variable coefficents.
2. Use the Cauchy-Riemann equations to obtain the derivative of complex functions
3. Use residues to evaluate contour integrals
4. Calculate the image of the given curve under the given transformation

SPECIAL FUNCTIONS

UNIT I

Special functions

Series solutions of second order Ordinary Differential Equations , Regular point , Regular singular point, Frobineous Method ,Bessel functions: properties, Recurrence relations, Orthogonality. Legendre polynomials: Properties, Rodrigue's formula, Recurrence relations and Orthogonal properties.

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 Logz, 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, lnz, 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.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech ECE,EEE, EIE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ECE001) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives

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

Course Outcomes

After going through this course the student will be able to

1. Understand the operation and characteristics of various electronic devices.
2. Develop few applications of devices.
3. Understand the importance of biasing and stabilization.
4. Analyze small signal model for BJTand FETamplifiers.

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 $V_{BE,}$ β_1 and I_{CO}. BiasCompensation using Diodes, Thermistors and Sensistors, Thermal Runway, Thermal Stability.

UNIT III

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.

UNIT IV

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.

UNIT V

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.
3. Electronic Devices and Circuits – David A Bell, Oxford University Press, 5th edition (2008)

REFERENCES

1. Integrated Electronics - J.Millman and Christos.C.Halkias, and Satyabratha, Jit Tata McGraw Hill, 2nd Edition,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.

Practice:: Subject practice through Multisim Software.

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II Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EEE077) PRINCIPLES OF ELECTRICAL ENGINEERING

Course Objectives:

1. To analyze transient response of circuits with dc excitation
2. To understand two port network parameters, filters and attenuators
3. To know about performance of DC machines
4. To understand the operation of transformers and AC machines

Course Outcomes:

After going through this course the student will be able to

1. Analyze transient response of circuits
2. Evaluate two port parameters and design simple filters
3. Appreciate the working of DC machines
4. 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 qunatitaive treatment); Band Pass filter and Band Elimination filters (qunatitaive treatment only), Illustrative Problems. Symmetrical Attenuators – T-Type Attenuator, π-Type Attenuator, Bridged T-type Attenuator, Lattice Attenuator.

UNIT IV- DC Machines

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

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, Shyammohan S.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.Lakshmi Narayana, BS publications.
5. Network Analysis – A.Sudhakar, Shyammohan S.Palli, TMH publications.

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II Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE002) Sensors and Signal Conditioning

Course Objectives:

1. To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
2. To provide better familiarity with the Theoretical and Practical concepts of Transducers.
3. To provide familiarity with different sensors and their application in real life.
4. 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:

1. Able to identify suitable sensors and transducers for real time applications.
2. Able to translate theoretical concepts into working models.
3. Able to design the experimental applications to engineering modules and practices.
4. Design engineering solution to the Industry/Society needs and develop products.

Unit I :

Introduction to measurement systems and Passive Sensors:

General concepts and terminology, measurement systems, sensor classifications, 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, Differential capacitor, **Inductive Sensors:** Reluctance variation sensors, Eddy current sensors, Linear variable differential transformers (LVDTs) ,Synchros, inductosync, magneto elastic sensors, electromagnetic sensors-sensors based on Faraday's law of electromagnetic induction.

Unit II:

Self-generating sensors: Thermoelectric sensors-Thermocouples, thermo electric effects, common thermocouples, practical thermocouple laws, cold junction compensation in thermocouples circuits, **Piezoelectric-sensors-**the piezoelectric effect, piezoelectric materials, applications, **Pyroelectric sensors-**the pyroelectric effect, pyroelectric materials, radiation laws: Plank, wein and Stefan-Boltzmann,

Applications, **Photovoltaic sensors-**The 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.

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, Transistorized chopper, Capacitive Modulator, Noise elimination using filters.

Introduction to Resolver-to-digital Converters and Digital-to-resolver converters- 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
3. Microsensors , MEMS and Smart Devices: Julian Garder, Vijay K. Varadan, John Wiley & Sons Ltd. (2006).

Reference:

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.

Practice: Subject practice through PSPICE Software.

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II Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE003) Electronic Measurements

Course Objectives:

1. Students will be able to understand different measurement methods and errors associated with them.
2. Able to know the different standards and calibration methodologies adopted in the measurement systems
3. Able to know different AC and DC bridges for the measurement of R, L and C.
4. Able to know different types of Oscilloscopes and Analyzers (Analog and Digital).
5. Acquire clear concepts about the DC and AC voltage and current measurements

Course Outcomes:

1. The students will be able to understand the different methods of measurement
2. The students will be able to calibrate different instruments.
3. The students are able to find the unknown values of R, L and C through bridges circuits.
4. The students are able to display the waveforms in an oscilloscope and measure the parameters of any input signal.
5. Analyze any complex waveforms through analog and digital techniques.

UNIT – I

Introduction to measurements, Physical measurement, Forms and methods of measurements, Static and Dynamic characteristics of measurement systems, Measurement errors, Statistical analysis of measurement data, Probability of errors and Limiting errors.

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

Testing and calibration. Primary calibration. Secondary calibration. Direct calibration. Indirect calibration. Routine calibration. Calibration of a voltmeter, ammeter and an oscilloscope: case study.

UNIT – II

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

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 – III

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 – IV

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 analyzer, Recorders. Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture. Scalar and Vector network analyzers.

UNIT – V

Smart Measuring Devices:

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

Text Books

1. Electronic Instrumentation – HS Kalsi, Tata Mc Graw Hill, 2004.
2. M Chidambaram, Computer control of processes, Narosa Publications (2002).
3. Smart Material Systems and MEMS: Design and Development Methodologies By Vijay K. Varadan, K. J. Vinoy, S. Gopalakrishnan ,Wiley Publications(2006).

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 techniques by Helfrick and W.D.Cooper.,PHI publications.

Practice: Subject practice through EDA tools.

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

(13EIE101) Sensors and Measurements Laboratory

Course Objectives:

1. To make student acquire hands on experience in active and passive sensors/transducers.
2. To make students understand different signal conditioners
3. To make students design basic measuring devices like bridges

Course Outcomes:

After going through this course the student will be able to

1. Appreciate the use of sensors
2. Identify the sensors required for any specific application.
3. Design and develop a simple measuring devices employing appropriate sensors.

List of Experiments:

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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	0	**3**	**2**

(13ECE101) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objectives

1. To identify various components and testing of active devices.
2. To study and operation of multimeters, function generators ,regulated power supplies and CRO
3. To know the characteristics of various active devices.
4. To study frequency response of an Amplifier.

Course Outcomes

After going through this course the student will be able to

1. Calculate various parameters of devices from characteristics.
2. Use of devices in real time applications.
3. Calculate h-parameters of BJT under various configurations.
4. 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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II Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE177) ELECTRICAL ENGINEERING LABORATORY

Course Objectives

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

Course Outcomes

After going through this course the student will be able to

1. Apply the network theorems in the domain applications
2. Practically study the transient behavior of the RLC networks
3. Find the applications of the electrical machines with the experimental determination of the performance of the machines.
4. Find the difference between Generator and Motor performance 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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II Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13CMS001) Business Economics and Financial Analysis

Course Objectives

1. 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.
2. 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.
3. To describe the features of different market structure and pricing strategies.
4. 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 going through this course the student will be able to

1. 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.
2. 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.
3. 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.
4. 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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II Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EIE001) SIGNALS AND SYSTEMS

Course Objectives:

1. To understand variousfundamental characteristics of signals and systems.
2. To study the importance of transform domain.
3. To analyzeand design various systems.
4. To study the effects of sampling.

Course Outcomes:

After going through this course the student will be able to

1. Design solutions for complex input signals
2. Analyze statistical parameters of a given signal.
3. Apply the knowledge in modeling of LTI systems
4. Create new systems

UNIT I

Representation of Signals: Continuous 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 Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions

UNIT II

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

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, Fourier transforms involving impulse function and Signum function.

UNIT III

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.

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 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, Extraction of signal from noise by filtering.

UNIT V

Representation of discrete time signals. Classification of Signals, Properties of discrete time complex exponential signals

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.

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, Power Series expansion and Partial fraction expansion.Distinction among Fourier transform, Laplace Transform and Z - Transforms.

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.

REFERENCES

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	**1**	**3**

(13EIE004) PULSE AND DIGITAL CIRCUITS

Course Objectives

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

Course Outcomes

After going through this course the student will be able to

1. Design linear and non-linear wave shaping circuits.
2. Apply the fundamental concepts of wave shaping circuits for various switching and logic circuits
3. Design the time base circuits for various applications
4. Design the sampling gates for various applications

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.

MULTIVIBRATORS

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

UNIT IV

TIME BASE GENERATORS

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

SYNCHRONIZATION AND FREQUENCY DIVISION

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

UNIT V

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

LOGIC GATES

Realization of logic gates Using Diodes and Transistors: AND, OR and NOT gates using Diodes & Resistor, RTL and DTL Logic families.

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.

REFERENCES

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

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ECE004) ELECTRONIC CIRCUIT ANALYSIS

Course Objectives

1. To explain the operation, design and Analysis of multistage amplifiersusing BJT and MOSFET.
2. Design high frequency BJT amplifiers and analysis of MOS amplifiers.
3. Understand the concepts of feedback amplifiers and Oscillators
4. Design large signal and tuned amplifiers.

Course Outcomes

After going through this course the student will be able to

1. Apply the knowledge of BJTs and MOSFETs to design practical amplifier circuits.
2. Design electronic sub systems such as feedback amplifiers, oscillators.
3. Design various power amplifiers to meet the required specifications.
4. Apply the knowledge of Tuned amplifiers to design practical amplifier circuits.

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, CE- CC amplifier, Cascode amplifier, Two-stage RC-coupled JFET amplifier (in Common Source configuration), Difference Amplifier.

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, Gain-Bandwidth Product, Emitter follower at higher frequencies.

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.

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 amplifiers, Class-C tuned amplifiers. 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.
3. Design of Analog CMOS Integrated Circuits - Behzad Razavi, Tata McGraw-Hill Education , 2008.

REFERENCES

1. Electronic Devices and Circuit Theory - Robert L.Boysted , Louis Nashelisky, Pearson Education , 9th edition, 2008.
2. Introductory Electronic Devices and Circuits, Robert T. Paynter, Pearson Education, 7th edition, 2010.
3. Micro Electronic Circuits – Sedra and Smith, Oxford University Press, 5th edition, 2009.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13ECE003) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives

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

Course Outcomes

After going through this course the student will be able to

1. Use the concepts of Boolean Algebra for the analysis and various number systems for digital data representations
2. Design combinational and sequential circuits
3. Implement designs on PLDs
4. 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 and error correcting codes –hamming codes.

BOOLEAN ALGEBRA: Fundamental postulates of Boolean algebra - Basic theorems and properties

UNIT II

SWITCHING FUNCTIONS: Canonical and Standard forms-Algebraic simplification, Digital logic gates, properties of XOR gates –universal gates-Multilevel NAND/NOR realizations.

MINIMIZATION OF SWITCHING FUNCTIONS: Map method, Prime Implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, simplification rules.

UNIT III

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX, Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

PROGRAMMABLE LOGIC DEVICES: Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's.

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 modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

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

TEXTBOOKS

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

REFERENCES

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

Practice: Subject Practice through EDA Tools.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13EIE102) PULSE AND DIGITAL CIRCUITS LABORATORY

Course Objectives

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

Course Outcomes

After going through this course the student will be able to

1. Design linear and non linear wave shaping circuits .
2. Generate various wave forms such as Square, Pulse and Sweep
3. Design electronic switch.
4. Design simple applications such as counters of flip-flops.

List of Experiments

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

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ECE103) ELECTRONIC CIRCUIT ANALYSIS LABORATORY

Course Objectives

1. Design and simulate various BJT and FET amplifiers.
2. Design and simulate various BJT Feedback amplifiers.
3. Design and simulate various BJT Oscillators.
4. Design and simulate various power amplifiers and tuned amplifiers.

Course Outcomes

After going through this course the student will be able to

1. Apply the concepts of amplifiers in the design of Public Addressing System
2. Generate Sinusoidal wave forms
3. Design stable system using feedback concepts.
4. Design Class C tuned amplifier.

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. MOSFET Amplifier.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ECE102) BASIC SIMULATION LABORATORY

Course Objectives

1. To learn basic Operations on Matrices
2. To model generation of various signals
3. To simulate operations on signals and systems.
4. To simulate various random variables' generation and processes

Course Outcomes

After going through this course the student will be able to

1. Apply signal generation in different areas.
2. Apply the knowledge of random variables and processes in fields of communications.
3. Analyze the systems for various properties.
4. Create or design various systems and analyze sampling effects

LIST OF EXPERIMENTS

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 Stationarity in Wide sense

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

(13EEE008) CONTROL SYSTEMS

Course objectives:

1. 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
2. To assess the system performance using time domain analysis and should know how to improve it
3. To assess the system performance using frequency domain analysis and should know how to improve it
4. To design various controllers and compensators to improve system performance

Course outcomes:

After going through this course the student will be able to

1. Got the knowledge how to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
2. Apply various time domain and frequency domain techniques to assess the system performance
3. Apply various control strategies to different applications (example: Power systems, electrical drives etc…)
4. 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, 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. Feed-Back Control system Characteristics.

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 Controllers 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, 2nd edition.
2. Automatic Control Systems 8th edition by B. C. Kuo 2003– John wiley and son's.,

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.

Practice : Subject Practice through MATLAB Software.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13EIE011) Virtual Instrumentation

Course Objectives:

1. It provides new concepts towards measurement and automation.
2. It gives knowledge about how to control an external measuring device by interfacing a computer.
3. To become competent in data acquisition and instrument control.
4. It gives knowledge networking
5. It provides knowledge on developing different applications in Digital image processing ,control system, signal processing, and in simulation.

Course Outcomes:

1. Design virtual instrument for any application
2. Acquire ,analyze and display the result of any project performed
3. Suggest a device to be interfaced based on the design constrains

UNIT I

Virtual Instrumentation: An introduction

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, Real-time systems, Embedded Controller, OPC, Active X programming.

UNIT II

VI programming techniques:

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

UNIT III

Data acquisition basics:

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

UNIT IV

VI 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. Networking basics for office & Industrial applications, VISA and IVI.

UNIT V

VI toolsets:

Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, 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. PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Kevin James, Newnes, 2000.

WEB RESOURCES: www.ni.com , www.ltrpub.com

PRATICE: Subject practice through LabVIEW software.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ITD005) JAVA PROGRAMMING

Course Learning Objectives

1. To produce object-oriented solutions to a range of standard programming problems
2. They will be able to articulate and restructure programming objectives in the object-oriented paradigm.
3. They will be informed with regard to the fundamental concepts and principles of object-oriented programming
4. They will be able to apply these concepts in any programming language.

Course Outcomes

After going through this course the student will be able to

1. Design/Develop Program
2. Implement Program
3. Test Program
4. Validate Program

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.

Networks basics: Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagram's

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, Swing, MVC architecture, components, containers, exploring swing.

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.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE006) LINEAR AND DIGITAL IC APPLICATIONS

Course Objectives

1. To study the characteristics and design concepts of operational amplifiers.
2. To understand the functionality of specific ICs: 555 timer, 565, voltage regulators.
3. To study the applications and design concepts of various ICs.
4. To understand concepts of Digital circuits using digital ICs.

Course Outcomes

After going through this course the student will be able to

1. Analyze electrical properties of Op-Amps and design various linear and nonlinear applications using Op-Amps.
2. Design various applications of 555 timer, IC 565, voltage regulators.
3. Understand and compare TTL and CMOS IC logic families.
4. Design various combinational and sequential logic circuits 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 application 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.

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, Comparators.

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 CIRCUIT DESIGN : Design using TTL-74XX series ICs - 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 : Commonly available 74XX series ICs-RS, JK, JK Master Slave, D and T Type Flip-Flops & their conversions, Design of Synchronous and Asynchronous counters, Decade counter, shift registers and applications using TTL-74XX series ICs.

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.
3. Op-Amps and Linear ICs – Ramakanth A. Gayakwad, PHI, 1987

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.
1. Op Amps and Linear Integrated Circuits: Concepts and Applications by James M.Fiore, Cengage/ Jaico ,2/e, 2009.
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.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ECE010) DIGITAL SIGNAL PROCESSING

Course Objectives

1. To understand characteristics of discrete time signals and systems
2. To analyze and process signals using various transform techniques
3. To understand various factors involved in design of digital filters and role of Multi rate Signal Processing.
4. To understand the effects of finite word length implementation.

Course Outcomes

After going through this course the student will be able to

1. Analyze and process signals in the discrete domain and their transformation
2. Design filters to suit specific applications
3. Design multi rate signal processing of signals through systems.
4. Analyze binary fixed point and floating-point representation of numbers and arithmetic operations.

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. Composite algorithm.

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, Tradeoff between round off and overflow noise, Measurement of coefficient quantization effects through pole-zero movement, Dead band effects.

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.

Practice: Subject practice through LabVIEW software.

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13CSE012) CYBER SECURITY

Course Objectives

1. Expose to computer science terminology related to coding, password protection, social engineering, and network security.
2. Learn overview of Information Security and Assurance over the Internet.
3. Describe how encryption works to protect privacy and know recent network security breaches.
4. Expose to the spectrum of security activities, methods, methodologies, and procedures.
5. Learn Service Processes, storage and security management, Cyber Forensics standard, laws and Acts for Information Security.

Course Outcomes

Upon completion of this course, students should be able to:

1. Understand security principles, threats, attack techniques & realize various information security laws and standards
2. Explain why the term "hacker" is extremely flexible and the variety of roles that hackers play
3. Depict reference monitors, security models, authentication and access control
4. Comprehend Service Delivery and support process and know the importance of network security and operating system security
5. Identify with Cyber forensics tools for imaging and recovery & know the storage and security management

UNIT I.

INTRODUCTION: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime. CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Biba Model, Chinese wall, Bell La Pedula Model.

UNIT II:

SERVICE DELIVERY PROCESS- Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management.

SERVICE SUPPORT PROCESS- Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management.

UNIT III:

STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention

SECURITY MANAGEMENT- Security, Computer and internet Security, Physical Security,Identity Management, Access Management. Intrusion Detection, Security Information Management.

UNIT IV:

Cyber Forensics- Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics Evaluation of crime scene and evidence collection ,Usage of tools for disk imaging and recovery processes.

UNIT V

Introduction to Information Security Standards , Laws and Acts: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies,ISO 27001,PCI DSS,IT Act, Copy Right Act.

Textbooks:

1. Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
2. "Management of Information Security", M. E. Whitman, H. J. Mattord, Nelson Education / CENGAGE Learning, 2011, 3rd Edition.
3. "Guide to Computer Forensics and Investigations", B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition.
4. Goel Ritendra, Computer Application in Management, New Age International Publishers, New Delhi.
5. Chowdhury G.G., Text Retrieval Systems in information Management, New Age International Publishers, New Delhi.

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

(13CED037) DISASTER MANAGEMENT

Course Objectives:

1. Understand the difference between a hazard and disaster
2. Know about various disasters and their impacts
3. Understand Different approaches of disaster risk reduction
4. Understand Disaster risks in India

Course Outcomes:

After going through this course the student will be able to

1. Acquire the knowledge disaster Management
2. Understand the vulnerability of ecosystem and infrastructure due to a disaster
3. Acquire the knowledge of Disaster Management Phases
4. Understand the hazard and vulnerability profile of India

UNIT I

Introduction to disaster

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

UNITII

Disasters: Classifications, Causes, Impacts (including social, economic, political,environment, health, sychosocial, 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.

UNITIV

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.

UNITV

Disaster Risk Management in India

Hazard and vulnerability profile of India

Components of Disaster relief: Water, food, sanitation, shelter, health, waste management

Institutional 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	**3**	**0**	**3**

(13ITD011) GREEN IT

(Open Elective)

Course Objectives:

1. Learn concepts of Trends and which has led to go green.
2. Identify and implement environmentally sound techniques to preserve power.
3. To analyze different techniques and technologies that will enhance Green IT initiatives and to create Data centre Design & Redesign
4. To understand the purpose and application of virtualization technology.
5. To Know about Data Replication methods and Disk Technology Advancements.

Course Outcomes:

Upon completion of this course, students should be able to:

1. To Know the global green mantra is "Reduce, Reuse, Recycle".
2. To illustrate the importance of managing the E-waste.
3. To know how to Minimizing Power Issues, Cooling, Changing the way we work.
4. Understand concepts of Greening Process to redesign green Datacentre.
5. To recognize the need for virtual server implementation & desktop virtualization and understand about Data Replication and Disk Technology Advancements

Unit -I

Trends and Reasons to Go Green:

Overview and Issues, Problems, Cost savings, Current Initiatives and standards, Global Initiatives

Unit- II

Consumption Issues

Minimizing Power Issues, Cooling, Changing the way we work, Going Paper less, Recycling, Hardware Considerations,

Unit- III

The Greening Process

Data Center Design and Redesign, Greening your Information Systems, Staying Green

Unit- IV

Virtualization

Virtual Server Implementation Plan, Desktop Virtualization, Benefits, Desktop access, Virtual Printing,

Unit -V

Data Replication and Disk Technology Advancements

Data Replication Methods, Disk Technology Advancements, The Green data Center, Cloud Computing, Remote Monitoring

TEXT BOOKS:

1. Green IT-Reduce your information system's Environmental Impact while adding to the bottom line Toby J Velte, Anthony T Velte, Robert Elsenpeter – McGrahill Publications, 2008
2. Foundation Of Green It, Consolidation, Virtualization, Efficiency, and Roi in the Data Center, Marty Poniatowski- Prentice Hall Publications

REFERENCE BOOKS:

1. Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting By Jason Harris.
2. Green IT for Sustainable Business Practice- Mark G. O' Neil, BCS The chartered institute for IT
3. The Greening of IT: How Companies Can Make a Difference for the Environment, John P. Lamb, Kindle Edition, IBM Press 2009.

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

(13CSE030) PROFESSIONAL ETHICS AND HUMAN VALUES

Introduction

Human values and ethics has 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:

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

Course Outcomes:

Upon completion of the course, the students are expected to:

1. Students learn the moral issues and problems in engineering ; find the solution to those problems .
2. Students learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
3. Students gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights

Outline of Syllabus

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 -- Moral character and responsibilities -- Privacy, confidentiality, Intellectual property and the law -- Ethics as law.

UNIT II

Understanding Engineering Ethics

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 – Self-interest –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

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 behaviour 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

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.

Text Books

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

Reference Books

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Jersey,2004 (Indian Reprint).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "EngineeringEthics Concepts and Cases", Thompson Learning, United States, 2000 (Indian Reprint now available).
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", 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**
Open Elective	**3**	**0**	**3**

(13CSE016) INTELLECTUAL PROPERTY RIGHTS

Course Objectives:

1. To make students familiar with Intellectual Property Rights.
2. To understand innovations in engineering and other domains.
3. To be familiar with patents, copyrights and various acts related to innovations.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. To define various terms related to Intellectual Property Rights.
2. To understand the process of patent, copyrights and related procedures.
3. To analyse the situation of IPR in the Indian context with that of global scenario.
4. To understand the patenting process through various case studies.

UNIT I

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property i. Movable Property ii. Immovable Property and iii.Intellectual Property.

UNIT II

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES

1. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010
2. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi
3. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

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

(13EIE104) Linear and Digital IC Applications Laboratory

Course Objectives

1. To demonstrate the characteristics and applications of Op-Amps
2. To verify the functionality of specific ICs: 555 timer, IC 565, Voltage regulators
3. To verify the functions of various digital ICs
4. To study and build applications with ASLKV2010 Starter Kit

Course Outcomes

After going through this course the student will be able to

1. Design various applications using Op-Amps
2. Design various applications with specific ICs: 555 timer, IC 565, voltage regulators
3. Design digital circuits using digital ICs
4. Design applications using ASLKV2010 Starter Kit

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: T0 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**

(13EIE108) Virtual Instrumentation Laboratory

Course Objectives:

1. Provide new concepts towards measurement and automation through LabVIEW.
2. Give knowledge about how to control an external measuring device by interfacing a computer.
3. Become competent in data acquisition and instrument control.
4. Give knowledge about networking
5. Provide knowledge on developing different applications in Digital image processing ,control system, signal processing, and in simulation.

Course Outcomes:

Upon completion of this course, students should be able to:

1. Design virtual instrument for any application
2. Acquire ,analyze and display the result of any project performed
3. Suggest a device to be interfaced based on the design constrains

List of Experiments:

(Minimum 14 experiments should be completed)

1 Introduction to LabVIEW
   I. Front Panel, Block Diagram, Icon and Connector Pane
   II. Getting Started with DAQ

2 Channels and Tasks in NI-DAQmx
   I. Launch the DAQ Assistant Express VI
   II. Create the Task
   III. Configure the Task
   IV. Test the Task
   V. Edit the Task
   VI. Generate Code

3 Configuring Front Panel Objects

4 Using X Controls

5 Configuring Front Panel Objects

6 Implementing book and real time examples using control system tool box

7 Implementing book and real time examples using PID tool box

8 Implementing book and real time examples using image processing tool box.

9. Implementing book and real time examples using signal processing tool box
10 Implementation of remote process control using CFP
11 Implementing real time process control using cDAQ
12 Real time image acquisition using IMAQ
13 Real time signal processing and control using Speedy 33
14 Implementation and testing of electronic circuits using NI ELVIS
15 Implementation of Inverted pendulum concept using NI ELVIS and LabVIEW

Pratice: Simulation through LabVIEW software.

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

(13ITD104) JAVA PROGRAMMING LABORATORY

Course Objectives:

1. Understand basic principles of object-oriented program design using Java.
2. Understand the basic and some advanced issues related to writing classes and methods such as data, visibility, scope, method parameters, object references, and nested classes.
3. Understand the basic ideas behind class hierarchies, polymorphism, and programming to interfaces.
4. Get exposure to exceptions and basic I/O streams.
5. Develop solid Java programming skills and the ability to put in practice the acquired knowledge and understanding of the Java language and object-oriented design in relatively simple case studies.

Course Outcomes:

Upon completion of this course, students should be able to:

1. **[Object-oriented Programming]**
   Be able to understand better the object-oriented approach in programming. Students should be able to analyze and design a computer program to solve real world problems based on object-oriented principles.
2. **[Java Programming Language]**
   Be able to write computer programs to solve real world problems in Java
3. **[Good Documentation Practices]**
   To learn and appreciate the importance and merits of proper comments in source code and API documentations
4. **[GUI Programming]**
   Be able to write simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles.

Programs:

1. Write a java program to print all the twin primes below 1000. (A twin prime is a prime number that differs from another prime number by two. (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), .821, 823), etc. .
2. Write a java program to implement matrix multiplication. (Take the input from keyboard).
3. Write a Java program for sorting a given list of names in ascending order.

4. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the run of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.
5. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
6. Write a Java program that checks whether a given string is a palindrome or not. Ex: MALAYALAM is a palindrome.
7. Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no real solutions.
8. Write a java program to implement constructor overloading.
9. Write a java program to implement variable length arguments
10. Write a java program to implement the use of inner classes.
11. Write a java program to implement dynamic method dispatch.
12. Write a Java program that illustrates how run time polymorphism is achieved.
13. Write a java program that illustrates the following
    Handling predefined exceptions
    Handling user defined exceptions
14. Write a java program that illustrates the following
    Creation of simple package. Accessing a package. Implementing interfaces.
15. Write a Java program for creating multiple threads
    Using Thread class Using Runnable interface
16. Write a Java program for creating multiple threads. The main method sleeps for 10 seconds at the end of which all the threads should be terminated.
17. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
18. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The client sends a Celsius value, and the result produced by the server is the Fahrenheit value.
19. Write a Java program that reads on file name from the user then displays information about whether the file exists, whether the file is readable, whether the file is writable, the contents of file and the length of the file in bytes.

20. Write a Java program that: (Use classes and objects)
    a) Implements stack ADT.
    b) Converts infix expression into Prefix form.
21. Write an applet that displays a simple message.
22. Write a java program for passing parameters to applets
23. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the Digits and for the + - * % operations. Add a text field to display the result.
24. Write a Java program for handling mouse and keyboard events.
25. Write a Java program for handling menu events.

TEXT BOOKS:

1. The Complete Reference Java J2SE, 5th Edition, Herbert Schildt , TMH.
2. Core Java 2 Volume I Fundamentals, 5th Edition. Cay S.Horstmann, Gary Cornell , PHI,2000.
3. The Java Programming Language - Second Edition, K. Arnold and J. Gosling , Addison Wesley, 1996.

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III Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE009) Industrial Instrumentation

Course Objectives:

1. To equip the students with the basic knowledge of the physical parameters like Pressure, Temperature, flow, level, density and viscosity employed in different Industries.
2. To provide sound knowledge about various techniques used for the measurement of industrial parameters.
3. To understand the construction and working of measuring instruments.

Course Outcomes:

1. To have an adequate knowledge about process transducers like pressure etc.
2. To have an idea about the temperature standards, thermocouples and pyrometry techniques.
3. To study about area flow meters, mass flow meters and calibration.
4. To know about various types of level measurements adopted in industry environment.

UNIT – I

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 – 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.

UNIT – III

FLOW 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.

UNIT – IV

DENSITY AND VISCOSITY MEASUREMENT

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.

UNIT – V

OTHER MEASUREMENTS

Sound-Level Meters, Microphones, Basic Level measurements, Humidity Measurement, Chemical Composition. Particle Instruments and Clean-Room.

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 – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13ECE009) MICRO PROCESSORS AND MICRO CONTROLLERS

Course Objectives

1. To understand characteristics and architectures of various microprocessors and microcontrollers.
2. Understand basic programming concepts and software tools
3. Learn various interfacing circuits necessary for various applications
4. To learn various interfacing concepts.

Course Outcomes

After going through this course the student will be able to

1. Demonstrate the ability to design a system, component or a process as per needs and specifications
2. Select the proper architecture for the implementation of digital designs
3. Write various assembly language programs for a given task using 8086, 8051 and ARM processors.
4. Design and implement microprocessor and microcontroller 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.
3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCES

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd edition.
2. Advanced microprocessors and Peripherals – A.K.Ray and K.M.Bhurchandi, TMH, 2000.3. Micro Computer System 8086/8088 Family Architecture Programming and Design – By Liu and GA Gibson PHI, 2ndEdition
4. Microcontrollers and Applications, Ajay . V. Deshmukh, TMGH,2005.
5. The 8085 Microprocessor : Architecture Programming and Interfacing – K.Uday Kumar, B.S Umashankar, Pearson , 2008.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE007) BIO-MEDICAL INSTRUMENTATION

Course Objectives

1. Identify and obtain biological parameters and relationship between them.
2. Identify mathematical models and principles for the design of biomedical instrumentation systems.
3. Understand the principles involved in acquiring different bio-signals.
4. Represent these principles in form of mathematical equations.

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Course Outcomes

After going through this course the student will be able to

1. Apply fundamental knowledge of sciences to analyze the relationship among different bio signals
2. Apply fundamental knowledge of mathematics coupled with electronics and use it for designing bio amplifiers for different applications.
3. Understand or become aware of artifacts caused by an incorrect diagnosis of the symptoms through sample data.
4. Apply these equations to analyze real time problems by making good assumptions and learn systematic engineering method design robust amplifiers.

UNIT I

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

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

Anatomy of the nervous system-neuronal communication, electro encepherogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, pre-amplifiers and amplifiers,

Anatomy of vision, electrophysiology of the Eye (ERG) Spatial properties of ERG, the electrooculogram (EOG), Ophthalmoscopes, Tonometer for eye pressure measurement.

UNIT IV

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

UNIT V

Modern medical imaging systems-Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography.

TEXT BOOKS

1. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
2. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

REFERENCES

1. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
2. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 2003.
3. Introduction to Biomedical equipment technology-by Joseph Carr and Brown.
4. Biomedical Electronics and Instrumentation by Omkar N Pandey and Rakesh Kumar

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13ITD004) COMPUTER ORGANIZATION

Course Objectives

1. Learn basic hardware and software of computer organization.
2. Know the instructions codes, formats and addressing modes of a computer.
3. Learn micro programmed control unit and memory organization of a computer.
4. Understand computer arithmetic, IO organization and parallel processing.

Course Outcomes

After going through this course the student will be able to

1. Analyze the concepts of computer organization for several engineering applications.
2. Use the fundamentals of computer organization as a tool in digital systems.
3. Identify, formulate, and solve hardware and software computer engineering problems.
4. Analyze IO, memory, Stack organization and parallel processing of a computer.

UNIT- I

BASIC STRUCTURE OF COMPUTERS: Computer types, functional unit, basic operational concepts, bus structures, multi processors and multi computers, multi tasking.

Register Transfer Language and Micro operations: Register Transfer language, Regiser Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations , 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

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

THE MEMORY ORGANIZATION: Memory hierarchy, Main Memory, Cache memory, performance considerations, virtual memory, secondary storage.

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,Instuction pipeline,RISC pipeline Vector Processing, Array Processors.

TEXT BOOKS:

1. Computer System Architecture – M. Morris Mano, III edition, Pearson/PHI
2. Computer organization – Carl Hamacher, Zvonks Vranesic, Safeazaky, V edition, Mc Graw Hill

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth edition, Pearson/PHI
2. Fundamentals of Computer Organization and Design, Sivarama Dandamudi
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

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13EIE008) PROCESS CONTROL INSTRUMENTATION

Course Objectives:

1. Identify and monitor process parameters of various processes.
2. Understand the principles of controllers, degrees of freedom, and control valves.
3. Recognize these principles written in form of mathematical equations for various control applications.
4. Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical process control problems.

Course Outcomes:

1. Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow, level, pressure, temperature problems.
2. Conduct experiments in pipe flows and open-channel flows and interpreting data from model studies to prototype cases. Documenting them in engineering reports.
3. Understand the possible disasters caused by an incorrect Design/Analysis in hydraulic, pneumatic engineering system.

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 t o realize various control actions.

UNIT – III

Controller Settings and Tuning of Controllers

Evaluation criteria – 1/4th decay ratio, IAE, 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 – Ratio control – Cascade control – Split range – Multivariable control and examples from distillation column, Boiler system and heat exchanger.

Text Books

1. Chemical Process Control : An introduction to Theory and Practice – by Stephanopoulos, Prentice Hall, New Delhi, 1999.
2. Process Control – Harriott P. , TMH, 1991
3. Process Control Instrumentation technology by Curtis.D.Johnson,Edition 8,PHI Publishers

References

1. Process Control, Third Edition – Liptak B.G., Chilton Book Company, Pennsylvania, 1995
2. Process control – by Pollard A., Heinemann Educational Books, London, 1971.
3. Automatic Process Control – by Eckman D.P. , Wiley Eastern Ltd., New Delhi, 1993.
4. Process Control – by Patranabis.
5. Process System Analysis and Control – Coughanowr, McGraw Hill, Singapore, 1991

Practice: Subject practice through LabVIEW software.

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

(13ECE106) MICRO PROCESSORS AND MICRO CONTROLLERS LABORATORY

Course Objectives

1. Design and develop both the hardware and software for microprocessor /microcontroller based systems.
2. To provide practical introduction to microcontrollers and microprocessors, assembly language programming techniques and interfacing
3. To Interface peripheral devices and circuits to microprocessors and microcontrollers
4. Interpret specifications for any microprocessor or peripheral chip

Course Outcomes

After going through this course the student will be able to

1. Develop the basic skills on hardware and software/programming of microprocessor
2. Enhance assembly language programming skills for simple and complex calculations used in various engineering disciplines.
3. Capable to innovative and design intelligent systems, called embedded systems, using microprocessor for special purpose.
4. Involve in verification of functionality, speed and power consumption of microprocessor based system.

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 motorto 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**

(13ENG102) ADVANCED ENGLISH COMMUNICATION SKILLS 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:

1. 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
2. enable students to adjust technical content to meet the needs of a specific target audience
3. groom students to speak accurately and fluently and prepare them for real world activities through behavioral skills.
4. train students in soft skills through role play and group discussion to improve their EQ.

Course Outcomes:

Students will be able to:

1. summarize and synthesize information and produce technical writing that is required in academics as well as in the engineering profession
2. write covering letters, resume, SOP, Project Proposals and Technical Reports
3. speak fluently and address a large group of audience and participate in debates and discussions.
4. 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

Applications and Covering letters

1. Resume Writing
2. Verbal Ability: language, reading and listening, reasoning and analysis
3. Oral Communication :Talking About Yourself

Unit II

1. Writing an SOP
2. Summarizing and Synthesizing Information (Precis Writing)
3. Oral Communication: Making Presentations

Unit III

1. Writing Project Proposals
3. Oral Communication: Group Discussions

Unit IV

1. Writing Project Reports
2. Oral Communication: Interview Skills

Unit V

Behavioral Skills and Personality Development

1. Building a positive attitude, building a positive personality, Motivation, goal setting & values & vision
2. Problem Solving and Decision Making; Negotiation Skills through Role Play
3. Team Building and Leadership Abilities
4. Social Etiquette

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**

(13EIE105) Process Control Instrumentation Laboratory

Course Objectives:

1. Identify and obtain process parameters of various processes in the prototype model.
2. Understand the principles and appreciate the working of controllers, degrees of freedom, control valves.
3. Understand the working of DAQ devices
4. Learn systematic engineering methodologies to solve practical process control problems.

Course Outcomes:

1. Apply the control system to industrial parameters like that- fluid flow, level, pressure, temperature problems.
2. Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
3. Understand disasters caused by incorrect design/analysis in hydraulic, pneumatic engineering system.
4. Identify optimal values for PID controller for any application.

List of Experiments

(Minimum 12 experiments should be conducted)

1. Realization of control actions: Electronic controllers.
2. Flow level control unit.
3. Temperature level control unit.
4. Servo and regulator operation.
5. Realization of control actions: Pneumatic controllers. Hydraulic controllers.
6. Process tuning – Process reaction curve method.
7. Process tuning – continuous and damped oscillation method.
8. Operation of flow loop in plant.
9. Input convertor – Pneumatic actuator.
10. Input convertor – Hydraulic actuator.
11. Control valve characteristics (Different types).
12. Feed forward control systems
13. Multi loop control systems – Ratio Control.
14. Multi loop control systems – Cascade Control.
15. Interacting and non interacting system

PRATICE: Simulation through LabVIEW software.

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IV Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE010) ANALYTICAL INSTRUMENTATION

Course Objectives:

1. 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.
2. The emphasis will be a "hands-on" approach with sample preparation, theory, application, method development, data analysis and interpretation being key elements.
3. Interpret data derived from any of the above mentioned spectroscopic instruments
4. Appreciate the basic concept, principles and terms of chromatography

Course Outcomes:

1. Observe basic lab safety rules while working in analytical instrumentation laboratories
2. Appreciate basic analytical processes and sampling procedures
3. Appreciate the basic principles of emission and absorption spectroscopy techniques.
4. Perform simple analytical procedures on given samples using VIS, Ultraviolet or Infrared Spectrophotometers.

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 – Instrumentation associated with the above spectrophotometers – sources and detectors.

IR Spectrometers – sources and detector, Instrumentation associated with the above spectrophotometers, FTIR.

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

Principles of Nuclear Magnetic Resonance

Instrumentation associated with NMR spectrophotometer – Introduction to mass spectrophotometers, Introduction and Working Principle of Electron Spin Resonance (ESR)

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.
3. Principles of Instrumental Analysis- by Skoog D.A and West D.M, Holt Sounder publication,Philadelphia,1985.

REFERENCES

1. Process Measurement and Analysis- by B.G. Liptak, CRC Press
2. 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	1	3

(13EIE012) PC BASED INSTRUMENTATION

Course Objective:

1. It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
2. Learn the process of collecting information/ data through PC from real world sources.
3. Learn remote and networked data acquisition and operating system.
4. Learn programmable logic controllers, and its application.

Course Outcomes:

1. 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.
2. Understand an operating systems and their importance such as multitasking, privilege levels and drivers.
3. Solve simple instrumentation tasks using both PC and microcontroller. They shall also master programming in C and LabVIEW on a level that enables them to solve such tasks.
4. At the end of each chapter, review question, problems given to reinforce their understanding of the concepts to re-in force their command and over these aspect to implement in projects.

UNIT –I

Introduction to 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

UNIT – V

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.

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. PC Based Instrumentation and Control Third Edition by Mike Tooley ; Elsevier.
2. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control. By Kevin James; Elsevier.
3. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
4. Distributed Control Systems, Lukcas M.P, Van Nostrand Reinhold Co., New York, 1986.
5. Programmable Logic Controllers, Second edition, Frank D. Petruzella, Mc Graw Hill, Newyork, 1997.
6. Programmable Logic Controllers Programming methods and applications- Prentice Hall by. John R. Hackworth and Frederick D. Hackworth, Jr.

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

(13EIE023) EMBEDDED AND REAL TIME SYSTEMS

Course Objectives

1. Understand the general embedded system concepts , design of embedded hardware and software development tools
2. Learn the basics of real time operating and embedded systems and apply them to real world processes.
3. Understand key issues such as CPU scheduling, memory management, task synchronization, and file system in the context of real-time embedded systems.

Course Outcomes:

After completing this course the student will be able to

1. Able to design embedded systems and real-time systems
2. Define the unique design problems and challenges of real-time systems and program and embedded system
3. Identify the unique characteristics of real-time operating systems and evaluate the need for real-time operating system and explain the general structure of a real-time system with reference to applications.
4. Utilize and use RTOS to build an simple embedded real-time system

Unit I : Introduction

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

Unit II:

General Purpose Processors and Device Drivers

Basic architecture, operation, Pipelining, Programmer's view, development environment, Application Specific Instruction-Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors.

Devices Drivers for interrupt handling memory device drivers, on board bus device drivers, Board I/O Driver examples.

Unit III : Introduction to RTOS and Basic Design

Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes, Signals

Principles, Semaphores and Queues, Hard real time scheduling considerations, Saving memory and power an example RTOS like µC – OS (Open Source) Embedded S/W Development tools.

Unit IV :: Real Time Operating Systems

Timers, Memory Management, Priority inversion problem, Embedded operating systems Embedded Linux, Real-time operating systems, RT Linux, Handheld operating systems, Windows CE.

Unit V : Design Technology

Introduction, Automation, Synthesis, Parallel evolution of compilation and synthesis, Logic Synthesis, RT synthesis, Behavioral Synthesis, Systems Synthesis and Hardware/ Software Co-Design, Verification, Hardware/Software co-simulation, Reuse of intellectual property codes.

Text Books

1. Embedded System Design – A Unified Hardware/Software Introduction – Frank Vahid, Tony D. Givargis, John Wiley, 2002.
2. Embedded / Real Time Systems – KVKK Prasad, Dreamtech Press, 2005.

References

1. Embedded Microcomputer Systems – Jonathan W. Valvano, Brooks / Cole, Thompson Learning.
2. An Embedded Software Primer – David E. Simon, Pearson Ed., 2005.
3. Introduction to Embedded Systems – Raj Kamal, TMS, 2002.

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

(13ITD008) OPERATING SYSTEMS

Course Objectives:

1. Analyze the tradeoffs inherent in operating system design.
2. Summarize the various approaches in solving the problem of mutual exclusion in an operating system.
3. Evaluate the trade-offs in terms of memory size (main memory, cache memory, secondary memory) and processor speed.
4. Demonstrate disk storage strategies, file strategies and analyze the system protection and security.

Course Outcomes:

Upon completion of this course, students should be able to:

1. Identify the System calls, interrupts and process scheduling of any GOS.
2. Write application keeping Concurrency and synchronization Semaphores/monitors, shared memory in mind
3. Design new deadlock free and efficient memory management schemes for a GOS.
4. Explain RAID, file systems facilities and protection and securityof any GOS.

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, Process States, Cooperating Processes, Inter-process Communication.

UNIT II

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.

Concurrency: 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

I/O systems: I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O request to hardware operations, STREAMS

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

Security: Security threats, Protection, Intruders, Viruses, Trusted System.

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**	**1**	**3**

(13EIE013) INSTRUMENTATION PRACTICES IN INDUSTRIES

Course Objectives:

1. Identify and quantitatively estimate different materials required for the manufacturing of Cement, Pulp, Paper, Gasoline, and Power.
2. Understand the principles of Kraft, Soda, Sulfite pulping & Distillation Column as applied to pulp manufacturing and Gasoline.
3. Recognize these principles written in form of mathematical & Chemical equations.
4. Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical industrial problems.

Course Outcomes:

1. Apply fundamental knowledge of chemistry & instrumentation to modeling and analysis of different Industrial engineering.
2. Conduct experiments on pH, ORP, Distillation Column and interpreting data simulation model studies to prototype cases, as well as documenting them in engineering reports.
3. Understand disasters caused by an incorrect analysis/design in different Industrial engineering system.

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, Kraft pulping, Soda pulping, Sulfite pulping, Semi chemical pulping, Mechanical and Thermo mechanical Pulping.

Manufacture of paper: Wet Processing, Fourdrinier Machine, Coated Papers, Speciality Papers.

Wet-end Instrumentation: Pressure, vacuum, temperature, liquid density, specific gravity, level, flow, consistency measurement, pH, Oxidation Reduction Potential (ORP) measurement, freeness measurement of the Pulp.

Dry-end Instrumentation: Moisture, basis weight, caliper, coat thickness, measurement of optical variables Brightness, Whiteness and Color.

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 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. Process measurement and analysis, Liptak B.G., Third edition, Chilton book Company, 1996.
3. Pulp and Paper Industry Technology & Instrumentation, Sankaranarayana, P.E., Kothari's Deskbook.
4. Principles of Industrial Instrumentation, D. Patranabis, Mc Graw Hill.

References

1. An Introduction to Paper Industry Instrumentation, John R Lavigne, Miller Freeman Publications, Califirnia, 1985 Series.
2. Mearsurement and Control in Papermaking, Robert J. McGill, Adam Hilger Limited, Bristol, 1980.
3. Process/ industrial instruments and controls hand book, Gregory K. McMillan, Doig;as M. Considine.
4. 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**	**1**	**3**

(13CSE076) RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Course Objectives:

1. To present an introduction to database management systems (DBMS) and relational data model.
2. To provide an emphasis on how to organize, maintain and retrieve information efficiently and effectively from a DBMS.
3. To introduce the concepts of transactions and transaction processing
4. To present the issues and techniques relating to concurrency in multi-user database environments

Course Outcomes:

After going through this course the student will be able to

1. Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. The students will be able to design and query databases, as well as understand the internals of databases.
3. Define basic functions of DBMS & RDBMS.
4. Apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
5. Analyze database models & entity relationship models.

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.

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.

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.

Use Structured Query Language (SQL) with complex queries

TEXTBOOKS

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 & 5 Units)
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw Hill(1,2,3 & 5 Units)
3. Introduction to Database Systems, C.J.Date, Pearson Education (4^{th} Unit)

REFERENCES

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

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

(13EIE022) DIGITAL CONTROL SYSTEMS

Course Objectives:

1. To equip the students with the basic knowledge of A/D and D/A conversion
2. To understand the basics of Z- Transform
3. To study the stability analysis of digital control system
4. To equip the basic knowledge of digital process control design

Course Outcomes:

1. Students will acquire the basic knowledge of A/D and D/A conversion
2. Students will acquire the knowledge of Z- Transform
3. Students will acquire knowledge of digital process control design
4. Able to apply the knowledge of basic sciences into engineering applications using mathematical tools for Design, Analysis, Modelling, Simulation and Control Applications.

UNIT-I

Z-PLANE Analysis of Discrete-Time Control System

Introduction to Digital Control System, Review of Z-Transforms, Z-Transform method for solving difference equations; Pulse transfer function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane. Modified Z-Transforms.

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

UNIT – III

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.

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

UNIT – IV

Design of Discrete Time Control System by Conventional Methods

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

UNIT – V State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order, minimum order and Reduced order observers.

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

References:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal

IV Year B.Tech EIE – I sem	L	T/P/D	C
Elective-I	3	1	3

(13EEE024) ARTIFICAIL NEURAL NETWORKS AND FUZZY LOGIC

Course Objectives

1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
2. To expose the students to the concepts of feed forward neural networks and about feedback neural networks.
3. To teach about the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzy control
4. To learn the basic difference between the Fuzzy Logic and Neural Networks

Course Outcomes

After going through this course the student will be able to

1. The concepts of feed forward neural networks and learning and understanding of feedback neural networks.
2. Concept of fuzziness involved in various systems and fuzzy set theory.
3. Comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic.
4. 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**
Elective -II	**3**	**1**	**3**

(13EIE018) ROBOTICS AND AUTOMATION

Course Objectives:

1. Classification by coordinate system and control system
2. Different types of Power Sources And Sensors
3. Classification Of Manipulators, Actuators And Grippers
4. Knowledge on kinematics
5. Applications of different Robots

Course Outcomes:

Upon completion of this course, students should be able to:

1. Acquire knowledge on different types of Power Sources (actuators) and Sensors, Classification Of Manipulators, Actuators And Grippers
2. Acquire knowledge on different applications of various types of robots.
3. Analyze the direct and the inverse kinematic problems and calculate the manipulator dynamics
4. Able to plan trajectory of a robot arm.

UNIT I

Basic Concepts & Power Sources

Fundamentals:

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.

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.

Manipulators: Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators.

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 & Path Planning

Robots as mechanisms, matrix representation, homogeneous transformation matrices, inverse of transformation of matrices, forward and inverse kinematics of robots, denavit-hartenberg representation of forward kinematics equations of robots, the inverse kinematic solution of robots, inverse kinematic programming of Robots, Jacobian, Differential motions of a frame, interpretation of the differential change, differential changes between frames, differential motions of a robot and its handframe, lagrangian mechanics, effective moments of a inertia, dynamic equations for multiple degree of freedom robot, static force analysis of robots.

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. Introduction to Robotics, Analysis, System, Applications by Saeed B. Niku.- PHI
2. Robotics / Fu K S/ McGraw Hill.
3. Industrial Robotics / Groover M P /Pearson Edu.

References

1. Fundamentals of Robotics Analysis and control. By Robert J.Schelling, PHI
2. I Robotics Technology and Flexible Automation / SR Deb
3. Robotic Engineering / Richard D. Klafter, Prentice Hall

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IV Year B.Tech EIE – I Sem	L	T/P/D	C
Elective -II	3	1	3

(13EIE024) PRINCIPLES OF COMMUNICATIONS

Course Objective:

1. To make students understand different signals and the techniques used for manipulation.
2. To make students understand different modulation technique
3. To make students understand different encoding and decoding techniques.

Course Outcome:

Upon completion of this course, students should be able to:

1. Appreciate the techniques used for signal manipulation and communications
2. Appreciate the need for PPM,PWM, Multiplexing
3. Appreciate different modulation and coding techniques.

UNIT I

Introduction : Block diagram of Electrical communication system, Radio communication : Typesof communications, Analog, pulse and digital Types of signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Autocorrelation, correlation, convolution.

UNIT II

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

Angle Modulation : Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT III

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 IV

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 V

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

Error control coding : Introduction, Error detection and correction codes, block codes, convolution codes,Error measurements for Channel efficiency-Bit Error Rates(BER)

Text Books

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

References

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

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IV Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
Elective -II	**3**	**1**	**3**

(13EIE015)Automation of Industrial Processes

Course Objective:

1. To make students understand the application of PC and other controllers.
2. To make students understand Different control system design
3. To make students understand the need for application of different controller to different processes.

Course Outcome:

Upon completion of this course, students should be able to:

1. Appreciate the need of automatic control.
2. Appreciate the need for Feed forward and adaptive controllers.
3. Appreciate the working of PLC,SCADA and DCS.

UNIT – I

Introduction To Computer Control

Role of computers in the control of Industrial processes (plants). Elements of Computer Controlled Process / Plant. Classification – Batch, Continuous, Supervisory and Direct Digital Controls. Architecture – Centralized, Distributed and Hierarchical Systems. Man Machine or Human Computer Interface (HCI).Process Control Requirements of Computers. Process related variables. Computer Network. Communications in Distributed control Systems. Smart Sensors and Field bus.

UNIT – II

Control System Design

Control System Design – Heuristics, Structural Controllability and Relative Gain Array. Controller Design – Regulator design and other design considerations. Controller Tuning – P, PI, PID, and Ziegler-Nicholas method. Computer aided Control System Design.Computer control loop, Modified Z – Transform, Zero-order hold equivalence, First order system with time delay, Converting continuous time controller to discrete time domain, Design of controllers based on discrete time model – Deadbeat and Dahlin's algorithms.

UNIT – III

Design of Feed Forward Controller

Block Diagram, Feed Forward control algorithms – dynamic, static, Deadbeat.

UNIT – IV

Cascade, Predictive and Adaptive Control

Cascade Control – Dynamic response, Types, Implementation. Predictive Control – Model based and Multivariable System. Adaptive Control – Adjustment, Schemes, and Techniques.advanced strategies-Inferential Control. Intelligent Control. Statistical Process Control. Algorithms for Processes with Dead Time – Smith Predictor (SP), Analytical Predictor (AP). Optimal Control

UNIT – V

Distributed Digital Control

Programmable logic controllers (PLC)- Architecture , Selection. Overview of Distributed Digital Control System (DCS). DCS Software configuration. DCS Communication – Data Highway. DCS Supervisory computer Tasks. DCS Integration with PLCs and Computers.Applications-SCADA,Dataloggers,Data acquisition system

Text Books

1. Computer Aided Process Control – S.K.Singh. PHI 2004
2. Computer Control of Processes – M.Chidambaram. Narosa 2003.

References

1. Computer-based Industrial Control by Krishna Kanth. PHI 1997
2. Real Time Control: An Introduction – second edition - S.Bennett, Pearson Education India 2003.

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IV Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
Elective-II	**3**	**1**	**3**

(13EIE014) Industrial Electronics

Course Objective:

1. To make students understand the application of Amplifiers in industries
2. To make students understand the need and working of SCR.
3. To make students understand the need of different operation of SCR and their industrial applications.

Course Outcome:

Upon completion of this course, students should be able to:

1. Appreciate the need of DC amplifiers,RPS and SMPS
2. Appreciate the need for SCR and different firing angle.
3. Appreciate the application of SCR to DC motor control, working of industrial timers, working of electrodes and RF generators.

UNIT I

DC Amplifiers:

Need for DC amplifiers, DC amplifiers—Drift, Causes, Darlington Emitter Follower, Cascode amplifier, Stabilization, Differential amplifiers—Chopper stabilization, Operational Amplifiers, Ideal specifications of Operational Amplifiers, Instrumentation Amplifiers.

UNIT II

Regulated Power Supplies:

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

UNIT III

Switched Mode & IC Regulators :

Switched Mode voltage regulator, Comparison of Linear and Switched Mode Voltage Regulators, Servo Voltage Stabilizer, monolithic voltage regulators Fixed and Adjustable IC Voltage regulators, 3-terminal Voltage regulators—Current boosting .

UNIT IV

SCR, Thyristor and its Applications:

Principles of operation and characteristics of SCR, Triggering of Thyristors, Commutation Techniques of Thyristors—Classes A, B, C, D, E and F, Ratings of SCR.

Static circuit breaker, Protection of SCR, Inverters—Classification, Single Phase inverters, Converters – single phase Half wave and Full wave.

Chopper circuits – Principle, methods and Configurations, Diac and Triac, Triacs – Triggering modes, Firing Circuits, Commutation.

Design of power supplies and regulators.

UNIT V

Industrial Applications

Industrial timers -Classification, types, Electronic Timers – Classification, RC and Digital timers, Time base Generators. Electric Welding – Classification, types and methods of Resistance and ARC wielding, Electronic DC Motor Control.

High Frequency heating – principle, merits, applications, High frequency Source for Induction heating. Dielectric Heating – principle, material properties, Electrodes and their Coupling to RF generator, Thermal losses and Applications.Ultrasonics – Generation and Applications.

Textbooks:

1. Industrial and Power Electronics – G.K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.
2. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.

References :

1. Electronic Devices and circuits – Theodore.H.Bogart, Pearson Education,6th Edn., 2003.
2. Thyristors and applications – M. Rammurthy, East-West Press, 1977.
3. Integrated Circuits and Semiconductor Devices – Deboo and Burroughs, ISE.

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IV Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
Elective-II	**3**	**1**	**3**

(13ECE027) BASICS IN NANO SCIENCE AND TECHNOLOGY

Course Objectives

1. To understand the size dependent physical properties of materials with nano dimensions
2. To learn the principles of various preparation methods of nano materials
3. To know the different characterization techniques of nano materials and related instruments
4. To study the basic electronic devices at nano scale.

Course Outcomes

After completing this course the student will be able to

1. Realize and explain that the properties of nano materials are size dependent and vary from corresponding bulk materials
2. Demonstrate the skills required to prepare some of the nano materials in the laboratory
3. Characterize and study the properties with respect to their size and shapes.
4. Appreciate the applications of nano electronic devices and understand their basic principles.

UNIT-I

Basics of Nano science

Introduction to quantum physics, electron as waves, wave mechanics, Schrödinger equation and particle in a box, Heisenberg's uncertainty principle, exclusion principle, Free electron theory (qualitative idea) and its features, Idea of band structure, Density of states for zero, one, two and three dimensional materials, Quantum confinement, Quantum wells, wires, dots, Factors affecting by particle size

UNIT II

Properties of Nanomaterials

Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties of nanomaterials.

Electrical and mechanical properties of Carbon nanostructures

UNIT III

Synthesis of Nonmaterials

Physical methods: Bottom up-Ball Milling, Physical vapour deposition, Ionizedn cluster beam deposition, Laser pyrolysis, Sputter deposition, Gas evaporation. **Chemical methods:** Top down Chemical vapor deposition, Synthesis of metal & semiconductor nano particles by colloidal route, Sol-gel method, Combustion method.

Nanomaterials characterization

XRD, UV-VIS spectroscopy, X-ray fluorescence, X-ray photon emission spectroscopy, Surface electron microscopy, Transmission electron microscopy, Scanning tunneling microscopy, Atomic force microscopy, Raman spectroscopy

UNIT V

Nanoelectronics

The p-n-junction and bipolar transistor, Metal semiconductor and metal insulator, semiconductor junction, field effect transistor.

Nano scale MOSFETS, limits to scaling, system integration, interconnects, Nanowire Field Effect Transistors, Single Electron Transistors, Carbon nanotube transistors, Memory Devices

TEXT AND REFERENCE BOOKS

1. Nanotechnology: Principles & Practicals. Sulbha K. Kulkarni, Capital Publishing Co.New Delhi.
2. Carbon nanotechnology-Recent developments in Chemistry, Physics, materials science and device applications -Elsevier Science
3. Nanostructures & Nanomaterials Synthesis, Properties & Applications. Guozhong Cao, Imperials College Press London.
4. Nanomaterials: Synthesis, Properties & Applications. Edited by A.S. Edelstein & R.C.Commorata. Institute of Physics Publishing, Bristol & Philadelphia.
5. Introduction to Nanotechnology. C.P. Poole Jr. and F. J.Owens, Wiley Student Edition.
6. Nano: The Essentials. T.Pradeep , McGraw Hill Education.
7. Nanophysics & Nanotechnology: An Introduction to Modern Concepts in Nanoscience Edward L. Wolf (2nd Ed.),WILEY-VCH, 2006
8. Nanoscience and Technology: Novel Structure and Phenomena- Ping and Sheng
9. Hand Book of Nanotechnology, Bhushan
10. Sol-gel science and technology processing, characterization and applications; . S. Sakka, Kluwer Acad. Publ.
11. Nanoelectronics & Nanosystems: From Transistor to Molecular & Quantum Devices, Goser et al,
12. Handbook of Semiconductor Nanostructures & Nanodevices, A. A. Balandin and K L. Wang,
13. Hand book of Nanostructure materials and nanotechnology; H.S.Nalwa, (Vol.1-5), Acad. Press, Boston, 2000
14. Nanotechnology; Springer Verrlag, . T.J.Deming, Berlin, 1999
15. Nano CMOS Circuit and Physical Design, Banwong, Anurag Mittal;

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

(13EIE107) ANALYTICAL INSTRUMENTATION LABORATORY

Course Objectives:

1. Students will be introduced to a whole array of modern analytical instruments with the goal of providing them with the tools.
2. The emphasis will be a "hands-on" approach with sample preparation, application, method development, data analysis and interpretation being key elements.
3. Interpret data derived from any analytical instruments.
4. Appreciate the basic concept, principles and terms of chromatography

Course Outcomes:

1. Apply basic lab safety rules while working in analytical chemistry laboratories
2. Apply basic analytical processes and sampling procedures and perform them in the lab
3. Apply the basic principles of spectroscopy and work in real time with it.
4. Perform simple analytical procedures on given samples using Ultraviolet or Infrared Spectrophotometers leading to applied research.

List of Experiments

(Minimum 10 experiments should be completed)

1. Gas analyzers.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass spectrometer.
8. pH measurement.
9. Nuclear radiation detector.
10. Water Purity meter
11. Digital Conductivity meter
12. Digital Turbidity meter

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

(13EIE110) EMBEDDED CONTROLLERS AND ROBOTICS LABORATORY

(Using ARM processors, PIC micro controllers, PSoC and RTOS)

Course Objectives:

1. Imparts System Level Thinking
2. Acquaints innovative Design Applications
3. Acquire command over design Automation

Course Outcomes:

1. Apply the knowledge of embedded controllers including the hardware building blocks to real world.
2. Apply the knowledge of program structure and design including instruction sets, machine language to real world problems.
3. Utilize assemblers, and assembly languages for real world problems.
4. The ability to use interrupts, and to build and program an embedded microcontroller.

List of Experiments:

1) Interfacing with a) Keyboard b) LCD and c) ADC & DAC
2) Serial data transmission and reception from temperature and pressure sensors
3) Multichannel Data Loggers
4) Implementation of digital FIR filter
5) Intelligent Multilevel Parking control system
6) Design of integrated automobile dashboard control system – I
7) Design of integrated automobile dashboard control system – II
8) Adaptive Traffic control system
9) Embedded platform for automated Patient Monitoring system
10) Adaptive electrocardiogram feature extraction on distributed embedded systems
11) Design of demand pace maker using embedded controller
12) Design of alarm systems through short range wireless sensor networks

Robotics : Programming and Applications

1. Simulation of obstacle avoiding robot using LabVIEW
2. Simulation of line follower robot using LabVIEW
3. Interfacing AURDUINO robot kit board with LabVIEW
4. Development of line follower and obstacle avoiding robots
5. Development of robots for R T V L motion control using Embedded Controllers.

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

(13EIE111) INDUSTRIAL PROCESS CONTROL SYSTEMS LABORATORY

Course Objectives:

1. To make students proficient with PLC and SCADA programming
2. To make students interface between PLC and SCADA
3. To make students implement PLC and SCADA for real time systems

Course Outcomes:

1. Write PLC and SCADA programs for desired application.
2. Implement PLC and SCADA control to real times systems.
3. Design create seamless interface between PLC and SCADA mincing the real industrial application.

List of Experiments

Industrial Instrumentation:

1. Calibration of Pneumatic pressure to Current (P to I) and Current to Pneumatic Pressure (I to P) Converters
2. Measurement of RP 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. Measurement of Viscosity of Edible Oil using Redwood Viscometer
8. Measurement of Viscosity of Crude Oil using Saybolt Viscometer

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 multiple process (Pressure, Flow, Level and Speed)
8. Monitoring and evaluation of PLC network using SCADA.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	0	**4**	**2**

(13EIE201) INDUSTRY ORIENTED MINI PROJECT

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13CMS002) MANAGEMENT SCIENCE

Course Prerequisites: Business Economics and Financial Analysis

Course Objectives:

The objective of this course is to:

1. 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.
2. Expose with a systematic and critical understanding of organizational theory, structures and design.
3. Comprehend conceptual models of strategic management and to familiarize with the tools of operations and project management.
4. Understand the role of human relations in the management of operations and to provide basic insights into contemporary management practices.

Course outcomes:

Upon completion of this course students should be able to:

1. Function effectively in multidisciplinary teams to accomplish a common goal of organizations.
2. Apply theories to improve the practice of management.
3. Appreciate the management challenges associated with high levels of change in the organizations.
4. 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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IV Year B.Tech EIE – II Sem	**L**	**T/P/D**	**C**
Elective – III	**3**	**0**	**3**

(13EIE019) FIBER OPTIC AND LASER INSTRUMENTATION

Course Objectives:

1. Understand the principles of optics and Principle of Lasing action, Design of lasers.
2. Apply the knowledge of Optics to fibers and understand the different industrial applications of Optical Fibers.
3. Learn the various applications of Lasers in Instrumentation.
4. Understand the Opto-Electronic devices and their principles of operation along with their applications.

Course Outcomes:

1. Apply fundamental knowledge of Optics and lasers to design application specific optical fiber.
2. Apply Lasers in Instrumentation for the measurement of Industrial parameters like Pressure, temperature, Level and find the solutions for the errors.
3. Understand the advantages of using Lasers in the measurements.

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.

UNIT – IV

Laser Fundamentals

Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Gas lasers, Solid 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. 'Introduction to Opto Electronics', J. Wilson and J.F.B. Hawkes, Prentice Hall of India, 2001.
3. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press

REFERENCES

1. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
2. 'Optical Fibre Communication and Sensors', M. Arumugam, Anuradha Agencies, 2002.
3. 'Optical Fibre Communication', G. Keiser, 'McGraw Hill, 1995.
4. Monte Ross, 'Laser Applications', McGraw Hill, 1968

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

(13EIE020) MICRO ELECTROMECHANICAL SYSTEMS (MEMS)

Course objective:

1. Aquire knowledge about present MEMS device and their application.
2. Understanding the principle laws of physics and chemistry employed in the fabrication of MEMS devices.
3. Understand different fabrication techniques like micro-machining, etching etc.
4. Study the electronic interface and software design tools for MEMS devices.

Course Outcomes:

1. Apply fundamental knowledge of mathematics, physics and chemistry to analyze practical micro-systems.
2. Experimenting with software simulation designs (in teams) and exploring the advantages of working on multi-physics tool for creating a blueprint for MEMS device, as well as documenting them in engineering reports.
3. Understand the pivotal role of electronics for developing an MEMS device.
4. Apply these techniques for development of MEMS for specific applications.

UNIT I

Fundamentals of MEMS

Overview of MEMS and Microsystems, Materials for MEMS and Microsystems: silicon, Silicon compounds, silicon piezoresistors, polymers, packaging materials, material characterization techniques - SEM, optical microscopy, XRD, IR, ESCA, SIMS.

UNIT II

MEMS Technology

Surface micromachining, Bulk micromachining, Deep Reactive Ion Etching, Bending of thin plates, mechanical vibrations, thermomechanics, fracture mechanics, thin film mechanics.

UNIT III

Scaling and Stress Analysis

Overview of finite element stress analysis scaling laws in miniaturization: scaling in geometry, scaling in Electrostatic forces, scaling in electromagnetic forces, scaling in electricity.

UNIT IV

Materials for MEMS & Microsystems and their fabrication

Substrates and Wafers, Active substrate materials, Silicon as a substrate material, Silicon compounds, Silicon Piezoresistors, Gallium Arsenide, Quartz, Piezoelectric

Crystals and Polymers, Photolithography, Ion implantation, Diffusion and oxidation, Chemical and Physical vapor deposition, etching, Surface Micromachining, The LIGA Process.

UNIT V

Process modeling and Applications of MEMS

Device layout, cross-section viewing, photomask generation

Design examples (any two in details): accelerometers, gyroscopes, infrared sensing array, RF MEMS, and Optical MEMS. Reliability Overview Design Rules and DRC

Text / Reference books:

1. An Introduction to Microelectromechanical Systems Engineering, by Nadim Maluf
2. The Micromachined TransducersSourcebook, by Gregory T.A. Kovacs, McGraw-Hill, Inc., 1998.
3. Microsystem Design, by Stephen D. Senturia, Kluwer Publishers, 2001
4. Fundamentals of Microfabrication, by Marc Madou
5. MEMS and Microsystems Design and Manufacture by Tai-Ran Hsu, Tata McGraw-Hill

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13EIE017) TELEMETRY AND TELECONTROL

Course Objectives

1. To study the concepts of classical telemetry systems
2. To get an exposure to radio and satellite telemetry systems.
3. To learn the fundamentals of optical telemetering systems.
4. To understand the essential principles of telecontrol systems and installation

Course Outcomes

1. Students will be able to apply techniques of telemetry and telecontrol.
2. Applications of Telemetry and Telecontrol from a remote location.
3. Able to design projects using Telecontrol and Telemetry concepts

UNIT – I

Telemetry Principles

Introduction, Functional blocks of Telemetry system, Methods of Telemetry – Non Electrical, Electrical, Pneumatic, Frequency

Symbols and Codes

Bits and Symbols, Time function pulses, Line and Channel Coding, Modulation Codes. Inter symbol Interference.

UNIT – II

Frequency& Time Division Multiplexed Systems

FDM, IRIG Standard, FM and PM Circuits, Receiving end, PLL

TDM-PAM, PAM /PM and TDM – PCM Systems. PCM reception. Differential PCM Introduction, QAM, Protocols.

UNIT – III

Satellite Telemetry

General considerations, TT&C Service, Digital Transmission systems, TT&C Subsystems, Telemetry and Communications.

Modern Telemetry

Zigbee, Ethernet.

UNIT – IV

Optical Telemetry

Optical fibers Cable – Sources and detectors – Transmitter and Receiving Circuits, Coherent Optical Fiber Communication System.

UNIT – V

Telecontrol Methods

Analog and Digital techniques in Telecontrol, Telecontrol apparatus – Remote adjustment, Guidance and regulation – Telecontrol using information theory –Example of a Telecontrol System.

Text Books

1. Telemetry Principles – D. Patranabis, TMH
2. Telecontrol Methods and Applications of Telemetry and Remote Control – by Swoboda G., Reinhold Publishing Corp., London, 1991

References

1. Handbook of Telemetry and Remote Control – by Gruenberg L., McGraw Hill, New York, 1987.
2. Telemetry Engineering – by Young R.E., Little Books Ltd., London, 1988.
3. Data Communication and Teleprocessing System – by Housley T., PH Intl.,Englewood Cliffs, New Jersey, 1987.

VNR Vignana Jyothi Institute of Engineering & Technology
(Elective-IV Inter Departmental Elective)

IV Year B.Tech EIE – II SEM	**L**	**T/P/D**	**C**
	3	**0**	**3**

(13ECE081) VLSI SYSTEM DESIGN

Course Objectives:

1. To learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
2. To study the concepts of stick diagrams and layouts with the knowledge of MOS layers through design rules.
3. To study gate level design of subsystems and integrated circuits.
4. To learn basic circuit concepts and scaling of MOS transitors.

Course Outcomes:

After going through this course the student will be able to

1. Understand the various fabrication processes for different FET transitors.
2. Design the basic combinational circuits using stick and layout diagrams.
3. Learn the elecrical properties and circuit concepts of MOS transistors.
4. Design the systems using subsytems design process.

UNIT I

Review of microelectronics and Introduction to MOS technology: Introduction to IC technology: Fabrication process:Oxidation,Diffusion,Lithography,Ion Implantation and Metallisation. Introduction to MOS and related VLSI technology – NMOS-CMOS-BICMOS Technologies used in VLSI circuits.

UNIT II

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS, CMOS and BiCMOS Circuits:

IDs –VDs relationships, MOS transistor threshold Voltage, gm, gds, figure of merit wo, Pass transistor, NMOS inverter, CMOS Inverter

UNIT III

VLSI Circuit Design Process: VLSI Design Flow ,MOS layers , stick diagrams , design rules and layout –Lambda based design rules for wires, transistors and contact cuts, Layout Diagrams for logic gates.

UNIT IV

Basic Circuit concepts and scaling of MOS transistors:

Sheet resitsance, Area capacitance, Delay unit, Inverter Delays ,Rise time and fall time estimations, wiring capacitance, Choice of layers, Scaling models ,Scaling factors, Limitaions of scaling.

UNIT V

GATE LEVEL DESIGN AND LAYOUT: Architectural issues, Switch logic networks, Gate logic, transmission gate logic, Alternate gate circuit: Pseudo-NMOS, Dynamic CMOS logic.

SUBSYSTEM DESIGN: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial-Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter.

Text Books:

1. Basic VLSI design by Douglas A, Pucknell, Kamran Eshraghian, Prantice Hall, 1996 3rd edition.
2. CMOS VLSI Design – A circuits and systems perspective, Neil H.E Weste , David Harris, Ayan Banerjee, pearson ,2009.

Reference book:

1.CMOS logic circuit Design – John P. Uyemura , Springer , 2007

2.Modern VLSI Design –Wayne Wolf, Pearson Education , 3rd Edition, 1997.

3.VLSI Design – A.Albert Raj, Latha PHI, 2008.

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

(13ECE025) AD-HOC WIRELESS NETWORKS

Course Objectives

1. To learn about the fundamentals of Adhoc wireless networks.
2. To learn about the different Routing protocols.
3. To learn about the different Multicasting and Security protocols.
4. To learn about the Qos and different power management schems.

Course Outcomes

After completing this course the student will be able to

1. Design protocols using IEEE standards
2. Design and implement different Routing protocols.
3. Design and implement different Multicasting and security protocols.
4. Implement different power management schems.

UNIT I

FUNDAMENTALS

Introduction – Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio Propagation Mechanisms – Characteristics of the Wireless Channel – IEEE 802.11a–b Standard – Origin of Ad hoc Packet Radio Networks – Technical Challenges – Architecture of PRNETs – Components of Packet Radios – Ad hoc Wireless Networks – What is an Ad Hoc Network? Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks – Ad hoc wireless Internet.

UNIT II

AD HOC ROUTING PROTOCOLS

Introduction – Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols – Table–Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) – Wireless Routing Protocol (WRP) – Cluster Switch Gateway Routing (CSGR) – Source–Initiated On–Demand Approaches – Ad hoc On–Demand Distance Vector Routing (AODV) – Dynamic Source Routing (DSR) – Temporally Ordered Routing Algorithm (TORA) – Signal Stability Routing (SSR) – Location–Aided Routing (LAR) – Power–Aware Routing (PAR) – Zone Routing Protocol (ZRP).

UNIT III

MULTICASTROUTING IN ADHOC NETWORKS

Introduction – Issues in Designing a Multicast Routing Protocol – Operation of Multicast Routing Protocols – An Architecture Reference Model for Multicast Routing Protocols – Classifications of Multicast Routing Protocols – Tree–Based Multicast Routing Protocols– Mesh–Based Multicast Routing Protocols – Summary of Tree and Mesh based Protocols – Energy–Efficient Multicasting – Multicasting with Quality of Service Guarantees – Application – Dependent Multicast Routing – Comparisons of Multicast Routing Protocols.

UNIT IV

TRANSPORT LAYER– SECURITY PROTOCOLS

Introduction – Issues in Designing a Transport Layer Protocol for Ad hoc Wireless Networks – Design Goals of a Transport Layer Protocol for Ad hoc Wireless Networks –Classification of Transport Layer Solutions – TCP over Ad hoc Wireless Networks – Other Transport Layer Protocols for Ad hoc Wireless Networks – Security in Ad Hoc Wireless Networks – Network Security Requirements – Issues and Challenges in Security Provisioning – Network Security Attacks – Key Management – Secure Routing in Ad hoc Wireless Networks.

UNIT V

QoS AND ENERGY MANAGEMENT

Introduction – Issues and Challenges in Providing QoS in Ad hoc wireless Networks – Classifications of QoS Solutions – MAC Layer Solutions – Network Layer Solutions – QoS Frameworks for Ad hoc Wireless Networks Energy Management in Ad hoc Wireless Networks –Introduction – Need for Energy Management in Ad hoc Wireless Networks – Classification of Energy Management Schemes – Battery Management Schemes – Transmission Power Management Schemes – System Power Management Schemes.

TEXT BOOKS

1 C. Siva Ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, 2004.

REFERENCES

1. C. K. Toh, “Ad Hoc Mobile Wireless Networks Protocols and Systems”, Prentice Hall, PTR, 2001.
2. Charles E. Perkins, “Ad Hoc Networking”, Addison Wesley, 2000
3. Introduction to Wireless Telecommunications Systems and Networks, Mullet, Cengage Publications

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

(13EIE021) PHARMACEUTICAL INSTRUMENTATION

Course Objective:

1. To make students understand the working pharmaceutical industry
2. To make students understand the necessity of a instrumentation engineer pharmaceutical industry
3. To make students understand different components and their control in pharmaceutical industry.

Course Outcome:

Upon completion of this course, students should be able to:

1. Appreciate the concept of analytical instrumentation learned during previous semester.
2. Appreciate the necessity of homogenization of mixture and size reduction .
3. Appreciate evaporation, 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 the miers 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 for 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,.
3. Tutorial Pharmacy, S.J. Carter, Cooper and Gunn's, 6th ed., CBS publisher, Delhi.

Reference Books:

1. 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 – III	**3**	**0**	**3**

(13ECE013) DIGITAL IMAGE PROCESSING

Course Objectives

1. To introduce fundamentals of digital image processing and study image transforms
2. To demonstrate digital image processing techniques in spatial and frequency domains
3. To study and compare various image compression algorithms
4. To study advanced image analysis methods: image segmentation, morphological image processing, & image restoration

Course Outcomes

After going through this course the student will be able to

1. Understand the basic principles of digital image processing and perform image transforms
2. Understand and perform basic image processing methods such as Image filtering operations, Image enhancement
3. Analyze and compare various image compression techniques and their applications
4. Design and implement various algorithms for image analysis

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 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, CRC Press, 2010

VNR Vignana Jyothi Institute of Engineering and Technology

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

(13EIE016) POWER PLANT INSTRUMENTATION

Course Objective:

1. To make students understand the working model of power plant
2. To make students understand the necessity of a instrumentation engineer in a power plant
3. To make students understand different components and their control in power plants.

Course Outcome:

Upon completion of this course, students should be able to:

1. Appreciate the power generation technique used in different types of power plants
2. Appreciate different parameters and their control in the power plant
3. Should understand and standby the saying "one watt saved = two watts generated".

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, Functions of 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.
3. Standard Boiler operations-Questions and Answers., Elonka S.M and Kohal A.L.,– Tata McGraw Hill, New Delhi, 1994.
4. Power Plant Instrumentation by Prof. K. Krishna Swamy, Newage International Publisher.

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

(13ECE007) DIGITAL COMMUNICATIONS

Course Objectives

1. Understand various modulation techniques.
2. Study the concepts of base band transmissions.
3. Knowledge of information theory.
4. Importance of coding theory.

Course Outcomes

After going through this course the student will be able to

1. Analyze pulse digital modulation techniques.
2. Compare power spectral densities of various encoding formats and know the Importance of pulse shaping.
3. Apply modulation techniques to design a digital system.
4. Understand source and channel coding schemes.

UNIT I

PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, elements of PCM: sampling, quantization and coding, quantization error, non-uniform Quantization and companding. Differential PCM systems (DPCM) and Adaptive DPCM.

DELTA MODULATION: Delta modulation, its drawbacks, adaptive Delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II

BASE BAND TRANSMISSION: Requirements of a line encoding format, various line encoding formats- Unipolar, Polar, Bipolar, Scrambling techniques-B8ZS,HDB3. Computation of power spectral densities of various line encoding formats.

M-ARY PULSE MODULATION: Inter symbol interference, pulse shaping to reduce ISI, Nyquist's criterion, Raised cosine filter, Equalization, Correlative level coding, Duo-binary encoding, Modified Duo-binary encoding.

UNIT III

DIGITAL MODULATION TECHNIQUES: Introduction, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and frequency Spectrum of FSK, Non-Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL,BPSK, Coherent PSK Detection, QPSK,DPSK, DEPSK.

DATA TRANSMISSION: base band signal receiver, probability of error, optimum filter, matched filter, probability of error using matched filter, probability of error for various line encoding formats, correlator receiver, Calculation of Probability Errors of ASK, FSK, BPSK.

UNIT IV

INFORMATION THEORY: Information and Entropy conditional entropy, Mutual Information, channel Capacity, Various Mathematical Modeling of Communication Channels and their Capacities, Hartley Shannon Law, Trade off between bandwidth and S/N ratio Source Coding. Fixed Length and Variable Length Source Coding Schemes.

UNIT V

LINEAR BLOCK CODES: Introduction to error control coding, Matrix description of linear block codes, error detection and error correction capabilities of linear block codes, hamming code, binary cyclic codes, algebraic structure, encoding, syndrome calculation and decoding.

CONVOLUTIONAL CODES: Introduction, encoding of convolutional codes, time domain approach, transform domain approach. General approach: state, tree and trellis diagram, decoding using Viterbi algorithm, burst error correction, block interleaving and Convolutional interleaving.

TEXT BOOKS

1. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, Goutam Saha, 3rd Edition, McGraw-Hill, 2010.

REFERENCES

1. Digital Communications – Simon Haykin, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983.
3. Communication Systems Analog and Digital – Singh and Sapre, TMH, 2004.
4. Modern Analog and Digital Communications – B.P. Lathi and Zhi Ding, International 4th Edition, Oxford University Press.

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

(13ECE021) DSP PROCESSORS AND ARCHITECTURES

Course Objectives

1. To study the Architectural details of TMS320C54xx DSPs and the concepts involved in execution control and pipelining
2. To analyze the importance of numeric formats and sources of errors in DSP implementation
3. To understand the concepts of Memory & I/O interfacing
4. Develop various algorithms

Course Outcomes

After going through this course the student will be able to

1. Compare various architectures
2. Design systems and role sampling rate
3. Interface different devices to the processor.
4. Design and implement real time signal processing algorithms and applications based on DSP processors.

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 EIE – II Sem	L	T/P/D	C
	0	0	2

(13EIE202) TECHNICAL SEMINAR

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

(13EIE203) COMPREHENSIVE VIVA

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IV Year B.Tech EIE – II Sem	L	T/P/D	C
	0	18	12

(13EIE204) MAJOR PROJECT