ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

REVISED REGULATIONS FOR

FOUR - YEAR B.TECH. DEGREE COURSE

(CREDIT BASED SYSTEM)

(Effective for the batch of students admitted into first year B.Tech. from the academic year 2011-2012).

1.0. MINIMUM QUALIFICATIONS FOR ADMISSION:

A candidate seeking admission into First Year of B.Tech. Degree Course should have passed either Intermediate examination conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics, and Chemistry as optional subjects (or any equivalent examination recognized by the Acharya Nagarjuna University) or Diploma in Engineering in the relevant branch conducted by the State Board of Technical Education & Training of Andhra Pradesh (or equivalent Diploma recognized by Acharya Nagarjuna University).

The selection is based on the rank secured by the candidate at the EAMCET / ECET (FDH) examination conducted by A.P. State Council of Higher Education.

The candidate shall also satisfy any other eligibility requirements stipulated by the University and / or the Government of Andhra Pradesh from time to time.

2.0. BRANCHES OF STUDY:

2.1. The B.Tech. Course is offered in the following branches of study at one or more of the affiliated colleges:

1 Biotechnology
2 Chemical Engineering
3 Civil Engineering
4 Computer Science & Engineering
5 Electrical & Electronics Engineering
6 Electronics & Communication Engineering
7 Electronics & Instrumentation Engineering
8 Information Technology
9 Mechanical Engineering

2.2 The first year of study is common to all branches of Engineering except for Chemical Engineering and Biotechnology.

2.3 In addition to the core electives, an open elective (non departmental elective) is to be offered in the first semester of fourth year by all branches of B.Tech. courses.

3.0. DURATION OF THE COURSE AND MEDIUM OF INSTRUCTION:

3.1 The duration of the course is four academic years consisting of two semesters in each academic year where as annual pattern is followed for
first year. The medium of instruction and examination is English.

3.2 The duration of the course for the students (Diploma Holders) admitted under lateral entry into II B.Tech. is three academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.

4.0. MINIMUM INSTRUCTION DAYS:

The first year shall consist of a minimum number of 180 instruction days and each semester of 2nd, 3rd and 4th years shall consist of 90 days of instruction excluding the days allotted for tests, examinations and preparation holidays.

5.0 EVALUATION:

The performance of the students in each year/ semester shall be evaluated subject wise

5.1. The distribution of marks between sessional work (based on internal assessment) and University Examination will be as follows:

Nature of the subject	Sessional Marks	University Exam. Marks
Theory subjectsDesign and / or	30	70
Drawing	30	70
Practicals	**30**	**70**
Mini projects/Seminar	**100**	**-**
Project work	50	**150 (**Viva voce)

5.2. In the First Year, there shall be three Mid Term Examinations and three Assignment Tests in theory subjects, conducted at approximate equal intervals in the academic year. Assignment questions shall be given at least one week in advance and the students shall answer the question(s) specified by the concerned teacher just before the commencement of the Assignment Test. A maximum of 18 Sessional marks (75% approx) shall be awarded based on the best two performances out of the three Mid Term Exams and a maximum of 7 (25% approx) marks for the best two Assignment Tests out of the three Assignment Tests conducted.

For Drawing subject (Engineering Graphics), 7 marks shall be awarded based on day-to-day class work and the remaining 18 marks based on the best two performances in the three Mid Term Exams. No separate Assignment Tests will be held for this subject.

The remaining 5 marks out of the 30 marks earmarked for the internal sessional marks are allotted for attendance in the respective theory and drawing subjects in a graded manner as indicated in ***clause* 7.2** from I year to IV year.

In each of the Semesters of 2^{nd}, 3^{rd} and 4^{th} years, there shall be two Mid Term examinations and two Assignment Tests in every theory subject. The Sessional marks for the midterm

examinations shall be awarded giving a weightage of 14 marks out of 18 marks (75% approx) to that midterm examination in which the student scores more marks and the remaining 4 marks (25% approx.) for other midterm examination in which the student scores less marks. Similarly a weightage of 5 marks (75% approx) out of 7 marks earmarked for assignment tests shall be given for the assignment in which the student scores more marks and remaining 2 marks (25% approx) shall be given for the assignment test in which the student scores less marks.

For Drawing subjects, there shall be only two Mid Term examinations in each semester with no Assignment Tests. In case of such subjects a maximum of seven marks shall be given for day-to-day class work and the remaining maximum 18 marks shall be awarded to the Mid Term examinations taking into account the performance of both the Mid Term examinations giving weightage of 14 marks for the Mid Term Examination in which the student scores more marks and the remaining 4 marks for the other midterm examination. A weightage of 5 marks will be given in the total sessional marks of 30 for attendance in all theory and drawing subjects as indicated in ***clause* 7.2.**

5.3. The evaluation for Laboratory class work consists of weightage of **20** marks for day to day laboratory work including record work and 10 marks for internal laboratory examination including Viva-voce examination.

In the case of Project work, the sessional marks shall be awarded based on the weekly progress and based on the performance in a minimum of two Seminars and the Project Report submitted at the end of the semester. The allotment of sessional marks for Seminars and for day-to-day class work shall be **20 and 30.**

NOTE : A student who is absent for any Assignment / Mid Term Exam, for any reason whatsoever, shall be deemed to have scored zero marks in that Test / Exam and no make-up test / Exam shall be conducted.

5.4. A student who could not secure a minimum of 50% aggregate sessional marks is not eligible to appear for the year-end / semester-end University examination and shall have to repeat that year/ semester.

6.0. LABORATORY / PRACTICAL CLASSES:

In any year/semester, a minimum of 90 percent experiments / exercises specified in the syllabi for laboratory course shall be conducted by the students, who shall complete these in all respects and get the Record certified by the concerned Head of the Department for the student to be eligible to face the University Examination in that Practical subject.

7.0. ATTENDANCE REGULATIONS:

7.1 Regular course of study means a minimum average attendance of 75% in all the subjects computed by totaling the number of hours / periods of lectures, design and / or drawing, practicals and project work as the case may be, held in every subject as the denominator and the total number of hours / periods actually attended by the student in all the subjects, as the numerator.

7.2 A Weightage in sessional marks upto a maximum of 5 marks out of 30 marks in each theory subject shall be given for those students who put in a minimum of 75% attendance in the respective theory in a graded manner as indicated below:

Attendance of 75% and above but less than 80% - 1 mark

Attendance of 80% and above but less than 85% - 2 marks

Attendance of 85% and above but less than 90% - 3 marks

Attendance of 90% and above - 5 marks

7.3 Condonation of shortage in attendance may be recommended on genuine medical grounds, up to a maximum of 10% provided the student puts in at least 65% attendance as calculated in ***clause* 7.1** above and provided the principal is satisfied with the genuineness of the reasons and the conduct of the student.

7.4 A student who could not satisfy the minimum attendance requirements, as given above, in any year / semester, is not eligible to appear for the year end or semester end examinations and shall have to repeat that year/semester.

8.0 DETENTION:

A student, who fails to satisfy either the minimum attendance requirements as stipulated in *Clause-7*, or the requirement of minimum aggregate sessional marks as stipulated in *Clause 5*, shall be detained. Such a student shall have to repeat the same year / semester as the case may be subsequently and satisfy the above requirements afresh to become eligible to appear for the year-end / semester-end University examination.

9.0. UNIVERSITY EXAMINATION:

9.1. For each theory, design and/or drawing subject, there shall be a comprehensive University Examination of three hours duration at the end of First year / each Semester of 2nd, 3rd and 4th years, except where stated otherwise in the detailed Scheme of Instruction.

Question paper setting shall be entrusted to external examiners from the panels approved by the respective Boards of Studies.

9.2. For each Practical subject, the University examination shall be conducted by one internal and one external examiner appointed by the Principal of the concerned college and the University respectively, the duration being that approved in the detailed Schemes of Instruction & Examination.

9.3 Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the University.

10.0 AWARD OF CREDITS

Credits are awarded for each Theory/Practical Subjects. Each theory subject is awarded 4 credits and each practical subject is awarded 2 credits. Project work is awarded 10 credits. However for some important theory subjects more than 4 credits may be awarded by individual boards. The total number of credits for all the four years put together should be in the range of 218-224 for any branch.

10.1 AWARD OF GRADES

S.No.	Range of Marks	Grade	Grade Points
1	≥85%	S	10.0
2	75%-84%	A	9.0
3	65%-74%	B	8.0
4	55%-64%	C	7.0
5	45%-54%	D	6.0
6	40%-44%	E	5.0
7	≤39%	F(Fail)	0.0
8	The grade 'W' represents withdrawal/absent (subsequently changed into pass or E toS or F grade in the same semester)	W	0.0

10.2 A Student securing 'F' grade in any subject there by securing 0 grade points has to reappear and secure at least 'E' grade at the subsequent examinations in that subject.

10.3 After Ist year/each semester, Grade sheet will be issued which will contain the following details:

- **The list of subjects for the 1st year/each semester and corresponding credits and Grades obtained**
- **The Grade Point Average(GPA) for the 1st year/ each semester and**
- **The Cumulative Grade Point Average(CGPA) of all subjects put together up to that semester from first year onwards**

GPA is calculated based on the fallowing formula:

$$\frac{\text{Sum of [No.Credits X Grade Points]}}{\text{Sum of Credits}}$$

CGPA will be calculated in a similar manner, considering all the subjects enrolled from first year onwards.

11.0 CONDITIONS FOR PROMOTION

11.1. A student shall be eligible for promotion to II B.Tech. Course if he / she satisfies the minimum requirements of attendance and sessional marks as stipulated in Clauses 5 and 7, irrespective of the number of backlog subjects in I B.Tech.

11.2. A student shall be eligible for promotion to III B.Tech. Course if he / she **secures a minimum of 70% of the total number of credits from one regular and one supplementary examinations of I B.Tech.**, (including practical subject) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in II/IV B.Tech.

11.3. A student shall be eligible for promotion to IV B.Tech. course if he/she **secures a minimum of 70% of the total number of credits from two regular & two supplementary examinations**

of I B.Tech. and two regular & one supplementary examinations of II B.Tech. 1st semester and one regular & one supplementary examinations of II B.Tech. 2nd semester (including practical subjects) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in III B.Tech.

11.4. A student (Diploma Holder) admitted under lateral entry into II B.Tech. shall be eligible for promotion to IV B.Tech. course if he/she secures a minimum of 70% of the total number of credits from two regular & one supplementary examinations of II B.Tech. 1st semester and one regular & one supplementary examinations of II B.Tech. 2nd semester (including practical subjects) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in III B.Tech.

12.0 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE

The B.Tech. Degree shall be conferred on a candidate who has satisfied the following requirements.

12.1 The candidate must have satisfied the conditions for pass in all the subjects of all the years as stipulated in *clause 10.*

12.2. Maximum Time Limit for completion of B.Tech Degree

A Student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the year of admission, shell forfeit his/her seat in B.Tech. course.

12.3 A student (Diploma Holder) admitted under lateral entry into II B.Tech., who fails to fulfill all the academic requirements for the award of the degree within six academic years from the year of admission, shell forfeit his/her seat in B.Tech. course.

13.0 AWARD OF CLASS

A candidate who becomes eligible for the award of B.Tech. Degree as stipulated in *Clause 12* shall be placed in one of the following Classes.

S.No.	Class	CGPA
1	First Class With Distinction	8.0 or more
2	First Class	6.5 or more but less than 8.0
3	**Second Class**	**5.0 or more but less than 6.5**
4	Pass Class	4.5 or more but less than 5.0

14.0. IMPROVEMENT OF CLASS

14.1. A candidate, after becoming eligible for the award of the Degree, may reappear for the University Examination in any of the theory subjects as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for Sessional Examination or for University Examinations in Practical subjects (including Project Viva-voce) for the purpose of improvement.

14.2. A single **Grade sheet** shall be issued to the candidate after incorporating the **Credits and Grades** secured in subsequent improvements.

14.3. A consolidated **Grade Sheet** shall be issued to the candidate indicating the **CGPA of all the four years put together** along with the Provisional Certificate.

15. AWARD OF RANK

The rank shall be awarded based on the following:

15.1. Ranks shall be awarded in each branch of study for the top ten percent of the students appearing for the Regular University Examinations or the top ten students whichever is lower.

15.2. Only such candidates who pass the Final year examination at the end of the fourth academic year after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree shall be eligible for the award of rank. The University Rank will be awarded only to those candidates who complete their degree within four academic years.

15.3. For the purpose of awarding rank in each branch, **the CGPA calculated based on the Grades** secured at the first attempt only shall be considered.

15.4. Award of prizes, scholarships, or any other Honors shall be based on the rank secured by a candidate, consistent with the desire of the Donor, wherever applicable.

16.0 SUPPLEMENTARY EXAMINATIONS

In addition to the Regular University Examinations held at the end of 1st year / each semester, Supplementary University Examinations will be conducted during the academic year. Such of the candidates taking the Regular / Supplementary University examinations as Supplementary candidates may have to take more than one University Examination per day.

17.0 TRANSITORY REGULATIONS

17.1. Candidates who studied the four-year B.Tech. Degree Course under Revised Regulations (RR)/ **Credit based Regulations(CR**) but who got detained in any year for want of attendance / minimum aggregate sessional marks may join the appropriate year / semester in the Semester system applicable for the batch and be governed by the Regulations of that batch from then on.

17.2. University Examinations according to **RR / CR** shall be conducted in subjects of each year five times after the conduct of the last set of regular examinations under those Regulations.

17.3. Candidates who have gone through the entire course of four academic years and have satisfied the attendance and minimum aggregate sessional marks **in 1st year/each semester under RR/CR**, but who are yet to pass some subjects even after the five chances stated in

Clause 17.2, shall appear for the equivalent subjects in the Semester system, specified by the University / Board of Studies concerned.

18. 0 AMENDMENTS TO REGULATIONS

The University may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi.

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ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
I/IV B.Tech. (All Branches) ANNUAL PATTERN (for I B.Tech. only)
(Except Chemical Engg. And Bio-Technology)

Sl. No.	Course Details		Scheme of Instruction		Scheme of Examination			Credits
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks	
			Lecture + Tutorial	Drawing / Practical	Sessional	University		
1.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 101	Mathematics-I	3	--	30	70	100	4
2.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 102	Mathematics-II	3	--	30	70	100	4
3.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 103	Engineering Physics	3	--	30	70	100	4
4.	CE/CSE/ECE/EEE/ EI/IT/ME – 104	Engineering Chemistry	3	--	30	70	100	4
5.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 105	Professional Communication Skills	3	--	30	70	100	4
6.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 106	C Programming and Numerical Methods	3	--	30	70	100	4
7.	CE/CSE/ECE/EEE/ EI/IT/ME – 107	Engineering Mechanics	3+1	--	30	70	100	4
8.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 108	Engineering Graphics*	2+4	--	30	70	100	4
9.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 151	Physics Lab	--	3	30	70	100	2
10.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 152	Chemistry Lab	--	3	30	70	100	2
11.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 153	Workshop Practice	--	3	30	70	100	2
12.	BT/CE/ChE/CSE/ECE /EEE/EI/IT/ME – 154	Computer Programming Lab	--	3	30	70	100	2
	TOTAL		23+5	12	360	840	1200	40

* Two different question papers will be set for the University Examination. One question paper for CE,ME,EEE,Ch.E and BT branches and the University Examination will be conducted in Morning Session. The second question paper will be set for ECE,EI,CSE & IT branches and the University exam will be conducted in Evening Session

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
II/IV B.TECH - I SEMESTER

II/I SEMESTER

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	Credits
1	EC/EI/EE-211	Mathematics-Ill	4	-	30	70	100	4
2	BT/CHE/EC/E E/EI-212	Environmental Studies	4	-	30	70	100	4
3	EC/EE/EI-213	Circuit Theory	4+1	-	30	70	100	4
4	EC/EE/EI-214	Electronic Devices and Circuit	4	-	30	70	100	4
5	EI-215	Electrical Technology	4	-	30	70	100	4
6	EC/EE/EI-216	Digital Logic Design	4+1	-	30	70	100	4
7	EC/El-251	Electronic Devices & Circuits Lab	-	3	25	50	75	2
8	EC/EI-252	Digital Logic Design Lab	-	3	25	50	75	2
9	EI 253	Electrical Technology Lab		3	25	50	75	2
TOTAL			28+2	6	255	570	825	30

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
II/IV B.TECH - II SEMESTER

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	
1	EC/EE/EI-221	Mathematics - IV	4	-	30	70	100	4
2	EC/EI/EE-222	Data Structures Using C++	4+1	-	30	70	100	4
3	EC/EE/EI-223	Electronic Circuit Analysis	4	-	30	70	100	4
4	EI-224	Elements of Mechanical Engineering	4	-	30	70	100	4
5	EI-225	Electromagnetic Field Theory	4+1	-	30	70	100	4
6	EC/EI-226	Signals and Systems	4+1	-	30	70	100	4
7	EC/EI-261	Electronic Circuits and Analysis Lab	-	3	25	50	75	2
8	EI-262	Measuremetns Lab	-	3	25	50	75	2
9	EC/EE/EI-263	Data Structures Lab	-	3	25	50	75	2
TOTAL			24+3	9	255	570	825	30

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
III/IV B.TECH - I SEMESTER

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	
1	EC/El-311	Professional Ethics and Human Values	4	-	30	70	100	4
2	EC/EE/ EI-312	Linear Control Systems	4+1	-	30	70	100	4
3	EC/EI-313	Computer Organization & Operating Systems	4	-	30	70	100	4
4	EC/El-314	Linear Integrated Circuits and Applications	4	-	30	70	100	4
5	EC/EI - 315	Pulse Circuits	4	-	30	70	100	4
6	EI-316	Transducers	4+1	-	30	70	100	4
7	EI-351	Transducers L:ab	-	3	25	50	75	2
8	EC/EI-352	Electronics Circuit Simulation Lab	-	3	25	50	75	2
9	EC/EI-353	Pulse Circuits and IC's Lab	-	3	25	50	75	2
TOTAL			24+2	9	255	570	825	30

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
III/IV B.TECH - II SEMESTER

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	
1	EI-321	Process Control	4	-	30	70	100	4
2	EC/EE/EI-322	Microprocessors and Microcontrollers	4+1	-	30	70	100	4
3	EC/EE/EI-323	Digital Signal Processing	4+1	-	30	70	100	4
4	EI-324	Analog and digital Communication	4	-	30	70	100	4
5	EI-325	Industrial Instrumentation	4	-	30	70	100	4
6	El-326	Elective – I	4	-	30	70	100	4
7	EI-361	Microprocessors and Microcontrollers Lab	-	3	25	50	75	2
8	EI-362	Process Control Lab	-	3	25	50	75	2
9	EI-363	Communication Skills Lab	-	3	25	50	75	2
TOTAL			24+2	9	255	570	825	30

Elective – I

A. Computer Networks
B. Advanced Sensors
C. Power Plant Instrumentation
D..Artificial Intelligence

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)
ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
IV/IV B.TECH - I SEMESTER

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	
1	EC/EE/EI-411	Industrial Management	4	-	30	70	100	4
2	EC/EI-412	Digital Image Processing	4	-	30	70	100	4
3	EI-413	Analytical Instrumentation	4	-	30	70	100	4
4	EC/EI-414	VLSI Design	4	-	30	70	100	4
5	EI-415	Elective – II	4	-	30	70	100	4
6	EI-416	Elective – III	4	-	30	70	100	4
7	EI-451	Advanced Instrumentation & VLSI Lab	-	3	25	---	25	2
8	EI-452	Digital Signal Processing & Embedded Systems Lab	-	3	25	50	75	2
9	EI-453	Term Paper / Mini Project	-	3	25	50	75	2
TOTAL			24	9	255	520	775	30

Elective – II Open Elective

A. Sensors And Transducers
B. Basic Electrical & Electronic Measurements

Elective – III

A. DSP Processors And Architectures
B. Neural Networks
C. Robotic And Automation
C. Advanced Computer Architectures

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f. 2011-2012(semester System)

Sl. No.	COURSE DETAILS		Scheme of Instruction		Scheme of Examination			Credits
	CODE No.	Subject Name	periods per week		Maximum Marks			
			Lecture + Tutorial	Practical	Sessional	University	Total Marks	
1	EI-421	Biomedical Instrumentation	4	-	30	70	100	4
2	EI-422	Opto electronics and Laser Instrumentation.	4	-	30	70	100	4
3	EI-423	PC Based Instrumentation	4	-	30	70	100	4
4	El-424	Elective- IV	4	-	30	70	100	4
5	EI-461	Biomedical Instrumentation Lab	-	3	25	50	75	2

ELECTRONICS & INSTRUMENTATION ENGINEERING BRANCH
IV/IV B.TECH - II SEMESTER

6	EI-462	Project and Viva Voce	-	3	50	100	150	10
TOTAL			16	6	195	430	625	28

Elective-IV
A. Embedded Systems
B. Advanced digital signal processing.
C. Telemetry & telecontroler
D. Instrumentation in Petrochemicals.

CE/CSE/ECE/EEE/EI/IT/ME – 101
MATHEMATICS – I
w.e.f: 2011-2012 batch

Credits:4

Unit-I

Differential Calculus:

Rolle's Theorem(without proof), Lagrange's Mean value theorem (without proof), Taylor's theorem (without proof), Maclaurin's series, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-II

Multiple Integrals :

Double integrals, Change of order of integration , Double integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Volume of solids, Change of variables.

Ordinary differential equations (first order): Introduction, Linear and Bernoulli's equations, Exact equations, equations reducible to exact equations, Orthogonal trajectories, Newton's law of cooling, Heat flow, Rate of Decay of Radio-Active Materials

Unit-III

Ordinary differential equations (higher order):

Linear Differential equations: Definition, Theorem, Operator D, Rules for finding the complementary function, Inverse operator, Rules for finding the particular integral, Working procedure to solve the equation, Linear dependence of solutions, Method of variation of parameters, Equations reducible to linear equations, Cauchy's homogeneous linear equation, Legendre's linear equation, Simultaneous linear equations with constant coefficients.

Unit-IV

Fourier Series: Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series Typical wave forms and Parseval's formulae, Complex form of the Fourier series Practical harmonic analysis.

Text Book: [1]. Higher Engineering Mathematics by B.S. Grewal, Khanna publishers, 40^{th} edition.

Reference Books: [1]. Advanced Engineering Mathematics by kreyszig.

[2]. Engineering Mathematics by Babu Ram

CE/CSE/ECE/EEE/EI/IT/ME – 102

MATHEMATICS - II

w.e.f: 2011-2012 batch

Credits:4

Unit-I

Matrices:

Rank of a matrix, vectors, Consistency of linear system of equations, Linear transformations, Characteristic equations, Properties of eigen values, Cayley- Hamilton theorem (without proof), Reduction to diagonal form reduction of Quadratic forms to canonical form, Nature of a quadratic form, Complex matrices.

Unit-II

Beta Gamma functions, error function.

Statistics: Method of least squares, Correlation, co-efficient of correlation (direct method only), lines of regression.

Vector Calculus:

Scalar and vector point functions, Del applied to scalar point functions. Gradient

Unit-III

Vector Calculus:

Del applied to vector point functions, Physical interpretation of divergence, Del applied twice to point functions, Del applied to products of point functions, Integration of vectors, Line integral, Surfaces, Green's theorem in the plane (without proof), Stoke' s theorem (without proof), Volume integral, Gauss divergence Theorem (without proof), Cylindrical Coordinates, Spherical polar coordinates.

Unit-IV

Laplace Transforms : Introduction, Transforms of elementary functions, Properties of Laplace Transforms, existence conditions, Transforms of derivatives, Integrals, multiplication by t^n, division by t, Evaluation of integrals by Laplace Transforms, Inverse transforms, convolution theorem, Application to Differential equations with constant coefficients, transforms of unit step function, unit impulse function, periodic function.

Text Book: [1] Higher Engineering Mathematics by B.S.Grewal
Khanna publishers, 40^h edition.

Reference Books:

[1] Engineering Mathematics by Babu Ram

[2] Advanced Engineering Mathematics by Erwin Keyszing John willy and sons.

CE/CSE/ECE/EEE/EI/IT/ME – 103

Engineering Physics (Common for ALL Branches)

Subject Code: **103** Lectures: 3

Credits:4

UNIT-I

Ultrasonics **20 Periods**

Production of Ultrasonics by Piezo electric oscillator method, Detection by Acoustic grating method, Applications - Pulse echo technique, ultrasonic imaging and some general applications.

Applied Optics

Interference: Stokes principle (Phase change on reflection), Interference in thin films due to reflected light (Cosine law), (uses of air films in wedge method and Newton's rings experiments - qualitative treatments only) Michelson's interferometer: Principle, construction working and applications (Determination of wavelength of monochromatic source & for resolution of two closely lying wavelengths).

Lasers: Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, Applications of lasers.

Holography: Principle, recording, reproduction and applications.

Fiber optics: Structure of optical fiber, Types of optical fibers, Numerical aperture, Fiber optics in communications and advantages.

UNIT –II **15 Periods**

Electromagnetism

Gauss's law in electricity (statement & proof), Coulomb's law from Gauss law, Circulating charges and Cyclotron principle & working, Hall effect and its uses, Gauss law for magnetism, Faraday's law of electromagnetic induction, Lenz's law, induced electric fields, Inductance, energy stored in a magnetic field, Displacement current, Maxwell's equations (qualitative treatment), electromagnetic wave equation and Velocity, Electromagnetic oscillations(qualitative treatment),

Electron Theory of Solids

Failure of classical free electron theory, quantum free electron theory, Fermi- dirac (analytical) distribution function and its temperature dependence, Fermi energy.

UNIT-III **20 Periods**

Principles of Quantum Mechanics

Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and applications (non-

existence of electron in nucleus, finite width of spectral lines). One dimensional time independent Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

Band theory of Solids

Bloch theorem, Kronig-Penny model (Qualitative treatment), Origin of energy band formation in solids, effective mass of electron, concept of hole.

Dielectric and Magnetic Materials

Electric dipole moment, polarization, dielectric constant, polarizability, types of polarizations, internal fields (qualitative), Clausius-Mossotti equation, Frequency dependence of polarization, Ferroelectrics and their applications.

Origin of magnetic moment of an atom, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

UNIT –IV

Advanced Materials of Physics **15 Periods**

Optoelectronic devices: Qualitative treatments of Photo diode, LED and LCD; Solar cell and its characteristics. Electro-optic and Magneto-optic effects (Kerr and Faraday effects).

Superconductivity: First experiment, critical parameters (T_c, H_c, I_c), Meissner effect, types of superconductors, BCS Theory (in brief) and Applications of superconductors.

NanoTechnology : Introduction to nano materials, nano scale, surface to volume ratio, fabrication of nanomaterials, sol-gel and chemical vapour deposition methods, Carbon nano tubes-preparation and properties (thermal, electrical and mechanical - in brief), some applications of nanomaterials.

TEXT BOOKS

1. Engineering Physics – M.R.Srinivasan, New Age International.
2. Physics Part I and II – Halliday and Resinck, John Wiley & sons (Asia).

REFERENCE BOOKS

1. Concepts of Modern Physics – Aurther Beiser (TMG)
2. Engineering Physics – Gaur & Gupta , Dhanpati Rai Publications, New Delhi.
3. Modern Engineering Physics – A.S.Vasudeva, S.Chand & Co., New Delhi
4. Materials science – M.Vijaya and G.Rangarajan, TMH, New Delhi

CE/CSE/ECE/EEE/EI/IT/ME – 104:
Engineering Chemistry
(Common to all branches except Chemical Engineering and Bio-Tech)

Lectures: 3 Periods/ week Sessional Marks: 30 University Exam. Marks: 70 University Exam. : 3 hrs

Credits:4

UNIT-I **(18 periods)**

WATER TECHNOLOGY: Various impurities of Water, WHO guidelines, Hardness units and determination by EDTA method (simple problems), water treatment for drinking purpose- sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.
Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic Embrittlement, boiler corrosion, priming and foaming- causes and prevention, Internal conditioning - Phosphate, Calgon and carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion exchange process, Desalination of brackish water by electro dialysis and reverse osmosis**.**

GREEN CHEMISTRY: Introduction, Principles and applications.

UNIT-II **(18 periods)**

POLYMERS:

Monomer functionality, degree of polymerization, Tacticity, classification of polymerization- addition, condensation and co-polymerization, mechanism of free radical polymerization.
Plastics- Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC. Compounding of plastics.
Conducting polymers: Polyacetylene, mechanism of conduction, examples and applications.
Rubber- Processing of latex, Drawbacks of natural rubber- Vulcanization, Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber.

NANOMATERIALS: Introduction to nanochemistry, preparation of nanomaterials-carbon nanotubes and fullerenes and their engineering applications.

UNIT-III **(18 periods)**
Phase Rule: Statement and explanation of the terms involved, one component water system, condensed phase rule- construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only).
Electrochemical Energy Systems: Types of electrochemical energy systems, electrochemistry of primary batteries (Lachlanche or dry cell), Secondary cells (Lead Acid cell, Ni-Cd cell), Lithium batteries (Li-MnO_2 ,Lithium organic electrolyte) and their advantages.

Corrosion and its control: Introduction, electrochemical theory of corrosion,dry corrosion, corrosion due to differential aeration, Types of corrosion-galvanic corrosion (galvanic series), Pitting, Stress and microbiological corrosion, Factors affecting corrosion-oxidizers, pH, over voltage and temperature.
Protection methods: Cathodic protection, (Impressed current and sacrificial anode) anodic protection, corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanisation.

UNIT-IV **(18 periods)**

Fuels: Classification of fuels, calorific value-units and determination (Bomb calorimeter). Coal-Ranking and analysis, carbonization of coal (using Beehive oven)
Petroleum based**:** Fractional distillation, cracking, reforming, composition and uses of petrol, diesel **,** CNG and LPG.
Composites: Introduction, Constituents of Composites, Types –Fibre reinforced, Particulate and layered composites and their applications.
Lubricants: Classification –liquid lubricants-Viscosity index, Flash point, Fire point, Cloud point, Pour point, oiliness. Solid lubricants –Graphite and Molybdenum sulphide, Additives.

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications.

Text Book recommended:

1. Engineering Chemistry, P.C. Jain and Monika Jain, Dhanpat Rai and Co., New Delhi

Reference Books :

1. A Text Book of Engineering Chemistry, S.S. Dara, 10^{th} Edition, S.Chand and Co.
2. Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House
3. A Text Book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai and Co.

PROFESSIONAL COMMUNICATION SKILLS
BT/CE/ChE/CSE/ECE/EEE/EI/IT/ME – 105

Lectures: 3 Periods/week Sessional Marks: 30

University Exam: 3 Hrs. University Examination Marks: 70

COURSE OBJECTIVE:

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

UNIT-1: SPEECH BUILDING

This arena refreshes the students in the usage of grammar and basics of communication in English. It also helps them start building up their vocabulary.

1. Speaking about oneself
2. Sentence and its types
3. Positive, Negative and Interrogative Sentences, Speaking in formal and informal contexts, Asking for opinion, Asking for information, Requesting and Seeking permission; Emphasising a point
4. A list of 100 Basic Words
5. One word substitutes

UNIT- II: BASIC LANGUAGE SKILLS

The emphasis is on Grammar and development of written and oral communication skills among students and equips them with the skills to overcome the cut throat competition in formal and informal situations in the present world.

1. Parts of speech

2. Tenses
3. Letter writing (Personal and Business)
4. Situational Dialogues
5. A list of 100 Basic Words

UNIT- III: ADVANCED LANGUAGE SKILLS

To develop two specific skills i.e. speaking and writing, using correct and good vocabulary to improve the communicative competence of learners in their discipline with glamour.

1. Antonyms
2. Paragraph Writing
3. Technical terms
4. Reading Comprehension
5. Correction of Sentences

UNIT- IV: COMMUNICATION SKILLS

Communication skills aim at making students familiar with various aspects of corporate world and the importance of verbal communication. It also provides intensive instruction in the practice of professional writing.

1. Essay writing
2. Corporate Information
3. Idioms
4. E-mail etiquette

Prescribed Textbook:

- Communication Skills for Engineers, K.R. Lakminarayana and T. Murugavel, Scitech Publications. ISBN: 9788183711548.

Reference Books:

Communication Skills for Professionals, Nira Konar, PHI Publication.

- Competitive English for Professional Courses, J.K.Gangal, S.Chand Publication.
- English for Technical Communication: Volume 1&2 by K.R. Lakminarayana , Scitech Publications.
- Effective Technical Communication, M.Ashraf Rizvi,Tata Mc Graw Hill.
- Advanced Technical Communication, Kavita Tyagi, Padma Misra, PHI Publication.
- Word Power Made Handy, Dr. Shalini Verma,S.Chand Publication.

L T P M

CE/CSE/ECE/EEE/EI/IT/ME – 106
C PROGRAMMING AND NUMERICAL

METHODS

Credits:4 **3 0 0 100**

UNIT-1 **(16 Periods)**

Computer Basics: The Computer System, Generations of Computer, Classification of Computer, Block diagram of digital Computer, Inside the Computer-Processor, Memory, External Ports, PCI Card, Formatting Hard disk, Understanding BIOS, BIOS Commands, Networking Basics, Internet Basics, Basics of S/W-OS fundamentals, Algorithm, Flowchart, Programming Paradigms.

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associativity, Basic input and out put statements, Control Structures, Simple programs in C using all the operators and control structures.

UNIT-II **(16 Periods)**

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

UNIT-III **(16 Periods)**

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types,, pointers to structures.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

UNIT-IV **(16 Periods)**

Numerical Methods: Types of Errors, General formula, numerical method for finding roots of an algebraic equation of one variable, successive bisection method, false position method, Newton Raphson method, secant method. Guass elimination method, Guass siedal method, Lagrange interpolation.

General Quadrature formula, Simpsons rule, Euler's method, general method for deriving differentiation formula, differentiation of Lagrange's polynomial, differentiation of Newton polynomial, Taylors Series, Ranga Kutta Method.

Text Books:

1. C Programming and Numerical Methods - Ajay Mithal - Pearson
2. Computer Oriented Numerical Methods -V.Raja Raman - PHI

References :

1. Programming with C-Gottfried-Schaums Outline Series-TMH

2. C Programming- Behrouz A forouzan – CENGAGE Learning
3. Computer Programming – Kanthane –Pearson Education
4. Elementary Numerical Methods - C.D. Conte
5. Introduction to Numerical Methods - S.S.Sastry

CE/CSE/ECE/EEE/EI/IT/ME – 107
ENGINEERING MECHANICS
(Common to all branches except Chemical Engg. & Biotechnology branches)

Lectures/Tutorials:3/1Periods/Week Sessional marks: 30
University Exam. : 3 Hours University exam. marks: 70

Credits:4

UNIT – I

Concurrent Forces In A Plane
Principles of statics ; composition and resolution of forces ; equilibrium of concurrent forces in a plane ; method of projections ; Method of moments.
Parallel Forces In A Plane
Couple ; general case of parallel forces in a plane ; center of parallel forces and centre of gravity ; Centroids of composite plane figures and curves; Centre of gravity of three-dimensional bodies.

UNIT – II
General Case Of Forces In A Plane
Composition of forces in a plane ; Equilibrium of forces in a plane ; Plane trusses – method of joints , Method of sections

Friction

Static and kinetic friction, Laws of friction; Applications of static friction.

Principle Of Virtual Work
Equilibrium of Ideal systems

UNIT – III
Rectilinear Translation
Kinematics of rectilinear motion ; Principles of dynamics ; Differential equation of rectilinear motion ; Motion of a particle acted upon by a constant force ; D'Alemberts principle ; Momentum and impulse ; Work and energy ; Ideal systems – conservation of energy ; direct central impact

Moments Of Inertia Of Plane Figures
Moment of inertia of a plane figure with respect to an axis in its plane ; Moment of Inertia with respect to an axis perpendicular to the plane of the figure ; Parallel axis theorem.

UNIT – IV

Curvilinear Translation

Kinematics of curvilinear motion ; Differential equations of curvilinear motion ; D'Alembert's principle in curvilinear motion ; Work and Energy.

Moments Of Inertia Of Material Bodies

Moment of inertia of a rigid body ; Moment of inertia of a lamina ; Moments of inertia of three-dimensional bodies.

Rotation Of A Rigid Body About A Fixed Axis

Kinematics of rotation ; Equation of motion for a rigid body rotating about a fixed axis; Work and energy

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Engineering mechanics by S. Timoshenko , D. H. Young and J. Rao , Tata McGraw-Hill Publishing Company Ltd.

REFERENCE BOOKS

1. Engineering mechanics by J. L. Meriam and L. Kraige , John Wiley & Sons
2. Vector mechanics for engineers by Beer and Johnston, Tata McGraw-Hill Publishing Company Ltd.
3. Engineering Mechanics by Hibbler and Gupta , Pearson Education

CE/ CSE/ECE/EEE/EI/IT/ME -108

ENGINEERING GRAPHICS

(Common to all branches)

Lectures : 3+3 Periods / week Sessional Marks : 30
University Exam. : 3 hrs. University Exam. Marks : 70

Credits:4

NOTE : 1) Unit VI not to be included in the university theory examination. This unit is only for internal assessment

2) University Examination Question paper consists of FIVE questions, TWO questions from each unit with internal choice.

(To be taught & examined in First angle projection)

UNIT I

GENERAL: Use of Drawing instruments, Lettering .-Single stroke letters, Dimensioning-Representation of various type lines. Geometrical Constructions. Representative fraction. (3+9)

CURVES : Curves used in Engineering practice - conic sections - general construction and special methods for ellipse, parabola and hyperbola. cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circle and Archemedian spiral.

(9+15)

UNIT II

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines. (6+12)

PROJECTIONS OF PLANES : Projections of planes, projections on auxiliary planes.

(4+8)

UNIT III

PROJECTIONS OF SOLIDS : Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

(4+8)

SECTIONS OF SOLIDS: Sections of Cubes, Prisms, Pyramids, cylinders and Cones.true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

(6+12)

UNIT IV

DEVELOPMENT OF SURFACES: Lateral development of cut sections of Cubes,Prisms,Pyramids,Cylinders and Cones.

(4+8)

ISOMETRIC PROJECTIONS : Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only). (4+8)

UNIT V

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

(6+12)

UNIT VI

(Demonstration only)

COMPUTER AIDED DRAFTING(Using any standard package): Setting up a drawing: starting , main menu (New, Open, Save, Save As etc.), Opening screen, error correction on screen, units, co-ordinate system, limits, grid, snap, ortho.

Tool bars: Draw tool bar, object snap tool bar, modify tool bar, dimension tool Bar

PRACTICE OF 2D DRAWINGS: Exercises of Orthographic views for simple solids using all commands in various tool bars.

(4+8)

TEXT BOOK:

- Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand).
- AutoCAD 14 for Engineering Drawing Made Easy(Features AutoCAD 200) by P.Nageswara Rao

REFERENCE BOOK:

- Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah.
- Engineering Graphics with AutoCAD 2002 by James D. Bethune

PHYSICS PRACTICALS

CE/CSE/ECE/EEE/EI/IT/ME – 151

w.e.f academic year 2011-'12 (Common for all branches)

Internal marks – 30 ; External marks – 70 ; Periods per week – 03

Credits:2

Any 15 experiments from the following list

LIST OF EXPERIMENTS

1. Compound pendulum –Determination of acceleration due to gravity (g)
2. Interference fringes - measurement of thickness of a foil / diameter of Wire using wedge method.
3. Sensitive galvanometer - Determination of figure of merit
4. Newton's rings – Measurement of radius of curvature of plano convex lens
5. Lissajous' figures –Calibration of an audio oscillator
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Diffraction grating – Measurement of wavelengths
8. Torsional pendulum- Determination of rigidity modulus of the wire material.
9. Carey- Foster's bridge: Determination of specific resistance/Temperature coefficient of resistance.
10. Photo voltaic cell - Determination of **fill-factor**
11. Variation of magnetic field along the axis of a current carrying circular coil.
12. Series l LCR resonance circuit - Determination of "Q" factor.
13. Thomson's method - determination of **e/m** of an electron.
14. Determination of a.c. Frequency – Sonometer.
15. Prism/Grating - Determination of dispersive power.
16. To determine the wavelength of Laser source.
17. Hall effect – Determination of Hall coefficient.
18. Determination of energy band gap.
19. Determination of Numerical Aperture of an optical fiber.
20. Determination of Amplitude and Frequency of an AC signal using a CRO.

CE/CSE/ECE/EEE/EI/IT/ME – 152

CHEMISTRY LABORATORY

(Common for all branches)

Lectures: 3 Periods/week Sessional Marks: 30

University Examination: 3 hours. UniversityExamination Marks: 70

Credits:2

Note: Minimum of twelve experiments have to be conducted out of the list of experiments given below.

List of Experiments:

- Estimation of total alkalinity of water sample
  - Standardization of HCl solution b. Estimation of alkalinity
- Determination of purity of washing soda
- Estimation of Chlorides in water sample
  - Standardization of $AgNO_3$ solution b) Estimation of Chlorides
- Determination of Total Hardness of water sample:
  - Standardization of EDTA solution b) Determination of Total Hardness
- Estimation of Magnesium
  a) Standardization of EDTA solution b) Estimation of Magnesium
- Estimation of Mohr's salt-permanganometry
  - Standardization of $KMnO_4$ solution b) Estimation of Mohr's salt
- Estimation of Mohr's salt –Dichrometry
  - Standardization of $K_2Cr_2O_7$ solution b) Estimation of Mohr's salt
- Analysis of soil sample:
  - Estimation of Ca and Mg b) Estimation of Organic matter
- Determination of available chlorine in bleaching powder-Iodometry
  - Standardization of Hypo solution b) Determination of Available chlorine
- Determination of Iodine in Iodized salt
- Determination of Iron (Ferrous and Ferric) in an iron ore by Permanganometry
- Determination of Zn using Potassium ferrocyanide
- Conductometric titration of an acid vs. base
- pH metric titrations of an acid vs. base

Demonstration Experiments:

- Potentiometric titrations: Ferrous vs. Dichromate

16.Spectrophotometry: Estimation of Mn/Fe

CE/CSE/ECE/EEE/EI/IT/ME – 153

WORKSHOP PRACTICE

(Common to all branches)

Lectures	: 2 Periods / week	Sessional Marks	: 30
University Exam.	: 3 hrs.	University Exam. Marks	: 70

Credits:2

Minimum four experiments should be conducted from each trade

1. Carpentry

To make the following jobs with hand tools

a) Lap joint
b) Lap Tee joint
c) Dove tail joint
d) Mortise & Tenon joint
e) Gross-Lap joint

2. Welding using electric arc welding process / gas welding.

The following joints to be welded.

a) Lap joint
b) Tee joint
c) Edge joint
d) Butt joint
e) Corner joint

3. Sheet metal operations with hand tools.

a) Preparation of edges like Saw edge, wired edge, lap seam, grooved seam
b) Funnel
c) Rectangular Tray
d) Pipe joint
e) Electronic Component joining Techniques like use of crimping tool, soldering of electronic components, strain guage, thermo couples, use of computer networking tools..

4. House wiring

a) One lamp by one switch
b) Two lamps by one switch
c) Wiring of Tube light
d) Stair case wiring
e) Go-down wiring

Fundamentals of H/W & S/W and C-Programming Lab

CE/CSE/ECE/EEE/EI/IT/ME – 154

L T P M

0 0 3 100

Credits:2

CYCLE-I Basics of Hardware and Software Exercises:

1. Explore Mother Board components and Layouts, identifying external ports and interfacing, identifying PCI cards and interfacing.
2. Partitioning and formatting Hard disks.
3. Install and Uninstall system and application software.
4. Understand BIOS configuration.
5. Connect computers in a network.
6. Assemble a Computer and troubleshoot a Computer.
7. Operating system commands
    a. Directory Related Utilities.
    b. File and Text Processing Utilities.
    c. Disk, Compress and Backup Utilities.
    d. Networking Utilities and
    e. Vi editor

CYCLE-II Programming Exercises:

1. Write a program to read x, y coordinates for 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?

2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (eg. For, while, and do write).

3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position. Copying one string to another, reversing a string, adding one string to another.

4. Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?

5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.

6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).

7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their means and standard deviation.

8. Write a program for implementing students management system(attendance, marks and fees reports) using structures and pointers.

9. Implement bisection method to find the square root of a given number to a given accuracy.

10. Implement Newton Raphson method to determine a root of polynomial equation.

11. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange's interpolation.

(CE/CS/EC/EEE/EI/IT/ME 211)

Mathematics-III **w.e.f: 2011-2012 batch**

Unit-I

Partial Differential Equations :

Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equations, Equations solvable by direct Integration, Linear Equations of the first Order, Non-Linear Equations of the first Order using Charpit's Method, Homogeneous Linear Equations with Constant Coefficients, Rules for finding the Complementary Function, Rules for finding the Particular Integral, Non-Homogeneous Linear Equations.

Unit-II.

Integral Transforms:

Introduction, Definition, Fourier Integral Theorem (without proof), Fourier sine and cosine integrals, Complex form of the Fourier Integral, Fourier Transforms, Properties of Fourier Transforms, Finite Fourier sine and cosine transforms, Convolution theorem (without proof), Parseval's Identity for Fourier Transforms (without proof).

Solution of Algebraic and Transcendental Equations : Introduction, Bisection method, Newton- Raphson Method, Solutions of Simultaneous Linear Equations: Direct Methods of Solution- factorization method (LU – decomposition method), Iterative Methods of Solution - Gauss-Seidel Iteration Method.

Unit-III

Finite Differences and Difference Equations: Introduction, Finite Difference operators, Symbolic relations, Differences of a polynomial, factorial notation, Newton's forward and backward difference interpolation Formulae, Central Difference Interpolation Formulae: Gauss's Forward and Stirling's formulae, Interpolation with Unequal Intervals: Lagrange's Interpolation , inverse interpolation. Difference Equations: Introduction, Formation, Linear difference equations - Rules for Finding the Complementary Function, Rules for Finding the Particular Integral.

Unit-IV

Numerical Differentiation: Finding First and Second order Differentials using Newton's formulae , Numerical Integration : Trapezoidal rule , Simpson's one-third rule, Numerical Solutions of Ordinary Differential Equations (first order): Euler's Method, Picard's Method, Runge- Kutta Method of fourth order, Simultaneous equations(R K method). Numerical Solutions of Partial Differential Equations: Classification of Partial Differential Equation of second order, Solutions of Laplace's and Poisson's Equations by iteration methods.

Text Book : Higher Engineering Mathematics, B.S.Grewal, 40th edition, Khanna publishers

Reference Books:

[1] A textbook of Engineering Mathematics by N.P. Bali

[2] Advanced Engineering Mathematics by Erwin Kreyszig John willy and sons.

BT/CHE/EC/EE/EI- 212 ENVIRONMENTAL STUDIES

(Common for all branches)

Lectures: 4 Periods / week
University Examination: 3 hours

Sessional Marks:30
University Examination Marks: 70
No. of credits : 4

UNIT-I

Introduction:

Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over-exploitation, Deforestation, Mining, dams and their effects on forests and tribal people.

Water Resources: Use and over-utilization of surface and ground water, floods and droughts, Water logging and salinity, Dams – benefits and problems, Conflicts over water.

Energy resources: Energy needs, Renewable and non-renewable energy sources.

Land resources: Land as a resource, land degradation, soil erosion & desertification, Effects of modern agriculture on land resources.

Ecosystems:

Definition, Structure and functions of an Ecosystems, Biogeochemical cycles-water, carbon, nitrogen and water cycles, Types-Forest, Greenland, Desert, Aquatic ecosystem.

UNIT-II

Biodiversity and its Conservation:

Definition, Value of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to bio-diversity, Endemic and endangered species of India, Conservation of biodiversity.

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Environmental Pollution: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear pollution, Solid waste management.

UNIT-III

Social Issues and Environment:

From unsustainable to sustainable development, Population growth and environment, Green revolution, Rain water harvesting, watershed management, cloud seeding, Resettlement and rehabilitation of people - problems and concerns, Environmental Impact Assessment.

Climate Changes:

Global warming & Green house effect, Acid rain, Ozone layer depletion.

UNIT-IV

Environmental acts:

Prevention and Control of Water pollution & Air Pollution act, Environmental protection act, Wild life protection act, Forest Conservation act.

International Conventions:
Stockholm Conference 1972, Earth Summit 1992. Copenhagen Summit 2009.

Case Studies:
Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Chernobyl Nuclear Disaster, Ralegaon Siddhi, Florosis and Bhopal Tragedy.

Field work:
Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain.
Study of local environment-common plants, insects, birds.
Study of simple ecosystems – pond, river, hill, slopes etc.
Visits to industries, water treatment plants, effluent treatment plants.

Text Books

1. Environmental Studies, by Dr. Suresh K. Dhameja, Published by S.K. Kataria & Sons, Ludhiana.

Reference Books

1. Environmental studies by Anubha Kaushik and C.P.Kaushik., New Age International Publishers, New Delhi.
2. T Benny Joseph, Environmental Studies, the Tata McGraw-Hill Publishing Company Limited, New Delhi.

EC/EE/EI 213	CIRCUIT THEORY	L	T	P	M
		4	1	0	100

UNIT – I

INTRODUCTION OF CIRCUIT ELEMENTS:

Basic definition of the unit of Charge, Voltage, Current, Power and Energy, Circuit concept, Active and Passive circuit elements; Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star Delta transformation, Energy stored in Inductors and Capacitors Kirchhoff's Voltage law and Kirchhoff's Current law.

GRAPH THEORY:

Introduction to Graph Theory, Tree, Branch, Link, Cutset and loop matrices, relationship among various matrices and parameters, Mesh and Nodal Analysis

UNIT – II

INTRODUCTION TO ALTERNATING CURRENTS AND VOLTAGES:

Instantaneous, Peak, Average and RMS values of various waveforms; Crest factor, Form factor; Concept of phase and phase difference in sinusoidal waveforms; Phase relation in pure resistor, Inductor and capacitor; Impedance diagram, phasor diagram, series and parallel circuits, compound Circuits.

POWER AND POWER FACTOR

Computation of active, reactive and complex powers; power factor.

UNIT – III

NETWORK THEOREMS:

Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegan's and Millman's theorems, Application of theorems to DC circuits. Sinusoidal steady state Mesh and Node Analysis. Application of network theorems to AC circuits.

RESONANCE:

Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance.

UNIT – IV

TRANSIENTS AND LAPLACE TRANSFORMS:

Steady state and transient response, DC and Sinusoidal response of an R-L, R-C, R-L-C circuits. Laplace Transforms of typical signals, periodic functions, Inverse transforms, Initial and final value theorems, Application of Laplace transforms in circuit analysis.

PSPICE:

Introduction to PSpice: D.C Analysis and control statements, dependent sources, DC Sweep, AC Analysis and control statements, Transient analysis.

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TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6th Edition,TMH, 2002.
2. M.E.Vanvalkenburg, Network Analysis, 3rd Edition, PHI, 2003.
3. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4th Edition, TMH, 2010

REFERENCE BOOKS:

1. Franklin F.Kuo, Network Analysis and Synthesis, 2nd Edition, John Wiley & Sons, 2003.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.

EC/EE/EI -214
ELECTRONIC DEVICES AND CIRCUITS

UNIT I

ENERGY BANDS AND CURRENT CARRIERS IN SEMICONDUCTORS: Allowed and Forbidden Energy Bands, Electrical Conduction In Solids, Density of States Function, Statistical Mechanics, Charge Carriers in Semiconductors, Dopant Atoms and Energy Levels, The Extrinsic Semiconductor, Statistics of Donors and Acceptors, Charge Neutrality, Fermi Level, Carrier Drift, Carrier Diffusion, Graded Impurity Distribution, T he Hall Effect, Carrier Generation and Recombination, Characteristics of Excess Carriers

UNIT II

THE PN JUNCTION DIODE: Basic Structure of the PN Junction, Zero applied Bias, Reverse applied Bias, Non-Uniformly Doped Junctions, PN Junction Current, Generation-Recombination Currents, Junction Break Down, Capacitances of The Diode

SPECIAL DIODES AND RECTIFIERS: LED, Tunnel Diode, Photodiode, Half Wave, Full Wave, and Bridge Rectifiers

UNIT III

The BIPOLAR TRANSISTORS: The Bipolar Transistor Action, The Modes of Operation, Minority Carrier Distribution, Low-Frequency Common-Base Current Gain, Nonideal Effects, CE, CB, and CC Characteristics, Photo Transistor

TRANSISTOR BIASING: The Operating Point, Fixed Bias and Self Bias, Bias Stability, Stability Factors, Thermal Runaway, Analysis of Transistor circuits at DC

UNIT IV

FUNDAMENTALS OF THE METAL-OXIDE-SEMICONDUCTOR FIELD-EFFECT TRANSISTOR: The Two Terminal MOS Structure, Capacitance-Voltage Characteristics, The Basic MOSFET Operation, Non-ideal Effects

THE JUNCTION FIELD-EFFECT TRANSISTOR: JFET Concepts, The Device Characteristics, Non-ideal Effects

TEXT BOOKS:

1. Donald A. Neamen, Semiconductor Physics and Devices, 3rd Edition,TMH,2003
2. Jacob Millman and Christos C. Halkias, Integrated Electronics, TMH, 1972

REFERENCE BOOKS:

1. Kanaan Kano, Semiconductor Devices, PHI, 1998
2. Ben G Streetman and Sanjay Banerjee, Solid State Electronic Devices, 5th Edition,2000
3. GSN Raju, Electronic Devices and Circuits, 1st edition, IK International Publishers, 2006
4.

EI - 215	ELECTRICAL TECHNOLOGY	L	T	P	M	Cr.
		3	1	0	100	4

UNIT – I

DC MACHINES:
Construction, Principle and operation of DC generator, EMF equation, Methods of excitation, DC motor principle, Back EMF, Torque equation, Load characteristics of DC shunt, series and compound generators, Motors, Losses and Efficiency, Applications of speed control, Swinburne's test, Three-point starter.

UNIT – II

POLYPHASE SYSTEMS- Advantage-relationship between various values for star and delta connection system.

TRANSFORMERS:
Principle, Operation on load and no load, Phasor diagrams, Equivalent circuit, Regulation, Losses and Efficiency, OC and SC tests, Auto transformers, Elementary treatment of 3 phase transformer connections, Star/star, Delta/star connections.

UNIT – III

THREE PHASE INDUCTION MOTORS:
Construction, Rotating magnetic field, Principle of operation of Induction Motors, Torque equation, Torque-slip characteristics, Types of starters.

SINGLE PHASE INDUCTION MOTORS:
Construction, Starting methods, Fractional Horse Power motors for tape recorders and teleprinters.

STEPPER MOTORS: Principle, Construction, Working and different types

UNIT – IV

SYNCHRONOUS MACHINES:
Principle and constructional features of an alternator, EMF equation, Synchronous impedance method, Synchronous motors, Principle of operation, Methods of starting andapplications.

TEXT BOOKS:

1. Edward Hughes, Electrical Technology, 6th Edition, Longman Group, 1987
2. JB Gupta, A Course in Electrical Technology, S K Kataria & Sons, 2003
3. PC Sen, Principles of Electrical Machines and Power Electronics, John Wiley, 1989

REFERENCE BOOKS:

1. H Cotton, Advanced Electrical Technology, AH Wheeler & Co., 1990
2. Eugene Lister, Electric Circuits and Machines,
3. BL Theraja, A Text Book of Electrical Technology, Nirja, 1995
4. CK Mukerjee, Electrical Machines.

EC/EE/EI-216

DIGITAL LOGIC DESIGN

UNIT-I

NUMBER SYSTEMS AND CODES: Decimal, Binary, Hexadecimal Number Systems and their Conversions Arithmetic Additions Subtraction using the method of Complements, Multiplication and Division Codes: BCD, Excess-3, Gray and Alphanumeric Codes

BOOLEAN ALGEBRA: Boolean Expressions and Theorems, Logic Gates, Universal Gates, Canonical and Standard forms, Boolean functions, Simplification of Boolean functions using K maps, Minimal Functions and their properties, Tabulation Method Nand and Nor Implementations Two Level and Multi Level

UNIT-II

COMBINATIONAL LOGIC CIRCUITS: EX-OR EX-NOR Circuits, General Design procedure for Combinational Logic Circuits, Design and Applications of Binary Adders and Subtractors, Comparators, Encoders, Decoders Multiplexers and Demultiplexers, Design of BCD to 7 Segment Decoder, Parity Generator and Checker, BCD Adder /Subtractor, Carry Look Ahead Adders

UNIT-III

SEQUENTIAL LOGIC CIRCUITS: Lathes, Characteristic Table, Characteristic Equation, Excitation Table, State table and State Diagrams for SR, JK, Master Slave JK, D and T flip-flops, Conversion from one type of Flip-Flop to another, Shift Registers Analysis and Synthesis of Sequential Circuits, Sequence Generator, Sequence Detector, Parity Generator

COUNTERS USING FLIP-FLOPS: Design of Ripple Counters, Synchronous Counters Up/Down Counters using Flip-Flops

UNIT-IV

SYNCHRONOUS SEQUENTIAL CIRCUITS: Basic Design Steps, Sate Assignment Problem, Mealy State Model, Serial Adder Example, State Minimization, Design of a Counter using the Sequential Circuit Approach, FSM as an Arbiter Circuit, Analysis of Synchronous Sequential Circuits, ASM Charts, Formal Model for Sequential Circuits

IC LOGIC FAMILIES: RTL, DTL, TTL, ECL and IIL families and their comparison

TEXT BOOKS:

5. M Morris Mano and Micael D. Ciletti, Digital Design, Pearson Education, 2008
6. Digital Principles and Design, Donald D. Givone,TMH,2003

REFERENCE BOOKS:

3. Thomas L. Floyd, Digital Fundamentals,7th Edition, Pearson Education,2000
4. Charles H. Roth Jr., Fundamentals of Logic Design, Jaico Publications,1992
5. Taub and Schilling, Digital Integrated Electronics, McGraw Hill,1977

EC 251 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

1. Study of C.R.O
2. Characteristics of Silicon and Germanium diodes
3. Characteristics of Zener diode and regulator
4. Characteristics of Common Base configuration
5. Characteristics of Common Emitter configuration
6. Characteristics of Emitter follower circuit
7. Drain and Transfer Characteristics of JFET
8. Drain and Transfer Characteristics of Depletion MOSFET
9. Drain and Transfer Characteristics of Enhancement MOSFET
10. Design and verification of Self bias circuit
11. Characteristics of LDR and Thermistor
12. Characteristics of source follower circuit
13. Characteristics of Photo transistor
14. Design and verification of collector to base bias circuit
15. Design and verification of Current Source Bias Circuit

.

EC/EI 252 DIGITAL LOGIC DESIGN LABORATORY

L	T	P	M
0	0	3	75

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-Sub tractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders like BCD – Decimal decoder.
6. Applications of IC Parallel Adder (1's & 2's compliment addition).
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial , Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EI - 253	ELECTRICAL TECHNOLOGY LAB	L	T	P	M	Cr.
		0	0	3	75	2

1. Verification of Thevenin's Theorem.
2. Verification of Superposition Theorem.
3. Verification of Reciprocity & Maximum Power Transfer Theorem.
4. Parameters of Given Choke Coil.
5. Resonance of a RLC Series & Parallel Circuits.
6. Verification of KCL & KVL.
7. Speed Control of a DC Shunt Motor.
8. Open Circuit Characteristics of a DC Shunt Generator and Obtaining Critical field

1. Resistance and Critical Speed.

9. Load Test on a DC Shunt Generator.
10. Load Test on a DC Compound Generator.
11. Swinburne's test on a DC Shunt Machine.
12. OC & SC test on Single Phase Transformer.
13. Direct Load Test on Single Phase Transformer.
14. Regulation of 3-Phase alternator by Synchronous Impedance Method.
15. Direct Load Test on a 3-Phase Induction Motor.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examinations.

MATHEMATICS-IV

EE/EC/EI 221 **w.e.f: 2011-2012 batch**

UNIT-I:

Complex Analysis:

Introduction, Continuity, Cauchy's- Riemann equations, Analytic Functions, Harmonic functions , Orthogonal system.

UNIT-II:

Complex Integration:

Cauchy's Integral Theorem, Cauchy's Integral Formulae, Poisson's Integral Formula, Taylor's Series, Laurent's Series, Zeros and Singularities.

UNIT-III:

Calculation of residues, Evaluation of real definite integrals(by applying the residue theorem).

Series Solutions of differential equations: Introduction, Series solution, Validity of series solution, General method (Frobenius method) forms of series solution.

UNIT-IV:

Series solution of Bessel's and Legendre's equations, Recurrence formulae, Generating functions, Rodrigue's formula, Orthogonality of Bessel's functions and Legendre polynomials.

Text Book:

1. Higher Engineering Mathematics by B.S.Grewal , Khanna publishers, 40th edition.

.**Reference Book:**

1. Advanced Engineering Mathematics,8th Edition, By Erwin Kreyszig, John Wiley,2000

EC/EE/EI - 222

DATA STRUCTURES USING C++

L	T	P	M
4	1	0	100

UNIT – I

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING: Concepts, benefits of OOPS, Object oriented Languages, Applications of OOPs.

TOKENS, EXPRESSIONS AND CONTROL STRUCTURES: Introduction, Tokens, Keywords, Basic Data Types, User defined data types, Derived data types, Declaration of variables, Operators in C++, Types, Scope resolution operator, Member dereferencing operator, Memory management operator, Type cast operator.

UNIT – II

FUNCTIONS: Function prototyping, Call by reference, Return by reference, Inline function, Function Overloading, Friend and Virtual functions.

CLASSES AND OBJECTS: Specifying a class, Defining member functions, Memory allocation for objects, Friendly functions, Pointer to members.

CONSTRUCTORS AND DESTRUCTORS – Introduction.

Type conversions, Operator overloading and inheritance and virtual functions.

UNIT – III

LINKED LISTS: List operations and their implementation using arrays, Linked list operations and their implementations, Single linked, Double linked and Circular linked lists.

STACKS: Logical operations on stack, Stack implementations with arrays and linked lists, Stack applications.

QUEUES: Queue operations, Queue implementation with arrays and linked lists, Queue applications.

UNIT – IV

SORTING METHODS: Insertion sort, Shell sort, Merge sort, Quick sort, Heap sort, Radix sort and their implementations.

SEARCHING METHODS: Binary Search, Hashing methods and applications.

TREES: Logical operations on Trees, Binary Tree Traversals, Binary Search Tree ADT,

TEXT BOOKS:

1. E Balaguruswamy, object oriented programming using c++Programming ANSI C, PHI, 1993.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, The Benjamin &Cummings, Addison Wesley, 1997
3. Trembley and Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill, 1997.

REFERENCES :

1. Dital and Dital c+ programming
2. S Tanenbaum, Data Structures Using C, PHI, 1992.

EC/EE/EI - 223
ELECTRONIC CIRCUIT ANALYSIS

UNIT I

BASIC BJT AND FET AMPLIFIERS: MOSFET DC Circuit Analysis, The MOSFET Amplifier, The Common Source Amplifier, The Common Drain Amplifier, The Common Gate Configuration, Single-Stage Integrated Circuit MOSFET Amplifiers, Multistage Amplifiers, Basic JFET Amplifiers, Analog Signals and Linear Amplifiers, The Bipolar Linear Amplifiers, Common-Emitter Amplifiers, Common-Collector Amplifier, Common-Base Amplifier, Multistage Amplifiers

UNIT II

FREQUENCY RESPONSE: Amplifier Frequency Response, System Transfer Functions, Transistor Amplifiers with Circuit Capacitors, Bipolar Transistor Frequency Response, The FET Frequency Response, High Frequency Response of Transistor Circuits

UNIT III

OUTPUT STAGES AND POWER AMPLIFIERS: Power Amplifiers, Power Transistors, Classes of Amplifiers, Class-A Power Amplifiers, Class-AB Push-Pull Complementary Output Stages

INTEGRATED CIRCUIT BIASING AND ACTIVE LOADS: Bipolar Transistor Current Sources, FET Current Sources, Circuits with Active Loads, Small Signal Analysis of Active Load Circuits

UNIT IV

FEEDBACK: Introduction to Feedback, Basic Feedback Concepts, Ideal Feedback Topologies, Voltage Amplifiers, Current Amplifiers, Transconductance Amplifiers, Transresistance Amplifiers

OSCILLATORS: Barkausen Criterion, The Phase Shift Oscillator, Resonant Circuit Oscillator and Crystal Oscillator.

TEXT BOOKS:

7. Donald A. Neamen, Electronic Circuits Analysis and Design, 3rd Edition,TMH,2007
8. Jacob Millman and Christos C. Halkias, Integrated Electronics, TMH, 1972

REFERENCE BOOKS:

6. Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits, 5th Edition, Oxford University Press, 2004
7. Paul R Gray, Gray J. Hurst, Stephen H. Lewis and Robert G. Meyer, Analysis and Design of Analog Integrated Circuits,4th edition, John Wiley and Sons,2001

EI - 224	ELEMENTS OF MECHANICAL ENGINEERING	L	T	P	M	Cr.
		4	1	0	100	4

UNIT – I

METROLOGY

Angular measurements, Measurement of length – Plain ness – Area – Diameter – Roughness and Angle , Comparators, Gauge blocks , Sine bars and Slip Gauges , Optical Methods of length and distance measurements.

MECHANICAL COMPONENTS

Pivots & Bearings, Linkages, Gears : Nomenclature of gears., Belt Chain & Friction Drives, Dials, Scales, Pointers & Indicating mechanism, Ratchets, Counters, Escapement, Integrators, Rack & Pinion, Geneva Mechanism, Relays & Switches

UNIT – II

Manufacturing Processes: Basic principles and operation of lathe, Milling machines and drilling machines.

Welding: Welding Types, Oxy-Acetylene Welding, Metal arc welding and resistance welding, soldering and brazing,

Forging: Basic Principle, Types of Casting and forging Process

Prime Movers: Basic principles, operations and its applications.

UNIT – III

THERMODYNAMICS:

Basic Concepts, equilibrium, Zeroth Law and First Law Of thermodynamics, 2nd Law statements, reversibility, Carnot's Theorem, Entropy with complete details

UNIT – IV

FLUID MECHANICS:

Properties of Fluids, Fluid static, Hydrostatic Law, Manometers, Centre of pressure, force acting on plane surfaces, kinematics of fluids, types of flow , Continuity equation, equation of motion, Bernoulli's equation and applications

TEXT BOOKS:

1. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishers 1986.
2. K.P Roy & SKH Choudary , Elements of mechanical Engineering-.
3. Vasandani and Kumar, A Treatise on Heat Engineering, Metropolitan Book co., 1972
4. RK Bansal, Fluid Mechanics and Hydraulic Machines, 8th Ed, Lakshmi Pub., 2002

EI - 225	ELECTROMAGNETIC FIELD THEORY	L	T	P	M	Cr.
		4	1	0	100	4

UNIT – I

Electrostatics –I:

The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Guass's law , Applications of Gauss law, Divergence, Maxwell's First equation (Electrostatics), Energy expended in moving a point charge in an electric field, The line integral, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient, the dipole and Energy density in electrostatic field.

UNIT – II

Electrostatics – II:

The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson's and Laplace's equations, Examples of the solution of Laplace's equation. Current and current density, continuity of current, conductor properties and boundary conditions

UNIT – III

The Steady Magnetic Field**:** Biot-Savart Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials

Magnetic Forces and Materials: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

UNIT – IV

Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current, Maxwell's equations in point form, integral form.

The Uniform Plane Wave: Wave propagation in free space, dielectrics. Poynting theorem and wave power. Propagation in good conductors: skin effect. Wave polarization. Reflection of uniform plane waves at normal incidence. Plane wave propagation in general directions. Plane wave reflection at oblique incidence angles.

TEXT BOOKS:

1. W H Hayt, J A Buck Engineering Electromagnetics, 7th Edition TMH, 2006.
2. Mathew NO Sadiku, Elements of Electromagnetics, Oxford University Press, 2003.
3. G S N Raju, Electromagnetic Field Theory and transmission lines, 1st Edition, Pearson Education India,2005.

REFERENCE BOOKS:

1. Joseph A Edminister, Theory and Problems of Electromagnetics, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill International, 1993
2. EC Jordan and KG Balmain, Electromagnetic Waves and Radiating Systems, PHI 2003.

EC/EI 226 SIGNALS AND SYSTEMS

L	T	P	M
4	1	0	100

UNIT – I

SIGNAL ANALYSIS: Introduction to signals and systems, Classification of signals and systems (both discrete and continuous); Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions, Trigonometric and Exponential Fourier series, Representation of a periodic function by Fourier series, Fourier transform, Properties of Fourier transforms, Fourier transform of simple functions. Sampling theorem - statement and proof, Aliasing.

UNIT – II

SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS: Linear time-invariant system, Time response, Convolution and it's graphical interpretation, Causality and stability, Paley-Wiener criterion, Frequency response, Filter characteristics of linear systems, Conditions for distortionless transmission, Relation between bandwidth and rise time.

SPECTRAL DENSITY AND CORRELATION: Energy and power spectral density, Properties, Auto-correlation and Cross-correlation functions, Properties of correlation function, Parseval's theorem.

UNIT – III

NOISE: Sources of Noise, Thermal Noise, Noise power spectral density, Noise calculation, Multiple sources-Superposition Of power spectra, Noise calculations in Passive circuits, Equivalent noise bandwidth, Noise-Figure of an amplifier, Power density and available power density, Effective input noise temperature, Effective noise temperature, Noise Figure in terms of available gain, Cascaded stages, Measurement of Noise Figure.

UNIT – IV

PROBABILITY& RANDOM VARIABLES: Definition of probability, Axioms of probability, Joint probability, Conditional probability, Total probability, Bayes' theorem, Independent events, Random variables, discrete and continuous, Probability Distribution Function, Probability Density Function, Guassian Random variable, Conditional distribution and density functions, Mean ,Variance and standard deviation of a random variable, Characteristic function.

RANDOM PROCESSES: Random process concept , stationarity and independence, correlation functions, Gaussian random process and Poisson random process, power density spectrum and its properties, relationship between power spectrum and autocorrelation function.

TEXT BOOKS:

1. B P Lathi, Signals, Systems and Communications, BSP, 2003
2. P.Z Peebles, Jr, Probability, random variables and random signal principles, TMH.
3. Simon Haykin, Signals and Systems, John Wiley, 2004

REFERENCE BOOKS:

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/ Pearson, 2003
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.

EC/EI 261 ELECTRONIC CIRCUITS AND ANALYSIS LABORATORY

Experiments Based on Electronic Circuits

1. Study of Full Wave Rectifier with and without Filters.
2. Frequency Response of Common Emitter Amplifier.
3. Frequency Response of Common Source Amplifier.
4. Measurement of Parameters of Emitter Follower and Source Follower; R_I, A_V, A_I & R_O.
5. Two Stage RC-Coupled Amplifier.
6. Study of Cascode Amplifier.
7. Current series feedback topology

Experiments Based on Networks

8. Constant K Low-Pass and High-Pass Filter.
9. Constant K Band-Pass and Band-Elimination Filters.
10. M-Derived Low-Pass and High-Pass Filters.
11. T And Π Attenuators.
12. Measurement of Impedance, Admittance and Transmission Parameters.
13. Measurement of Image and Iterative Impedance of Symmetrical and Asymmetrical Networks.
14. Design of Constant Resistance and Bridged T-Equalisers.

EI - 262	MEASUREMENTS LAB	L	T	P	M	Cr.
		0	0	3	75	2

1. DC meters using D' Arsonval Galvanometers
2. AC meters using D' Arsonval Galvanometers
3. Measurement of resistance using Kelvin Double Bridge
4. Measurement of inductance using Maxwell Bridge
5. Measurement of capacitance using Shearing and DeSauty's Bridge
6. Study of CRO: Voltage, Frequency, and phase measurement
7. Study of Spectrum Analyzer
8. Study of Wave Analyzer
9. Study of Harmonic distortion Analyzer
10. Study of Q meter
11. Measurement of RF power and Voltage
12. Study of Function generator
13. Study of True RMS voltmeters
14. Study of vector impedance meter
15. Design of ohmmeter.

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC/EE/EI – 263	DATASTRUCTURES LAB	L	T	P	M	Cr.
		0	0	3	75	2

1. Over Loading Functions
2. Objects and Classes
3. Arrays
4. Overloading Operators
5. Inheritance
6. Virtual Functions
7. Linear list-Three programs.
8. Linear and Binary search.
9. Stacks - Two programs.
10. Queues - One program.
11. Linked Lists - Two programs.
12. Heap - One program.
13. Sorting - One program on (a) Quick sort (b) Heap sortt
14. Sorting - One program on (a) Radix sort (b) Merge sort.
15. Binary Tree-One program.
16. Tree Traversal-One program.

NOTE: A minimum of 10(Ten) programs, with One program from each Head, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 311 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	M
4	0	0	100

UNIT – I

Human Values: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self Confidence, Character, Spirituality.

UNIT – II

Engineering Ethics: Senses of 'Engineering Ethics', Variety of model issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Professions and Professionalism, Professional Ideals and Virtues, Theories about right action, Self-interest, customs and Religion, Uses of Ethical Theories.

UNIT – III

Engineering as Social Experimentation: Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law.

Safety, Responsibility and Rights: Safety and Risk-Assessment of Safety and Risk , risk Benefit analysis and reducing risk.

Collegiality and Loyalty , Respect for Authority , Collective Bargaining - Confidentiality , Conflicts of Interest , Occupational Crime , Professional Rights , employee Rights , Intellectual Property Rights (IIPR) , Discrimination.

UNIT – IV

Global Issues: Multinational Corporations , Environmental Ethics , Computer Ethics , Weapons Development , Engineers as Managers , consulting Engineering , Engineers as Expert Witnesses and Advisors, Moral Leadership,Sample Code of Ethics like ASME, ASCE, IEEE, Institution of engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York 1996.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Engineering Ethics, PHI, 2004.

REFERENCE BOOKS:

1. Charles D Fleddermann, Engineering Ethics, Prentice Hall, New Jersey, 2004
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, Engineering Ethics Concepts and Cases, Thomson Learning, United States, 2000.
3. John R Boatright, Ethics and the Conduct of Business, PHI,New Delhi, 2003.

Edmund G Seebauer and Robert L Barry, Fundamentals of ethics for Scientists and Engineers, Oxford University Press, 2001.

		L	T	P	M	C
EE/EC/EI 312	**LINEAR CONTROL SYSTEMS**	**4**	**1**	**0**	**100**	**4**

UNIT – I

Introduction: Basic concept of simple control system – open loop – closed loop control systems. Effect of feed back on overall gain – stability sensitivity and external noise.
Types of feed back control systems – Liner time invariant, time variant systems and non linear control systems
Mathematical models and Transfer functions of Physical systems: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions and open loop and closed loop systems. Block diagram representation of control systems – block diagram algebra – signal flow graph – Mason's gain formula
Components of control systems: DC servo motor – AC servo motor – synchro transmitter & receiver

UNIT – II

Time domain analysis:

Standard test signals – step, ramp, parabolic and impulse response function – characteristic polynomial and characteristic equations of feed back systems – transient response of first order and second order systems to standard test signals. Time domain specifications - steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width – dominant poles of transfer functions.

Stability analysis in the complex plane: Absolute, relative, conditional, bounded input –bounded out put, zero input stability, conditions for stability, Routh –Hurwitz criterion.

UNIT - III

Frequency domain analysis: Introduction – correlation between time and frequency responses – polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT – IV

Root locus Technique: Introduction – construction of root loci -Introduction to Compensation Techniques

State space analysis: Concepts of state, state variables and state models – diagonalisation – solution of state equations – state models for LTI systems. 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, 3rd edition.
REFERENCE BOOKS:
1. Feedback and Control Systems - by Schaum Series
2. Control systems Principles and design - by M. Gopal
3. Control systems Engineering R.Ananda Natarajan & P.Ramesh Babu SciTech 3rd edition
4. Control Systems- by Anand Kumar – PHI

L	T	P	M
4	0	0	100

EC/EI -313

COMPUTER ORGANIZATION AND OPERATING SYSTEMS

UNIT – I

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic Logic Shift Unit.
BASIC COMPUTER ORGANISATION AND DESIGN: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator logic.
MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

UNIT – II

CENTRAL PROCESSING UNIT: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).
COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point Arithmetic Operations.
MEMORY ORGANISATION: Memory Devices, Semiconductor Memories, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory.

Unit - III

OVERVIEW OF OPERATING SYSTEMS:

Introduction, Computer systems structures, Operating system structures.
PROCESS MANAGEMENT: Process: Process Concepts, Process Scheduling, Operation on Process, Co-operating Process, Threads, Inter process communication.
CPU SCHEDULING: Scheduling criteria, Scheduling algorithm, Multiprocessor scheduling, Real time scheduling, Algorithm evaluation

UNIT – IV

STORAGE MANAGEMENT: *MEMORY MANAGEMENT:-Logical Vs Physical address space, Swapping, Contiguous allocation, Paging Segmentation, Segmentation with Paging*
VIRTUAL MEMORY: Performance of Demand Paging, Page Replacement Algorithms, Allocation of Frames,

Thrashing, Demand Segmentation

CASE STUDIES: Features of Linux OS

TEXT BOOK:

1. M..Morris Mano, Computer System Architecture, 3rd Edition, PHI, 2003.
2. Silberschatz and Galvin, Operating System Concepts, Fourth Edition, John Wiley & Sons, 2002. (For Units III & IV)

REFERENCE BOOKS

1. William Stallings, Operating Systems, Fourth Edition, Pearson Education/PHI, 2003
2. Timothy Budd, An Introduction to Object Oriented Programming, Second Edition, Pearson Education, 2002

3.

EC/EE- 314

LINEAR ICs AND APPLICATIONS

UNIT – I

OPERATIONAL AMPLIFIERS:

Operational amplifier and block diagram representation, op-amp with negative feedback. Block diagram representation of feedback configurations, voltage series feedback amplifier, voltage shunt feedback amplifier, differential amplifier with one op-amp, input offset voltage, input bias current, input offset current, total output offset voltage, frequency response of op-amp, stability, slew rate.

OP-AMP APPLICATIONS:

The summing amplifier, Differential and instrumentation amplifiers, Voltage to current and current to voltage conversion, The Op-amp with complex impedances, Differentiators and integrators, Non Linear Op Amp circuits, Precision rectifiers.

UNIT – II

OSCILLATORS: Oscillator principles, Oscillator types, Frequency stability, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square-wave generator, Triangular wave generator, Saw tooth wave generator, Voltage controlled oscillator.

COMPARATORS: Introduction to comparator, Basic comparator, Zero-crossing detector, Schmitt Trigger, Comparator characteristics, Limitations of Op-Amps as comparators, Voltage limiters.

UNIT – III

CLIPPERS, CLAMPERS & CONVERTERS: Positive and negative clippers, Positive and negative clampers, Absolute value output circuit, Peak detector, Sample and hold circuit. D/A conversion fundamentals, Weighted resistor summing D/A Converter, R-2R Ladder D/A converter, A/D conversion: Ramp converters, Successive Approximation A/D converters, Dual slope converters, Parallel A/D converters. Tracking A/D converters.

UNIT – IV

APPLICATIONS OF SPECIAL ICS: The 555 timer, 555 as Monostable and Astable Multivibrator and applications. Phase Locked Loops, Operating principles, Monolithic PLLs, 565 PLL applications, A 723 Voltage Regulator and its design.

ACTIVE FILTERS: Active LP and HP filters, Band pass filters: Wideband, Narrow Band pass filters, Band stop filters, State variable filters, All pass filters.

TEXT BOOKS:

1. Rama Kant A. Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Edition, PHI/ Pearson Education, 2003.
2. D.Roy and Choudhury, Shail B.Jain, Linear Integrated Circuits, 2nd Edition, New Age International, 2003.
3. Denton J Dailey, Operational Amplifiers and Linear Integrated Circuit Theory and Applications,

REFERENCE BOOK:

1. J.Michael Jacob, Applications and Design with Analog Integrated Circuits, 2nd Edition, PHI, 2003.

EC 315	PULSE CIRCUITS	L	T	P	M
		4	1	0	100

UNIT – I

LINEAR WAVE SHAPING:

Responses of RC-high pass circuit and low pass circuits to sinusoidal, step, pulse, square, ramp and exponential inputs, Criteria for good differentiation and integration, Uncompensated and compensated attenuators, Ringing circuit.

UNIT – II

NON-LINEAR WAVE SHAPING:

Clipping circuits with diodes, Multi-diode circuits, Transient and steady state response of a diode clamping circuit, Clamping circuit theorem, Practical clamping circuits, Transistor as switch, Design of Transistor switch, Transistor Switching Times

UNIT – III

MULTIVIBRATORS (using BJTs):

Bistable Multivibrator: Fixed bias and self bias transistor binary, Commutating capacitors, Non-saturated binary, Direct coupled binary, Unsymmetrical and symmetrical triggering of binary, Schmitt Trigger circuit, Collector Coupled Monostable and Astable Multivibrators-operation & design

UNIT –IV

SWEEP CIRCUITS:

Voltage sweep circuits, Deviation from linearity expressed as errors, Exponential and Constant current charging voltage sweep circuits, Principles of Miller and Bootstrap Sweep circuits, Simple current sweep circuit, Need for a trapezoidal waveform for linearity correction, its generation and application.

TEXT BOOKS:

1. J Millman and H Taub, Pulse, Digital and Switching Circuits, TMH, 2003
2. David A Bell, Solid State Pulse Circuits, 4th Edition, PHI, 2003
3. Mothiki S. Prakash Rao, Pulse Digital & Switching Waveforms, 2nd Edition, TMH.

EI – 316	TRANSDUCERS	L	T	P	M	Cr.
		4	1	0	100	4

UNIT – I

Introduction:
Basic definitions related to measurements/ Instrumentation , Block diagram of generalized measurement / Instrumentation system.

Static characteristics of instruments:
Introduction, static characteristics: accuracy, precision, resolution, static sensitivity, Linearity, Threshold, Hysteresis, Dead Zone, span, Range Loading effect.

Errors in Measurements:
Static error, Types of errors, estimation of static errors: limiting errors & their combinations, error estimates from the normal distribution, probable errors& their combinations statistical analysis of measurement data uncertainty analysis curve fitting: Method of least squares.

Dynamic characteristics:
Generalised Mathematical model of measurement system, operational & sinusoidal transfer functions zero, first and second order instruments & their response to step, ramp, and impulse inputs.

UNIT – II

Introduction:
Definition of Transducer, Classification of transducers.

Resistive Transducers:
Potentiometers, straingauges & their types, RTD's, thermistors, Hotwire anemometers.

Inductive Transducers:
Transducers type, electromagnetic type, Magnetostrictive type, Variable reluctance type, (or) Variable permeability type.

Capacitive Transducers:
Variable dielectric, Variable gap, Variable area type Capacitive devices, Differential type.

UNIT – III

Piezo-electric Transducers:
Piezo-electric effect, Piezo-electric Materials, Piezo-electric transducer & its characteristics.

Force-Balance Transducers:
The force balance Principle, Electro dynamic acceleration transducer, electrostatic pressure transducer.

UNIT – IV

Thermal Transducers:
Thermal expansion transducers: Bi-metallic strips, Liquid-in-glass thermometers, pressure thermometers, Thermo Couples, Thermocouple Laws: Law of Intermediate temperature, Law of intermediate metals

Radiation Transducers:
Radiation Pyrometry, Radiation fundamentals Radiation Pyrometer: Total radiation pyrometer, selective radiation pyrometer, Two color radiation pyrometers.

TEXT BOOKS:

1. BC Nakra&KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition, TMH
2. E.O.Doeblin, Measurement systems: Applications and Design,TMH*:*
3. D.V.S Murthy, Transducers & Instrumentation, PHI
4. D.S.Kumar, Mechanical Measurements, Metro Politan

REFERENCE BOOKS:

1. Allan s Morris, Principles of Measurement systems (PHI)
2. A.K.Sawheny, Electrical & Electronic Measurements and Instrumentation Dhanpath Rai
3. JB Guptha, Electrical & Electronic Measurements and Instrumentation, S.K. Kataria
4. AK Ghosh, Introduction to Instrumentation and Control (PHI)

EI – 351	TRANSDUCERS LAB	L	T	P	M	Cr.
		0	0	3	75	2

1. Displacement measurement using LVDT
2. Temperature measurement using RTD
3. Transfer characteristics of thermistor
4. Transfer characteristics of thermocouple
5. Pressure measurement
6. Speed measurement
7. Study of Light Dependent resistor
8. Weight measurement using load cell
9. Torque measurement
10. Study of Synchro Transmitter receiver
11. Study of first order and second order systems
12. Vibration measurement
13. Acceleration measurement
14. pH measurement
15. Humidity measurement
16. Study of Piezo – electric Transducer

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination

EC-352

ELECTRONIC CIRCUIT SIMULATION LAB

1. Obtain the V-I characteristics of Silicon and Germanium diodes.
2. Design a zener diode voltage regulator.
3. Design and verify the operating point for a self bias circuit.
4. Study the characteristics of a half wave and full wave rectifier.
5. Study the characteristics of a bridge rectifier.
6. Obtain the frequency response of a CE amplifier.
7. Obtain the frequency response of a two stage RC couple CE amplifier.
8. Design and simulate Class A power Amplifier.
9. Simulate a differentiator and integrator using OPAMP.
10. Simulate a low pass and high pass filter using OPAMP.
11. Simulate a RC phase shift and Wein bridge Oscillator using OPAMP.
12. Simulate a constant K low pass and high pass filter.
13. Design and simulate a constant resistance and bridged T equalizer.
14. Simulate an Amplitude Modulator and Demodulator.
15. Simulate a Frequency Modulator and Demodulator.

EC 353	PULSE CIRCUITS AND ICs LAB	L	T	P	M
		0	0	3	75

1. Linear Wave-Shaping.
2. Non-linear Wave-Shaping.
3. Design and Verification of Astable Multivibrator.
4. Design and Verification of Monostable Multivibrator.
5. Design and Verification of Schmitt Trigger(using discrete components and using IC741).
6. Measurement of Op-amp Parameters.
7. Applications of Op-amp (Adder, Subtractor, Integrator, Differentiator).
8. Instrumentation Amplifier using Op-Amp.
9. Waveform Generation using Op-amp (Square, Triangular).
10. Design of Active Filters (LPF&HPF-First Order).
11. Application of 555 Timer (Astable, Monostable, Schmitt Trigger).
12. PLL using 556.
13. Design of IC Regulator using 723.
14. Design of VCO using 566.
15. D-A Converter (R-2R Ladder).

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the Candidate to attain eligibility for University Practical Examination

EI – 321	PROCESS CONTROL	L	T	P	M	Cr.
		4	1	0	100	4

Unit – I

Introduction to Process Control:-

Definition, Elements of Process Control, Process Variables, degrees of freedom, Characteristics of liquid System, gas System, thermal System, Mathematical model of liquid process, gas process and thermal process, Batch process and continuous process, self regulation.

Controller Characteristics:-

The automatic Controller, Proportional Control, Integral Control, Proportional – Integral Control, Proportional Derivative Control, Proportional – Integral Derivative action, Two position control, Single speed floating Control, Transient response of control systems using different control modes.

Unit – II

Controlling Elements:-

Self operated controller – pneumatic controllers (displacement type), Air supply for pneumatic systems, Hydraulic Controller, electrical and electronic controllers, pneumatic and electric transmission system, voice – coil motor.

Final Control Elements:-

Pneumatic actuators, Electro Pneumatic actuators, Hydraulic actuators, Electric motor actuators. Two position motor actuator, sliding stem control valves, rotating shaft Control valves, Fluid flow through control valves, Control valve sizing

Unit – III

Advanced Control Strategies:-

Cascade Control, Analysis of cascade control, feed forward Control, Analysis of feed-forward control, Ratio Control, Dead time Compensation(Smith Predictor), Internal model control.

Unit – IV

Controller tuning and process identification:-

Controller tuning, criteria for good control, Ziegler – Nichols tuning rules, Cohen coon tuning rules, process identification, step testing, Frequency testing, pulse testing.

TEXT BOOKS:

1. Donald P Eckman, Automatic process control, wiley Eastern, 1990.
2. Donald p caughnowr, process systems analysis and control, Mc Graw Hill.

REFERENCE BOOKS:

1. Process Control, Modeling, Design and Simulation,- B.Wayne Beqvette
2. Stephanoupoulis, Chemical Process Control, Prentice Hall
3. Patranabis, Principles of Process Control, TMH

EC/EE/EI - 322
MICROPROCESSORS AND MICROCONTROLLERS

UNIT – I

Microprocessor: introduction to microcomputers and microprocessors, introduction and architecture of 8086 family, addressing modes, instruction description and assembler directives of 8086 microprocessors.

UNIT – II

8086 programming and system connections: Program development steps, writing programs for use with an assembler, assembly language program development tools, writing and using procedures and assembler macros.
An example of minimum mode system, addressing memory and ports in microcomputer system. 8086 interrupts and interrupt responses.

UNIT – III

Digital Interfacing: Programmable parallel ports, handshake IO, interface Microprocessor to keyboards.
Analog interfacing: DAC principle of operation, specifications and different types of DAC's and interfacing.
Programmable devices: Introduction to Programmable peripheral devices 8255, 8254, 8259, 8251, DMA data transfer, RS232 communication standard.

UNIT – IV

Introduction:- Introduction to microcontrollers, comparing microprocessors and microcontrollers, Architecture:- Architecture of 8051, pin configuration of 8051 microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts.

Programming & interfacing 8051:- Addressing modes of 8051 microcontroller, Instruction set of 8051 microcontroller, simple programs using 8051 microcontroller.

TEXT BOOKS:

9. Duglus V. Hall, Microprocessor and Interfacing, Revised 2nd Edition, TMH,2006.
10. Kenneth J. Ayala, The 8051 Microcontroller Architecture Programming and Applications, 2nd Edition, Penram International Publishers (I), 1996.

REFERENCE BOOKS:

8. John Uffenbeck, The 80X86 Family, Design, Programming and Interfacing, 3rd Edition, Pearson Education, 2002.
9. Barry Bray, the intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium processors, architecture, programming, and interfacing, 6th Edition, PHI edition.
10. Mohammed Ari Mazidi and Janci Gillispie, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003.

EC/EE/EI 323 DIGITAL SIGNAL PROCESSING

L	T	P	M
4	1	0	100

UNIT – I

DISCRETE SIGNALS AND SYSTEMS: Introduction to digital signal processing, Advantages and applications, Discrete time signals, LTI system: Stability and causality, Frequency domain representation of discrete time signals and systems

Z-TRANSFORMS: Z-transforms, Region of convergence, Z-transform theorems and properties, Parseval's relation, Relation between Z-transform and Fourier transform of a sequence, Inverse Z transform using Cauchy's integration theorem, Partial fraction method, Long division method, Solution of differential equations using one sided Z-transform, Frequency response of a stable system.

UNIT – II

DFT AND FFT: Discrete Fourier Series, Properties of DFS, Discrete Fourier Transform, Properties of DFT, Linear convolution using DFT, Computations for evaluating DFT, Decimation in time FFT algorithms, Decimation in frequency FFT algorithm, Computation of inverse DFT.

UNIT – III

IIR FILTER DESIGN TECHNIQUES: Introduction, Properties of IIR filters, Design of Digital Butterworth and Chebyshev filters using bilinear transformation, Impulse invariance transformation methods. Design of digital filters using frequency transformation method.

UNIT – IV

FIR FILTER DESIGN TECHNIQUES: Introduction to characteristics of linear phase FIR filters, Frequency response, Designing FIR filters using windowing methods: Rectangular window, Hanning window, Hamming window, Generalised Hamming window, Bartlett triangular window, Comparison of IIR and FIR filters.

REALISATION OF DIGITAL FILTERS: Direct, Canonic, Cascade, Parallel and Ladder realizations

TEXT BOOKS:

1. Lonnie C Ludeman, Fundamentals of Digital Signal Processing, John Wiley & Sons, 2003.
2. S K Mitra, Digital Signal Processing: A Computer Based Approach, 2nd Edition, TMH, 2003
3. Alan V Oppenheim and Ronald W Schafer, Digital Signal Processing, Pearson Education/PHI, 2004.
4. P.Ramesh Babu, Digital Signal Processing, 2nd Edition, Scitech Publications, 2004.

REFERENCE BOOKS:

1. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
2. Andreas Antoniou, Digital Signal Processing,TMH, 2006.
3. John G.Proakis, Dimitris G Manolakis, digital Signal Processing: Principles, Algorithms and Applications, Pearson Education / PHI, 2003

EI – 324	ANALOG AND DIGITAL COMMUNICATION	L	T	P	M	Cr.
		4	0	0	100	4

UNIT – I

INTRODUCTION TO ELECTRONIC COMMUNICATIONS: Electronic Communication Systems need for modulation, Electromagnetic Spectrum Band Width and Information capacity.

AMPLITUDE MODULATION TRANSMISSION : Principles of AM, The AM envelope, AM frequency spectrum and Band Width, modulation coefficient, AM voltage and power distributions, Modulation by a complex information signal.

AM MODULATION CIRCUITS: Low level AM Modulator, Medium power AM Modulator, High power AM Modulator.

SSB COMMUNICATION SYSTEMS: SSB systems, comparison of SSB system with conventional AM, SSB generation: Balanced ring modulator, balanced bridge modulator.

Single side band transmitters: Fitter method, Phase shift method, third method.

UNIT – II

AMPLITUDE MODULATION RECEPTION: Receiver parameters, AM receivers: TRF receiver, super heterodyne receiver block diagrams (with detail explanation of each block).

AM RECEIVER CIRCUITS: RF amplifier circuits, AM detector circuits, IF amplifier circuits.

SSB RECEIVERS: SSB BFO receiver, coherent SSB BFO receiver.

UNIT – III

ANGLE MODULATIONS: Mathematical Analysis, Deviation sensitivity, FM, PM wave forms, modulation index, Frequency deviation. Frequency analysis, Band width requirements and power of an angle modulated wave. Noise, pre-emphasis, de-emphasis.

FREQUENCY MODULATORS:

DIRECT FM MODULATORS: Varactor diode modulators, FM reactance Modulators, LIC direct FM modulators, Direct FM transmitters: phase locked loop, Cross by; Indirect FM transmitters: Armstrong; Advantages and disadvantages of angle modulation vs. amplitude modulation , FM receiver block diagram.

FM DEMODULATORS: Slope detector, Balanced slope detector, Ratio detector

UNIT – IV

PULSE MODULATION: Modulation methods: PAM, PWM, PPM, and PCM: sampling, sampling rate, quantization. Signal-quantization noise ratio, Companding, Analog, Digital , Delta modulation , PCM, Differential PCM ,Multiplexing – TDM, FDM

DIGITAL MODULATION: Shannon limit for information capacity, Modulation methods: ASK,FSK, PSK:BPSK, QPSK, DPSK

TEXT BOOKS:

1. Wayne Tomasi, Electronic Communication Systems, Fourth Edition, Pearson Education , 2003
2. George Kennedy, Electronic Communication Systems, Fourth Edition, TMH, 1999

REFERENCE BOOKS:

1. Simon Haykin, Analog and Digital Communication Systems, John Wiley & Sons , 2001.
2. Principals of communication systems by Taub and Shilling,TMH
3. Communication Electronics Principles and applications, Frenzel,TMH

EI – 325	INDISTRIAL INSTRUMENTATION	L	T	P	M	Cr.
		4	0	0	100	4

UNIT – I

Introduction:
Introduction to Speed/Velocity, Acceleration, Vibration Measurements

Speed/Velocity Measurement:
Linear Velocity Measurement techniques: Electro dynamic Transducer, Electro Magnetic Transducer, Doppler transducer, Digital Transducer. Rotational Speed/Angular velocity Measurement techniques: Revolution counter/Timer, Eddy Current tachometer, DC generator tachometer, AC generator tachometer, Variable reluctance tachometer, Photo-electric pick up, Stroboscope.

Acceleration Measurement:
Acceleration Measurement techniques: Seismic Accelerometer, LVDT Accelerometer, Piezo-electric accelerometer, Strain gauge accelerometer.

Vibration Measurement:
Vibration Measurement techniques: Capacitive vibration sensor, Inductive vibration sensor, Reed type vibration sensor

UNIT – II

Force Measurement:
Introduction, Force Measurement techniques: Analytical Balance, Unequal lever arm balance, Force balance method, Hydraulic load cell, Pneumatic load cell, Strain gauge load cell, Piezo-electric load cell, Vibration string transducer.

Torque Measurement:
Introduction, Torque Measurement techniques: Torque Measurement using stroboscope, Strain gauge torque transducer, Optical torsion meter, Electrical torsion meter.

Pressure Measurement:
Introduction, Pressure Measurement techniques: Force summing devices, McLeod gauge, Knudson gauge, thermo couple and Pirani gauges, Ionization gauge.

UNIT – III

Flow Measurement:
Introduction, Flow Measurement techniques: Head type devices (Orifice plate, Venturi tube, and Pitot tube), Rota meter, Electromagnetic flow meter, Ultra sonic flow meter.

Level Measurement:
Introduction, Level Measurement techniques: Dip sticks (Both ordinary and Optical Dipsticks), Hydro static devices, Ultra sonic level gauge, Radiation level sensor, Vibrating level sensor, Radar Methods, Using Hot-Wire elements, Laser methods, Fiber optic level sensors.

UNIT – IV

Viscosity Measurement:
Introduction, Units of Viscosity, Viscosity Measurement techniques: Co-axial cylindrical viscometer, Capillary tube viscometer, Redwood &Say bolt viscometers, Falling sphere viscometer, Two float

viscometer, Definition for consistency, Consistency Measurement techniques: Rotating vane consistency meter, Oscillating type consistency meter.

Density/Specific gravity:
Introduction, Specific gravity scales/Standards, Density/Specific gravity Measurement techniques: Buoyancy density meter, Hydrometer, Bubbler system, Gamma ray method.

Humidity & Moisture Measurement:
Introduction, Humidity Measurement techniques: Hair Hygrometer, Electrical type Humidity transducer, Dry & Wet bulb Psychro meter, Al_2O_3 Hygro meter, Dew-point meter. Moisture Measurement techniques: Dean & Stark technique, Thermal drying technique, Karl Fischer technique, Resistive Moisture sensor, Capacitive Moisture sensor

TEXT BOOKS:

1. BC Nakra&KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition TMH.
2. E.O.Doeblin, Measurement systems: Applications and Design,TMH
3. R.K.Jain, Mechanical and Industrial Measurements, KHP
4. D.S.Kumar, Mechanical Measurements, Metro Politan.

REFERENCE BOOKS:

1. Allan s Morris Principles of Measurement systems (PHI) *Author:*
2. A.K.Sawheny Electrical & Electronic Measurements and Instrumentation Dhanpath Rai)
3. JB Guptha Electrical & Electronic Measurements and Instrumentation, S.K. Kataria
4. AK Ghosh Introduction to Instrumentation and Control (PHI) *Author*

EI – 326 (A)	**COMPUTER NETWORKS**	**L**	**T**	**P**	**M**	**Cr.**
		4	**0**	**0**	**100**	**4**

UNIT – I

INTRODUCTION:
Uses of Computer networks, Network Hardware, Network Software, Reference Models (OSI and TCP/IP only).
PHYSICAL LAYER:
Introduction to Guided Transmission Media, Wireless Transmission

UNIT – II

DATA LINK LAYER:
Data Link Layer design issues, Error detection and correction, Elementary Data link Protocols, Sliding window protocols

MEDIUM ACCESS CONTROL SUBLAYER:
The channel Allocation problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband wireless, Bluetooth, Data Link Layer Switching.

UNIT – III

NETWORK LAYER:
Network layer Design Issues, Routing Algorithms – (The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts.)
Congestion Control Algorithms, Quality of Service - (Requirements, Techniques for Achieving Good Quality of Service), Internetworking, The Network layer in the internet- (The IP Protocol, IP Address, Internet Control Protocols, OSPF, BGP).

UNIT – IV

TRANSPORT LAYER:
Elements of Transport Protocols, TCP, UDP,RTP.

APPLICATION LAYER:
DNS, Electronic Mail, The World Wide Web (Architectural Overview only) Multimedia.

TEXT BOOKS:

1. A.S Tanenbaum, Computer Networks, 4th Edition, PHI, 2003
2. Behrouz A. Foruzan, Data communication and Networking, TMH, 2004.

EI – 326 (B)	**ADVANCED SENSORS**	**L**	**T**	**P**	**M**	**Cr.**
		4	**0**	**0**	**100**	**4**

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

TEXT BOOKS:

1. Middle Hock S and Andel SA – Silicon Sensors, Academic Press, London, 1989
2. Chemical Seasons Edmonds TE - , Blackie London 1988
3. Sensors and Actuators: No. 8, 1985, No.10, 1986, (pp 65-82), No. 12, 1987.
4. Patranabis D – Sensors and Transducers, Wheeler Publishing

EI – 326 (C)	**POWER PLANT INSTU,MENTAION**	**L**	**T**	**P**	**M**	**Cr.**
		4	**0**	**0**	**100**	**4**

UNIT – I

AN OVERVIEW OF POWER GENERATION: Brief survey of methods of power generation Hydro, Thermal, Nuclear, Solar wind etc. Importance of instrumentation for power generation – Thermal power plants – Building Blocks Details of the Boiler process – PI diagram of Boiler.
Non electrical parameters, flow of feed water, fuel, air and strain with correction factors for temperature, pressure, temperature level –radiation detectors – smoke density measurement, dust monitor.

UNIT – II

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, main and reheat steam temperature control, burner tilting up, bypass damper, super heater, spray and gas recirculation controls – B.F.P. recirculation control – hot well and de-aerator level control – Pulverizer control, computers in power plants.

UNIT – III

TURBINE MONITORING AND CONTROL: Condenser Vacuum Control – gland steam exhaust pressure control – speed vibration, shell temperature monitoring and control – lubricating oil temperature control – hydrogen generator cooling system.

UNIT – IV

ANALYSERS IN POWER PLANTS: Thermal conductive type – Paramagnetic type Oxygen Analyzer, IR type and 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, Pergaman Press, Oxford 1971
2. Wakil. M.M.; Power Plant Technology (Mc Graw Hills), 1985
3. Elonka S.M. and Kohal, Standard Boiler Operations Questions and Answers, TMH, 1973

EI – 326 (D)	**ARTIFICIAL INTELLIGENCE**	**L**	**T**	**P**	**M**	**Cr.**
		4	**0**	**0**	**100**	**4**

UNIT – I

PROBLEMS, PROBLEM SPACES AND SEARCH: Defining the problem as a State space Search,, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

HEURISTIC SEARCH TECHNIQUES: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT – II

KNOWLEDGE REPRESENTATION USING PREDICATE LOGIC: Representing Simple Facts in logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

UNIT – III

REPRESENTING KNOWLEDGE USING RULES – Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

Semantic Nets, Conceptual dependency, scripts

UNIT - IV

PROLOG Language: Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, fail Recursion, Lists, string operations, Dynamic databases.

TEXT BOOKS:

1. Ellaine Rich & Kevin Knight, Artificial Intelligence, 2nd Edition, TMH, 2003
2. Carl Townsend, Introduction to TURBO PROLOG, BPB Publications, 1988

REFERENCE BOOKS:

1. Patrick Henry Winston, Artificial Intelligence, Pearson Education, 2001
2. Russel and Norvig, Artificial Intelligence, Pearson Education, 2003

EC/EI – 361	**MICROPROCESSOR AND MICROCONTROLLERS LAB**	**L**	**T**	**P**	**M**	**Cr.**
		0	**0**	**3**	**75**	**2**

Experiments Based on ALP (8086)

1. Programs on Data Transfer Instructions.
2. Programs on Arithmetic and Logical Instructions.
3. Programs on Branch Instructions.
4. Find the square of a number using lookup table method.
5. Programs on Subroutines.
6. Block data transfer using string instructions
7. Find minimum and maximum in an array
8. Sorting of an Array.
9. Writing subroutines for reading and displaying strings on a screen.
10. Programs on Interrupts (Software and Hardware).
11. 8086 Programs using DOS and BIOS Interrupts.
12. Square wave generator
13. Seven segment LED display
14. Stepper motor control using 8255
15. Interfacing matrix keyboard to microprocessor

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be Performed and recorded by the candidate to attain eligibility for University Practical Examination.

EI – 362	**PROCESS CONTROL LAB**	**L**	**T**	**P**	**M**	**Cr.**
		0	**0**	**3**	**75**	**2**

1. Characteristics of PID controller in TPS. Using PC/PLC
2. Characteristics of Level transmitter
3. Characteristics of I/P converter and control valve (L)
4. Characteristics of P I D controller in LPS using PC
5. Characteristics of P I controller in LPS using PC Characteristics of Flow transmitter
6. Characteristics of Flow transmitter
7. Characteristics of P I controller in FPS using PC/PLC
8. Characteristics of I/P converter and control valve (F)
9. Characteristics of PID controller in PPS using PC
10. Characteristics of pressure transmitter and I/P converter (P)
11. Controller tuning in pressure process station
12. Cascade Control
13. Ratio Control
14. Feed forward Control
15. Study of Data Acquisition System
16. Study of Flapper Nozzle system and I/P and P/I converter.
17. Study of Inter acting and Non interacting systems.

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the Candidate to attain eligibility for University Practical Examination

EI – 363	COMMINICATION SKILLS LAB	L	T	P	M	Cr.
		0	0	3	75	2

Lectures: 3 Periods/week
Sessional Marks: 30
University Exam: 3 hours
University Examination Marks: 70

Course Objectives:

The course mainly focuses on to improve the Linguistic Competence, Communicative Competence, Telephonic Skills and Employability Skills of the learners. Activities in the Communication Skills Lab will simulate actual discourses that students will engage in their interaction with their peers, teachers or strangers in their day-to-day situations.

By the time the students complete the course they would be able to identify and use the general features of discourse development, which may be, realized differently in different situations.

Syllabus:

Module-1: Phonetics

a) Introduction to vowels and consonants
b) Introduction to Accent, Intonation and Rhythm

Module-2: Reading skills

a) Reading for main idea.
b) Scanning and skimming the text
c) Inference of lexical and contextual meaning

Module-3: Presentation Skills

a) Debate
b) Paper Presentation:
    i) Identification of source material
    ii) Arrangement of Collected Data
c) Extempore

Module-4: Employability Skills

a) Resume Preparation

i) Identification of information

ii) Arrangement of collected data

b) Group Discussions

c) Interview Skills

i) Dress code

ii) Behavioral Skills

Module-5: Telephonic Skills

a) Formal &Informal interaction

b) Receiving Messages & Complaints

c) Tone modulation

NOTE: 12 Lab Activities are minimum in Record (125 pages single side book) with contents: Name of the Activity, Source, Skill Improved.

Minimum Requirements:

The Communication Skills Lab shall need two labs. One is Communication Skills Lab with LAN facilitated 60 multimedia systems and English language software suggested by the concern faculty. The other, Conversational Skills Lab with 6 to 10 round tables, 60 movable chairs and audio-visual Devices with LCD Projector.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Clarity Pronunciation Power.
- The Rosetta Stone English Library.
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- English in Mind Series: Starter and 1 to 5 work books, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- Language in Use, Foundation Books Pvt. Ltd with CD.
- Mastering English in Vocabulary, Grammar, Spellings, Composition.
- Telephoning in English.

- Oxford Advanced Learner's Compass, 7th Edition.
- Communicate to Conquer: A Handbook of Group Discussions and Job Interviews.

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

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
3. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
4. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
5. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
6. A Text book of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)
7. English Skills for Technical Students, WBSCTE with British Council, OL.

DISTRIBUTION AND WEIGHTAGE OF MARKS

Communication Skills Lab Practical Paper:

1. The practical examinations for the Communication Skills Laboratory shall be conducted as per the University norms prescribed for the Core Engineering Practical Sessions.
2. For the ***Communication Skills lab*** sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 10 marks shall be awarded for day-to-day performance (i.e. according to final Grade in the Record) and 15marks (including 5 Marks for attendance) to be awarded by conducting Internal Lab Test(s) by the teacher concerned. The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department. Of 50 marks, 40 marks shall be equally distributed to LSRW Skills and 10 marks for vice-a-voce.

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EC/EE/EI 411 INDUSTRIAL MANAGEMENT

L	T	P	M
4	0	0	100

UNIT – I

GENERAL MANAGEMENT:
Principles of scientific management, Brief treatment of managerial functions.
FORMS OF BUSINESS ORGANISATION:
Salient features of sole proprietorship. Partnership, Joint Stock Company, private limited and public limited companies.

UNIT – II

FINANCIAL MANAGEMENT:
Concept of interest, compound interest, equivalent cash flow diagram
ECONOMIC EVALUATION OF ALTERNATIVES:
Basic methods, the annual equivalent method, present worth method, future worth method.
DEPRECIATION:
Purpose, types of depreciation, common methods of depreciation. The straight line method, declining balance method, the sum of the years digits method.

UNIT – III

PERSONNEL MANAGEMENT:
Functions of Personnel Management – Human Resources Planning, Brief treatment of Recruitment, Selection, Placement, Performance Appraisal, Career Development, Training and Development, Compensation. Staff role of Personnel Department, Organization for the Personnel Function. Goals and Plans of the Organization. Motivation and Leadership, Theories of motivation and styles of Leadership.

UNIT – IV

MATERIAL MANAGEMENT:
Purchasing, Objective, Source Selection, Procurement Methods, Inventory Management –EOQ, EPQ, ABC Analysis.
MARKETING MANAGEMENT: Functions of Marketing, Product life cycle, Channels of distribution, Advertising & Sales promotion, Market Research.

TEXT BOOKS:

1. KK Ahuja, Industrial Management, Vol. I & II, Dhanpat Rai, 1978.
2. E.Paul Degarmo, John R Chanda, William G Sullivan, Engineering Economy, Mac Millan Publishing Co, 1979

REFERENCE BOOKS:

1. Philip Kotler, Marketing Management, 11th Edition, Pearson Education, 2004.
2. P. Gopalakrishnan, Hand Book of Materials Management, PHI, 1999
3. Heinz Weirich and Harold Koontz, Management, 10th Edition, TMH, 2004.

EC/EI 412 DIGITAL IMAGE PROCESSING

L	T	P	M
4	0	0	100

UNIT – I

INTRODUCTION:
Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System.
DIGITAL IMAGE FUNDAMENTLS:
Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations.

UNIT – II

IMAGE ENHANCEMENT IN SPATIAL DOMAIN:
Some basic Grey level transformations, histogram processing, enhancement using Arithmetic/Logic operations, Smoothing Spatial Filters, Sharpening Spatial Filters.
IMAGE ENHANCEMENT IN FREQUENCY DOMAIN:
Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.

UNIT – III

IMAGE RESTORATION:
Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Inverse Filtering, Wiener Filtering.
IMAGE COMPRESSION:
Fundamentals – Image Compression models – Error Free Compression, Lossy Compression.

UNIT – IV

IMAGE SEGMENTATION:
Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation
IMAGE REPRESENTATION AND DESCRIPTION:
Representation schemes, Boundary Descriptors, Regional Descriptors.

TEXT BOOK:

1. R C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education, Second Edition, 2002

REFERENCE BOOKS:

1. A K Jain, Digital Image Processing, PHI, 1989
2. B Chanda and D Dutta Majumder, Digital Image Processing and Analysis, PHI, 2001.
3. MilanSonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.

EI – 413	**ANALYTICAL INSTRUMENTAITON**	**L**	**T**	**P**	**M**	**Cr.**
		4	**0**	**0**	**100**	**4**

UNIT – I

ULTRAVIOLET AND VISIBLE SPECTROSCOPIC INSTRUMENTS: Radiation sources – Monochromators – filters, prism, grating types – detectors – Recording type of instruments – UV & VIS absorption methods – emission methods – various types of instruments – application in Industry.

UNIT – II

INFRARED SPECTROSCOPIC INSTRUMENTS: Fundamentals of Infrared spectrometers – Sources of Infrared – detecting units – different types of Instruments
FLAME SPECTROPHOTOMETRY: Essential parts of flame photometers – different types of flame photometers.

UNIT – III

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY : Principle of NMR, Measurement of NMR spectrum, Broad band NMR spectrometer – FT NMR spectrometer – application
ELECTRON SPIN RESONANCE SPECTROSCOPY : Principle of ESR, ESR spectrometer – application,
MASS SPECTROMETRY
Principle of operation – Magnetic deflection Mass Analyzer – Time of flight mass analyzer

UNIT – IV

NUCLEAR RADIATION MEASUREMENTS: Nuclear Radiation detectors – Ionization chamber, GM Counter, proportional counter, scintillation counter, solid state detector

X-RAY SPECTROSCOPY: Introduction, Instrumentation for X-ray spectroscopy, X-ray absorption meter, X-ray diffractometer, X-ray fluorescence spectrometer – application.

TEXT BOOKS :

1. Willard H.H., Merrit L.L. , Dean J.A., Scattle F.I. – Instrumental methods of Analysis, 7th Edn., CBS, 1986
2. R.S.Khandpur – Handbook of Analytical Instruments, TMH 1989
3. Skoog D.A. – Principles of Instrumental Analysis, Holt Soundes publications, 4th Edn., 1982
4. Mann C.K., Vicker T.J. & Gullick W.H. – Instrumental Analysis, Harper and Row Publishers

EC-414 **VLSI DESIGN** **L T P M**
4 0 0 100

UNIT- I

An introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, NMOS fabrication, CMOS fabrication and BICMOS technology. Basic Electrical Properties of MOS and BICMOS Circuits: I_{ds} versus V_{ds} relationships, threshold voltage V_t, Transconductance g_m, Figure of merit u_o , Pass transistor, NMOS inverter, Pull-up to pull- down ratio, CMOS inverter, BICMOS inverters, Latch-up in CMOS circuits.

UNIT- II

MOS and BICMOS circuit Design processes: MOS layers, Stick diagrams, Design rules and layout, Sheet resistance Rs, Standard unit of capacitance, The Delay unit, Inverter delays, Propagation delays, Wiring capacitances, Scaling models, Scaling factors for device parameters.

UNIT- III

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic, examples of Structured Design (combinational logic).
Design of an ALU subsystem**:** Design of 4-bit adder, adder element requirements , a standard adder element ,Implementing ALU functions with an adder.
A further consideration of adders**:** Manchester carry chain, carry select adder, carry skip adder.

UNIT- IV

VLSI design flow, Introduction to ASICs, Full Custom ASICs, standard cell based ASICs, Gate array based ASICs, Programmable logic devices, PLAs, PALs, CPLDs and FPGAs.

VHDL Hardware Description Language: Program Structure, Types and Constants, functions and Procedures, Libraries and Packages, Structural Design Elements, Dataflow design Elements, Behavioral design Elements, The Time Dimension and Simulation, Synthesis.

TEXT BOOKS:

1. Douglas A.Pucknell and Kamran Eshranghian, Basic VLSI Design, Third edition, PHI, 2002.
2. Michael John Sebastian Smith, Application Specific Integrated Circuits, Addison Wesley, 2003.
3. J.Bhasker, A VHDL Primer, Pearson Education, Third edition, 1999.
4. John F Wakerly, Digital Design Principles & Practices, 3rd Edition, Pearson Education, 2002.

REFERENCE BOOKS:

1. Neil H E Weste and Kamran Eshranghian, Principles of CMOS VLSI Design, A system perspective, 2nd Edition, Pearson Education, 2002.
2. Stephen Brown and Z Vonko Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH, 2002.

EI – 415(A)	ELECTIVE -II	L	T	P	M	Cr.
OPEN ELECTIVE – II	**SENSORS AND TRANSDUCERS**	**4**	**0**	**0**	**100**	**4**

Sensors and Transducers

UNIT-I:

Introduction: Definition related to measurements /instrumentation, static and dynamic characteristics of instruments, classification of transducers.

UNIT-II:

Displacement Measurement: Variable resistance devices, variable inductance devices, variable capacitance devices, digital displacement transducers.

Strain measurement: Stress-strain relations, resistance strain guages, types of strain gauges, strain gauge measurement techniques, static measurements ,dynamic measurements. Calibration of strain gauge, strain gauge load cell, force and torque measurements using strain gauge.

UNIT-III

Pressure measurement: Diaphragm, Bellows, Bourdon tubes, Resistive inductive and capacitive transducers, piezo-electric transducers.

Low pressure measurement: McLeod gauge, Knudson gauge, Ionization gauge.

Temperature measurement: RTD, Thermocouple and thermistor.

UNIT-IV

Flow measurement: Head type flowmeters, Rotometer, Electromagnetic flow meter.

Measurement of liquid level, viscocity, humidity and moisture.

Text Books:

1.A.K.Ghosh,Introduction to Instrumentation and Control, PHI.

2.BC Nakra, KK Chaudhry,Instrumentation measurement and analysis, TMH, New Delhi second edition

Reference:

1.Patranabis D,"Sensors and transducers", second edition, PHI,New Delhi 2003.

2.Ernest O Doeblin, "Measurement Systems Application and Design", TMH.

EI – 415(B)	ELECTIVE -II	L	T	P	M	Cr.
OPEN ELECTIVE – II	**BASIC ELECTRICAL AND ELECTRONIC MEASUREMETNS**	**4**	**0**	**0**	**100**	**4**

Unit-1 :

Standards and indicating Instruments: units, Dimensions and standards, Measurement errors and statistical analysis.

Moving coil instruments, moving iron instruments, Thermal Instruments, Rectifier Instruments, True RMS meters Measurement of power and energy, Instrument Transformers.

Unit-II

Measurement of Resistance: Substitution method, wheat stone bridge, Kelvin's double bridge, ohmmeter, Direct deflection method, loss of charge method, megohm bridge, megger - measurement of earth resistance.

Potentiometers: Student type potentiometer – L and N type potentiometer – Precision potentiometer – polar and coordinate type – AC Potentiometers.

Unit – III

Impedance Measurements: - Q of coil, Maxwell bridge, Maxwell - wein bridge, Hay's bridge, Schering bridge, Anderson bridge, Campbell bridge to measure mutual inductance, errors in AC bridges and their compensation, Q-meter, Vector Impedance meter, Vector Voltmeter

Unit –IV:

Electronic Laboratory Instrumentations:
CRO: Oscilloscope block diagram, CRO Controls, Measurement of voltage, frequency and phase. Digital Voltmeters, Digital frequency meter, Function generators, pulse generators, signal generators, strip chart and X-Y Recorders, wave analyzer, Spectrum analyzer.

Text Books:

1. A K Sawhney, " A Course in Electrical and Electronic Measurements and Instrumentation" Dhanpatrai and sons, New Delhi
2. Helfrick D.Albert and cooper W D , " Electronic Instrumentation and measurement Technique" PHI, New Delhi

Reference:

1. David A Bell, "Electronic Instrumentation and measurements" PHI
2. Dr. Rajendra Prasad, " Electronic measurements and Instrumentation" Khanna Publishers

EI – 416(A)	**DSP PROCESSOR AND ARCHITECTURES**	**L**	**T**	**P**	**M**	**Cr.**
ELECTIVE – III		**4**	**0**	**0**	**100**	**4**

UNIT – I
Realtime concepts, structural level of processing, digital signal processing and DSP systems, comparission between general purpose processors and DSP processors, examples of DSP processors, motivation for the specialized processors,

UNIT – II
Numeric representation and arithmetic fixed point verses floating point representation, native data word widths, relation between data word size and instruction word sizes, effects of finite word registers.

UNIT – III

Key features of TMS 320 c 6713 processor, architecture and addressing modes of 6713 processor, instruction set of TMS 320 c 6713 processor.

UNIT – IV
Programming the TMS 320 c 6713 processor, implementation of circular convolution, linear convolution , FFT algorithms,. FIR filters, IIR filters and multi rate filters on the DSP processor.

Text Books:
John G Ackenhhusin, Realtime signal processing, Printice Hall of India, 1999.
Phil Lapsly, Jeff Bier, Amit Sheham, dDSP processor fundementals and architectures and features, S Chand & Co. New Delhi.

References:
TMX 32C 67133 User Guide.

EI – 416(B)	**NEURAL NETWORKS**	**L**	**T**	**P**	**M**	**Cr.**
ELECTIVE – III		**4**	**0**	**0**	**100**	**4**

Unit – I: Introduction to Neural Networks
Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, 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, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

Unit–II: Single Layer Feed Forward Neural Networks
Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.
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, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function.
Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis.
Classical & Fuzzy Sets
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT IV: Fuzzy Logic System Components
Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.
Applications:
Neural network applications: Process identification, control, fault diagnosis.
Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOK:
1. S. Rajasekharan and G. A. Vijayalakshmi pai, “Neural Networks, Fuzzy logic, Genetic algorithms:

synthesis and applications", PHI Publication, 2004.
2. John Yen and Reza Langan, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education, 2004.

REFERENCE BOOKS:

1. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2001.
2. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TMH, 2006.
3. James A Freeman and Davis Skapura, Neural Networks Pearson Education, 2002.
4. Timothy J. Ross, " Fuzzy Logic With Engineering Applications", McGraw-Hill Inc. 1997

EI – 416 (C)	**ROBOTICS AND AUTOMATION**	**L**	**T**	**P**	**M**	**Cr.**
ELECTIVE – III		**4**	**0**	**0**	**100**	**4**

UNIT -1

BASIC CONCEPTS: Definition and origin of robotics - different types of robots -various generations of robots - degrees of freedom- Asimov's laws of robotics - Dynamics stabilization of robots
POWER SOURCES AND SENSORS: Hydraulic, pneumatic and electric drives - determination of HP of motor and gear ratio - variable speed arrangements - path determinations - machine vision - ranging - laser - acoustic - magnetic - fibre optic and tectil sensors

UNIT-II

MANIPULATORS, ACTUATORS AND GRIPPERS: Construction of manipulators - manipulator dynamics and force control - electronic and pneumatic manipulator control circuits and effectors - various types of grippers - design considerations

UNIT-III

KINEMATICS AND PATH PLANNING: Solution of inverse kinematics problem - multiple solution - jacobian work envelope - hill climbing techniques- robot programming languages

UNIT-IV

CASE STUDIES: Multiple robots - machine interface robots in manufacturing and manufacturing applications - robot cell design - selection of a robot

TEXT BOOKS:

1. Mikell P Weiss G M, Magel R N. Ordrey N G, Industrial Robotics, McGraw Hill, 1986.
2. Deb S R, Robotics Technology and Flexible Automation, Tata McGraw Hill 1994
3. Asfehi C R Robots and Manufacturing Automation, John Wiley, 1992
4. Klafter R D . Chimielewski T A and Neighiru, Robotic Engineering : An Integrated approach, Prentice Hall Of India Pvt. Ltd., 1994

EI – 416(D)	**ADVANCED COMPUTER ARCHITECTURES**	**L**	**T**	**P**	**M**	**Cr.**
ELECTIVE – III		**4**	**0**	**0**	**100**	**4**

Unit – I
Instruction set architecture: Instructions and addressing, procedures and data, assembly language programming, instructions and set variations.

The arithmetic and logic unit: number representation, address and simple ALU, multipliers and dividers, floating point arithmetic.

Unit – II

Data path and control: instruction executing steps, control unit synthesis, pipelined data paths, pipeline performance limits.

Memory system design: main memory concepts, cache memory organization, Mass memory concepts, virtual memory concepts.

Unit III

Input / output and interfacing: Input and output devices, input/output programming, uses, links and interfacing, context switching and interrupts.

Unit IV :

Advanced architectures: vector array processing, shared memory multi processing, distributed multicomputing.

Text book :
Computer architecture by Behrooz parhami, oxford press.

EI – 451	**ADVANCED INSTRUMENTAION & VLSI LAB**	**L**	**T**	**P**	**M**	**Cr.**
		0	**0**	**3**	**75**	**2**

1. Temperature control using Programmable logic controllers (PLC)
2. Level control using PLC
3. Pressure control using PLC
4. Motor Speed control using PLC
5. Digital PID controller.
6. Implementation of logic gates, timer and counter using PLC
7. Process control simulator
8. Flame photo meter
9. UV & IR spectrometers

Design, Simulation and Layout of following experiments

10. Logic gates
11. Sequential logic circuits
12. Multiplexer/De-multiplexer
13. Parity generator
14. Design of ALU
15. CMOS inverter

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination

EI – 452	**DIGITAL SIGNAL PROCESSING & EMBEDDED SYSTEMS LAB**	**L**	**T**	**P**	**M**	**Cr.**
		0	**0**	**3**	**75**	**2**

Digital Signal Processing : using MATLAB

1. Simulation of linear convolution and Circular Convolution.
2. Simulation of DFT & IDFT using DIT algorithm (16 sample sequence).
3. Simulation of DFT & IDFT using DIF algorithm (16 sample sequence).
4. Design of FIR filter using windowing methods.
5. Design of digital Butterworth filter using bilinear transformation & impulse invariant method.
6. Design of digital Chebyshev filter using bilinear transformation & impulse invariant method.
7. Design of digital filters using frequency transformation method.
8. Direct from realization of IIR filters.
9. Cascade realization of IIR filters.
10. Parallel realization of IIR filters.

Embedded system Lab

11. Semaphores and Messages
12. Message Queues
13. Round Robin Scheduling
14. priority scheduling
15. Signals
16. Interrupt handlers

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination

EI – 453	**TERM PAPER / MINI PROJECT**	**L**	**T**	**P**	**M**	**Cr.**
		0	**0**	**3**	**75**	**2**

Course work is prescribed to develop the project and documentation skills of the students. Marks are awarded based on Internal Assessment.

EI 421	BIOMEDICAL INSTRUMENTATION	L	T	P	M	Cr.
		4	1	0	100	4

UNIT – I

Introduction:
Introduction to Bio-Medical Engineering field, Components of Man-Instrument system, problems encountered in measuring a living system

Physiological systems of the Body:
Basic Features of cardiovascular system, Nervous system, muscular system, respiratory system.

Resting potential & action potential concepts:
Resting potential concept, characteristics of resting potential, action potential concept, propagation of action potential.

Bio-electric potentials:
Definition for Bio-electric Potential, Typical Examples of Bio-Electric Potential with important features

UNIT – II

Bio-Medical Electrodes:
Introduction to Bio-Medical Electrodes, Various types of Bio-Medical Electrodes: surface electrodes, micro electrodes, needle electrodes depth electrodes.

Electro Cardiograhphy (ECG):
Introduction to electro cardiography, ECG LEAD Concept, various types of ECG Lead configurations, typical ECG waveform details, ECG recording, Analysis of Recorded ECG waveform.

Electro Encephalography (EEG):
Introduction to Electro Encephalography, EEG Recording EEG in diagnostics

Electro Myography:
Introduction to Electro-Myography, EMG Recording, EMG Applications.

UNIT – III

Cardiovascular Measurements:
Introduction to various cardiovascular parameters: Blood Pressure Blood flow, cardiac output, Heart sounds. Blood Pressure Measurement techniques: Direct methods & In-direct Methods.

Blood flow measurement techniques:
Electro Magnetic Blood flow meter, ultrasonic Blood flow meter, Thermal convection method. Cardiac output Measurement techniques: Fick's technique, Indicator dillution method, thermal dilution method, Impedance change method. Phono cardiography: Heart sounds Recording

UNIT – IV

Therapeutic Instruments:
Cardiac Pacemakers, Types of pacemakers: External pace makers, Internal Pacemakers, Pacing modes, lead wires & Electrodes for internal pacemakers, power sources for implantable cardiac pacemakers, hem dialysis. Cardiac defibrillators, defibrillator electrodes, Introduction to diathermy. Various diathermy apparatus: surgical, shortwave, microwave .

Instruments for clinical laboratory:
Introduction to Bio-Chemical electrodes, Types of Bio-Chemical electrodes for measurement of various Blood gas parameters such as Blood P^{H}, $P^{O2}P^{CO2}$ Blood gas analyzer, Blood cell counters.

Modern technologies in Bio-Medical field:
Use of X-Rays in medicine, CT scan, ultrasound applications in medicine, MRI scan.

TEXT BOOKS:

1. khandpur, Hand Book of Bio-Medical Instrumentation, 2nd Edition, TMH)
2. Cromwell weibell, Bio-Medical Instrumentation and Measurements, Pfeiffer, PHI (or) LPE Pearson 2nd Edition.

REFERENCE BOOKS:

1. Webster, Medical Instrumentation Application & Design,John Wiley & Sons

EI 422	OPTO ELECTRONICS AND LASER INSTRUMENTATION	L	T	P	M	Cr.
		3	1	0	100	4

UNIT-I

Introduction to optical fiber communication system, advantages of optical fiber communication. Ray theory transmission: Acceptance angle ,Numerical aperture, skew rays. Types of optical fibers: single step ,graded index, single mode fiber and its cutoff wavelength. Transmission characteristics of optical fibers: Attenuation: intrinsic and extrinsic, Linear scattering losses: Rayleigh scattering , mie scattering, Non linear Scattering loss , Fiber bend loss ,Dispersion: Intra model ,Inter model dispersion.

UNIT -II

Optical sources:
LASER :Absorption and emission of radiation, Einstein relations, population inversion, optical feedback and laser oscillation. Optical emission: spontaneous emission, stimulated emission and lasing, Types of Lasers: gain-guided lasers, index guided lasers, quantum well lasers. Non semi conductor lasers: Nd:yag laser, Ruby laser,Co2 laser Laser Instrumentation ; Industrial applications of Lasers, bio medical application, Laser Doppler velocity meter, hologram and applications

UNIT-III

Fiber optic sensors: Interferometric sensor, Polarization sensor, micro bending fiber sensor, Extrinsic fiber sensors, for measurement of length, displacement, velocity, pressure, temperature, current, voltage, level, strain .
Optical sources :LED: Advantages of LEDs,LED power , LED internal quantum efficiency, external power efficiency. Types of LEDs : Surface emitter LEDS, Edge emitter LEDS, Super Luminescent LED ,LED characteristics: optical output power, output spectrum, modulation bandwidth.

UNIT-IV

Optical detectors: Detection principles. Absorption, Quantum efficiency , responsivity
Semiconductor photo diodes: p-n photo diode, p-i-n photo diode, Avalanche photodiode, silicon reach through avalanche photodiode.
Electro-optic modulator , magneto-optic modulator, acoustic -optic modulator, polarization maintaining fibers-applications.

TEXT BOOKS:

1. Senior J.M., Optical Fiber Communication Principles and Practice, Prentice Hall, 1985
2. Thyagarajan & Ghatak A-Laser theory and applications
3. Bishnu P Pal-Fundamentals of fiber optics in Telecommunications and sensor systems

REFERENCE BOOKS:

1. Keiser G., Optical Fiber Communication, McGraw-Hill, 1991
2. Ghatak A.K and Thiagarajan K, Optical electronics foundation book, TMH,1991.

EI 423	PC BASED INSTRUMENTATION	L	T	P	M	Cr.
		4	1	0	100	4

UNIT – I

Data acquisition basics and Bus Standards: 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. Bus standards: microcomputer bus standards, bus management, bus communication protocols, bus topology, bus control signals, data transfer control signals, transmission of digital signals along a bus line, introduction to ISA, VME buses, IEEE 488 bus etc.

UNIT – II

Add on cards and device drivers: Introduction to add on cards, add on card design considerations, power requirements and physical dimensions, of add on cards, case studies of two programmable instruments, Device Drivers: introduction and purpose of device drivers, types of device drivers, static vs. loadable device drivers,

UNIT – III

Virtual instrumentation 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 programming.

UNIT – IV

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 WEB. VI chassis requirements, common instrument interfaces, current loop, RS 232C/ Rs485 GPIB. BUS interfaces: USB< PCMCIA, VXI, SCSI, PCI, PXI, Fire wire, PXI system controllers, Ethernet control of PX.I. Networking basics for office and industrial applications VISA and IVI.

TEXT BOOKS :

1. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control – Kevin James, newness, 2000.
2. Writing Device Drivers, Tutorial and References by T.BURNE, M.A.PARENTI, A.WOJTAS

REFERENCE BOOKS:

1. D.A.Nortan - Writing Windows Device Drivers.
2. Gary Johnson, LAB VIEW graphical programming, 2nd edition, Mc Graw Hill Edition.
3. LABVIEW for Every One, Printicehall, Newjersy 1997 by Lisa K. Wills, & Jeffery Travis.

EC/EI 424/A	EMBEDDED SYSTEMS	L	T	P	M	Cr.
		3	1	0	100	4

UNIT – I

Introduction :

Introduction to Embedded System, Role of processor selection in Embedded Systems, Embedded System project management, design cycle in the development phase for an Embedded System, using of target system or its Emulator and in-Circuit emulator, use of software tools for development of an Embedded Systems.

UNIT – II

RTOS and its overview:

Real Time Operating Systems: Task and Task States, Tasks and Data, Message Queues, Timers and Timer Functions, Events Memory Management , Interrupt Routines in an RTOS environment, Basic Design Using RTOS.

UNIT – III

Embedded system development :

Interfacing of external memory, interfacing of analog and digital blocks, interfacing of different peripheral devices LEDs, LCDs, Graphical LCD, Switches, Relay, Stepper motor, ADC, DAC, and various sensors, introduction to assembler, compiler, cross compilers, and Integrated Development Environment.

UNIT – IV

Net works for Embedded Systems:

The I^2C Bus, The CAN bus, SHARK link ports, Ethernet, Introduction to Bluetooth: specification, Core protocol. IEEE 1149.1 (JTAG) Testability

Text Books :

1. The art of programming Embedded systems, Jack G. Ganssle, academic press.
2. Intelligent Embedded systems, Louis L. Odette, Adison Wesly , 1991.
3. J. Starustrup and W. Wolf Hardware software Co Design principles and practice. KJluwer, Academic Publications.

Reference Books:

1. Design with PIC microcontroller bu john B. Pitman, pearson edition.
2. Designing Embedded Systems Hardware : John Catsoulis, Shroff Publications, Distributors New Delhi.
3. Microcenters Architecture Programming, Interfacing and system design by Raj Kamal, Pearson edition.
4. Programming Embedded systems in C and C++, Micheel Barr, Shroff Publications, Distributors New Delhi.

EC 424/B **ADVANCED DIGITAL SIGNAL PROCESSING**

L	T	P	M
4	0	0	100

UNIT – I

Multirate Digital Signal Processing Fundamentals:

The basic Sample Rate Alteration Devices, Multrate structures for Sampling rate conversion, Multistage Design of Decimator and Interpolator. The polyphase decomposition. Arbitrary rate sampling rate converter. Nyquist Filters.

UNIT – II

Multirate Filter Banks and Wavelets:
Digital Filter Banks. Two-Channel Quadrature-Mirror Filter Bank, Perfect reconstruction Two-Channel FIR Filter Banks. L-Channel QMF Banks. Multilevel Filter Banks.

UNIT – III

Adaptive Filters:
Typical applications of Adaptive Filters: Echo cancellation in communication, Equalization of data communication channels, Linear predictive coding, Noise cancellation.Principles of Adaptive Filters

1.

UNIT – IV

Methods of Steepest Descent, Least Mean Square Adaptive Filters: Derivation, Adaptation in stationary SOE, LMS algorithm and Applications of LMS algorithm, Recursive Least Square Adaptive Filters.

TEXT BOOKS:

1. Sanjit K Mitra: Digital Signal Processing, Third Edition, Tata McGraw Hill Edition-2006.
2. D.G.Manolakis, Vinay K.Ingle, S.M.Kogon: Statistical and Adaptive signal processing, McGraw Hill, 2000.

REFERENCE BOOK:

1. P.P.Vaidyanathan: Multirate Systems and Filter Banks, Pearson Education India 2006.

EI 424/C	TELEMETRY AND TELE CONTROL	L	T	P	M	Cr.
		3	1	0	100	4

UNIT – I

TELEMETRY FUNDAMENTALS AND CLASSIFICATION: Fundamental concepts, significance, principles, functional blocks of Telemetry and Tele control system - Methods of telemetry – Electrical, pneumatic, Hydraulic and optical telemetry – state of the art. Telemetry standards.

UNIT – II

LAND LINE TELEMETRY: Electrical telemetry – current systems – voltage systems – Synchro systems – Frequency systems – position and pulse systems – Example of land line telemetry system.
RADIO TELEMETRY: Block diagram of a Radio telemetry system – Transmitting and receiving techniques – AM, FM, PM, Multiplexing and Demultiplexing – Transmitting and receiving techniques – Digital coding Methods – Advantages of PCM, PWM, PDM, FSK – Delta Modulation – coding and decoding equipment, Example of a radio telemetry system.

UNIT – III

OPTICAL TELEMETRY: Optical fibers for signal transmission – sources for fiber optic transmission – optical detectors – Trends in fiber optic device development – Example of an optical telemetry system.

UNIT – IV

TELECONTROL METHODS: Analog and Digital techniques in tele control, tele control apparatus – Remote adjustment, Guidance and regulation – Tele control using information theory – Example of a tele control system.

TEXT BOOKS :

1. Gruenberg, Handbook of telemetry and remote control, Mc Graw Hill, New York, 1987.
2. Swoboda G, Tele control methods and applications of telemetry and remote control, Reinhold Publishing Corporation, London 1991.
3. Young R.E., Telemetry Engineering, Little Books Ltd., London 1988
4. Houslay T. Data Communication and Teleprocessing System, Prentice Hall

EI 424/D	INSTRUMENTATION IN PETRO CHEMICAL INDUSTRIES	L	T	P	M	Cr.
		3	1	0	100	4

UNIT – I

PETROLEUM PROCESSING: Petroleum Exploration – Petroleum recovery techniques – Oil Gas separation – processing of wet gases – Refining of crude oil.

UNIT – II

UNIT OPERATION IN PETROLEUM INDUSTRY: Unit operations in petroleum industry – Thermal cracking – Catalytic cracking – Catalytic reforming – Polymerization – Alkylation – Isomerisation – Production of ethylene, acetylene and propylene and petroleum.

UNIT – III

CHEMICALS FROM PETROLEUM PRODUCTS: Chemicals from petroleum – Methane derivatives – Acetylene derivatives – Ethylene derivatives – Propylene derivatives – other products.

MEASUREMENTS IN PETROCHEMICAL INDUSTRIES: Measurements in refineries and petrochemical industries, selection and maintenance of measuring instruments – special measurement problems.

UNIT – IV

CONTROL OF PETROCHEMICAL MANUFACTURES
Process Control in Refineries and Petrochemical Industries – Control of distillation column – control of catalytic crackers and pyrolysis unit.

TEXT BOOKS:

1. Waddams A.L., Chemicals from Petroleum
2. Balcen J.G. and Mumme K.I., Process Control Structures and Applications
3. Austin G.T. , Chemical Process Industries, 5th EdItion, Mc GH, 1984
4.

EI 461 **BIO-MEDICAL INSTRUMENTATION and VI LAB**

L	T	P	M	Cr.
0	0	3	75	2

Bio medical Instrumentation Lab

1. Measurement of Blood Pressure
2. Measurement of Blood PH
3. Measurement of Blood PCO2, PO2
4. Study of ECG
5. Study of EEG, EMG
6. Measurement of heart sounds
7. Measurement of respiration parameters.
8. Study of Electronystagmography.
9. Study of stress test system.

Virtual Instrumentation Lab

10. Data acquisition System.
11. Thermo couple modules
12. Strain gauge modules
13. Motion control module.
14. Image acquisition setup

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examinati

EI 462	PROJECT AND VIVA VOCE	L	T	P	M	Cr.
		0	0	9	150	10

The internal assessment is based on the weekly progress, performance in a Minimum of two seminars and the project report submitted at the end of the semester.