ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

Electronics and Instrumentation Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2011-2012)

VNR VIGNANA JYOTHI
INSTITUTE OF ENGINEERING AND
TECHNOLOGY
(AFFILIATED TO JNTUH)
An Autonomous Institute under JNTUH

Bachupally, Nizampet (S.O),
Hyderabad – 500090
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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

HYDERABAD

An Autonomous Institute under JNTUH

ACADEMIC REGULATIONS 2011 FOR B.TECH. DEGREE COURSE

(Applicable for Students admitted from the academic year 2011-2012)

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.

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.

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

1.1.1 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 State Government GOs 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

He candidates shall be admitted into the Third 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 75 marks for practical subjects.** In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for **50, 50, 50 and 200 marks** respectively.

ii. For theory subjects the distribution shall be **30 marks for Internal Evaluation** and **70 marks for the End-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. First mid examination should be conducted for 1 – 2 ½ Units of syllabus and the second mid examination shall be conducted for 2 ½ - 5 Units of syllabus. The mid descriptive type exam paper consists of Section-A and Section-B.

Section-A [compulsory] consists of 5 short answer questions and each carries one mark.

Section-B consists of 5 questions out of which 4 are to be answered and each question carries 5 marks. The time duration of each mid examination is 90 minutes.

Two assignments are to be given to students covering the syllabus of first mid and second Mid examinations and are evaluated for 5 marks each. .
The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

At the end of the Semester Internal Marks Maximum 30 for the respective subjects are allotted as follows:

(a) 25 marks for the better of the two mid term examinations
(b) 5 marks of the average of the two assignment marks

iii. For practical subjects there shall be a continuous evaluation during the Semester for **25 internal marks and 50 marks for end examination**. Out of the 25 marks for internal, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and 10 marks for internal examination (two internal practical examinations will be conducted and the better of the two examinations will be taken into account) and 5 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.

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 internal tests (**the better of the two examinations will be taken into account**) and 70 marks for end examination.** There shall be **two internal tests** in a Semester.

iv. There shall be an **industry-oriented mini-Project**, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. The **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 **50 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 internal assessment for industry oriented mini project.**

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 report shall be evaluated for **50 marks**. There shall be **no external examination for Seminar.**

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. 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 50 marks** by the Committee. There will be **no internal 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 Internal Evaluation** and **140 marks for the Semester end Examination**. The Semester end Examination (viva-voce) shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The Internal 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 contains two sections [Section-A and Section-B]

Section-A: Carries 30 marks [Five questions of one mark each, five questions of two marks each and another five questions of three marks each] which is compulsory.

Section-B: carries 40 marks consisting of six essay type questions out of which four questions to be answered, each carrying 10 marks.

Drawing related subjects, question paper contains 8 questions (atleast one question from each unit), out of which the candidate has to answer any 5 questions, each carrying 14 marks.

(b) Practical Courses

Each lab course is evaluated for 50 marks. The examination shall be conducted by the laboratory teacher and another senior teacher concerned with the subject of the same/other department/Industry. The external examiner may be appointed by the Chief Superintendent in consultation with HOD as and when required.

(c) Supplementary Examinations

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

4. Attendance Requirements

i. A student shall be eligible to appear for the Semester end examinations if he acquires a **minimum of 75% of attendance in aggregate of all the subjects** for Semester / year.

ii. Condonation of shortage of attendance in aggregate **up to 10% (65% and above 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 hence not promoted to the next Semester unless he satisfies the attendance requirement of the present Semester, as applicable. They may seek re-admission for that Semester 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 in any Semester are not eligible to take their end examination of that Semester.

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

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 internal evaluation and end examination taken together.**

ii. A student shall be **promoted from II to III year** only if he fulfils the academic requirement of **37 credits from Two regular and one supplementary examinations of I year I Semester and One Regular and One Supplementary exam of I year II Semester, and one regular examination of II year I Semester** irrespective of whether the candidate takes the examination or not.

iii. A student shall be **promoted from III year to IV year** only if he fulfils the academic requirements of total **62 credits from the following examinations,** whether the candidate takes the examinations or not.

- Three regular and Two supplementary examinations of I B Tech I Semester.
- Two regular and two Supplementary examinations for I B Tech II Semester
- Two regular and one supplementary examinations up to the end of II year I Semester.
- One regular and one supplementary examinations of II year II Semester.
- One regular examination of III year I Semester.

iv. A student shall register and put up minimum academic requirement in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.

v. Students who fail to earn 200 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 shall stand get cancelled.**

6. Course pattern

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

ii. A student eligible to appear for the end examination in a subject, but absent or has failed in the end 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 to be promoted or for promotion into the next year after fulfillment of the academic requirements, **with the academic regulations of the batch into which he gets admitted**

7. 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 **200 credits.**

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.

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

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the 200 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	
Fail	Below 40%	

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

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 and he will not be allowed to go into the next higher Semester. 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 Institute Academic Committee.

10. Minimum Instruction Days

The minimum instruction days for each Semester shall be **90 clear 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 procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules concerned in view.

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 doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

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

v. The College 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 2012-2013)

(i) A student shall register for all 150 credits and earn all the 150 credits. Marks obtained in all 150 credits shall be considered for the calculation of the class.

(ii) A student who fails to earn 150 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 37 credits from the following examinations.

a. Two regular and one supplementary examination of II year I Semester

b. One regular and one supplementary examination of II year II Semester

c. One regular examination of III year I Semester.

Irrespective of whether the candidate appears the Semester-End examination or not as per the normal course of study and in case of getting detained for want of credits the

student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV year I Semester.

(v) Award of B.Tech. Degree and Class

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

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the 150 Credits. (i.e., II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	
Fail	Below 40%	

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

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

Vision and Mission Statements of the Institution

VISION

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

MISSION

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

Vision and Mission Statements of Department of Electronics and Instrumentation Engineering

VISION

A resource center of academic excellence for imparting quality technical education imbibing with strong professional ethics to improve the standards of the society around mission

MISSION

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

Program Education Objectives (PEOs)

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

Program Outcomes

The program demonstrates that the graduate is

a. Apply the knowledge of mathematics, basic sciences and engineering for the applications in the field of Electronics and Instrumentation Engineering.
b. Communicate and Present the concepts effectively with all the stake holders.
c. Analyze and present effectively the problems and solutions among the core and multidisciplinary teams.
d. Apply the knowledge of instrumentation engineering for design and development of solutions for engineering problems.
e. Apply appropriate modern technical tools necessary for design, implementation, testing, operation, and maintenance of various Industrial and Socially useful Instruments.
f. Translate theoretical concepts into working models in multidisciplinary environment to meet the Local, National and Global needs.
g. Apply appropriate tools and provide solutions to the industry/society needs
h. Investigate, analyze, design, develop solutions and interpret the results to provide valid conclusions.
i. Develop aptitude for working individually as well as in a team to acquire and apply modern technical skills.
j. Identify, formulate, and develop solutions in the fields of health, safety & security of the society, following professional ethics.
k. Be moulded into globally successful technocrats with good managerial and entrepreneurship skills.
l. Synchronize with contemporary knowledge, technological development and acquire life long learning.

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
R11MTH1101	Mathematics - I	3	1	3
R11MTH1102	Mathematics- II	3	1	3
R11PHY1101	Engineering Physics-I	3	0	3
R11HAS1101	English	3	0	3
R11CSE1101	Computer Programming	3	0	3
R11MED1105	Engineering Drawing	3	3	4
R11HAS1201	English Language Communication Skills Lab - I	0	3	2
R11CSE1201	Computer Programming Lab	0	3	2
R11MED1202	Workshop Practice	0	3	2
Total		**18**	**14**	**25**

I YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R11EEE1101	Circuit Theory	4	0	4
R11MTH1104	Numerical analysis and Linear Programming	3	1	3
R11PHY1102	Engineering Physics-II	3	0	3
R11CHE1101	Engineering Chemistry	3	0	3
R11CSE1102	Data Structures	3	0	3
R11CED1109	Environmental Studies	3	0	3
R11CSE1202	Data Structures Lab	0	3	2
R11EPC1201	Engineering Physics and Engineering Chemistry Lab	0	3	2
R11HAS1202	English Language Communication Skills Lab - II	0	3	2
Total		**19**	**10**	**25**

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
R11HAS1102	Business Economics and Financial Analysis	4	0	4
R11MTH1105	Applied Mathematics	3	1	3
R11EEE1105	Principles of Electrical Engineering	3	1	3
R11EIE1101	Signals and Systems	4	1	4
R11EIE1102	Sensors and Signal Conditioning	3	1	3
R11ECE1102	Electronics Devices and Circuits	4	1	4
R11EEE1202	Electrical Engineering Laboratory	0	3	2
R11ECE1202	Electronics Devices and Circuits Laboratory	0	3	2
Total		**21**	**11**	**25**

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R11HAS1103	Management Science	4	0	4
R11EEE1106	Control Systems	3	1	3
R11EIE1103	Electronic Measurements	3	1	3
R11EIE1104	Pulse and Digital Circuits	3	1	3
R11EIE1105	Electronic Circuit Analysis	4	0	4
R11ECE1103	Switching Theory and Logic Design	4	0	4
R11EIE1202	PDC Laboratory	0	3	2
R11EIE1201	Transducers and Measurements Laboratory	0	3	2
Total		**21**	**09**	**25**

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

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
R11CSE1103	Computer Organization	4	0	4
R11EIE1106	Linear and Digital IC Applications	4	0	4
R11EIE1107	Bio-Medical Instrumentation	3	1	3
R11EIE1108	Process Control Instrumentation	4	0	4
R11EIE1109	Industrial Instrumentation	4	0	4
R11EIE1203	Electronic Circuit Analysis Laboratory	0	3	2
R11EIE1204	Linear and Digital IC Applications Laboratory	0	3	2
R11EIE1205	Process Control Instrumentation Laboratory	0	3	2
Total		**19**	**11**	**25**

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
R11ECE1130	Principles of Communications	3	0	3
R11ECE1108	Micro Processors and Micro Controllers	4	0	4
R11ECE1109	Digital Signal Processing	4	1	4
R11EIE1110	Analytical Instrumentation	4	0	4
R11EIE1111	Virtual Instrumentation	4	1	4
R11ECE1204	Microprocessor and Micro Controllers Laboratory	0	3	2
R11HAS1204	Advanced English Language Communication Skill Laboratory	0	3	2
R11EIE1206	Industrial Instrumentation Laboratory	0	3	2
Total		**19**	**11**	**25**

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
R11EIE1112	PC Based Instrumentation	4	0	4
R11EIE1113 R11EEE1119 R11EIE1114	**Elective – I** Instrumentation Practices in Industries Neural Networks and Fuzzy Logic Industrial Electronics	4	0	4
R11EIE1115 R11ECE1110 R11CSE1118	**Elective – II** Automation of Industrial Processes VLSI Design Computer networks	4	1	4
R11EIE1116 R11CSE1114 R11ITD1117	**Elective – III** Power Plant Instrumentation Object Oriented Programming Managerial Information Systems	4	0	4
R11EIE1122 R11ECE1127 R11CSE1110	**Elective – IV** Telemetry and Tele Control Embedded and Real Time Operating Systems Data Base Management Systems	3	1	3
R11EIE1207	Analytical Instrumentation Laboratory	0	3	2
R11EIE1208	Virtual Instrumentation Laboratory	0	3	2
R11EIE1301	Industry Oriented Mini –Project	0	8	2
Total		**19**	**16**	**25**

***Major Project initiated in I Semester and Evaluated in II Semester**

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
R11EIE1118	Robotics and Automation	3	1	3
	Elective – V			
R11EIE1119	Fiber Optic and Laser Instrumentation			
R11EIE1120	Micro Electromechanical Systems (MEMS)	3	1	3
R11CSE1108	Operating Systems			
R11ECE1115	Digital Design through Verilog			
	Elective – VI			
R11EIE1125	Pharmaceutical Instrumentation			
R11ECE1113	Digital Image Processing	3	1	3
R11EIE1122	Digital Control Systems			
R11MED1164	Elements of Nano Technology			
R11EIE1302	Seminar	0	3	2
R11EIE1303	Comprehensive Viva	0	0	2
R11EIE1304	Major Project	6	12	12
Total		**15**	**18**	**25**

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

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

I Year B.Tech ECE,EEE,EIE – I Sem

L	T/P/D	C
3	1	3

(R11MTH1101) MATHEMATICS – I
(Advanced Calculus)

Prerequisites: Differentiation, Integration

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

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

UNIT I

Elementary analysis

Sequences and series - convergence and divergence, ratio test, comparison test, integral test, Cauchy's root test, Raabe's test (statements only for the tests), and absolute and conditional convergence.

Mean value theorems (statements only) - Rolle's theorem, Lagrange's theorem, Cauchy's theorem, and generalized mean value theorem (Taylor's Theorem).

UNIT II

Functions of several variables

Partial differentiation; Functional dependence; Jacobian; Maxima and Minima of functions of two variables with constraints and without constraints.

Radius of curvature; Centre and circle of curvature – evolutes and envelopes.

UNIT III

Improper integrals and special functions

Improper Integrals; Beta, Gamma, and Error functions - Properties and simple applications.

UNIT IV

Curve tracing, applications of integration and multiple integrals

Curve tracing – Cartesian, polar, and parametric curves; Applications of integration to lengths, volumes and surface areas in cartesian and polar coordinates.

Multiple integrals - double and triple integrals, change of variables, and change of order of integration.

UNIT-V

Vector calculus

Introduction to vector and scalar functions; gradient, curl, divergence, and their related properties of sums and products; Laplacian and second order operators; Vector integration - line integral, work done, potential function; Area, surface, and volume integrals; Statements of Vector integral theorems and their verification (without proofs) - Green's theorem, Stoke's theorem, and Gauss divergence theorem.

TEXT BOOKS

1. Calculus and Analytic Geometry - Thomas and Finney, 9th edition, *Pearson Education*.

REFERENCES

1. Elementary Analysis: The Theory of Calculus - Kenneth Ross, *Springer.*
2. Principles of Mathematical Analysis - Walter Rudin, 3rd edition, *Paperbac,* 1976.
3. Advanced Engineering Mathematics - Erwin Kreyszig, 8th edition, *John Wiley*.
4. Calculus - Tom M. Apostol, Volume1 and Volume 2, 2nd edition, *John Wiley,* 2003.
5. Schaum's Outline of Vector Analysis - Murray R. Spiegel, 2nd edition, *Tata McGraw Hill* 2011.

I Year B.Tech ECE,EEE,EIE – I sem	L	T/P/D	C
	3	1	3

(R11MTH1102) MATHEMATICS – II
(Linear Algebra and Ordinary Differential Equations)

Course Objectives:

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

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

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

LINEAR ALGEBRA
UNIT I
Solution of linear systems
Matrices and linear systems of equations - elementary row transformations, Rank Echelon form, and normal form; Solution of linear systems - direct methods - LU decomposition, LU decomposition from Gauss elimination, and solution of Tri-diagonal systems; Eigen values, eigen vectors, and their properties - Liner dependence and independence; Cayley-Hamilton theorem - inverse and powers of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, calculation of powers of a matrix; Modal and spectral matrices.

UNIT II
Linear transformations
Real matrices - symmetric, skew symmetric, and orthogonal linear transformation; Complex matrices - Hermitian, Skew-Hermitian and unitary matrices; Eigen values and eigen vectors of complex matrices and their properties; Quadratic forms - reduction of quadratic form to canonical form, rank, positive, negative definite, semi definite, index, signature, Sylvester law, and singular value decomposition.

ORDINARY DIFFERENTIAL EQUATIONS

UNIT III

Ordinary differential equations and their applications

Differential equations of first order and first degree - Linear, Bernoulli and exact 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.

UNIT IV

Differential equations of higher order and their applications

Differential equations of higher order - homogeneous and non-homogenous type, differential equations of second order and higher order with constant coefficients with right hand side term of the type e^{ax}, sin (ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x), and method of variation of parameters; Applications to bending of beams; Mechanical systems - Simple harmonic motion.

UNIT V

Linear differential equations and qualitative methods

Cauchy's linear differential equation; Legendre's differential equations; Simultaneous linear differential equations; The phase plane; Phase portraits and direction fields; Critical points and stability.

TEXT BOOKS

1. Advanced Engineering Mathematics - R.K Jain and S.R.K Iyengar, 3rd edition, Narosa Publications, 2011.
2. Differential Equations - Dennis G. Zill, Cengage learning, 2011.

REFERENCES

1. Advanced Engineering Mathematics - Erwin Kreyszig, 8th edition, *John Wiley*.
2. Advanced Engineering Mathematics - Peter V. O'Neil, 9th Edition, *Cengage Learning.*
3. Elementary Differential Equations and Boundary Value Problems - William E. Boyce and Richard C. Diprima ,*Wiley.*
4. Linear Algebra and its applications - David C Clay, *Pearson Education.*
5. Differential Equations, with Applications and Historical Notes - George F. Simmons and John S. Robertson, 2nd Edition, *Tata McGraw Hill,* 2008.
6. Advanced Engineering Mathematics - Dennis G. Zill, Warren S. Wright, and Michael R. Cullen, 4th edition, *Jones & Bartlett Learning*.

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

(R11PHY1101) ENGINEERING PHYSICS-I

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

- Realize importance of diffraction in optical elements and interference of light in thin films.
- Work with different wave plates to obtain desired polarization and to distinguish LASER light from ordinary light.
- Describe types of crystal systems and bonds in crystals.
- Illustrate the importance of X rays in crystal studies and identify various crystal defects. Identify importance of Nano dimensional materials.

UNIT –I

INTERFERENCE AND DIFFRACTION: 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, Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Qualitative and Quantitative(Phasors approach)), double slit, circular aperture, and multiple slits (grating)(Qualitative Approach). Resolution of spectral lines, Rayleigh criterion, resolving power of grating and telescope.

UNIT - II

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

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 – Carbon dioxide laser - Semiconductor Laser – Applications of lasers.

UNIT - III

FIBER OPTICS: Principle of optical fiber – 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.

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

UNIT - IV

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

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.

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 - V

SURFACE PHYSICS: Surface Electronic structure(work function, thermionic emission, surface states, tangential surface transport), Electron Microscope, Scanning Tunneling Microscope.

SCIENCE and TECHNOLOGY OF NANOMATERIALS:Origin of nanotechnology – (Basic principles of Nanoscience and Technology) surface to volume ratio, quantum confinement –

Fabrication of nano materials Bottom up fabrication: sol-gel and combustion methods – Top down fabrication: CVDand PVD methods– Characterization (XRD and TEM) - Applications of nanotechnology.

TEXT BOOKS:

(1) Introduction to Solid State Physics by Charles Kittel : John Wiley and Sons
(2) Physics vol.2, by Halliday, Resnick and Krane; John Wiley and Sons
(3) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.
(4) Optics by Ghatak and Thyagarajan, Tata Mc Graw

REFERENCE BOOKS:

(1) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
(2) Solid State Physics by S.O.Pillai
(3) Engineering Physics by M Chandra Shekar and P. Appala Naidu, VGS Book links.
(4) Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
(5) Solid State Physics by N.W.Ashcroft and N.David Merwin. Thomson Learning
(6) Engineering Physics by G Sahashra Buddhe; University Press
(7) Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
(8) Introduction to Optical Communication by G. Keiser
(9) Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill

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

(R11HAS1101) 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:

- To equip the students with all the LSRW skills for advanced writing and speaking.
- To equip the students with basic grammar, infrastructural patterns and grammatical constructions required of in technical writing.
- To acquaint the students with the writing process, beginning with paragraph writing. This would prepare them for academic and workplace writing.
- Equip the students with Oral Communication Skills.

Course Outcomes:

After completion of the course the student is able to:

- Comprehend technical writing produced in the engineering profession
- Understand the writing process and create logical paragraphs
- Use infrastructural patterns in writing and speaking
- 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 : Prose

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

Unit II : Basic 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 III Reading and Writing Skills

i) Reading Comprehension
ii) Paragraph Writing
iii) Letter Writing
iv) Memo Writing
v) Words often Confused
vi) Synonyms and Antonyms
vii) One Word Substitutes
viii) Prefixes and Suffixes
ix) Idioms and Phrases

Unit IV : Prose

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

Unit V : Technical Writing Component

A. Definition of a Technical Term
B. Description of a Mechanism
C. Description of a Technical Process
D. Classification
E. Cause and Effect
F. Comparison and Contrast
G. Analogy

Prescribed Text Books

1. Ashraf Rizvi, **Effective Technical Communication**
2. M. Raman and S. Sharma, **Technical Communication : Principles and Practices,** OUP, 2004. (Indian Edition)

References

1. Gerson Sharon J. and Steven Gerson : Technical Writing Process and Product. 3rd edition, New Jersey: Prentice Hall 1999
2. Blanton, L.L. 1993; Composition Practice, Book 4 ,Second Edition, Heinle and 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/
4. Glendinning, E.H. and Glendinning, N. 1995; Oxford English for Electrical and Mechanical Engineering, Oxford University Press, pp.28,68,83
5. Greaney, G.L. 1997; Less is More: Summary Writing and Sentence Structure in the Advanced ESL Classroom, The Internet TESL Journal, Vol.III, No.9 http://iteslj.org/Techniques/Greaney-Writing.html
6. Neufeld, J.K. 1987; A Handbook for Technical Communication, Prentice-Hall, Inc. pp.20,65-68
7. Yalden, J. 1987; Principles of Course Design for Language Teaching, Cambridge University Press
8. David F. Beer and David McMurrey**,** Guide to Writing as an Engineer, 2nd ed., Wiley, 2004, ISBN: 0471430749.
9. Dale Jungk, Applied Writing for Technicians, McGraw-Hill, 2005, ISBN 0-07-828357-4.
10. Diane Hacker, Pocket Style Manual**,** Bedford/St. Martin's, 2003, ISBN: 0312406843.

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

(R11CSE1101) COMPUTER PROGRAMMING

Course objectives

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

Course Outcomes

After completion of the course the student is able to:

- Understand the fundamentals of C programming.
- Choose the loops and decision making statements to solve the problem.
- Usage of different derived data types and the concepts of files
- Implement different c concepts in problem solving.

UNIT- I

Introduction to Computers – Computer Systems, Computing Environments (DOS/Linux*)*, Computer languages, Linux commands *,* creating and running programs, Software Development Methods, Algorithms, Pseudo code, flow charts, applying the software development method.

UNIT - II

Introduction to C Language – History, Simple C Programme, Identifiers, Basic data types, Variables, Constants, type qualifiers, Input / Output, Operators. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

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

UNIT - III

Designing Structured Programs, Functions- basics, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, recursive functions, example C programs.

Arrays – Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, arrays to functions, C program examples.

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

UNIT - IV

Derived types – Structures – Basic concepts, nested structures, arrays of structures, structures and functions, unions, typedef, bit fields, enumerated types, 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

File I/O – Basic concepts, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

Preprocessor Directives, Dynamic Memory Allocation, Command-Line Arguments.

TEXT BOOKS:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan,E.V.Prasad,Richard F.Gilberg
2. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie

REFERENCES:

1. Let Us C Yashavant kanetkar BPB
2. C How to Program Paul Deitel and Harvey Deitel , PH
3. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994

I Year B.Tech ECE,EEE,EIE – I Sem	L	T/P/D	C
	3	3	4

(R11MED1105) ENGINEERING DRAWING

Course Prerequisites: Geometrical construction

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

- Interpret the concepts of curves and Solve the problems as per the drawing conventions in Auto Cad
- Solve the problems on Projections for points, lines, planes and solids in Auto CAD.
- Apply the concepts of isometric projections and solve the problems in Auto CAD
- Apply the concepts of orthographic projections and solve the problems in Auto CAD

UNIT – I

Introduction to engineering graphics – construction of ellipse, parabola and hyperbola – cycloidal curves.

UNIT – II

Orthographic projections of points, lines and planes – axis inclined to one planes and inclined to both the planes.

UNIT – III

Orthographic projections of solids:

Cylinder, cone, prism, pyramid and sphere positions and axis inclined to both the planes.

UNIT – IV

Isomeric projections of lines, planes and simple solids.

UNIT – V

Conversion of orthographic views into isometric views and vice-versa.

TEXT BOOKS :

1. Engineering drawings 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

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

(R11HAS1201) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY-I

The English language Communication Skills Lab aims to provide practice in all the four skills of LSRW, and provide ample practice in listening and speaking skills.

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

Syllabus for Lab Sessions

Unit 1

Multimedia Lab

1. Phonetics
2. Listening Comprehension
3. Vocabulary Lesson 1

Oral Communication Skills Lab: Self Introduction ; E-mail

Unit 2

Multimedia Lab

1. Grammar ---Nouns and Pronouns; The Present Tense
2. Vocabulary Lesson 2
3. Listening Skills

Oral Communication Skills Lab: Role Play/ Situational Dialogues

Unit 3

Multimedia Lab

1. Telephoning Skills
2. Grammar --- Articles; The Past Tense
3. Vocabulary Lesson 3

Oral Communication Skills Lab: JAM/ Short Talk

Unit 4

Multimedia Lab

1. Grammar ---- Concord; The Future Tense
2. Vocabulary Lesson 4
3. Listening Comprehension

Oral Communication Skills Lab: Information Transfer

Unit 5

Multimedia Lab

1. Grammar --- Adjectives, adverbs, conjunctions
2. Vocabulary -- Lesson 5

Oral Communication Skills Lab : Presentation Skills

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 and video system and camcorder etc.

System Requirement (Hardware component):

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

iv) P – IV Processor

a) Speed – 2.8 GHZ
b) RAM – 512 MB Minimum
c) Hard Disk – 80 GB
v) Headphones of High quality

5. Suggested Software:

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

Suggested 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 and GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

Multimedia Lab Requirements

Minimum Requirement:

The English Language Lab shall have two parts:

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

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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)

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

(R11MED1202) WORKSHOP PRACTICE

Course Objectives:

- To **study/demonstrate** the concepts of computer w.r.t. its hardware, operating system, assembling and disassembling.
- To **conduct** the experiments related to production engineering technology.
- To **demonstrate** the usage of power tools, CNC lathe and machine shop for different exercises

Course Outcomes:

After completion of the course the student is able to:

- Identify, assemble, dissemble, install and write commands for a given
- configuration of a computer.
- To develop components using the techniques of carpentry, tin smithy, forging,
- etc. listed in trades for exercises.
- To work out the given models in machine shop and CNC lathe.
- To develop the designs and models that are suitable to industry.

TRADES FOR EXCERCISES (10 + 6 Weeks)

At least two exercises from each trade:

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

1. Computer Hardware: Identification of Parts, AsSembling and disasSembling Simple diagnostic exercises -

2. Installation of Operating System: Windows , Linux – Basic Commands Simple diagnostic exercises .

Text Books

1. Work shop Manual - P.Kannaiah/ K.L.Narayana, Scitech Publishers.
2. Workshop Manual by Venkat Reddy.
3. Engineering Workshop Practice – V Ramesh Babu, VRB Publishers Pvt. Ltd.
4. IT Essentials PC Hardware and Software Companion Guide Third
5. Edition by Davis Anfinson and Ken Quamme – CISCO Press, Pearson Education.
6. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

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

(R11CSE1201) COMPUTER PROGRAMMING LABORATORY

Course objectives

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

.

Course Outcomes:

After completion of the course the student is able to:

- Able to write, compile and debug programs in C language using both Linux and windows environment
- Implement appropriate decision making statements and derived data types to solve a given problem.
- Implement different concept s of files to solve real world examples.
- Implement different c concepts in problem solving

Week 1

1. WAP that reads three different integers from the keyboard and prints – sum, average, product, smallest, largest of the numbers.
2. WAP that reads two integers and prints – difference, quotient and remainder
3. WAP that reads two integers and determines whether the first is a multiple of the other

Week 2

1. Write a C program to find the sum of individual digits of a positive integer.
2. Write a program to generate Fibonacci sequence (1, 1 ,2, 3, 5, 8,…)
3. Write a C program to generate all the prime numbers between
   1 and n, where n is a value supplied by the user.

Week 3

1. Write a C program to calculate the following Sum: Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!

2. Write a C program to find the roots of a quadratic equation.

Week 4

1. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
2. Write a C program to generate Pascal's triangle.
3. Write a C program to construct a pyramids of numbers

Week 5

1 WAP to print a given number [0-1000] in words. For example, 123 as One Hundred and Twenty Three

2 WAP to check whether a given number is an Armstrong, Palindrome, Perfect, Prime, or a Fibonacci prime Number

3 Write a C program to find both the largest and smallest number in a list of integers

Week 6

1. Implementation of functions categories.
2. Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.

Week 7

1. Write a C program to calculate
   i) Minimum and maximum of an 1-d array
   ii) Sorting and Searching of 1-D array
   iii) Addition and Multiplication of Two Matrices

Week 8

1. Programs on String handling functions-Copying, reverse, substring, concatenation.
2. Programs on structure and unions.

Week 9

Midterm exam

Week 10

Programs using pointers- pointer basic operations, pointers and functions

Week 11

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

Week 12
Implementation of file operations and error handling.

Week 13
Implementation of Dynamic memory allocation

Week 14
Programs using command line arguments.

Week 15
Implementation of preprocessor directives

Week 16
Internal Lab Exam

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

(R11EEE1101) CIRCUIT THEORY

Pre-requisites: Mathematics, Physics

Course Objectives

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

Course Outcomes:

After the completion of the course students will be able to

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

Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Magnetic circuits, Single phase circuits, Resonance, Network topology and Theorems.

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 & 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 & 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. Second edition 2004.
3. Network Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.
4. Electrical Circuit theory by K. Rajeswaran, Pearson Education 2004.
5. Basic Circuit analysis by D.R, Cunningham & J.A Stuller, Jaico Publications.

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

(R11MTH1104) NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

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

Course objectives:

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

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

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

NUMERICAL ANALYSIS

UNIT I

Solutions of non-linear systems

Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – the bisection method, the method of false position, the iteration method, Newton - Raphson method, and 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; Cubic spline interpolation.

UNIT III

Numerical differentiation and Integration

Introduction; Differentiation of equally and unequally spaced data, and finite difference approximations; 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-Moulton method.

UNIT IV

Numerical solutions of partial differential equations (PDE)

Introduction; Classification of second order PDE; finite difference approximations to derivatives; Solution of Laplace and Poisson equation - Jacobi's method, Gauss-Seidal method by Leibmann's, Solution of parabolic equations (heat equation) by explicit and Crank Nicolson implicit scheme method; Solution of hyperbolic equations (wave equation).

LINEAR PROGRAMMING

UNIT V

Linear programming

Basic concepts; formulation of linear programming problem; constrained optimization-linear programming - simplex method, dual simplex method, and transportation problems.

TEXT BOOKS

1. Introduction to Numerical Analysis - S.S.Sastry*, PHI , 2010.*
2. Operations Research - Prem Kumar Gupta and D.S.Hira, *S.Chand,* 2003.

REFERENCES

1. Advanced Engineering Mathematics - Erwin Kreyszig, 8th Edition, *John Wiley and Sons.*
2. Advanced Engineering Mathematics - Peter V. O'Neil, 9th Edition, *Cengage Learning.*
3. Elementary Numerical Analysis – an algorithmic approach - Samuel D. Conte and Carl De Boor ,3rd edition,*Tata McGraw Hill,* 2006.
4. *Numerical Analysis - R.L Burden and J.D Faires, , 7th ediation, Thomson, 2007.*

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

(R11PHY1102) Engineering Physics-II

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

- Distinguish fermions and bosons, recognize wave nature of particles and one dimensional behavior of a particle quantum mechanically.
- Illustrate periodic motion of electrons in solids that leads to classification of solids into conductors, semiconductors and non conductors.
- Estimate the concentration of charge carriers in semiconductors and realize the importance of principle of in Pn junction which is the fundamental for many semiconductor devices.
- Distinguish magnetic materials, especially ferrites and realize the importance of super conducting materials.
- Understand the dielectric behavior of materials under application of electric field

UNIT- I

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 Wein'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 - II

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 (Qulitaitve), thermal conductivity of metals.

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 - Concept of effective mass of an electron.

UNIT- III

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.

Physics of Semiconductor Devices: Formation of p-n junction – open circuit p-n junction – Energy diagram of diode – i/v characteristics of p-n junction diode – p-n diode as a rectifier – Diode equation – LED

UNIT- IV

Magnetic Properties :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 – properties of Anti ferro and Ferri magnetic materials – Ferrites and their applications.

UNIT V

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, Josephson effect – High temperature Superconductors, Applications of Superconductors.

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

Text books:

(1) Introduction to Solid State Physics by Charles Kittel (Publishers: John Wiley & Sons) for units 2 to 5
(2) Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
(3) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd

References:

1. Solid State Physics by S.O.Pillai, New Age Publishers
2. Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
3. Engineering Physics by Dr M Chandra Shekar and Dr P. Appala Naidu, VGS Book links.
4. Solid State Physics by N.W.Ashcroft & N.David Merwin. Thomson Learning
5. Engineering Physics by G Sahashra Buddhe; University Press
6. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
7. Engineering Physics by M.R.Srinivasan, New Age Publishers

I Year B.Tech ECE,EEE,EIE – II Sem

L	T/P/D	C
3	0	3

(R11CHE1101) ENGINEERING CHEMISTRY

Course Objectives

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

Course Outcomes

After the completion of the course student will be able to

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

UNIT- I

Electrochemical cells and Batteries:

Cell representation, Galvanic cells, Single electrode potential, standard electrode potential, Electrochemical series, Nernst equation, Concentration cells. Reference electrodes – (Hydrogen, Calomel, Quinhydrone 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 – Hydrogen – Oxygen fuel cells, Advantages of fuel cells. Solar cells: working, principle and applications.

UNIT- II

Corrosion and its control: Introduction, causes and different types of corrosion and effects of corrosion. Theories of corrosion – Chemical, Electrochemical corrosion, corrosion reactions, factors affecting corrosion – Nature of metal – galvanic series, over voltage, purity of metal, nature of oxide film, nature of corrosion product. Nature of environment -effect of temperature, effect of pH, Humidity, effect of oxidant.

Corrosion control methods – cathodic protection, sacrificial anode, impressed current cathode. Surface coatings – methods of application on metals - hot dipping, galvanizing, tinning, cladding, electroplating -Organic surface coatings – paints constituents and functions.

UNIT- III

Polymers:

III a).Polymers: Introduction**,** Types of Polymerization, Plastics: Thermoplastic resins & Thermoset resins. Compounding & fabrication of plastics, preparation, properties, engineering applications of: polyethylene, PVC, PS, Teflon, Bakelite, Nylon.

III b).Rubber: Characteristics and uses Rubber –Natural rubber, vulcanization. Elastomers – Buna-s, Butyl rubber, Thiokol rubbers, Fibers – polyester, Fiber reinforced plastics (FRP), applications.

UNIT- IV

Water: Introduction, Hardness: Causes, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water, 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, Electro dialysis.

UNIT- V

Nano-materials: Introduction, preparation and applications of nanomaterials with special reference to Carbon nano tubes.

Insulators: Classification of insulators, characteristics of thermal & electrical insulators and applications of Superconductors (Nb-Sn alloy, $YBa_2 Cu_3 O_{7-x}$).

TEXT BOOKS

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

REFERENCES

1. Text book of Engineering Chemistry by S.S. Dhara & Mukkanti, S.Chand & Co. New Delhi.
2. Text book of Engineering Chemistry by C.P.Murthy, C.V.Agrawal, A.Naidu, B.S.Publications,Hyderabad.
3. Text book of Engineering Chemistry by R.Gopalan,D.Venkappayya,Sulochana Nagarajan, Vikas Publishers.

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

(R11CSE1102) DATA STRUCTURES

Course Objectives

- To **teach** efficient storage mechanisms of data using files dynamically
- To **design** and implementation of various basic and advanced data structures.
- To **introduce** various techniques for representation of the data in the real world.
- To **develop** application using data structures.
- To **improve** the logical ability

Course Outcomes

After completion of the course the student is able to:

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

UNIT-1

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT – 2

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

UNIT-3

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

UNIT-4

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals.
Graphs – Definitions, Graph representations, Graph traversals.

UNIT-5

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

REFERENCES:

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

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

(R11CED1109) ENVIRONMENTAL STUDIES

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Acquire the knowledge on environment
- Acquire the knowledge of various Natural Resources
- Develop skills in understanding of various environmental problems
- Develop skills to protect the Environment

UNIT-I

Introduction, Definition, scope and Importance

Ecosystems: Introduction, types, Classification of Eco system, structure and functions of ecosystems.

Bio-diversity and its conservation, Value of bio-diversity Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots of Bio Diversity, Conservation of bio-diversity.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land degradation, Soil erosion and desertification, Food resources, Effects of modern agriculture, fertilizer pesticide problems, Food miles, organic farming, Forest resources, Use and over-exploitation, Water resources, Dams –benefits, Conflicts over Water, Energy resources-sustainable Development, and Energy Audit

UNIT III

Environmental pollution and its control :Classification of pollution and pollutants, Air pollution, causes ,Effects ,Control measures, ambient air quality standards, water pollution causes , Effects ,Control measures, water and waste water treatment methods, water quality standards, Noise pollution causes ,Effects ,Control measures, land pollution causes ,Effects ,Control measures, solid waste disposal methods ,characteristics of e-waste and management

UNIT IV

Global Environmental problems and global Efforts: Nuclear hazards, Global warming, Acid rain, hurricanes, Hazardous Waste, Overpopulation , ozone layer depletion, Clean development mechanism , Green computing ,Green Building ,carbon credits, carbon trading

International conventions/protocols: Earth summit, Kyoto protocol and Montreal protocol, Stockholm Declaration

UNIT V

Environmental Impact Assessment and Environmental Management plan: Definition of impact, Classification of Impacts, Prediction of Impacts and Impact assessment Methodologies, Environmental Impact Statement, Environmental Management plan: Technological Solutions

TEXT BOOKS

1. Introduction to Environmental Science by Y.Anjaneyulu, BS Publications
2. Text book of Environmental studies by Deeksha dave, Cengage publishers
3. Text book of Environmental studies by M.Anji Reddy, BS Publications

REFERENCES

1. Text book of Environmental studies by Anuba Kaushik & C P Kaushik, Newage International Pvt.Limited
2. Text book of Environmental studies by S V S Rana, Rastogi Publications
3. Text book of Environmental studies by Dr. K Raghavan Nambiar, Scitech Publishers

I Year B.Tech ECE,EEE,EIE – II Sem	L	T/P/D	C
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(R11CSE1202) DATA STRUCTURES LABORATORY

Course Objectives

- To **handle** file management dynamically
- To **develop** skills to design and analyze simple linear and nonlinear data structures
- To **Strengthen** the ability to identify and apply the suitable data structure for the given real world problem
- To **Gain** knowledge in practical applications of data structures

Course Outcomes

After completion of the course the student is able to:

- Relate various basic concepts of data structures.
- Design and implement various linear and non linear data structures for a given application.
- Implement and analyze the performance of different searching and sorting techniques.
- Apply the appropriate data structures for the given application.

WEEK1:

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

WEEK2:

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

WEEK 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

WEEK 4:

1. Write a program to implement stack using Arrays

2. Write a program to implement stack using Linked List

WEEK 5:

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

WEEK 6:

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

WEEK 7:

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

WEEK 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

WEEK 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

WEEK 10: Midterm Exam

Week 11:

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

Week 12:

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

WEEK 13:

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

WEEK 14:

1. Implementation of a binary tree representation using Arrays
2. Write a program to search an element, to print right and left children of every node in a tree

Weeks 15:

1. Implementation of a Graph representation using Adjacency Matrix
2. Write a program to print all adjacent nodes of every node in a graph

WEEK 16: Final Internal Lab Exam

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

(R11EPC1201) ENGINEERING PHYSICS LABORATORY

Course Objectives

- To practically **learn** interaction of light with matter through physical phenomena like interference, diffraction and dispersion.
- To **understand** the periodic motion and formation of standing waves and to know the characteristics of the capacitors and resistors.
- To **compare** the experimental results with the class room learning.
- **Familiarize** the preparation of solutions and operation of instruments
- **Conduct** of experiment, collection and analyzing the data
- **Summarizing** the data and find the applicability of the experiment to common society

Course Outcomes

After completion of the course the student is able to:

- Demonstrate the optical phenomena with formation of Newton Rings, and formation of spectra with a grating and a prism.
- Illustrate periodic motion by measuring rigidity modulus of a material and formation of standing waves by Melde's apparatus and also discharging of a capacitor.
- Correlate the experimental results with the class room learning
- Understand the extent of hardness range present in a water sample and its consequences if used for various industrial operations.
- Determination of strength of solutions, pH of various solutions, lubricants usage in machinery to prevent wear and tear.
- Understanding the composition of soap used for washings.

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 wedgeshaped film
6. Energy gap of a Semiconductor material
7. Torsional Pendulum Expt. to determine the rigidity modulus of material of a wire
8. Melde's experiment
9. Sonometer Experiment
10. Numerical Aperture and Acceptance angle of an optical fiber cable

11. Stewart Gee's experiment
12. Characteristics of LED.
13. Photo cell/ Solar Cell

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

ENGINEERING CHEMISTRY LABORATORY

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) Potentiometry

a) Titration of strong acid Vs Strong base by potentiometry

3. Physical properties

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

4. Preparation of organic compounds

a) Preparation of aspirin or Thiokol rubber

TEXT BOOKS:

1. Laboratory Manual on Engineering Chemistry by S.K.Bhasin and Sudha Rani,Dhanpat Rai Publishing Company.
2. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri, VGS Book Links, Vijayawada.

I Year B.Tech ECE,EEE,EIE – II Sem	L	T/P/D	C
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(R11HAS1202) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY-II

In continuation with the first Year I Semester syllabus, this course offers further practice in Listening, Speaking, and Grammar in preparation for the advanced speaking and writing skills offered in the III Year .

Course Objectives

- **Enable** the students to create clear, accurate, and succinct content to write business letters, resume, SOP, Proposals and Technical Reports for academics as well as for workplace
- **Enable** students to adjust technical content to meet the needs of a specific target audience
- **Groom** students to speak accurately and fluently and prepare them for real world activities through behavioral skills.
- **Train** students in soft skills through role play and group discussion to improve their EQ.

Course Outcomes

After completion of the course the student is able to:

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

Unit I

Multimedia Lab :

1. Listening Comprehension
2. Grammar – Voice
3. Vocabulary Lesson 6

Oral Communication Skills Lab : Self Introduction

Unit 2

Multimedia Lab :

1. Grammar - Conditionals & Prepositions
2. Listening Comprehension
3. Vocabulary Lesson 7

Oral Communication Skills Lab : 1. Description of Objects 2. Description of Processes

Unit 3

Multimedia Lab :

1. Grammar -- Use of Subordinate Clauses; Phrasal Verbs; Idioms
2. Vocabulary Lesson 8

Oral Communication Skills Lab : Presentation Skills

Unit 4

Multimedia Lab :

1. Grammar -- Use of Substitution, Reference and Ellipsis
2. Listening Comprehension
3. Vocabulary Lesson 9

Oral Communication Skills Lab : Debate

Unit 5

Multimedia Lab :

1. Grammar --- Parallelism, Repetition, Nominalization
2. Vocabulary Lesson 10

Oral Communication Skills Lab : Group Discussions

II Year B.Tech EIE – I Sem

L	T/P/D	C
4	0	4

(R11HAS1102) Business Economics and Financial Analysis

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

UNIT I

Business and new economic environment

Characteristic features of business; Features and evaluation of sole proprietorship; Partnership; Joint stock company; Public enterprises and their types; Changing business environment in post- liberalization scenario.

UNIT II

Introduction to business economics, and demand analysis

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

Elasticity of demand and demand forecasting

Definition; Types; Measurement and significance of elasticity of demand; Demand forecasting; Factors governing demand forecasting; Methods of demand forecasting - survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, and judgmental approach to demand forecasting.

UNIT III

Cost analysis

Cost concepts - opportunity cost, fixed vs. variable costs, explicit costs vs. implicit costs, and out of pocket costs vs. imputed costs; Break-even analysis (BEA) - determination of break-even point (simple problems), managerial significance, and limitations of BEA.

Capital and capital budgeting

Capital and its significance; Types of capital; Estimation of fixed and working capital requirements; Methods and sources of raising finance.

Nature and scope of capital budgeting; Features of capital budgeting proposals; Methods of capital budgeting - payback method, accounting rate of return (ARR), and net present value method (simple problems)

UNIT IV

Theory of production

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

UNI T 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 ratio, 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 BOOK

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

REFERENCES

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

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

(R11MTH1105) APPLIED MATHEMATICS
(SPECIAL FUNCTIONS AND COMPLEX ANALYSIS)

Course Objectives

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

Course Outcomes:

After completion of the course the student is able to:

- Solve Second order D.E's with variable coefficients.
- Use the Cauchy Riemann equations to obtain the derivative of complex functions
- Use residues to evaluate contour integrals
- 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, Maclaurin's series and Laurent series. Singular point, Isolated singular point, pole of order m , essential singularity. Residues – Evaluation of residue by formula and by Laurent Series, Residue theorem, Evaluation of integrals of the type (a) Improper real integrals (b) Integrals by indentation.

UNIT – V

Conformal mapping

Transformation of e^z , lnz, z^n, (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion. Bilinear transformation , fixed point , cross ratio , properties , invariance of circles , determination of bilinear transformation mapping three given points.

TEXT BOOKS:

1. Advanced Engineering Mathematics - R.K Jain and S.R.K Iyengar, 3rd edition, Narosa Publications, 2011.
2. Complex Analysis-Lars V.Ahlfors, International Edition, McGraw Hill, 1979.

REFERENCES

1. Advance Engineering Mathematics - Peter O'Neil, 5th Edition, Cengage Learning,2000.
2. Schaum's Outline of Complex Variables - Murray.R.Spiegel, 2nd Edition, Tata McGraw Hill, 2011.
3. Complex Variables and Its Applications- Churchill and Brown, International Edition, McGraw Hill,1996.

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

(R11EEE1105) PRINCIPLES OF ELECTRICAL ENGINEERING

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

Unit – I

Transient Analysis (First and Second Order Circuits) : Transient Response of RL, RC and RLC Circuits for DC excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.

Unit – II

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

Unit – III

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

Unit – IV- DC Machines

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

DC Motors : Principles of Operation of DC Motor, 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.

REFERENCE BOOKS

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, Dhanpat Rai and Co.
4. Network Analysis – N.C.Jagan and C.Lakshmi Narayana, BS publications.
5. Network Analysis – A.Sudhakar, Shyammohan S.Palli, TMH publications.

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

(R11EIE1101) SIGNALS AND SYSTEMS

Course Objectives

Student will be able to

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

Course Outcomes

After completion of the course the student is able to:

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

UNIT – I

Representation Of Signals: Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – properties of discrete time complex exponential. 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,

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.

UNIT – II

Fourier Transforms : Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

Laplace Transforms : Review of Laplace transforms, , Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Inverse Laplace transform - Partial fraction expansion, Convolution method, Laplace transform of certain signals using waveform synthesis.

UNIT – III

Signal Transmission through Linear Systems

Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and 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, Convolution property of Fourier transform and Laplace transform. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. 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

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 - z-transform definition – 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 –A.Rama Krishna Rao,TMH, 2008.
3. Signals and Systems – Alan V.Oppenheim, Alan S.Willsky and S.Hamid Nawab,2nd Edition, PHI.

REFERENCES

1. Signals and Systems -Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley.
2. Signals and Systems- Cengage Learning, Narayana Iyer, 2011.
3. Fundamentals of Signals and Systems - Michel J. Robert, MGH International Edition , 2008
4. Signals, Systems and Transforms –C.L.Philips,J.M Parr and Eve A. Riskin,3rd Edition, Pearson, 2004 .
5. Signals and Systems Schaum's Outlines - HWEI P. HSU , Tata Mc Graw Hill, 2004.

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

(R11EIE1102) Sensors and Signal Conditioning

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

Unit I :

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

Unit II :

Resistive Sensors : Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs) Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers, **Capacitive Sensors:** Variable capacitor, Differential capacitor, Proximity sensors.**Inductive Sensors:** Reluctance variation sensors, Eddy current sensors, Linear variable differential transformers (LVDTs), **Variable transformers :** Synchros, resolvers, inductosync, magneto elastic sensors, electromagnetic sensors-sensors based on faraday's law, hall effect sensors.

Unit III :

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, electrochemical sensors, electrochemical sensors.

Unit IV :

Digital and other Sensors: Position Encoders, Incremental position encoders, absoluted position encoders, Variable frequency sensors-Quartz digital thermometers, vibrating wire strain gages, vibrating cylinder sensors, SAW sensors, Digital flowmeters. Sensors based on MOSFET Transistors, Charge coupled Sensors, Ultrasonic based Sensors, Fiber Optic Sensors.

Unit V:

Signal conditioning: Voltage dividers: Potentiometers, Wheatstone Bridge and linearization of resistive bridge sensor, Electrostatic shield, Transistorized chopper, Capacitive Modulator, Noise elimination: HPF, LPF, B.P, B.E using RC Components.

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

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. Process Control Instrumentation Technology – D. Johnson, John Wiley and sons.
5. Electronic Instrumentation by H.S.Kalsi.

II Year B.Tech EIE – I Sem	L	T/P/D	C
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(R11ECE1102) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

UNIT I

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

The p-n Junction 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. Principle of series voltage regulators.

UNIT II

Transistors, Biasing and Stabilization: The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications. Quiscent operating Point, The DC and AC Load lines, 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}. Bias Compensation using Diodes and Transistors, 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: The Junction Field Effect Transistor (Construction, Principle of operation) – Pinch-off Voltage-Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, Principle of operation), MOSFET Characteristics in Enhancement and Depletion modes. FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor. 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, 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, 9th Edition, 2006.
3. Introduction to Electronic Devices and Circuits - Rober . T. Paynter, 7th Edition, PE, 2009.

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.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

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

(R11EEE1202) ELECTRICAL ENGINEERING LABORATORY

Course Objectives

- To verify the theoretical concepts of KVL and KCL experimentally
- To study the transient behavior of RLC networks practically
- To verify the network theorems experimentally
- To determine the performance and efficiency / regulation of electrical machines experimentally (under various operating conditions)

Course Outcomes

After completion of the course the student is able to:

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

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 10 of the above experiments 5 from each part to be conducted.

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

(R11ECE1202) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Plot behaviour of various electronic devices.
- Calculate various parameters of devices from characteristics
- Use of devices in real time applications.
- Analyze results and give conclusions.

Part A: (Only for viva-voce Examination)
ELECTRONIC WORKSHOP PRACTICE(in 3 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, Full wave and Bridge Rectifier 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.

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

(R11HAS1103) MANAGEMENT SCIENCE

Course Objectives

- **Understand** the principles, functions, theories and practices of different management areas and to provide them with practical exposure to cases of success/failure in business.
- **Expose** with a systematic and critical understanding of organizational theory, structures and design.
- **Comprehend** conceptual models of strategic management and to familiarize with the tools of operations and project management.
- **Understand** the role of human relations in the management of operations and to provide basic insights into contemporary management practices.

Course outcomes

After completion of the course the student is able to:

- Function effectively in multidisciplinary teams to accomplish a common goal of organizations.
- Apply theories to improve the practice of management.
- Appreciate the management challenges associated with high levels of change in the organizations.
- Develop global vision and management skills at both a strategic level and interpersonal level.

UNIT I

Introduction to management

Concepts of management - nature, importance, and functions of management; Taylor's scientific management theory; Fayol's principles of management; Mayo's Hawthorne experiments; Maslow's theory of human needs; Douglas McGregor's theory X and theory Y; Herzberg's two-factor theory of motivation; System and contingency approach to management; Planning – meaning, significance, and types of plans; Decision making and steps in decision making process; Leadership styles; Social responsibilities of management.

Organizing - Meaning, and features; Process of organization; Principles of organization; Elements of organization; Organization chart; Span of control - Graicunas formulae; Centralisation and decentralization; Types of mechanistic and organic structures of

organisation - line organization, line and staff organization, functional organization, committee organization, matrix organization, virtual organisation, cellular organisation, team structure, boundaryless organization, inverted pyramid structure, and lean and flat organization structure; Their merits, demerits and suitability.

UNIT II

Human resources management

Concepts of HRM;

Basic functions of HR manager - human resource planning (definition; objectives; process), recruitment (definition; sources; techniques), selection (definition; process), induction and orientation, training and development (definition; need; methods), employee exit process, employee relations management, employee compensation and benefits administration, job evaluation (objectives; process; methods), and performance appraisals (objectives; process; methods).

UNIT III

Strategic management

Mission; Goals; Objectives; Policy; Strategy; Programmes; Elements of corporate planning process - environmental scanning; value chain analysis, BCG matrix, generic strategy alternatives, SWOT analysis, and steps in strategy formulation and implementation; Balance score card; Capability maturity model (CMM)/ People capability maturity model (PCMM).

UNIT IV

Operations management

Plant location; Types of plant layout; Methods of production – job, batch, and mass production; Work study-basic procedure involved in method study and work measurement.

Materials management

Objectives; Need for inventory control; EOQ, ABC Analysis; Purchase procedure; Value analysis; JIT, Six sigma; TQM; Supply chain management; Stores management and stores records.

Marketing

Functions of marketing; Marketing mix, and marketing strategies based on product life cycle; Channels of distribution.

UNIT V

Project management – network analysis

Network analysis; Programme evaluation review technique - PERT (probability of completing the project within given time); Critical path method - CPM (Identifying critical path); Project cost analysis; Project crashing; Simple problems.

TEXT BOOK

1. Management Science *by* Aryasri; *Publisher: Tata McGraw Hill, 2009.*
2. Management *by* James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R. Gilbert 6th Ed; *Publisher: Pearson Education/Prentice Hall.*
3. Principles and Practice of Management - L.M. Prasad; *Publisher: Sultan Chand Publications, New Delhi.*

REFERENCES

1. Principles of Marketing: A South Asian Perspective *by* Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan ul Haque , 2010, 13th Edition, *Publisher: Pearson Education/ Prentice Hall of India*.
2. A Handbook of Human Resource Management Practice *by* Michael Armstrong, 2010; *Publisher: Kogan Page Publishers*.
3. Quantitative Techniques in Management *by* N.D. Vohra, 4th edition, 2010; *Publisher: Tata McGraw Hill*.
4. Operations Management: Theory and Practice *by* B. Mahadevan, 2010; *Publisher: Pearson Education*.
5. Strategic Management *by* V.S.P. Rao and V. Hari Krishna, 2010; *Publisher: Excel Books*.

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

(R11EEE1106) CONTROL SYSTEMS

Course Objectives

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

Course outcomes

After completion of the course the student is able to:

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

UNIT – I INTRODUCTION

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

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II TRANSFER FUNCTION REPRESENTATION AND TIME RESPONSE ANALYSIS

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

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

UNIT –III STABILITY ANALYSIS IN S-DOMAIN

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

Root Locus Technique:

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

UNIT – IV

FREQUENCY RESPONSE AND STABILITY ANALYSIS IN FREQUENCY DOMAIN

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

UNIT – V

CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, 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. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

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 Engg. by NISE 3rd Edition – John wiley
4. "Modelling and Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers.

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

(R11EIE1103) Electronic Measurements

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- The students will be able to understand the different methods of measurement.
- The students will be able to calibrate different instruments.
- The students are able to know the unknown values of R,L and C through bridge circuits.
- The students are able to display the waveforms in an oscilloscope and measure the parameters of any input signal.

UNIT – I

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

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

UNIT – II

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

UNIT – III

Bridges: AC Bridges – measurement of inductance, Maxwell's bridge, Anderson 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

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

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

Analyzers: Spectrum analyzers, Different types of spectrum analyzer, Recorders, Introduction to magnetic recording techniques & X-Y plotters. Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture.

Text Books

1. Electronic Instrumentation – HS Kalsi, Tata Mc Graw Hill, 2004..
2. Principles of measurement and instrumentation, Alan S. Morris: 2nd edition, Prentice-Hall of India,2004.

References

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

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

(R11EIE1104) PULSE AND DIGITAL CIRCUITS

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Design linear and nonlinear wave shaping circuits.
- Apply the fundamental concepts of wave shaping circuits for various switching and logic circuits
- Design the time base circuits for various applications
- 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, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II

NON-LINEAR WAVE SHAPING

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

UNIT III

MULTIVIBRATORS

Design of transistor switch, Diode and Transistor-switching times.

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

UNIT IV

TIME BASE GENERATORS

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

SYNCHRONIZATION AND FREQUENCY DIVISION

Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

UNIT V

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates. Realization of Logic Gates Using Diodes and Transistors (Discrete Components): AND, OR and NOT gates using Diodes and Transistors, DCTL, RTL, DTL Logic Families and its comparison.

TEXT BOOKS

1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub and Mothiki, S Prakash Rao 2nd Edition, TMH, 2008.
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

REFERENCES

1. Solid State Pulse circuits - David A. Bell, PHI, 4th Edition, 2002.
2. Wave Generation and Shaping L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

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

(R11EIE1105) ELECTRONIC CIRCUIT ANALYSIS

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Apply the knowledge of BJTs to design and analyze practical amplifier circuits
- Design and analyze electronic subsystems such as feedback amplifiers and oscillators
- Design and analyze Class A or B power amplifiers for specific applications
- Design and analyze tuned amplifiers to design practical amplifier circuits

UNIT I

Multi Stage Amplifiers : Multi Stage Amplifiers Methods of Inter Stage Coupling, n – Stage Cascaded Amplifier, Equivalent Circuits, Miller's Theorem, Frequency Effects, Amplifier Analysis, Transistor Circuits. Cascade – Transistor Configuration, CE-CC Amplifiers (Darlington Pair), Two Stage RC Coupled JFET amplifier (in Common Source configuration), Difference Amplifier.

UNIT II

BJT High Frequency Model and Amplifiers

Logarithms, Decibels, General frequency considerations, Frequency response of BJT Amplifier, Analysis at Low and High frequencies, Effect of coupling and bypass Capacitors, the Hybrid-pi (π) – Common Emitter Transistor Model, CE Short Circuit Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter follower at higher frequencies.

UNIT III

Feedback Amplifiers and Oscillators

Concepts 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 and weinbridge Oscillator. Generalized analysis of LC oscillators – Hartley, and Colpitts Oscillators, Crystal Oscillators, Stability of Oscillators.

UNIT IV

Power Amplifiers

Classification, Class A Large signal Amplifiers, Transformer coupled Class-A Audio Power Amplifier, Efficiency of Class-A Amplifier , Class B Amplifier, efficiency of Class B Amplifier, Class-B Push-Pull Amplifier, Complementary-Symmetry Class B Push –Pull Amplifier, Distortion in Power Amplifiers, Thermal Stability and Heat Sinks, Design of Power Supplies.

UNIT V

Tuned Amplifiers

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, wideband Amplifiers Stability of Tuned Amplifiers, Class-C tuned Amplifier.

TEXT BOOKS :

1. Integrated Electronics – J. Millman and C.C. Halkias, TMH, 2008.
2. Electronic Devices and Circuits- S. S Salivahanan, N. Sursh Kumar, A. Vallava Raju, 2nd Edition, TMH, 2010.
3. Design of Analog CMOS Integrated Circuits – Behzad Razavi , TMH, 2008.

REFERENCES :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2008.
2. Introduction to Electronic Devices and Circuits- Rober . T. Paynter, 7th Edition, PEI, 2009.
3. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
4. Electronic Devices and Circuits – David A. Bell , Oxford University Press, 5th Edition.
5 Micro Electronic Circuits – Sedra A.S. and K.C. Smith, 5th Edition, Oxford University Press,2009.

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

(R11ECE1103) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Use the concepts of Boolean Algebra for the analysis and various number systems for digital data representations
- Design combinational and sequential circuits
- Implement designs on PLDs
- 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 and Switching Functions: Fundamental Postulates of Boolean Algebra. Basic theorems and Properties , Switching Functions, Canonical and Standard forms , Algebra Simplification, Digital Logic Gates, Universal Gates, Multilevel NAND/NOR Realizations.

UNIT II

Minimization of Switching Functions: K-map method , Prime Implicants , Don't care Combinations , Minimal SOP and POS forms, Tabular Method ,Prime Implicant chart, Simplification rules.

Combinational Logic Design: Design using Conventional logic gates, Encoder, Decoder, Multiplexer, De- Multiplexer, Modular Design using IC Chips, Design of code converters, Parity bit generator, Hazards and Hazard free Realizations.

UNIT III

Sequential Circuits – I: Classification of Sequential circuits (Synchronous, Asynchronous, Plus mode, Level mode with examples), Basic Flip-Flops, Triggering and Excitation tables, Flip-Flop conversions, Steps in Synchronous Sequential circuit Design, shift registers and their applications, Design of counters, Serial Binary Adder, Sequence detector.

UNIT IV

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.

UNIT V

Programmable Logic Devices: Basic PLD's: ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's.

Algorithmic State Machines : Salient features of the ASM chart, Simple examples, System Design using data path and control subsystems , Control Implementations, ASM charts for Flip-Flop's, Examples of Dice Game and Binary Multiplier.

TEXT BOOKS:

1 Switching and Finite Automata Theory- Zvi Kohavi, 2nd Edition, TMH.
2 Degital Design – Morris Mano, 3rd Edition, PHI, 2006.
3 Switching Theory and Logic Design – A. Anand Kumar, PHI , 2008

REFERENCES:

1. An Engineering Approach to Digital Design – Fletcher, PHI.
2. Fundamentals of Logic Design – Charles H, Roth, 5th Edition, Thomson Publications, 2004.
3. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006
4.Mordern Digital Electronics – R.P.Jain, 4th Edition.

II Year B.Tech EIE – II Sem	L	T/P/D	C
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(R11EIE1202) PULSE AND DIGITAL CIRCUITS LABORATORY

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Design linear and non linear wave shaping circuits .
- Generate various wave forms such as Square, Pulse and Sweep
- Design electronic switch.
- Design simple applications such as counters of flipflops

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.

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

(R11EIE1201) Transducers and Measurements Laboratory

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Appreciate the use of sensors
- Identify the sensors required for any specific application.
- Design and develop a simple measuring devices employing appropriate sensors.
- Able to measure Resistance, Capacitance and Inductance values using various devices.

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 Shering'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

III Year B.Tech EIE –I Sem

L	T/P/D	C
4	0	4

(R11CSE1103) COMPUTER ORGANIZATION

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Analyze the concepts of computer organization for several engineering applications.
- Use the fundamentals of computer organization as a tool in digital systems.
- Identify, formulate, and solve hardware and software computer engineering problems.
- 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 Microoperations, Logic Microoperations, Shift Microoperations, 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, microprogrammed 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, Instruction 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

REFERENCES

1. Computer Organization and Architecture – William Stallings Sixth edition Pearson/PHI
2. Fundamentals of Computer Organization and Design, Sivarama Dandamudi Springer Intl. edition
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 – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(R11EIE1106) LINEAR AND DIGITAL IC APPLICATIONS

Course Objectives

- **To study** about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.
- **To analyze** and know the design concepts of various applications of ICs.
- **To study** the design concepts Digital circuits using ICs.

Course Outcomes

After completion of the course the student is able to:

- Analyze electrical properties of OpAmps and design various linear and nonlinear applications using OpAmps.
- Design various applications of 555 timer, IC 565, voltage regulators.
- Understand and compare TTL and CMOS IC logic families.
- 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, Instrumentation amplifier, Log and antilog amplifier, Precision rectifiers, Differentiators, Integrators, and comparators, sample and hold circuits..

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, Wien and quadrature type, waveform generators – triangular, sawtooth, 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, series voltage regulator , shunt voltage regulator and IC 723 Voltage Regulator.

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, 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 DIGITAL CIRCUIT DESIGN

Design using TTL-74XX and CMOS 40XX series, code converters, decoders, Demultiplexers, decoders and drives for LED and LCD display. Encoder, priority Encoder, multiplexers and their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's-Complement system. Digital comparator circuits.

SEQUENTIAL CIRCUITS

Design of synchronous counters, Decade counter, shift registers and applications using TTL-74XX and CMOS 40XX series , familiarities with commonly available 74XX and CMOS 40XX series of IC counters.

Memories: ROM architecture, types and applications, RAM architecture, Static and Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2008.
2. Op-Amps and Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.
3.Digital Fundamentals – Floyd and Jain, Pearson Education,8th Edition, 2005.

REFERENCES

1.Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2.Operational Amplifiers and Linear Integrated Circuits: Theory and Applications –Denton J. Daibey, TMH.
3.Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Edition, 2002.
4. Op Amps and Linear Integrated Circuits: Concepts and Applications, Fiore,Cengage Publications.
5. Operational Amplifiers and Linear Integrated Circuits by K.Lal Kishore- Pearson education,2008.

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

(R11EIE1107) Bio-Medical Instrumentation

Course Objectives

- **To identify** and obtain biological parameters and relationship between them.
- To u**nderstand** the principles involved in acquiring different bio-signals.
- **To represent** these principles in form of mathematical equations.

Course Outcomes

After completion of the course the student is able to:

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

UNIT – I:

Components of Medical Instrumentation System. Bio signals and their characteristics, Bio amplifier. Characteristics of medical instruments. Problems encountered with measurements from human beings.

Organization of cell. Nernst equation for membrane. Resting and Action Potential.

UNIT – II:

Bio Electrodes – Bio potential Electrodes and their classifications-External electrodes, Internal Electrodes-Biochemical Electrodes.

UNIT – III:

The Heart and Cardiovascular system- Heart Sounds- Mechanical function, Electrical Conduction system of the heart. Cardiac cycle. Relation between electrical and mechanical activities of the heart. Interpretation of ECG waveform with respect to electro mechanical activity of the heart.

UNIT – IV:

Cardiac Instrumentation: Blood pressure and Blood flow measurement. Specification of ECG machine. Einthoven triangle, Standard 12-lead configurations, EEG and EMG- Neuro-Muscular Instrumentation: Specification of EEG and EMG machines. Electrode placement for EEG and EMG recording. Interpretation of EEG and EMG.

UNIT – V:

Therapeutic equipment.: Pacemaker, Defibrillator, Shortwave diathermy. Hemodialysis machine.

Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

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.
3. Biomedical Instrumentation-by Chatterjee,Cengage,Publications

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. Biomedical Telemetry – by Mackay, Stuart R., John Wiley.

III Year B.Tech EIE – I Sem	L	T/P/D	C
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(R11EIE1108) Process Control Instrumentation

Course Objectives

- **To identify** and monitor process parameters of various processes.
- To u**nderstand** the principles of controllers, degrees of freedom, and control valves.
- **To recognize** these principles written in form of mathematical equations for various control applications.
- To a**pply** these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical process control problems.

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of mathematics to modeling CO2: analysis of fluid flow, level, pressure, temperature problems.
- Conduct experiments in pipe flows and open channel flows and interpreting
- data from model studies to prototype cases. Documenting them in engineering reports.
- Understand the possible disasters caused by an incorrect Design/Analysis in hydraulic, pneumatic engineering system.

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, IEA, ISE, 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 and Boiler system.

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

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

Pratice:

Subject practice through labview software.

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

(R11EIE1109) Industrial Instrumentation

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- To have an adequate knowledge about process transducers like pressure etc.
- To have an idea about the temperature standards, thermocouples and pyrometry techniques.
- To study about area flow meters, mass flow meters and calibration.
- 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 Gage, Knudsen Gage,

Momentum Transfer Gages, Thermal Conductivity Gages, Ionization Gazes, Dual Gage 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 Veloci-meter.

UNIT – IV

DENSITY and RADIATION MEASUREMENT

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

Radiation Fundamentals-Radiation Detectors-Radiation Thermometers. Optical Pyrometers.

UNIT – V

OTHER MEASUREMENTS

Sound-Level Meters, Microphones, Time, Frequency, and Phase-Angle measurements. 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.

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

(R11EIE1203)ELECTRONIC CIRCUIT ANALYSIS LABORATORY

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

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

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

1. Common Emitter Amplifier with and 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. Cascade amplifier.
7. RC phase shift Oscillator using Transistor.
8. Hartley Oscillator using BJT.
9. Crystal controlled Oscillator using BJT.
10. Class A power Amplifier.
11. Complementary Symmetry Class B Push-Pull Amplifier.
12. Class C Tuned Amplifier.
13. Common Source MOSFET Amplifier.
14. Frequency Response Common Emitter Amplifier.

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

(R11EIE1204) Linear and Digital IC Applications Laboratory

Course Objectives

- **To demonstrate** functionalities of analog and digital ics
- **To demonstrate** applications of analog and digital ics
- **To explore** usage of ASLKV2010 Starter Kit

Course Outcomes

After completion of the course the student is able to:

- Analyse various types of ICs
- Design various analog applications using analog ICs and ASLKV2010 Starter Kit.
- Design digital circuits using digital ICs.
- Design Digital Ics for different combinations.

(Minimum 12 experiments should be completed.)

1. 741 OPAMP as adder, subtractor and comparator.
2. Integrator and differentiator using 741 OPAMP.
3. Function Generator using 741 OP AMP.
4. Full wave rectifier using OPAMP.
5. D/A Converter, A/D Converter using OP amp.
6. IC 555 Timer– Monostable Operation, Astable Operation.
7. Voltage Regulator using IC 723.
8. Study of Logic Gates and Flip-Flops using Ics.
9. Half Adder, Full Adder and Subtractor.
10. Encoders and Decoders.
11. Counters and Shift Registers & 7490 Counter.
12. BCD to 7 Segment decoder using IC 7447.
13. Multiplexer and Demultiplexer.
14. Study of RAM and ROM ICs.

PRATICE:

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

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

(R11EIE1205) Process Control Instrumentation Laboratory

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow, level, pressure, temperature problems.
- Conduct experiments in pipe flows and openchannel flows CO3:
- Interpreting data from model studies to prototype cases. Documenting them in engineering reports.
- Understand the possible disasters caused by an incorrect Design/Analysis in hydraulic, pneumatic engineering system.

(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.

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

(R11ECE1130) PRINCIPLES OF COMMUNICATIONS

Course Objective:

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

Course Outcome:

After completion of the course the student is able to:

- Appreciate the techniques used for signal manipulation and communications
- Appreciate the need for PPM,PWM, Multiplexing
- 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.

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

(R11ECE1108) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Demonstrate the ability to design system, component or a process as per needs and specifications
- Select the proper architecture for the implementation of digital designs
- Write various assembly language programs for a given task using 8086, 8051 and ARM processors.
- 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. Memory and I/O organization of 8086.

UNIT II

8255 PPI – various modes of operation and interfacing to 8086. Interfacing Keyboard and Displays, D/A and A/D converter to 8086 using 8255, memory interfacing to 8086, Interfacing 8257 DMA Controller 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

The AVR RISC microcontroller architecture: Introduction, AVR family architecture, Register File, The ALU, Memory access and Instruction execution, I/O memory, EEPROM, I/O ports, Timers, UART, Interrupt structure.

TEXT BOOKS

1. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
2. 8051 Microcontroller – Kenneth J. Ayala, Penram International/ Thomson, 3rd Edition.
3. The 8051 microcontrollers and Embedded systems- Mazidi and mazidi, PHI, 2000.

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, 2nd Edition
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.

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

(R11ECE1109) DIGITAL SIGNAL PROCESSING

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

UNIT I

Introduction: Introduction to Digital Signal Processing: Discrete time signals and sequences, linear shift invariant systems, stability, and causality. 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: Properties of 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: Fast Fourier transforms (FFT) – Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N.

UNIT III

IIR Digital Filters:

Analog filter approximations- Butterworth and Chebyshev, 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 and Ladder forms.

UNIT IV

FIR Digital Filters : Introduction to characteristics of linear phase FIR filters, Frequency response, Design of FIR filters : Fourier Method, windowing methods: Rectangular window, Hanning window, Hamming window, Generalized Hamming window, Bartlett triangular window, Frequency Sampling method, Comparison of IIR and FIR filters.

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, Trade off 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, 3rd Edition, Perason/PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI, 2009
3. Digital Signal Processing – A Pratical Approach – Emmanuel C.Ifeacher, Barrie. W. Jervis, 2nd Edition., Pearson Education, 2009.

REFERENCES

1. Digital Signal Processing- Fundamentals and Applications – Li Tan, Elsevier , 2008.
2. Fundamentals of Digital signal Processing using MatLab- Robert J.Schilling, Sandra L.Harris, Thomson , 2007.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya,TMH , 2009.
4. Fundamentals of Digital Signal Processing - Loney Ludeman, John Wiley ,2009.
5. Discrete Systems and Digital Signal Processing with MatLab -Taan S. ElAli, CRC Press ,2009.

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

(R11EIE1110) Analytical Instrumentation

Course Objectives

- Students will be introduced to a whole array of modern analytical instrumentation with the goal of providing them with the tools with which they can further their applied research.
- The emphasis will be a "hands-on" approach with sample preparation, theory, application, method development, data analysis and interpretation being key elements.
- **Interpret** data derived from any of the above mentioned spectroscopic instruments
- **Appreciate** the basic concept, principles and terms of chromatography

Course Outcomes

After completion of the course the student is able to:

- Appreciate basic analytical processes and sampling procedures
- Appreciate the basic principles of emission and absorption spectroscopy techniques.
- 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- Lamberts 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 and 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 Chromatograph's. Applications of above Chromatographs.

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, NOx 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.

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

(R11EIE1111) Virtual Instrumentation

Course Objectives

- **To develop** virtual instruments to specific application using LabVIEW software.
- To easy the programming required to make computer interact with real world.
- To **acquire**, **analyze** and **display** the throughput of any compactible system.
- To gain Knowledge to **connect** with third party software and hardware

Course Outcomes

After completion of the course the student is able to:

- To create virtual instruments using loops, charts, arrays, clusters in LabVIEW.
- To interface sensor output with a DAQ device and create applications, based on those readings
- To use different interface buses, to achieve easy connectivity among popular engineering instruments.
- To develop some basic image processing application using LabVIEW.

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, HMI / SCADA software, Active X programming.

UNIT II

VI programming techniques:

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

UNIT III

Data acquisition basics:

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

UNIT IV
VI 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.

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

(R11ECE1204) MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Course Objectives

- Devices and circuits to microprocessors and microcontrollers.
- **Design** and develop both the hardware and software for microprocessor /microcontroller based systems.
- To **provide** practical introduction to microcontrollers and microprocessors, assembly language programming techniques and interfacing
- **Connect** peripheral
- **Interpret** specifications for any microprocessor or peripheral chip

Course Outcomes

After completion of the course the student is able to:

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

I. Microprocessor 8086 and Interfacing:.

1. Introduction to MASM/TASM.

2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.

4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

5. 8255 : Interface keyboard

6. 8255 : Interface Display

7.Serial communication between 8086 processors and PC through 8251.

II. Microcontroller 8051 and Interfacing:

1. Programming using arithmetic, logical and Bit manipulation instructions of 8051
2. Reading and Writing on a parallel port.
3. Timer in different modes
4. Serial communication between 8051 and PC
5. Interrupt programming
6. LCD Interfacing
7. Keyboard Interfacing
8. ADC Interfacing
9. DAC Interfacing
10. stepper motor Interfacing
11. DC motor Interfacing
12. Sensor Interfacing and signal conditioning

(At least 5 interfacing experiments must be completed in addition to programming experiments from part-II)

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

(R11HAS1204) ADVANCED ENGLISH LANGUAGE 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

- Expose students to workplace writing
- Initiate them into the process of technical communication
- To enable the students to create clear, accurate, and succinct content
- Enable students to produce documents reflecting different types of technical communication such as abstracts, proposals and technical reports through ample practice
- Enable students to adjust technical content to meet the needs of a specific target audience
- Groom students in behavioral skills

Course Outcomes

After completion of the course the student is able to:

- Summarize and synthesize information and produce technical writing that is required in academics as well as in the engineering profession
- Write covering letters, resume, sop, project proposals and technical reports, speak fluently and address a large group of audience and participate in debates and discussions.
- Negotiate terms, manage complex situations through interpersonal skills,
- Persuade people and make quick decisions.

Methodology

Writing Component

A Process- Genre methodology will be used in teaching the technical genres. This method would enable students to understand the use of particular lexico-grammatical patterns required of in the context of technical writing. They would learn to use language to express the particular communicative intent that is required of in the context of writing these genres.

Oral Communication Component

The objective of including Oral Communication is to impart behavioral skills and prepare students to speak to a large group or team, keeping in mind the audience, context and purpose of communication. This Oral Communication component must enable students to speak in an organized and mature way, without any inhibitions. They will be groomed to relate their speech to their audience.

Objectives of Oral Communication Component

i) equip students with Behavioral skills
ii) prepare them for Oral presentations, and Group Discussions
iii) equip them with Interview skills

Syllabus Outline

Unit I

1. Applications and Covering letters
2. Resume Writing
3. Oral Communication :Self Introduction

Unit II

1. Introduction to Technical Writing

- Defining Technical Writing
- Distinguishing it from other types of writing
- Determining audience, purpose and context

2. Summarizing and Synthesizing Information

3. Behavioral Skills and Personality Development

a) Building a Positive Attitude, Building a Positive Personality, Motivation, Goal Setting & Values & Vision
b) Problem Solving and Decision Making; Negotiation Skills through Role Play
c) Team Building and Leadership Abilities

Unit III

1. Verbal Ability : Language, Reasoning Skills, Analytical Ability, Reading and Listening Skills
2. Oral Communication: Presentation Skills (Oral and Visual)

Unit IV

1. Writing Research Abstracts
2. Oral Communication: Group Discussions

Unit V.

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

REQUIRED TEXT BOOKS AND MATERIALS

1. Technical Writing: Process and Product *by* Sharon J. Gerson and Steven M. Gerson (1999); *Publisher: Prentice Hall.*
2. Effective Technical Communication *by* Ashraf Rizvi, M., (2005); Publisher: *Tata Mc Graw Hill*.
3. Anderson, Paul V. (2003). Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed.) (pp. 457-473). Boston: Heinle.

REFERENCES

1. Technical Communication *by* Rebecca E. Burnett, 5th edition (2001); *Publisher: Thomson/Wadsworth*
2. Technical Communication: A Practical Approach (7th ed.) *by* William S. Pfeiffer; *Publisher: Person education*
3. Technical Communication: Situations and Strategies *by* Mike Markel (2006-2007); *Publisher: Bedford/ St. Martins*.
4. Anderson, Paul V. (2003). Three Types of Special Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed..) ((pp. 474-513). Boston:Heinle.
5. Bolter, Jay David (2001), "The Late Age of Print" in Robert P. Yagelski's Literacies and Technologies: A Reader for Contemporary Writers (135-145); *Publisher: Longman*.
6. Brandt, Deborah. (1998) Sponsors of literacy. College Composition and Communication 49.2, 165-185.
7. Burnett, Rebecca, E. (2001) "Locating and Recording Information" in Rebecca E. Burnett's Technical Communication (pp. 164-195).
8. Johnson-Sheehan, Richard (2007). "Starting Your Career" in Richard Johnson-Sheehan's Technical Communication Today (2nd ed.) (pp. 388-402). New York: Longman.
9. Business Correspondence and Report Writing by R. C. Sharma and K. Mohan, Third Edition (2002); *Publisher: Tata McGraw Hill*.
10. Technical Communication: Principles and Practices by M. Raman and S. Sharma (Indian edition; 2004); *Publisher: Oxford University Press*.

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

(R11EIE1206) Industrial Instrumentation Laboratory

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- To have an adequate knowledge about various transducers.
- To have an idea about the standards of measuring device.
- To study about Speed, Precision Angular Velocity and calibration.
- To know about various types of measurements adopted in industry environment.

(minimum 14 experiments should be completed)

1. Design and simulation of analog circuits using CAD Package.
2. Design of PCB's using Ultiboard Package and Fabrication of PCB
3. Linearization of Thermistor interfacing with a PC
4. Study of level/temperature/pressure/flow monitoring instrumentation using PLC
5. Measurement of Blood Pressure
6. Calibration of Pneumatic pressure to Current (P to I) and Current to Pneumatic Pressure (I to P) Converters
7. Measurement of RP using opto-coupler and comparing it with stroboscope
8. Measurement of precision Angular Velocity and RPM of a rotating Disk
9. Measurement of Velocity of liquid using Ultrasonic (Doppler Effect) method and also flow measurement
10. Measurement of Level using Capacitive Method
11. Displacement measurement using Inductive pickup and capacitive pickup
12. Measurement of Velocity, Acceleration and Vibration using Piezo-electric transducer
13. Measurement of Humidity
14. Measurement of intensity of Light
15. Measurement of Sound Level.
16. Measurement of Viscosity of Edible Oil using Redwood Viscometer
17. Measurement of Viscosity of Crude Oil using Saybolt Viscometer
18. ECG/EEG Monitor

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

(R11EIE1112) PC Based Instrumentation

Course Objectives

- To **provide** and **ensure** a comprehensive understanding of using personal computers in measurement and control instrumentation.
- **To Learn** the process of collecting information/ data through PC from real world sources.
- **To Learn** remote and networked data acquisition and operating system.
- **To Learn** programmable logic controllers, and its application.

Course Outcomes

After completion of the course the student is able to:

- Complete knowledge of plc and their architecture And Applications in industry
- Student able to get knowledge of DCS and Applications in industry
- Student able to get Programming knowledge Of PLC/DCS.
- Various PLC's and DCS Architecture and its Hardware.

UNIT –I

Introduction to Computer Instrument Communication:

Personal Computer, 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

PC Programming Considerations:

Programming Considerations using the command line interface, asSembly language programming, C,C++,Embedded C programming. Linux operating system. scaling and linearization.

UNIT –III

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 – IV

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, PLC-PID functions.

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.

IV Year B.Tech EIE – I Sem	L	T/P/D	C
Elective - I	4	1	4

(R11EIE1113) Instrumentation Practices in Industries

Course Objectives

- **Identify** and quantitatively estimate different materials required for the manufacturing of Cement, Pulp, Paper, food, Power and pharmacy.
- **Understand** the principles of different manufacturing processes.
- **Recognize** these principles written in form of mathematical & chemical equations.
- **Apply** these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical industrial problems.

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of chemistry & instrumentation for modeling industrial engineering.
- Analysis of different Industrial engineering.
- Conduct experiments on pH, ORP, Distillation Column and interpreting data simulation model studies to prototype cases, as well as documenting them in engineering reports.
- Understand disasters caused by an incorrect nalysis/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, craft 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 Analyser, Hydro Corbon Dewpoint 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. Aircrafts instruments and integrated systems' Pallet, E.H.J.. Longmn Scientific & Technical, Mcgraw-Hill, 1992.
4. Pulp and Paper Industry Technology & Instrumentation, Sankaranarayana, P.E., Kothari's Deskbook.
5. 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.

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

(R11EEE1119) Neural Networks and Fuzzy Logic

Course Objectives

- To **cater** the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- To **expose** the students to the concepts of feed forward neural networks and about feedback neural networks.
- To **teach** about the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control
- To **teach** the design of fuzzy logic controllers.

Course Outcomes

After completion of the course the student is able to:

- The concepts of feed forward neural networks and learning and understanding of feedback neural networks.
- Concept of fuzziness involved in various systems and fuzzy set theory.
- Comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic.
- Adequate knowledge of application of fuzzy logic control to real time systems.

Unit – I:

Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, 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, Limitations of the Perceptron Model, Applications.

Multilayer Feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, 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, Proof of BAM Stability Theorem

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network

Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Unit – IV:

Classical and Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, 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 and Fuzzy classification.

TEXT BOOKS*:*

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publications.

2. Artificial neural networks, B.Yegnarayana, PHI publications.

REFERENCE BOOKS*:*

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – 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, J.M.Zurada, Jaico Publishing House.
6. Introduction to Neural Networks using MATLAB 6.0 - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006.

IV Year B.Tech EIE – I Sem	L	T/P/D	C
Elective - I	4	1	4

(R11EIE1114) Industrial Electronics

Course Objective

- **To Understand** the application of Amplifiers in industries
- **To Understand** the need and working of SCR.
- **To Understand** the need of different operation of SCR and their industrial applications.

Course Outcome

After completion of the course the student is able to:

- Appreciate the need of DC amplifiers, RPS and SMPS
- Appreciate the need for SCR and different firing angle.
- 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.

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

(R11EIE1115)Automation of Industrial Processes

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Understand the role of computer control in industrial process
- Appreciate the need of automatic control.
- Appreciate the need for Feed forward and adaptive controllers.
- 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.

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

(R11ECE1110) VLSI DESIGN

Course Objectives

- To **learn** the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- To **study** the concepts of stick diagrams and layouts with the knowledge of MOS layers through design rules.
- To **study** gate level design of subsystems, integrated circuits
- To **learn** concepts of PLD's, design capture tools and CMOS testing.

Course Outcomes

After completion of the course the student is able to:

- Learn IC Fabrication process steps required for PMOS, NMOS, CMOS, BiCMOS and IdsVds relationship.
- Understand VLSI Design flow for fabrication of a chip , layout design rules, stick diagrams and scaling of MOS transistor.
- Learn the time delays, driving large capacitive loads, wiring capacitance, and design of different subsystems.
- Understand concepts of PLD's, CMOS testing, Design Strategies, verification, and CMOS Testing.

UNIT I

INTRODUCTION: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation , Packing

BASIC ELECTRICAL PROPERTIES : Basic Electrical Properties of MOS ,CMOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit w_o, Pass transistor, NMOS inverter, Various pull ups, Determination of pull-up to pull-down ratio(Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

UNIT II

VLSI CIRCUIT DESIGN PROCESSES : VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts , CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures ,wires and vias,

Scaling of MOS circuits- Scaling models, Scaling factors, Scaling factors for device parameters, Limitations of Scaling.

UNIT III

GATE LEVEL DESIGN AND LAYOUT : Architectural issues, Switch logic networks: Implementation of AND,OR and Multiplexer , Gate logic , Other forms of CMOS logic-Pseudo-NMOS , Dynamic CMOS logic.

Basic circuit concepts, Sheet Resistance R_S and its concept to MOS, Area Capacitance Units, Calculations , The delay unit T ,Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT IV

SUBSYSTEM DESIGN Process: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generator, Comparators, Zero/One Detectors, Counters, Memory elements ,.

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN: PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

UNIT V

VHDL SYNTHESIS : VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

CMOS TESTING : CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Over view of Chip level Test Techniques and System-level Test Techniques, Layout Design for Improved Testability.

TEXTBOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, Edition, 2005.
2. VLSI DESIGN – K.Lal Kishore , VSV Prabhakar – I.K..International ,2009
3. CMOS VLSI Design – A circuits and systems perspective, Neil H.E Weste , David Harris , Ayan Banerjee, pearson ,2009.

REFERENCES

1. CMOS logic circuit Design – John P. Uyemura , Springer , 2007
2. Moderan VLSI Design –Wayne Wolf, Pearson Education , 3rd Edition, 1997.
3. VLSI Design – A.Albert Raj, Latha PHI, 2008.
4. .Introduction to VLSI Design- Mead and Convey , BS Publcations, 2010.
5. VLSI Design – M. Michal Vai, CRC Press, 2009.

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

(R11CSE1113) COMPUTER NETWORKS

Course Objectives

- **Build** an understanding of the fundamental concepts of computer networking.
- **Familiarize** the student with the basic taxonomy and terminology of the computer networking area.
- **Introduce** the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- **Allow** the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes

After completion of the course the student is able to:

- Understand the Layered Architecture of Computer Networks.
- Learn various datalink protocols and algorithms
- Learn various routing protocols and algorithms.
- Apply TCP and UDP in real time applications.

UNIT – I

Introduction to networks, internet, protocols and standards, the OSI Model, Layers in OSI model, TCP/IP suite, Addressing, Analog and Digital signals.
Physical layer: Digital transmission, multiplexing, transmission media, circuit switched networks, Datagram networks, virtual circuit networks, switch and Telephone networks.

UNIT – II

Data link layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point protocols.
Medium Access sub layer: Random access, controlled access, channelization.

UNIT – III

IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet, wireless LANS.
Connecting LANS , backbone networks and virtual LANS, Wireless WANS, SONET, Frame relay and ATM.

UNIT – IV

Network layer: Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, Uni-cast routing protocols, multicast routing protocols.

UNIT – V

Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, Data traffic, congestion, congestion control, Qos, integrated services, differentiated services,QoS in switched networks.

Application Layer: Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multi-media, network security.

TEXT BOOKS :

1. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition TMH,2006.
2. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

REFERENCES :

1. Data communications and computer Networks, P.C .Gupta, PHI.
2. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
3. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
4. Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W. Ross,*3rd* Edition, Pearson Education.

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

(R11EIE1116) Power Plant Instrumentation

Course Objective:

- **To Understand** the working model of power plant
- **To Understand** the necessity of an instrumentation engineer in a power plant
- **To Understand** different components and their control in power plants.

Course Outcome:

After completion of the course the student is able to:

- Appreciate the power generation technique used in different types of power plants
- Appreciate different parameters and their control in the power plant
- Should understand and standby the saying "one watt saved = two watts generated".
- Use suitable instruments to measure process variables in the plant

UNIT – I

An Overview of Power Generation

Brief survey of methods of power generation – hydro, thermal, nuclear, solar, wind etc.

Thermal power plants – building blocks – details of Boiler Processes – PI diagram of Boiler – Cogeneration.

UNIT – II

Parameters and Measurements

Electrical measurements – current – voltage – power – frequency - power factor – Tri-vector meter.

Non electrical measurements – flow of feed water, fuel, air and steam with correction factors for temperature – pressure – temperature – level – radiation detectors – smoke density measurement – dust monitor.

UNIT – III

Control Loops and Interlocks In Boiler

Combustion control – control of main header pressure – air fuel ratio control – furnace draft and excessive air control – drum level (three element control) – main and reheat steam temperature control – burner tilting up, bypass damper, super-heater, spray and gas recirculation control –

B F P recirculation control – hot-well and de-aerator level control – pulverizer control – computers in power plants.

UNIT – IV

Turbine Monitoring and Control

Condenser vacuum control – gland steam exhaust pressure control – speed control – vibration control - shell temperature monitoring and control – lubricating oil temperature control – hydrogen generator cooling system.

UNIT – V

Analyzers in Power Plants

Thermal conductive analyzer – paramagnetic oxygen analyzer – infrared analyzer – trim analyzer – spectrum analyzer – hydrogen purity meter – chromatography – pH meter – conductivity cell – fuel analyzer – brief survey of pollution monitoring and control equipment.

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.

IV Year B.Tech EIE – I SEM	`L	T/P/D	C
Elective - III	4	0	4

(R11CSE1114) OBJECT ORIENTED PROGRAMMING

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

- Understand the concept and underlying principles of Object Oriented Programming
- Discuss how object oriented concepts are incorporated into the Java programming
- Design and develop UI applications using AWT and to understand the event based GUI handling principles
- Relate JDBC APIs to Java applications for operations on database

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 - 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 & 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 Herbert Schildt, The Complete Reference Java J2SE, 5th Edition, , TMH.

2. Cay S.Horstmann, Gary Cornell - Core Java 2 Volume I Fundamentals,5th Edn. PHI,2000.

REFERENCES

1. K. Arnold and J. Gosling - The Java Programming Language - Second Edition, Addison Wesley, 1996.

2 . Richard A. Johnson - Java Programming and Objected Oriented Application Development INDIA Edition CENGAGE Learning.

1. R.Buyya, S.T.Selvi, X.Chu – Object Oriented Programming with Java, TMH.

2. Y.Daniel Liang – An Introduction to Java Programming- Pearson Education.

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

(R11ITD1117) Managerial Information Systems

Course Objectives

- To understand the principles, functions, theories and practices of different management areas.
- To expose with a systematic and critical understanding of organizational theory, structures and design
- To comprehend conceptual models of strategic management and to familiarize with the tools of operations and project management.
- To understand the role of human relations in the management of operations.

Course Outcomes

After completion of the course the student is able to:

- Understand the principles, functions, theories and practices of different management areas and to provide them with practical exposure to cases of success/failure in business.
- Expose with a systematic and critical understanding of organizational theory, structures and design.
- Comprehend conceptual models of strategic management and to familiarize with the tools of operations and project management.
- Understand the role of human relations in the management of operations and to provide basic insights into contemporary management practices.

UNIT - I

Information systems in the enterprise: Why information systems, perspectives on information systems, contemporary approaches to information systems, four major types of systems in organizations transaction processing systems, management information systems, decision support systems, executive support systems.

Systems from a functional perspective: Sales and Marketing Systems, Manufacturing and Production Systems, Financial and Accounting Systems, Human Resources Systems. Integrating functions and business processes.

UNIT - II

The Digital Firm, Electronic Business and Electronic Commerce: Internet technology and the digital firm, categories of electronic commerce, customer centered retailing, business-to business electronic commerce, commerce payments, electronic business, management opportunities, challenges and solutions.

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

UNIT - III

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

UNIT - IV

Redesigning the organizations with information systems:
Systems as planned organizational change, business process reengineering and process improvement, overview of system development, alternative systems building approaches – traditional systems life cycle, prototyping, end user development, application software package and outsourcing.

UNIT - V

Managing change and international information systems: The importance of change management in information systems success and failure, managing implementation, the growth of international systems, organizing international information systems, managing global systems, technology issues and opportunities for global value chains.

Text Books

1. Management Information Systems Kenneth - C. Laudon, Jane P. Laudon & VM Prasad, 9th Edition Pearson Education, 2005.

References

1. Management Information Systems - Effy Oz, Third Edition, Thomson, 2002.
2. Information Technology-Strategic Decision Making for Managers - M Henry C.Lucas, Jr., John Wiley & Sons, Inc, 2005.
3. Introduction to Information Systems, - James A. O'Brien, TMH, New Delhi, 2002.
4. Information Systems Today - Jessup &Velacich, PHI, 2004.
5. Management Information Systems - Sadagopan, PHI, 2004.
6. Information Systems, Pearson Education - Steven Alter, Fourth Edition, 2004.
7. Information Technology, - Turban, Rainer, Potter, John Wiley, 2003.
8. Management Information Systems - W S Jawadekar, TMH, Second Edition, 2002.

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

(R11EIE1117) Telemetry and Telecontrol

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

- Students will be able to apply techniques of telemetry and telecontrol.
- Applications of Telemetry and Telecontrol from a remote location.
- Use different communication technique to assist telemetry and telecontrol
- 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, Power Line Carrier Communication.

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.

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

(R11ECE1127) EMBEDDED AND REAL TIME OPERATING SYSTEMS

Course Objectives

- **Learn** the general embedded system concepts
- **Understand** design of embedded hardware and software development tools
- **Learn** the basics of OS and RTOS
- **Describe** key issues such as CPU scheduling, memory management, task synchronization, and file system in the context of real-time embedded systems.

Course Outcomes

After completion of the course the student is able to:

- Understand and design real time and non real time embedded systems
- Define the unique design challenges of real time systems and program them.
- Understand unique characteristics of RTOS and use RTOS to build an embedded realtime system
- Gain knowledge and skills necessary to design and develop embedded applications based on realtime operating systems.

UNIT 1:

Introduction to Embedded systems:

Examples of Embedded systems, Typical hardware, Hardware fundamentals: Terminology, gates,Timing diagrams, memory, Microprocessors, Buses, Direct memory access, Interrupts.

UNIT 2:

Software Architectures:

Round Robin, Round Robin with Interrupts, Function queue Scheduling Architecture, Real time operating System Architecture, Selecting an Architecture.

UNIT 3:

Introduction to Real time operating Systems:

Tasks and Task states, Tasks and Data, Semaphores and shared data, Message queues Mailboxes and Pipes, Timer functions, events, Memory management, Interrupt routines in an RTOS environment.

UNIT 4:

Basic Design Using a Real Time Operating System:

Principle, Example, encapsulating Semaphores and queues, Hard real time scheduling considerations, saving memory space, saving power.

UNIT 5:

Embedded software Development tools and Debugging techniques:

Host and Target machines, Linkers/Locators for embedded software, getting embedded software into the target system, Testing on host machine.

TEXT BOOKS

1. An Embedded Software Primer – David E. Simon, Pearson Edition, 2005.

REFERENCES

1. Introduction to Embedded Systems – Raj Kamal, TMS, 2002
2. Real time Systems", J. W. S. Liu, Pearson
3. The 8051 Microcontroller and Embedded Systems using AsSembly and C by Ayala and Gadre, Cengage Publications.

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

(R11CSE1110) DATA BASE MANAGEMENT SYSTEMS

Course Objectives:

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

Course Outcomes:

After completion of the course the student is able to:

- Understand, appreciate and effectively explain the underlying concepts of database system architecture and technologies
- Design and illustrate the database schema for a given scenario in an EntityRelationship(ER) model.
- Analyse the features of Relational Data Model features in SQL and formulate the queries in Relational Algebra, Calculus and SQL.
- Define the concepts of Normalization and apply them for the design of the database.

UNIT-I

Introduction to Databases and Database Management System - Database system Applications - Advantages of DBMS over File System - Data Models – Instances and schema - View of Data - Database Languages -DDL-DML - Database Users and Administrator - Database System Structure.

UNIT-II

Database Design and ER diagrams – Attributes and Entity Sets – Relationships and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features - Database Design with ER model - Database Design for Banking Enterprise

UNIT – III

Introduction to the Relational Model – Structure of RDBMS - Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data - Relational Algebra and Calculus.

Introduction to SQL- Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations - Join operations - Sub queries and correlated queries, SQL functions , views ,Triggers, Embedded SQL.

UNIT – IV

Functional Dependencies– Introduction , Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies- Schema Refinement in Database Design- Problems Caused by Redundancy – Decompositions – Problem Related to Decomposition –- Lossless Join Decomposition – Dependency Preserving Decomposition - FIRST, SECOND, THIRD Normal Forms – BCNF –– Multivalued Dependencies – Fourth Normal Form.

UNIT-V

Transaction concept- Transaction state- Implementation of atomicity and Durability- Concurrent executions – Serializability, Recoverability

Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling – Failure Classification – Storage Structure - Recovery and Atomicity- Log Based recovery – Recovery with concurrent transactions – Checkpoints .

File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B^+Tree Index files, B- tree index files – Static Hashing – Dynamic Hashing – Comparision of Indexing with Hashing.

TEXTBOOKS.

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 & 5 Units)
2. Introduction to Database Systems, C.J.Date, Pearson Education (4th Unit)

REFERENCES:

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw Hill(1,2,3 & 5 Units)
3. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
4. Data Base Systems using Oracle : A simplified guide to SQL and PL /SQL, Shah, PHI

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

(R11EIE1204) ANALYTICAL INSTRUMENTATION LABORATORY

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

(minimum 14 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. Interfacing of ADC to PC and observe the data.
10. Interfacing of DAC to PC and generate various types of signals.
11. Serial communication through RS-232C between µCs / PCs.
12. GPIB interface – master to slave data transfer.
13. GPIB interface – slave to slave data transfer.
14. Data transfer through IEEE-1394 (fireware) interface.
15. Data Acquisition System
16. Nuclear radiation detector.

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

(R11EIE1208) Virtual Instrumentation Laboratory

Course Objectives

- **To acquire** the concepts towards measurement and automation through LabVIEW.
- **To acquire** knowledge about how to control an external measuring device by interfacing a computer.
- To be **competent** in data acquisition and instrument control.
- **To provide** knowledge on developing different applications in Digital image processing ,control system, signal processing, and in simulation.

Course Outcomes

After completion of the course the student is able to:

- To create virtual instruments using LabVIEW software and implement controllers to control prototyped real time process.
- To acquire signals using DAQ devices, and rig up circuits using NI ELVIS and interface them with LabVIEW.
- To develop digital signal processing applications using SPEEDY 33
- To Create and edit image processing applications using IMAQ and vision assistant.

(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.

IV Year B.Tech EIE – I Sem	L	T/P/D	C
	0	6	2

(EIE1301) INDUSTRY ORIENTED MINI PROJECT

Course Objectives:

- Train the students to analyse, design, and develop novel products and offer solutions for simple engineering problems.
- Write a technical report on the product or engineering problem solved
- Orally present the technical report in a stipulated time

Course Outcomes:

- Acquaint with the basic principles.
- Translate the basic principles of Instrumentation into a design
- Develop a small module based on this design.
- Communicate the relevance of the product to the end user.

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

(R11EIE1118) ROBOTICS and AUTOMATION

Course Objectives

- Classification by coordinate system and control system
- Different types Power Sources And Sensors
- Classification Of Manipulators, Actuators And Grippers
- Knowledge on kinematics and Applications of different Robots

Course Outcomes

After completion of the course the student is able to:

- The students will be able to acquire knowledge on different types of Power Sources (actuators) and Sensors, Classification of Manipulators, Actuators and Grippers.
- The students will be able to analyze the direct and the inverse kinematic problems and calculate the manipulator dynamics
- The students will be able to able to plan trajectory of a robot arm.
- The students will be able to acquire knowledge on different applications of various types of robots.

UNIT I Basic Concepts & Power Sources

Fundamentals:

An over view of Robotics, classification of Robots, Robot Component, 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, torques 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. Joints-space Vs Cartesian-space descriptions. Basics of Trajectory Planning Cartesian-space Trajectories.

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.

References

1. Industrial Robotics / Groover M P /Pearson Edu.
2. I Robotics Technology and Flexible Automation / SR Deb
3. Robotic Engineering / Richard D. Klafter, Prentice Hall

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

(R11EIE1119) Fiber Optic and Laser Instrumentation

Course Objectives

- **To understand** the principles of optics and lasing action, Design of lasers.
- To a**pply** the knowledge of Optics to fibers and understand the different industrial applications of Optical Fibers.
- **To Learn** the various applications of Lasers in Instrumentation.
- **To understand** the Opto-Electronic devices and their principles of operation along with their applications.

Course Outcomes

After completion of the course the student is able to:

- Apply fundamental knowledge of Optics and lasers to design application specific optical fiber.
- Develop different optical source
- Apply Lasers in Instrumentation for the measurement of Industrial parameters like Pressure, temperature, Level and find the solutions for the errors.
- 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

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 – III

Opto-Electronic Components

Optical sources: LED, LD - Optical detectors: PIN, APD - Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT – IV

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–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.

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. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press
5. Monte Ross, 'Laser Applications', McGraw Hill, 1968

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

(R11EIE1120)Micro Electromechanical Systems (MEMS)

Course Objectives:

- **Acquire** knowledge about MEMS devices and their applications in various domains.
- **Understand** the techniques to fabricate MEMS devices.
- **Learn** the design considerations for MEMS devices and Microsystems.
- **Learning** to characterize Microsystems using optical and electron microscopy and other techniques.

Course Outcomes

After completion of the course the student is able to:

- Complete knowledge of smart sensors/Actuators and their Applications in industry
- Student able to get knowledge about Fabrication of Micro Chips
- Student able to understand Lithography, LIGA Process, Microstereolithography fabric techniques.
- Bulk Micromachining and Surface Micromachining of MEMS Devices

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

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

(R11CSE1108) OPERATING SYSTEMS

Course Objectives

- **To analyze** the tradeoffs inherent in operating system design.
- **To summarize** the various approaches to solving the problem of mutual exclusion in an operating system.
- **To evaluate** the trade-offs in terms of memory size (main memory, auxiliary memory) and processor speed.
- **To demonstrate** Main memory, disk storage strategies, file strategies and Implementation
- **To analyze** the system security with different cryptographical models.

Course Outcomes

After completion of the course the student is able to:

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

UNIT-I

Computer System and Operating System Overview- Overview of Computer System hardware . Operating System Objectives and functions, Evaluation 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 philosophers 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 Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.

2.Operating Systems - Internal and Design Principles William Stallings, Fifth Edition-2005, Pearson education/PHI

REFERENCES

1. Operating System A Design Approach-Crowley,TMH.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.
3. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.
4. Operating Systems – A Concept based Approach – D.M.Dhamdhere, 2nd Edition, TMH.

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

(R11ECE1115) DIGITAL DESIGN THROUGH VERILOG

Course Objectives

- To develop HDL code for digital system designs
- To describe ASM charts for synchronous sequential systems
- To acquire knowledge to Implement and test designs on the target CPLDs & FPGAs.
- To develop different digital solutions ranging from signal processing, data manipulation, electronic instrumentation, control telecommunications to consumer electronics

Course Outcomes

After completion of the course the student is able to:

- Develop HDL code for digital system designs.
- Describe ASM charts for synchronous sequential systems
- Acquire knowledge to Implement and test designs on the target CPLDs & FPGAs.
- Develop different digital solutions ranging from signal processing, data manipulation, electronic instrumentation, control telecommunications to consumer electronics.

UNIT I

INTRODUCTION TO VERILOG: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Test Benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS : Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks.

UNIT II

GATE LEVEL MODELING : Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits, Exercises.

BEHAVIORAL MODELING : Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Examples, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non blocking Assignments, The case statement, Simulation Flow. if and if-else constructs, assign-deassign construct,

repeat construct, for loop, the disable construct, while loop, forever loop, parallel blocks, force-release construct, Event.

UNIT III

MODELING AT DATA FLOW LEVEL: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

SWITCH LEVEL MODELING: Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets

UNIT IV

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations, Exercises,

FUNCTIONS, TASKS, AND USER-DEFINED PRIMITIVES: Introduction, Function, Tasks, User- Defined Primitives (UDP), FSM Design (Moore and Mealy Machines)

UNIT V

DIGITAL DESIGN WITH SM CHARTS : State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative realizations for SM Charts using Microprogramming, Linked State Machines.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES : Xilinx 3000 Series FPGAs, Altera FLEX 10K Series CPLDs.

VERILOG MODEL: Design of Microcontroller CPU,Interfacing Memory to a Microprocessor Bus.

TEXT BOOKS

1. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
2. A Verilog Primier – J. Bhaskar, BSP, 2003.

REFERENCES

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. Digital Systems Design using VHDL – Charles H Roth, Jr. Thomson Publications, 2004.
3. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.
4. HDL Programming Fundamentals VHDL and VERILOG, Botros, Thomson Publications.

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

(R11EIE1125) Pharmaceutical Instrumentation

Course Objectives

- **To understand** the working pharmaceutical industry
- **To understand** the necessity of a instrumentation engineer pharmaceutical industry
- **To understand** different components and their control in pharmaceutical industry.

Course Outcomes

After completion of the course the student is able to:

- Appreciate the concept of analytical instrumentation learned during previous semester.
- Appreciate the necessity of homogenization of mixture and size reduction.
- Apply instrumentation technique to different process involved
- 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 and

Evaporation: Factors affecting evaporation, study of evaporating stills and evaporating pans, heat transferring evaporators, vapor compression evaporators and evaporation under reduced pressure. Distillation: Importance of distillation in Pharmacy, methods of distillation. Brief introduction to freeze drying, sublimation, desiccation and exsiccation, efflorescence and its importance.

Unit- IV

Size Reduction and Separation

Introduction, mechanism and principles of size reduction, classification of size reduction equipment, law of size reduction, large equipment, mills using impact force for size reduction, cage mills, pin mills, fluid energy or jet mills, attrition and grinding mills tumbling mills. Ball mills and tube mills, practical size classifiers used with grinding mills, wet classifiers, non-rotary ball and bead mills, dry vs wet grinding, end runner mill, edge runner mills, disc attrition mills, dispersion and colloid mills, roller mills, size reduction combined with other operations, factors

influencing choice of size reduction machinery, changes resulting in the material due to size reduction.

size separation sieving, Screening equipment, sedimentation, screen analysis

Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill etc. Various methods and equipments employed for **size separation**, centrifugal elutriation, microscopic methods.

UNIT-V

Mixing and Homogenization

Introduction, equipment for4 mixing of miscible liquids, mixing of a soluble solid with a low viscon liquid etc., mixing solids with solids, equipment, consideration while choosing solids mixing equipment, theory of mixing, mixing solids with liquids, mixing miscible liquids, mixing viscous masses, mixing of immiscible liquids, equipment for emulsification.

Theory of mixing, solid solid, solid liquid and liquid liquid mixing equipment, double cone, twin-shell, silverson mixer, colloid mill, sigma blade mixer, planetary mixer, propeller mixer and turbine mixer.Semi solid mixing, Triple roller mill.

Text books:

1 Pharmaceutical Engineering . K. Samba Murthy,

2. Pharmaceutical Engineering CVS Subhramanyam,.

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.

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

(R11ECE1113) DIGITAL IMAGE PROCESSING

Course Objectives

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

Course Outcomes

After completion of the course the student is able to:

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

UNIT I

Fundamentals of Image Processing and Image Transforms

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, Constrained Least squares Restoration, Interactive restoration.

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.
3. Fundamentals of Digital Image Processing-A.K.Jain, PHI, 1989.

REFERENCES:

1. Digital Image Processing-William K.Pratt, 3rd Edition, John Willey, 2004.
2. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyl, Cengage Learning, 2008.
3. Digital Image Processing using MATLAB - Rafael C. Gonzalez, Richard E.Woods and Steven L.Edding 2nd ,
,TMH. 2010.
4. Introductory Computer Vision Imaging Techniques and Solutions – Adrian Low,2nd Edition, 2008.
5. Introduction to image Processing and Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010

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

(R11EIE1122) Digital Control Systems

Course Objectives

- To facilitate the knowledge of basic of digital control system for the real time analysis
- To analyze and design the controllers for digital sytems.
- To provide comprehensive knowledge of concepts of stability analysis and design of discrete time systems.
- To expose the students to the concepts of optimal control for discrete domain

Course Outcomes

After completion of the course the student is able to:

- Apply the modeling concepts to real time systems
- Do the stability analysis of a given systems
- Develop the control matrix to quantify the controller's performance.
- Develop suitable controllers for nonlinear systems.

UNIT-I

Z-PLANE Analysis of Discrete-Time Control System

Review of Z-Transforms,Z-Transform method for solving difference equations; Pulse transforms 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 and 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 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 – II Sem	L	T/P/D	C
Elective – VI	3	1	3

(R11MED1164) Elements of Nano Technology

Course Objectives

- To throw light on the multidisciplinary nature of nanotechnology and its applications
- **To understand** various nanomaterials and methods manipulating these materials for wide variety of applications
- **To provide** knowledge about metrology equipment for nanoscale measurements
- **To provide** overview of specific applications of nanotechnology to electronics and medicine

Course Outcomes

After completion of the course the student is able to:

- To appreciate the need and the societal impacts of Nanotechnology in 21st century.
- To discuss the applications of CNTs, Nanowires, Nanodots etc.
- To create process flow diagrams for topdown and bottomup approach used in building nano structures.
- To inspect different microscopic techniques used in nanotechnology.
- To appreciate quantum wells and its applications to nanoworld

UNIT I

Introduction Nano scale, Definition of Nano technology, Consequences of the Nano scale for technology and society. Beyond Moore's Law. Nano-scale 1D to 3D structures; Technologies for the Nanoscale; Nano-scale fabrications; Nano manipulation, Nano lithography.

UNIT II

Nano scale Materials and Applications Nano composites; Nano-scale Electronics; Safety issues with nanoscale powders; Quantum wells, wires, dots and nanoparticles; Nano scale bio and medical applications; Applications in energy, informatics, medicine, etc.

UNIT III

Length scales, top-down and bottom-up approaches to nanotechnology. Common growth methods.Vapour-solid-liquid. Properties of selected Nano materials, including carbon Nano tubes, other carbon based materials and metallic Nano clusters

UNIT IV

Scanning tunnelling microscopy and spectroscopy, Atomic and molecular manipulation – lateral manipulation and 2D quantum corrals, vertical manipulation, 1D quantum structures, tip induced effects, Ullmann process.

UNIT V

Electron and ion sources, Field-ion microscope and atom-probe. Focused Ion Beam machines. High-resolution electron microscopy including TEM and aberration corrected TEM. Lithography, X-Ray, proton beam, microbeam techniques.

TEXTBOOKS

1. Jacob N. Israel achvili Inter molecular and Surface Forces, Second Edition: With Applications to Colloidal and Biological Systems Colloid Science
2. Dietmar Mobius and Reinhard Miller. Organized Monolayers and AsSemblies: Structure, Processes and Function,Elsevier Science 2004
3. Michael Rieth Nano Engineering in Science and Technology : An introduction to the world of nano design World Scientific Publishing Co., Inc 2003
4. K. Holmberg, B. Jonsson, B. Kronberg, B. Lindman, Surfactants and Polymers in Aqueous Solution Wiley 2004.
5. Raoul Zana Dynamics of Surfactant Self-AsSemblies: Micelles, Microemulsions, Vesicles and Lyotropic Phases CRC Publisher.
6. Sergey Edward Lyshevski, Nano- and Micro-Electromechanical Systems: Fundamentals of Nano- and Microengineering, 2005.
7. Lyklema J,Fundamentals of Interface and Colloid Science –Academic Press,
8. Z.L Wang Characterization of nanophase materials – Wiley-VCH,2000. G. Schmidt Nanoparticles: From theory to applications –, Wiley 2004.

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

(R11EIE1302) SEMINAR

Course Objective:

- Prepare students to acquire the learning culture to get knowledge various technical topics
- Prepare a document of latest technological development
- Orally present the study report in stipulated time

Course Outcomes:

At the end of the seminar presentation, student is able to

- get knowledge of various Technical topics
- increase their oratory skills
- Learn how to address a group
- Present a technical report

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

(R11EIE1303) COMPREHENSIVE VIVA

Course Objectives:

- Review technical knowledge acquired through the program to face technical competitions and interviews.

Course Outcomes:

At the end of the comprehensive viva, student is able to

- Review the technical knowledge obtained in the subjects related to core engineering program.
- Review the technical knowledge obtained in the subjects related to interdisciplinary subjects of the program.
- Orally present the practical knowledge obtained from Lab courses.
- Present the skills required to face any technical interview.

IV Year B.Tech EIE – II Sem	L	T/P/D	C
Elective-VI	6	12	12

(R11EIE1304) MAJOR PROJECT

Course Objectives:

- Train the students in engineering practices to analyze, design, and develop novel products and offer solutions for society and industry specific processes.
- Acquire the skills to work and lead a team
- Develop a technical document for the product developed
- Orally present the study report in stipulated time

Course Outcomes:

- Identify and formulate real world problems
- Analyze and design using contemporary technologies
- Develop a prototype for the model
- Present technical report