ACHARYA NAGARJUNA UNIVERSITY

NAGARJUNA NAGAR – 522 510
ANDHRAPRADESH, INDIA

Scheme of Instruction, Examination and detailed Syllabi

of

ELECTRONICS & COMMUNICATION ENGINEERING

4-Year B.Tech Degree Course
(Semester System)

w.e.f. 2007-2008

ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

REVISED REGULATIONS
FOR

FOUR - YEAR B.TECH. DEGREE COURSE

(SEMESTER SYSTEM)

(Effective for the batch of students admitted into first year B.Tech. from the academic year 2007-2008).

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.

3.0. DURATION OF THE COURSE AND MEDIUM OF INSTRUCTION:

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.

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:

5.1. The performance of the students in each year or semester shall be evaluated subject wise.

5.2. 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 subjects	30	70
Design and / or Drawing	30	70
Practicals	25	50
Project work	50	100 (Viva voce)

5.2.1. 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 shall be awarded based on the best two performances out of the three Mid Term Exams and a maximum of 7 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 7.1 (a) 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 the 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 7.1(a).

5.2.2. The evaluation for Laboratory class work consists of weightage of 15 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 25 and 25.

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.

5.2.3. 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.

7.1(a). A Weightage in sessional marks up to 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

7.2. 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 7.1 above and provided the principal is satisfied with the genuineness of the reasons and the conduct of the student.

7.3. 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.

9.3.1 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 CONDITIONS FOR PASS:

A candidate shall be declared to have passed the University Examination in individual subjects if he / she secures a minimum of 40% marks in theory and drawing subjects, and 50% marks in Practical subjects (including Project Viva-voce).

11.0 CONDITIONS FOR PROMOTION

11.1. A student shall be eligible for promotion to II/IV 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/IV B.Tech.

11.2. A student shall be eligible for promotion to III/IV B.Tech. Course if he / she has passed all but three subjects of I/IV 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/IV B.Tech. Course if he/she has passed all but three subjects of II/IV B.Tech. and all but one subject of I/IV B.Tech. in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in III/IV 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, after admission to B.Tech. Degree Course of the University pursued the course of study for not less than four academic years in any one of the affiliated Engineering Colleges.

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

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

A Maximum time limit of 8 (eight) years for Four Year B.Tech is prescribed for a candidate to complete B.Tech Degree beyond which the candidate shall not be permitted to appear for the B.Tech Degree examinations.

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.

First Class with Distinction : 70% aggregate* or more.

First Class : 60% aggregate or more but less than 70%.

Second Class : 50% aggregate or more but less than 60%

Pass Class : All other candidates eligible for the award of the Degree.

* “Aggregate,” for this purpose, shall mean aggregate of the marks obtained in the University Examinations and Sessional marks put together in all the four years.

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. The Sessional marks and the University Examination marks shall be shown separately on the Marks Sheet.

14.3. A single Marks Statement shall be issued to the candidate after incorporating the marks secured in subsequent improvements.

14.4. A consolidated Marks Statement shall be issued to the candidate indicating the aggregate percentage of marks of all the four years along with the Provisional Certificate.

15.0. 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 aggregate of marks - University Examination and Sessional marks put together - in all the four years, secured at the first attempt only shall be considered.

15.3. 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 each academic 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 New Regulations (NR) / Revised Regulations (RR) 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 NR / RR 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 each year under NR / RR, 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 2007-2008 (Semester System)

I/IV B.TECH (ALL BRANCHES) - ANNUAL PATTERN (For I B.Tech. only)

(except Chemical Engg. and Biotechnology)

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Drawing/ Practical	Sessional	University	
1	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 101	Mathematics – I	3	-	30	70	100
2	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 102	Mathematics– II	3	-	30	70	100
3	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 103	Physics	3	-	30	70	100
4	CE/CSE/ECE/EEE/ EI/IT/ME - 104	Chemistry	3	-	30	70	100
5	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 105	Technical English Communication Skills	3	-	30	70	100
6	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 106	Computer Programming with C	3	-	30	70	100
7	CE/CSE/ECE/EEE/ EI/IT/ME - 107	Engineering Mechanics	3+1	-	30	70	100
8	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 108	Engineering Graphics**	2+4	-	30	70	100
9	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 151	Physics Lab	-	3	25	50	75
10	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 152	Chemistry Lab*	-	3	25	50	75
11	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 153	Workshop Practice*	-	3	25	50	75
12	BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 154	Computer Programming Lab	-	3	25	50	75
		TOTAL	**23+5**	**9**	**340**	**760**	**1100**

* Alternate weeks

** 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 from 9.00 A.M. to 12.00 Noon. The second question paper will be set for ECE, EI, CSE & IT branches and the University exam will be conducted from 2 P.M. to 5 PM.

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

II/IV B.TECH – I SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC/EI/EE-211	Mathematics-III	4	-	30	70	100
2	BT/CHE/ EC/EE/EI -212	Environmental Studies	4	-	30	70	100
3	EC/EE/EI -213	Circuit Theory	4+1	-	30	70	100
4	EC/EE/EI -214	Electronic Devices	4	-	30	70	100
5	EC/EE/EI -215	Electromagnetic Field Theory	4	-	30	70	100
6	EC/EE/EI -216	Digital Electronics	4+1	-	30	70	100
7	EC/EI -217	Electrical Technology	4	-	30	70	100
8	EC -251	Electronic Devices Lab	-	3	25	50	75
9	EC/EI -252	Digital Electronics Lab	-	3	25	50	75
		TOTAL	**28+2**	**6**	**260**	**590**	**850**

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

II/IV B.TECH – II SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC/EE/EI-221	Mathematics-IV	4	-	30	70	100
2	EC/EE/EI-222	Data Structures using C	4+1	-	30	70	100
3	EC/EE/EI-223	Electronic Circuits-I	4	-	30	70	100
4	EC-224	Transmission Lines and Waveguides	4	-	30	70	100
5	EC-225	Network Analysis and Synthesis	4+1	-	30	70	100
6	EC/EI-226	Signals and Systems	4+1	-	30	70	100
7	EC-261	Electronic Circuits Lab	-	3	25	50	75
8	EC-262	Electrical Engineering Lab	-	3	25	50	75
9	EC/EE/EI-263	Data Structures Lab	-	3	25	50	75
		TOTAL	**24+3**	**9**	**255**	**570**	**825**

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

III/IV B.TECH – I SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC-311	Professional Ethics and Human Values	4	-	30	70	100
2	EC/EE/EI-312	Linear Control Systems	4+1	-	30	70	100
3	EC/EE/EI-313	Electronic Circuits - II	4	-	30	70	100
4	EC/EE-314	OOPS and OS	4	-	30	70	100
5	EC-315	Electronic Measurements and Instrumentation	4	-	30	70	100
6	EC-316	Pulse Circuits	4+1	-	30	70	100
7	EC-317	Analog Communications	4	-	30	70	100
8	EC-351	Analog Communications Lab	-	3	25	50	75
9	EC-352	OOPS and PSPICE Lab	-	3	25	50	75
		TOTAL	**28+2**	**6**	**260**	**590**	**850**

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

III/IV B.TECH – II SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC-321	Digital Communications	4	-	30	70	100
2	EC/EE-322	Linear ICs and Applications	4+1	-	30	70	100
3	EC/EE/EI-323	Microprocessors and Microcontrollers	4+1	-	30	70	100
4	EC/EE/EI-324	Digital Signal Processing	4+1	-	30	70	100
5	EC-325	Antennas and Wave Propagation	4	-	30	70	100
6	EC-326	Communication Systems	4	-	30	70	100
7	EC-361	Pulse Circuits and ICs Lab	-	3	25	50	75
8	EC/EE/EI-362	Microprocessors and Microcontrollers Lab	-	3	25	50	75
9	EC-363	Communication Skills lab	-	3	25	50	75
		TOTAL	**24+3**	**9**	**255**	**570**	**825**

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

IV/IV B.TECH – I SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC/EE/EI-411	Industrial management	4	-	30	70	100
2	EC/EI-412	Computer Networks	4	-	30	70	100
3	EC-413	Microwave Engineering	4	-	30	70	100
4	EC-414	Satellite Communications	4	-	30	70	100
5	EC-415	Elective - I	4	-	30	70	100
6	EC-416	Elective - II	4	-	30	70	100
9	EC-451	Term Paper	-	3	25	--	25
7	EC-452	Digital Communications and VHDL Lab	-	3	25	50	75
8	EC-453	Digital Signal Pocessing Lab	-	3	25	50	75
		TOTAL	**24**	**9**	**255**	**520**	**775**

Elective - I:

(A) VLSI Design
(B) Database Management Systems
(C) Biomedical Engineering
(D) Fuzzy Systems

Elective - II:

(A) Digital Image Processing
(B) Neural Networks
(C) Speech Signal Processing
(D) Artificial Intelligence

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SCHEME OF INSTRUCTION AND EXAMINATION
w.e.f 2007-2008 (Semester System)

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

IV/IV B.TECH – II SEMESTER

Sl. No	COURSE DETAILS		Scheme of Instruction		Scheme of Examination		
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks
			Lecture+ Tutorial	Practical	Sessional	University	
1	EC-421	Mobile and Cellular Communications	4	-	30	70	100
2	EC-422	Optical Communications	4	-	30	70	100
3	EC-423	Radar and Navigational Aids	4	-	30	70	100
4	EC-424	Elective - III	4	-	30	70	100
5	EC-461	Project and Viva Voce	-	3	50	100	150
6	EC-462	Microwave and Optical Communications Lab	-	3	25	50	75
		TOTAL	**16**	**6**	**195**	**430**	**625**

Elective - III:

(A) Embedded Systems

(B) Advanced Digital Signal Processing

(C) HDL Programming

(D) Java Programming

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME -101	MATHEMATICS – I (Common to all Branches)	L	T	P	M
		3	0	0	100

UNIT – I

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

UNIT – II

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

UNIT – III

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. Convolution Theorem, Application to ordinary differential equations

UNIT – IV

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. B.S. Grewal, Higher Engineering Mathematics, 39th edition, Khanna Publishers.

REFERENCE BOOKS:

1. Erwin Kreyszig , Advanced Engineering Mathematics, John Wiley and sons.
2. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME -102	MATHEMATICS – II (Common to all Branches)	L	T	P	M
		3	0	0	100

UNIT – I

Matrices:

Rank of a matrix, vectors, Elementary transformations, Solution of linear system of equations, Consistency of linear system of equations, System of linear homogeneous 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

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 – III

Multiple Integrals and Vector Calculus:

Double integrals, Change of order of integration , Double integrals in polar coordinates, Area enclosed by plane curves, Evaluation of triple integrals, Volume of solids, Change of variables.
Vector Calculus:
Scalar and vector point functions, Del applied to scalar point functions. Gradient

UNIT – IV

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.

TEXT BOOK:

1. B.S.Grewal, Higher Engineering Mathematics, 39thedition., Khanna publishers.

REFERENCE BOOKS:

1. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications
2. Erwin Kreyszig , Advanced Engineering Mathematics, John Wiley and sons.
3. Shanti Narayan, Differential Calculus, S.Chand

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 103	PHYSICS (Common to all Branches)	L	T	P	M
		3	0	0	100

UNIT – I

Ultrasonics & Optics :

Ultrasonics- Production of Ultrasonics by Magnetostriction & Piezoelectric oscillator methods, Detection of Ultrasonics by Kundt's tube and acoustic grating method, applications of Ultrasonics in engineering & medicine. Lissajous' figures for time periods with Ratios 1:1 and 1:2, applications of Lissajous' figures.
Optics: Superposition principle, Stokes principle (Phase change on reflection) - Interference in thin films due to reflected light(cosine law) -Michelson's interferometer principle, construction, working and applications (Determination of wave length of monochromatic source & for resolution of two closely lying wavelengths).
Diffraction: Fraunhoffer diffraction due to a single slit, Plane diffraction grating, resolving power of a grating using Rayleigh's criterion.
Polarization: double refraction, Nicol prism, quarter wave plate, Production and detection of circular and elliptical polarizations (qualitative), Optical activity, Electro-optic and Magneto-optic effects (Kerr & Faraday effects) .

UNIT – II

Electricity & Electromagnetism:

Gauss's law in electricity (statement and proof) and its applications: Coulomb's law from Gauss law, line of charge, non-conducting infinite sheet, Charged non-conducting sphere.
Circulating charges and Cyclotron principle& working, Hall effect, Biot-Savart's law- B for a long wire and circular loop, Faraday's law of induction- Lenz's law- induced electric fields ,Gauss' law for magnetism ,Inductance, Energy storage in a magnetic field, Electromagnetic oscillations(quantitative),Displacement current, Maxwell's equations (Qualitative treatment),Electromagnetic waves equation and velocity, A.C. Circuit containing series LCR circuit (Resonance condition).

UNIT – III

Modern Physics:

Planck's theory of black body radiation, Dual nature of light, Compton effect, Matter waves - 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 wave function - Particle in a box(one dimension)- Radio Isotopes-applications in medicine and industry, Qualitative treatment (without derivation) of Fermi -Dirac distribution function and Fermi-energy level concept in semiconductors.

UNIT – IV

Advanced Physics:

Lasers: -Spontaneous emission -stimulated emission – Population inversion – Solid State (Ruby) laser – Gas (He-Ne) laser – Semiconductor(Ga-As) laser – Applications of lasers. Holography Principle, Recording, reproduction and applications.
Optical fibers : Structure of optical fiber, types of optical fibers, Numerical aperture – fiber optics in communication and its advantages
Super conductivity: First experiment, critical parameters(T_C,H_C,I_C) Meissner effect, types of superconductors, Applications of Superconductors.
Optoelectronic devices: Qualitative treatments of -- Photo diode, LED , LCD and Solar cell and its applications.
Nano Technology (Basic concepts only) and its applications.

TEXT BOOKS

1. Halliday and Resinick, Physics Part I and II, 8th Edition, John Wiley & Sons (Asia).
2. Gaur & Gupta, Engineering physics, Dhanpat Rai Publications, New Delhi

REFERENCE BOOKS:

1 M.R.Srinivasan, Physics for engineers, Oscar Publications, New Delhi.
2 M.Arumugam, Engineering physics, Anuradha Agencies
3 A.S Vasudeva, Modern Engineering Physics, S. Chand and Co.

CE/CSE/ ECE/EEE/EI /IT/ME - 104	CHEMISTRY (Common to all Branches except Chemical Engineering and Biotechnology branches)	L	T	P	M
		3	0	0	100

UNIT – I

WATER TECHNOLOGY: Drinking Water quality parameter, WHO guidelines, Hardness units and determination by EDTA method, water treatment for drinking purpose, sedimentation, coagulation, filtration, various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement and boiler corrosion- causes and prevention, Lime Soda process, softening by ion exchange process (related problems), Desalination of brakish water by electro dialysis and reverse osmosis.

COMPOSITES: Classification and Properties of composite materials, Mechanism of reinforcement in composites.

UNIT – II

POLYMERS:
Monomer functionality, degree of polymerization, classification of polymerization- addition, condensation and co polymerization, mechanism of free radical polymerization.

Classification of plastics- Thermoplastic and thermosetting resins, chemistry of synthesis of bekalite, urea formaldehyde and polyesters. Compounding of plastics, Conducting polymers, polytiophene, mechanism of conduction, examples and applications, polymers as optical fibers-Application of polymers in biomedical devices and electronics.

Natural Rubber- drawbacks of natural rubber- vulcanisation.

Synthetic rubbers- Buna-S and Buna-N and polyurethane rubber

Materials used in information Technology: Liquid crystals, cellulose acetate, ZnO, CdS, Silicon, Germanium

UNIT – III

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 (Weston Cadmium Standard cell), Secondary cells(Lead Acid cell, Ni-Cd cell), Lithium batteries and their advantages.

Fuels: Classification of fuels, calorific value- determination. Coal- Ranking and analysis, carbonization of coal, coal-tar products, metallurgical coke, classification of petroleum- fractional distillations, cracking, reforming, composition and uses of petrol- diesel, coal gas, natural gas, producer gas, LPG- Bio gas.

UNIT – IV

Corrosion and its control: Introduction, electrochemical theory of corrosion, corrosion due to dissimilar metals, galvanic series, corrosion due to differential aeration cells, Types of corrosion: Pitting, Stress corrosion, cracking 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 by electroplating.

Lubricants:

Role of lubricants in reducing wear and friction, Mechanism and types of lubrication. Classification, properties and selection of lubricants, Additives

Text Books recommended:

1. P.C. Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi
2. S.S. Dara, A Text Book of Engineering Chemistry, 10th Edition, S.Chand and Co.
3. B.S.Bahl and G.D. Tuli, Essentials of Physical Chemistry, 24Rev Ed edition, Chand (S.) & Co Ltd , India, 2000.
4. P.Bahadur and N.V.Sastry, Principles of Polymer Science, Narosa Publishing House,New Delhi.

BT/CE/Ch.E/CSE/ ECE/EEE/EI/ IT/ME - 105	TECHNICAL ENGLISH COMMUNICATION SKILLS (Common to all Branches)	L	T	P	M
		3	0	0	100

Course objectives: The areas of technical communication assay to make learners linguistically aware and communicatively competent. Special attention has been paid to the contemporary tests on language and industrial needs keeping in mind the current societal demands.

UNIT – I

General Communication Skills: This area exposes the learners to some standard varieties of linguistic communication.

1. Guided composition
   a) Paragraph writing
   b) Essay writing
   c) Confusable words
2. Reading comprehension
3. Letter writing

UNIT – II

Technical Communication Skills: This area falls under English for specific purposes (ESP) which trains the learners in basic technical communication.

1. Report writing
2. Corporate information
3. Technical words

UNIT – III

Vocabulary and Basic Language Skills: This unit offers the learners some basic aspects of language like vocabulary, structure and usage which are common to many contemporary tests.

1. Basic word list – A list of 500 words.
2. Idioms and phrases and their use.
3. Correction of sentences.
4. Analogies
5. One word substitutes
6. Antonyms & Synonyms

TEXT BOOKS:

1. Developing Language Skills: (Foundation Books)
2. Hari Mohan Prasad Uma Rani Sinha Objective English for Competitive Examinations, 3rd Edition - Tata McGraw Hill.

REFERENCE BOOKS

1. M.Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill.
2. English for Engineers Prepared by Regional Institute of English, South India, Bangalore (Foundation Books).
3. Cambridge Preparation Guide for TOEFL.
4. Dictionary of Technical Terms, F.S.Cripsin, Oxford IBH.
5. Cambridge Advanced Learner's Dictionary.
6. Cambridge Idioms Dictionary
7. Basic Correspondence & Report writing, Sharma, Tata McGraw Hill.
8. Business Correspondence and Report Writing, R.C.Sharma and Krishna Mohan, Tata McGraw Hill.
9. Dictionary of Misspelled and Easily Confused Words, David Downing and Deborah K.Williams, Tata McGraw Hill.

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 106	**COMPUTER PROGRAMMING WITH C (Common to all Branches)**	**L** **3**	**T** **0**	**P** **0**	**M** **100**

UNIT – I

Introduction:
ComputerFundamentals:Computer&it'sComponents,Hardware/Software**,**Algorithm,C haracterstics of algorithm, Flowchart ,Symbols are used in flowchart, history of C,Basic structure of C ,C language features.

C Tokens: Character set, Variables, Keywords, Data types and sizes, Type qualifiers, Numeric Constants and their forms of representation, Character Constants, String Constants, Declarations and Initialization of variables.

Operators & Expressions: Arithmetic operators, and expressions, Type-conversion rules, Coercion, Assignment operators and expressions, Increment and decrement operator, Conditional operator, Statements, Preprocessor directives, Input/ Output functions and other library functions. Relational operators and expressions. Boolean operators and expressions.

Programming Exercises for Unit I :
C-Expressions for algebraic expressions, Evaluation of arithmetic and boolean expressions. Syntactic errors in a given program, Output of a given program, Values of variables at the end of execution of a program fragment, Filling the blanks in *a* given program, Computation of values using scientific and Engineering formulae, Finding the largest of three given numbers.

UNIT – II

Conditional Statements: Blocks, If-Else statement, Else-If statement and Switch statement.

Iterative Statements: While loop, For loop, Do-While loop, Break, and continue.
Arrays: One - dimensional and character arrays, Two-dimensional numeric arrays.

Programming Exercises for Unit - II:
Computation of discount on different types of products with different ranges of discount Finding the type of triangle formed by the given sides, Computation of income-tax, Computation of Electricity bill, Conversion of lower case character to its upper case, Finding the class of an input character; Sum of the digits of a given number, Image of a given number, To find whether a given number is-prime; Fibonacci; abundant; perfect,Strong,Amstrong; deficient, Prime factors of a given number, Merging of lists, Transpose of a matrix, Product and sum of matrices, String processing-length of a string; comparison of strings; reversing a string; copying a string, Sorting of names using arrays, Graphics patterns, To print prime numbers and Fibonacci numbers in a given range, and Amicable numbers.

UNIT – III

Functions: Function Definition, types of User Defined Functions, Parameter passing mechanisms, and simple recursion.

Scope & extent: Scope rules, Storage Classes, Multi-file compilation.

Pointers: Pointers Arithmetic, Character array of pointers, Dynamic memory allocation, array of Pointer, Pointer to arrays.

Programming Exercises for Unit - III:

Recursive Functions: factorial, GCD(Greatest Common Divisior),Fibonacci; To evaluate the pointer arithmetic expressions; An interactive program to perform Pointers & Functions - Insertion sort, Bubble sort, Linear search Binary search, Computation of Statistical parameters of a given list of numbers, Counting the number of characters, words and lines in a given text, Table of values of f (x,y) varying x and y; Using Storage Classes to implement the multifile compilation; implement the string operations using Dynamic memory allocation functions;

UNIT – IV

Structures: Structures, Array of structures, structures within structures, Pointer to structures, self referential structures, Unions.

Files: File Handling functions, File error handling functions, Command-line arguments.

Programming Exercises for Unit - IV:

Operations on complex numbers, operations on rational number (p/q form), Matrix operations with size of the matrix as a structure; Frequency count of keywords in an input program, Sorting a list of birth records on name and date of birth using File handling functions, Student marks processing, Library records processing - sorting on name, author, Copy one file to another.

TEXT BOOK:

1. Byron Gottfried, Programming with C, Schaum's Outlines, Tata Mc graw-Hill.

REFERENCE BOOKS:

1. Kernighan B W and Ritchie O M, The C programming language, Prentice Hall.
2. K R Venugopal & Sudeep R Prasad, Programming with C, TMH.
3. K.Balaguruswamy, ‘C’ Programming, BPB
4. Herbert Sheildt, C Complete Reference, TMH

CE/CSE/ ECE/EEE/EI/ IT/ME - 107	ENGINEERING MECHANICS (Common to all Branches except Chemical Engineering and Biotechnology branches)	L	T	P	M
		3	1	0	100

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.

UNIT – II

GENERAL CASE OF FORCES IN A PLANE:
Composition of forces in a plane – Equilibrium of forces in a plane – Plane trusses: methods of joints.

FRICTION: Static, kinetic, and limiting friction–angle 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

TEXT BOOKS:

1. S. Timoshenko and D. H. Young, Engineering mechanics, Mc Graw-Hill International edition (For concepts and symbolic problems)

2. A. K. Tayal, Engineering Mechanics Statics and Dynamics, Umesh Publication, Delhi (For numerical problems using S.I. system of units)

REFERENCE BOOKS:

1. Beer and Johnston, Vector mechanics for engineers statics and dynamics, Tata Mc Graw-Hill publishing company, New Delhi.

2. J. L. Meriam and L. Kraige, Engineering Mechanics Statics and Dynamics.

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 108	ENGINEERING GRAPHICS (Common to all Branches)	L	T	P	M
		2	4	0	100

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 methods for ellipse, parabola and hyperbola. cycloidal curves - cycloid, epicycloid andhypocycloid; 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:

1. N.D. Bhatt & V.M. Panchal, Engineering Drawing, Charotar Publishing House, Anand
2. P.Nageswara Rao, AutoCAD 14 for Engineering Drawing Made Easy (Features AutoCAD 2000

REFERENCE BOOKS:

1. Prof. K.L.Narayana & Prof. R.K.Kannaiah, Engineering Drawing
2. James D. Bethune, Engineering Graphics with AutoCAD 2002

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 151	PHYSICS LAB (Common to all Branches)	L	T	P	M
		0	0	3	50

LIST OF EXPERIMENTS:

1. **Compound Pendulum** - Measurement of g-value.
2. **Sonometer** - Determination of unknown frequency of tuning fork and verification of laws of transverse vibrations of a stretched string.
3. **C.R.O** - Measurement of voltage, frequency and phase difference of an A.C. signal.
4. **Torsional Pendulum** - Determination of Rigidity modulus/damping coefficient.
5. **Newton's Rings** - Measurement of wavelength/Radius of curvature.
6. **Dispersive Power** - Determination of Dispersive power of prism.
7. **Diffraction Grating -** Determination of wavelength.
8. **Air Wedge** - Measurement of thickness of given wire.
9. **Field along the axis of a current carrying circular coil.** - Variation of intensity of magnetic field along the axis of circular coil.
10. **L.C.R** - Resonance Characteristics.
11. **Sensitive Galvanometer** - Figure of Merit.
12. **Hall Effect** - Measurement of Hall potential and Carrier concentration
13. **Carey Foster's bridge** - Measurement of temperature coefficient of resistance.
14. **Platinum resistance thermometer** - Measurement of room temperature.
15. **GM Counter** - Characteristics.
16. **Photo Tube** - Characteristics of photo tube/determination of planks constant.
17. Determination of **band gap of semiconductors**.
18. Optical Measurements with **laser**.
19. **Solar Cell** - Characteristics and Fill Factor determinations.
20. **Fiber Optics** - Numerical Aperture Calculations.

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 152	CHEMISTRY LABORATORY (Common to all Branches)	L	T	P	M
		0	0	3	50

LIST OF EXPERIMENTS

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

1. Estimation of total alkalinity of water sample
   a. Standardization of HCl solution b. Estimation of alkalinity
2. Determination of purity of washing soda
3. Estimation of Chlorides in water sample:
   a. Standardization of $AgNO_3$ solution b. Estimation of Chlorides
4. Determination of Total Hardness of water sample:
   a. Standardization of EDTA solution b. Determination of Total Hardness
5. Estimation of Mohr's salt-permanganometry
   a. Standardization of $KMnO_4$ solution b. Estimation of Mohr's salt
6. Estimation of Mohr's salt –Dichrometry
   a. Standardization of $K_2Cr_2O_7$ solution b. Estimation of Mohr's salt
7. Analysis of soil sample:
   a. Estimation of Ca and Mg b. Estimation of Organic matter
8. Determination of available chlorine in bleaching powder-Iodometry
   a. Standardization of Hypo solution b. Determination of Available chlorine
9. Determination of Iodine in Iodized salt
10. Determination of Iron (Ferrous and Ferric) in an iron ore by Permanganometry
11. Determination of Zn using Potassium ferrocyanide
12. Preparation of Phenol-formaldehyde resign
13. Conductometric titration of an acid vs. base
14. pH metric titrations of an acid vs base

Demonstration Experiments:

15. Potentiometric titrations: Ferrous vs Dichromate
16. Spectrophotometry: Estimation of Mn/Fe

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 153	WORKSHOP PRACTICE (Common to all Branches)	L	T	P	M
		0	0	3	50

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) Saw edge
b) wired edge
c) lap seam
d) grooved seam
e) funnel

4. House wiring

a) To control one lamp by aspt switch
b) To control two lamps by aspt switch
c) To assemble a fluorescent lamp fitting
d) Stair case wiring
e) Go down wiring

BT/CE/Ch.E/CSE/ECE/ EEE/EI/IT/ME - 154	COMPUTER PROGRAMMING LAB (Common to all Branches)	L	T	P	M
		0	0	3	50

List of programs (to be recorded)

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 200	0.50 per unit
201 - 400	100 plus 0.65 per unit
401 - 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Street level Consumption As follows:	
Consumption Units	**Rate of Charges(Rs.)**
0 - 50	0.50 per unit
100 – 200	50 plus 0.6 per unit
201 - 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the fllowing(using loops):

   a. $1 + x^2/2! + x^4 / 4!+$ upto ten terms
   b. $x + x^3/3! + x^5/5!+$ upto 7 digit accuracy
   c. $1+x+x^2/2! +x^3/3!+$……upto n terms
   d. Sum of 1 + 2+ 3 +……..+n

3. A menu driven program to check the number is:
   i) Prime or not
   ii) Perfect or Abundant or deficient
   iii) Armstrong or not
   iv) Strong or not
   v) Fibonacci or not

4. A menu driven program to display statistical parameters (**using one – dimensional array)** i) Mean ii) Mode iii) Median iv) Variance v) Standard deviation

5. A menu driven program with options (**using one - Dimensional array)**
   (i) To insert an element into array
   (ii) To delete an element
   (iii) To print elements
   (iv) To print elements in reverse order
   (v) To remove duplicates

6. A menu driven program with options (using two dimensional array)
   (i) To compute A+B
   (ii) To compute A x B
   (iii) To find transpose of matrix A
   (iv) To Check A=B
   Where A and B are matrices. Conditions related to size to be tested

7. A menu driven program with options (using Two-dimensional Character arrays)
   (i) To insert a student name
   (ii) To delete a name
   (iii) To sort names in alphabetical order
   (iv) To print list of names
   (v) To print names having maximum length, min. length

8. A menu driven program (using pointers)
   a. Linear search b. Binary search c. Fibonacci search

9. A menu driven program with options (**using Dynamic memory allocation**)
   a. Bubble sort b. Insertion sort c. Selection sort

10. A menu driven program with options (**using Character array of pointers**)
   (i) To insert a student name
   (ii) To delete a name
   (iii) To sort names in alphabetical order
   (iv) To print list of names
   (v) To print names having maximum length, min. length

11. Write a program to perform the following operations on Rational numbers (**using Structures & pointers):**
   i) Read a Rational number
   ii) Addition of two Rational numbers
   iii) Subtraction of two Rational numbers
   iv) Multiplication of two Rational numbers
   v) Division of two Rational numbers
   vi) Display a Rational number

12. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price,publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author and the system searches the list and displays whether it is available or not. If it is not an appropriate message is displayed, if it is then the system displays the book details and request for the number of copies are required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message "required copies not in stock" is displayed. **Write a program for the above in structures with suitable functions.**

13. Create a student data file (roll no., name, date of birth, rank) and code a program with options (**use pointers & structures**)
   (i) Listing names, dob sorted on names
   (ii) Listing names, dob sorted on dob
   (iii) Listing names, dob sorted on names, dob

14. a) Write a C program To copy the one file contents to the another file (**using commandline arguments)**
   b) Write a C Program to count the frequencies of words in a given file.

EC/EE/EI 211	MATHEMATICS – III	L	T	P	M
		4	0	0	100

UNIT – I

Partial Differential Equations:
Partial Differential Equations - Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equation, Equations solvable by direct Integration, Linear Equations of the first Order, Non-Linear Equations of the first Order, 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

Beta Gamma Functions, Error Function.
Integral Transforms:
Introduction, Definition, Fourier Integrals-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), Fourier Transforms of the derivatives of a function.

UNIT-III

Solution of Algebraic and Transcendental Equations: Introduction, 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.
Finite Differences and Difference Equations: Introduction, Finite Difference operators, Symbolic relations, Differences of a polynomial, 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 Solution of Ordinary and Partial Differential Equations - Euler's Method, Picard's Method, Runge- Kutta Method of fourth order (for first order equations, Simultaneous equations) Classification of Partial Differential Equation of second order, Solutions of Laplace's and Poisson's Equations by iteration methods.

TEXT BOOK:

1. B.S.Grewal, Higher Engineering Mathematics, 39th Edition, Khanna Publishers, 2004.

REFERENCE BOOKS:

1. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications
2. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, New Age International (P) Ltd.

BT/CHE/EC/EE/EI 212	ENVIRONMENTAL STUDIES	L	T	P	M
		4	0	0	100

UNIT – I

Introduction: Definition, Scope and Importance.

Ecosystems: Introduction, types, characteristic features, structure and functions of *Ecosystems- Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries).*

Natural Resources:

Land resources - Land as a resource, Common property resources, land degradation, soil erosion and desertification and Effects of modern agriculture, fertilizer- pesticide problems.

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

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

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

UNIT – II

Biodiversity and its Conservation: Value of biodiversity- consumptive and productive use, social, ethical, aesthetic and option values. Bio-geographical classification of India, India as a mega-diversity habitat. Threats to bio-diversity – Hot spots, habitat loss, poaching of wildlife, loss of species, seeds, etc. Conservation of biodiversity - In-situ and Ex-situ conservation.

Environmental Pollution: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting and vermiculture, Urban and industrial wastes, recycling and re-use.

UNIT –III

Sustainability: Theory and practice, equitable use of resources for sustainable life styles.

Rain water harvesting, cloud seeding and watershed management, Water scarcity and ground water depletion.

Controversies on major dams- Resettlement and rehabilitation of people, problems and concerns. Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. Green revolution. Population growth and environment. Environmental Impact Assessment.

UNIT – IV

Environmental acts: Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act.

International Conventions: Stockholm Conference 1972 and Earth Summit 1992

Case Studies: Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Chernobyl Nuclear Disaster, Tehri Dam, Ralegaon Siddhi (Anne Hazare), 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 BOOK:

1) Benny Joseph, Environmental Studies**,** The Tata McGraw-Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS:

1) Erach Bharucha, Text book of environmental studies, UGC.
2) Anubha Kaushik and C. P. Kaushik, Environmental Studies.
3) S. Deswal and A. Deswal, A basic course in environmental studies, Dhanapath Rai & Co.
4) Kurian joseph and R.Nagendram, Essentials of environmental studies, Pearson Education Pt Ltd, Delhi.
5) R.Rajagopalan, Environmental studies, Oxford university press.
6) C. S. Rao, Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Age International Ltd.
7) Anjaneyulu Y, Introduction to Environmental Science, B S Publications
8) Manoharachary C and Jayarama Reddy P, Principles of Environmental Studies, B S Publications.

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

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.

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.

UNIT – III

SINUSOIDAL STEADY STATE ANALYSIS:

Application of network theorems to AC circuits. Computation of active, reactive and complex powers; power factor.

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, 3rd Edition, TMH, 2006.

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	L	T	P	M
		4	0	0	100

UNIT – I

CONDUCTION IN SEMICONDUCTORS: Classification of materials based on energy band diagram, Conductivity of a semiconductor, Carrier concentration in an intrinsic semiconductor, Fermi level in an intrinsic semiconductor, Law of mass action, Donor and acceptor impurities, Charge densities in a semiconductor, Fermi level in a semiconductor having impurities, Diffusion, Carrier life time, Continuity equation, Diffusion length, Hall effect

UNIT – II

SEMICONDUCTOR DIODES: Quantitative theory of P-N junction diode, V – I Characteristics and its temperature dependence, Transition and Diffusion capacitances of P-N junction diode, Limitations and specifications of diodes, Break down of junctions under reverse bias. Avalanche Diode, Zener Diode, Varactor Diode, Tunnel Diode, Photo Diode, LED and LCD: Characteristics and areas of applications.

UNIT – III

JUNCTION TRANSISTOR: NPN & PNP junction transistors, Transistor current components, Transistor as an Amplifier, CB, CE and CC configurations and their characteristics, DC bias and its stabilization, Various Stabilization and Compensation circuits, Thermal runaway and thermal stability, Phototransistor.

UNIT – IV

UNIPOLAR DEVICES: JFET, Depletion-MOSFET, and Enhancement-MOSFET: Basic construction, operation, Drain and Transfer characteristics, FET Parameters - r_d, g_m, μ; biasing methods. UJT: Basic construction, electrical equivalent circuit and operation, emitter characteristics.

POWER DEVICES: P-N-P-N Devices, SCR-Two transistor analogy and characteristics, DIAC and TRIAC: their characteristics only.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics, TMH, 2002
2. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.
3. Robert L Boylested and Louis Nashelsky , Electronic Devices and Circuit Theory, 8th Edition, PHI, 2003

REFERENCE BOOKS:

1. David A Bell, Electronic Devices and Circuits, 4th Edition, PHI, 2003
2. NN Bhargava, DC Kulshrestha and SC Gupta – Basic Electronics and Linear Circuits, TTTI Series, TMH, 2003.
3. GSN Raju, Electronic Devices and Circuits, 1st Edition, IK International Publishers, 2006

EC/EE/EI 215 ELECTROMAGNETIC FIELD THEORY

L	T	P	M
4	0	0	100

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. Pointing 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/EE/EI 216	DIGITAL ELECTRONICS	L	T	P	M
		4	1	0	100

UNIT – I

NUMBER SYSTEMS AND CODES:
Decimal, Binary, Octal, Hexadecimal Number systems and their conversions, Arithmetic additions, subtraction using the method of complements, Multiplication and division. Codes: BCD, Excess 3, Gray, Alphanumeric and Error detection codes.

BOOLEAN ALGEBRA:
Boolean expressions and theorems, Logic gates, Universal gates, Canonical and standard forms, Boolean functions, simplification of Boolean functions using K maps (up to five variables), Minimal functions and their properties, Tabulation method, NAND implementations two level and Multilevel.

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, Error Detection and Correction using Hamming Code, BCD Adder / Subtractor, Carry look ahead adders.

UNIT – III

SEQUENTIAL LOGIC CIRCUITS:
Latches, 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

IC LOGIC FAMILIES: RTL, DTL, TTL, ECL, MOS, CMOS and IIL families and their comparison. MSI and LSI: Programmable Logic Arrays, Programmable Array Logic.

TEXT BOOKS:

1. M Morris Mano, Digital Logic and Computer Design, PHI/Pearson Education, 2003.
2. RP Jain, Modern Digital Electronics, 3rd Edition, TMH, 2003
3. Fundamentals of Digital Circuits, A.Anand Kumar,4th Edition,Pearson Education.

REFERENCE BOOKS:

1. Zvi Kohavi, Switching and Finite Automata Theory, 2nd Edition, TMH, 1978
2. Taub and Schilling, Digital Integrated Electronics, Mc-Graw Hill, 1977.

EC/EI 217	ELECTRICAL TECHNOLOGY	L	T	P	M
		4	0	0	100

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

Introduction to polyphase system, Advantages, relationship between phase and line values for star and delta connection system.

TRANSFORMERS:
Principle and Operation on no-load and 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, Regulation-Synchronous impedance method, Synchronous motors, Principle of operation, Methods of starting and applications.

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. Vincent Del Toro, Fundamentals of Electrical Engineering, Pearson Education
2. H Cotton, Advanced Electrical Technology, AH Wheeler & Co., 1990
3. Eugene C Lister, Electric Circuits and Machines, New York, MCGraw-Hill, 1975
4. B.L Theraja & A.K.Theraja, A Text Book of Electrical Technology, 23rd Revised Edition, S.Chand & Company Ltd., New Delhi, 2005.

EC 251	ELECTRONIC DEVICES LABORATORY	L	T	P	M
		0	0	3	75

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. Characteristics of JFET
8. Characteristics of UJT
9. Design and verification of Self bias circuit
10. Characteristics of Silicon Controlled Rectifier
11. Characteristics of DIAC
12. Characteristics of LDR and Thermistor characteristics
13. Characteristics of source follower circuit
14. Design and verification of collector to base bias circuit
15. Characteristics of Photo transistor

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

EC/EI 252 DIGITAL ELECTRONICS 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.

EC/EE/EI 221	MATHEMATICS – IV	L	T	P	M
		4	0	0	100

UNIT – I

COMPLEX ANALYSIS: Introduction, Continuity, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Orthogonal systems.

UNIT – II

COMPLEX INTEGRATION: Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, Zeros and singularities.

UNIT – III

Calculation of residues, Residue theorem, 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 equation. Recurrence formulae, Generating functions, Rodrigue's formula, Orthogonality of Bessel's functions and Legendre polynomials.

TEXT BOOK:

1. B S Grewal, Higher Engineering Mathematics, 39th Edition, Khanna Publishers, Delhi, 2004.

REFERENCE BOOK:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, New Age International (P) Ltd.

EC/EE/EI 222	DATA STRUCTURES USING C	L	T	P	M
		4	1	0	100

UNIT – I

Algorithm Analysis: Mathematical Back Ground, Model, What to Analyze, Running Time Calculations.

Lists: Abstract Data Types, the List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT.

UNIT – II

STACKS: The Stack ADT Implementations using Arrays and linked list, Stack applications such as Infix to postfix expression conversion, Evaluation of Postfix expressions, Delimiter Matching, Recursion.

QUEUES: The Queue ADT Implementations using Arrays and linked list, the Circular Queue ADT, Applications.

UNIT – III

SEARCHING: Linear and Binary Searching, Hashing – Hash functions, Separate chaining, Open-Addressing.

Internal Sorting: Preliminaries, Exchange sort, Selection sort, Insertion Sort, Shell Sort, Heap Sort, Merge Sort, Quick Sort, , Comparison of Sorting in terms of Timing Complexities.

UNIT – IV

Binary Trees: Implementation, Expression Tress, Binary tree traversal techniques (recursive & no-recursive).

Search Trees: Binary Search Trees, Implementation.

AVL Trees : Single Rotations, Double Rotations, Insertion, Deletion.

Splay Trees: A Simple Idea, Splaying, B-Trees, B+Trees.

TEXT BOOK:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.

REFERENCE BOOKS:

1. Langsam, Augenstein & Tenenbaum, Data Structures using C and C++, 2nd Edition, Pearson Education.
2. Robert L.Kruse, Leung and Tando, Data Structures and Program Design in C, PHI.
3. Trembly and Sorenson, An Introduction of Data Structures with Applications.
4. Horowitz and Sahani, Fundamentals of Data Structures
5. Samanta, Classic Data Structures, 1e, 2001, PHI.
6. Bandyopadhyay, Dey, Data Structures Using C,1e, 2004, Pearson Education.

EC/EE/EI 223	ELECTRONIC CIRCUITS – I	L	T	P	M
		4	0	0	100

UNIT – I

RECTIFIERS:
Diode as a Rectifier, Half wave, Full wave and Bridge Rectifiers without filter and with inductor filter, Capacitor filter, L section and π - section filters.

UNIT – II

TRANSISTOR AMLIFIERS:
Hybrid parameter model of transistor, Determination of h parameters from Characteristics, Measurement of h parameters, Analysis of transistor amplifier using h Parameter model, Millers theorem, High input resistance circuits – Darlington pair, Boot Strapped Darlington pair, Cascode transistor amplifier, Emitter coupled difference amplifier, Other transistor models – r_e model and T model.

UNIT – III

TRANSISTOR AT HIGH FREQUENCIES:
Hybrid model of transistor, CE short circuit current gain, CE current gain with Resistive load, Single stage CE amplifier response, Gain Bandwidth product, Emitter follower at high frequencies.

UNIT – IV

MULTISTAGE AMPLIFIERS:
Distortion in amplifiers, Frequency response of an amplifier, Band pass of cascaded stages – Interacting and Non-interacting, RC coupled amplifier, Direct coupled amplifier, Effect of emitter bypass capacitor on overall response.

FET AMPLIFIERS:
FET amplifiers at low frequencies, CS / CD / CG configurations at low frequencies, FET amplifier at high frequencies – CS / CD amplifiers.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, TMH, 2003
2. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.
3. Adel S. Sedra and Kenneth C.Smith, Microelectronic Circuits, 5th Edition, Oxford University Press, 2004

REFERENCE BOOK:

1. Donald L. Schilling and Charles Belove, Electronic Circuits-Discrete and Integrated, 3rd Edition, TMH, 2002

EC 224 TRANSMISSION LINES AND WAVEGUIDES

L	T	P	M
4	0	0	100

UNIT – I

TRANSMISSION LINES: A line of cascaded T-sections, Transmission line general solution, Attenuation constant and phase constant, Propagation constant, Problems on above, Computing primary and secondary constants. The infinite line, Wavelength, Velocity of propagation, Group velocity, Waveform distortion, The distortionless line, Telephone cable, Inductance loading of telephone cables, Reflection on a line not terminated in Zo, Reflection coefficient, Input and transfer impedance, Open and short circuited lines, Reflection factor and reflection loss, Insertion loss, T and section equivalents to lines.

UNIT – II

TRANSMISSION LINE AT HIGH FREQUENCIES: Parameters of open wire line at high frequencies, Parameters of coaxial lines at high frequencies, Constants for the line of zero dissipation, Voltages and current on dissipation line, Standing waves, Standing wave ratio, Input impedance of the dissipationless line, Input and output impedance of short circuited lines, Power and impedance measurement on lines, Reflection losses on the unmatched line, Single stub and double stub impedance matching on line using Smith chart.

UNIT – III

GUIDED WAVES: Waves between parallel planes, Transverse electric waves, Transverse magnetic waves, Characteristics of TE and TM waves, Transverse electromagnetic waves; Velocities of propagation, Attenuation in parallel plane guides, Field distribution in the transverse and longitudinal sections, Current flow on the walls for dominant and other important modes.

RECTANGULAR WAVE GUIDES: Transverse magnetic waves, Transverse electric waves, Impossibility of TEM waves in hollow wave guides, Wave impedance and characteristic impedance, Field distribution in the transverse and longitudinal planes, Current flow on walls for dominant and other important modes, Attenuation factor and Q - factor of wave guide.

UNIT IV

CIRCULAR WAVE GUIDES: Solution of the field equation in cylindrical co-ordinates, TM and TE waves in circular guides, field distribution in the transverse and longitudinal planes.

STRIP TYPE TRANSMISSION LINES: Parallel plate transmission, Symmetrical strip transmission, Asymmetric strip transmission, other strip transmission lines.

TEXT BOOKS:

1. John D Ryder, Networks Lines and Fields, PHI, 1995
2. E C Jordan and K G Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2003.
3. M N O Sadiku, Elements of Electromagnetics, 3rd Edition, Oxford University Press, 2003.
4. P A Rizzi, Micro Wave Engineering : Passive Circuits, PHI, 2002

REFERENCE BOOK:

1. A Kumar, Microwave Techniques, Transmission Lines, NAI (P) LTD, 2000.

EC 225 NETWORK ANALYSIS AND SYNTHESIS

L	T	P	M
4	1	0	100

UNIT – I

NETWORK FUNTIONS**:** Poles and Zeros, Network functions for the one port and two port, Poles and zeros of network functions, Restrictions on pole and zero locations for driving point functions and transfer functions, Time domain behavior from the pole zero plot.

TWO PORT NETWORK PARAMETERS: Two port network, Open circuit impedance, Short circuit admittance (Y), Transmission, Inverse transmission, Hybrid and inverse hybrid parameters, Relation between parameter sets, Interconnection of two port networks, Lattice networks, Image parameters.

UNIT – II

ATTENUATORS: Symmetrical and Asymmetrical attenuators, T-type attenuator, P-type attenuator, Lattice attenuator, Bridged T attenuator, L-type attenuator.

FILTERS: Characteristic impedance of symmetrical networks, Properties of symmetrical networks, Filter fundamentals, Pass and stop bands, Characteristic impedance, Constant K low pass filter, Constant K high pass filter, m - derived T section, m – derived Section, Variation of characteristic impedance over the pass band, Termination with m-derived half section, Band pass filters, Filter circuit design, Filter performance.

UNIT – III

FILTER DESIGN: The filter design problem, The approximation problem in network theory, The maximally flat low pass filter approximation, other low-pass filter approximations, Transient response of low pass filters, Magnitude and phase normalization, Frequency transformation.

UNIT – IV

NETWORK SYNTHESIS: Positive real functions, Positive real function properties, Testing driving point functions, Driving point function synthesis with two LC,RL,RC (Both caur and foster froms) elements, Two port network synthesis by ladder development, series and parallel realistions.

TEXT BOOKS:

1. M.E.Vanvalkenburg, Network Analysis, 3rd Edition PHI, 2003.
2. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 3rd Edition, TMH, 2006.
3. John D Ryder, Networks, Lines and Fields, 2nd Edition, PHI, 2003.
4. Franklin F. Kuo, Network Analysis and Synthesis, 2nd Edition, Wiley India Ltd.,2005.

REFERENCE BOOKS:

1. M.E Vanvalkenburg, Introduction to Modern Network Systhesis, 2nd Edition, Wiley India Ltd,1986.
2. Vasudev K Atre, Network Theory and Filter Design, 2nd Edition, Wiley Estern,2002.

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 261	ELECTRONIC CIRCUITS LABORATORY	L	T	P	M
		0	0	3	75

Experiments Based on Electronic Circuits

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

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.

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 262 ELECTRICAL ENGINEERING LABORATORY

L	T	P	M
0	0	3	75

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 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.

EC/EE/EI 263	DATA STRUCTURES LAB	L	T	P	M
		0	0	3	75

LIST OF PROGRAMS :

Write a C program to Implement:

1. **Singly Linked List ADT**:
   a) Creation b) Print c) Count d) Find e) FindPrev
   f) Insertion g) Deletion h) Concatenation i) Sorting

2. **Doubly Linked List ADT**:
   a) DCreation b) DPrint c) DCount d) DFind e) DInsertion g) Ddeletion

3. **Polynomial ADT (Using Arrays)**:
   a) PCreation b) PPrint c) PolyAdd d) PolySub e)PolyMul

4. **Stack ADT (Using Arrays & Linked list):**
   a) Push b) Pop c) Print

5. **Linear Queue ADT** (Arrays & Linked list):
   a) Enqueue b) Dequeue c) Print

6. **STACK Applications(using arrays):**
   i)Infix to Postfix Conversion ii) Postfix Evaluation

7. **Searching Techniques(using Pointers):**
   i) Linear Search ii) Binary Search (iterative & recursive)

8. **Internal Sorting Techniques - I:**
   i) Insertion sort ii) Shell sort iii) Merge sort iv) Quick sort v) Heap sort

9. **Binary Tree Traversals**:
   a) Creation b) Preorder c) Inorder d) Post order

10. **Binary Search Tree ADT:**
    a) Creation b) Insertion c) Deletion d) FindMin e) FindMax f) Print (Inorder)

11. **Hashing methods:**
    i) Separate Chaining ii) Open Addressing

NOTE: A minimum of 10(Ten) programs 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.
4. Edmund G Seebauer and Robert L Barry, Fundamentals of ethics for Scientists and Engineers, Oxford University Press, 2001.

EC/EE/EI 312 LINEAR CONTROL SYSTEMS

L	T	P	M
4	1	0	100

UNIT – I

Introduction: Basic concept of simple control system, open loop – closed loop control systems. Effect of feedback on overall gain – stability sensitivity and external noise. Types of feed back control systems – Linear 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 – black 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 – State space analysis: Concepts of stat, state variables and state models – digitalization – solution of state equations – state models for LTI systems. Concepts of controllability and Observability.

TEXT BOOKS:

1. B.C. Kuo, Automatic control systems, 7th edition, PHI.
2. I.J.Nagrath & M Gopal, Control Systems Engineering, 3rd edition, New Age International.
3. K. Ogata, Modern Control Engineering, 3rd edition, PHI.

REFERENCE BOOKS:

1. Schaum Series, Feedback and Control Systems, TMH
2. M.Gopal, Control Systems Principles and Design, TMH
3. John Van de Vegta, Feedback Control Systems, 3rd edition, Prentice Hall,1993.

EC/EE/EI 313	ELECTRONIC CIRCUITS – II	L	T	P	M
		4	0	0	100

UNIT – I

POWER AMPLIFIERS:
Design and analysis of Direct-Coupled Class A, Transformer Coupled Class A, Class B, Push-Pull, Direct Coupled Push-Pull, Complementary Symmetry Push-Pull, Class C power amplifiers, Harmonic distortion in amplifiers, Phase inverter circuits for power amplifiers, Temperature considerations.

UNIT – II

FEEDBACK AMPLIFIERS:
Classification of amplifiers, Feedback concept, Negative feedback amplifiers and their characteristics, Different topologies.

OSCILLATORS:
Barkhausen criterion for sinusoidal oscillators, RC phase shift oscillator using FET and BJT, Wein Bridge, Hartley, Colpitt's oscillators using BJT, Crystal oscillators, Frequency stability criterion for oscillators.

UNIT – III

TUNED AMPLIFIERS:
Single tuned amplifier, Tuned primary amplifier, Tuned secondary FET amplifier, Double tuned transformer coupled amplifier, Stagger tuned amplifier and Synchronously tuned amplifier.

UNIT – IV

REGULATED POWER SUPPLIES:
Design and analysis of Series and Shunt regulators using discrete components, Protection techniques, Switching Mode Power Supplies, UPS.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, TMH, 2003
2. Donald L. Schilling and Charles Belove, Electronic Circuits-Discrete and Integrated, 3rd Edition, TMH, 2002
3. John D Ryder, Electronic Fundamentals and Applications : Integrated and Discrete Systems, 5th Edition, PHI, 2003
4. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6thEdition, Pearson Education, 2004.

EC/EE 314	OOPS AND OS	L	T	P	M
		4	0	0	100

UNIT – I

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING: Concepts, benefits of OOPS, Object oriented Languages, Applications of OOP, Introduction to C++, C++ Statements, Creating the source file, Compiling and linking.
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: Main function, 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

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 BOOKS:

1. E Balaguruswamy, Object Oriented Programming with C++, 2nd Edition,TMH, 2003. (For Units I & II)
2. Silberschatz and Galvin, Operating System Concepts, 4th John Wiley & Sons, 2002.(For Units III & IV)

REFERENCE BOOKS:

1. William Stallings, Operating Systems, 4th Edition, Pearson Education/PHI, 2003
2. Timothy Budd, An Introduction to Object Oriented Programming, 2nd Edition, Pearson Education, 2002

EC 315	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	L	T	P	M
		4	0	0	100

UNIT – I

MEASURENT AND ERROR: Definitions, Accuracy and precision, Types of errors, Statistical analysis, Probability of errors, Limiting Errors.

DIRECT CURRENT INDICATING INSTRUMENTS: DC ammeters, DC voltmeters, Series type ohmmeter, Shunt type ohmmeter, Multimeter, Calibration of DC Instruments.

DC & AC BRIDGES: Wheatstone, Kelvin, Guarded Wheatstone, Maxwell, Hay, Schering and Wein bridges, Wagner ground connection.

UNIT – II

ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS:

AC voltmeters using rectifiers, True RMS responding voltmeter, Electronic multimeter, Digital voltmeters: Ramp, Stair case ramp, Integrating, Successive approximation, Quantizing error; Frequency counter, Universal counter.

CATHODE RAY OSCILLOSCOPE: Introduction, Cathode ray oscilloscope, Storage and sampling oscilloscopes, Digital storage oscilloscope, Spectrum analyzer.

UNIT – III

TRANSDUCERS:

Introduction, Classification of transducers, Analog transducers, Resistive transducers, Potentiometers, Strain gauges, Types of strain gauges, Resistance strain gauges, Semiconductor strain gauges, Resistance thermometers, Thermistors, Application of Thermistors, Thermo couple construction, Measurement of thermocouple output, Compensating circuits, Advantages and disadvantages of thermocouples, Variable inductance type transducer, Variation of self inductance, Variation of mutual inductance, Linear variable differential transformer, Rotary variable differential transformer, Capacitive transducers, Piezo-electric transducers, Digital transducers, Shaft Encoder.

UNIT – IV

DATA ACQUISITION SYSTEMS: Digital Data Acquisition System, Various ways of multiplexing, Computer controlled instrumentation.

BIO-MEDICAL MEASUREMENTS: Bioelectric signals (ECG,EMG,ERG,EOG) and electrodes. Elementary Principles of Electrocardiograph, Electromyograph, Electroencephalograph.

TEXT BOOKS:

1. W D Cooper & A D Helfrick, Electronic Instrumentation and Measurement Techniques, PHI, 1998
2. A K Sawhney, Electrical and Electronics Measurement and Instrumentation, Dhanpat Rai, 2000
3. R S Khandpur, Hand Book of Biomedical Engineering, TMH, 2002

REFERENCE BOOKS:

1. C S Rangan, G R Sarma and V S V Mani, Instrumentation Devices and Systems, TMH, 1997
2. H S Kalsi, Electronic Instrumentation, TMH, 1995
3. John G.Webster,Medical Instrumentation: Application and Design,3rd Edition, Wiley India Ltd, 2003.

EC 316	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.

EC 317	ANALOG COMMUNICATIONS	L	T	P	M
		4	0	0	100

UNIT – I

AMPLITUDE MODULATION: Time domain description, Frequency domain description, Single tone modulation, Generation of AM wave, Square law modulator, Switching Modulator, Detection of AM waves, Square law detector, Envelope detector, DSB-SC Modulation, Time-domain and frequency domain descriptions of DSB-SC, Generation of DSB-SC: Balanced modulator, Coherent detection of DSB-SC modulated waves, Costas loop, Quadrature-Carrier multiplexing.

UNIT – II

SSB AND VSB MODULATIONS: Band-pass transmission, Complex low-pass representation of Narrow-band signals, Concepts of pre-envelope, Complex envelope and Natural envelope, Equivalent low-pass transmission model, Single side band modulation: Frequency domain description, Generation of SSB-SC wave, Frequency-discrimination method, Phase discrimination method, Demodulation of SSB-SC waves, Vestigial side-band modulation, Frequency domain description, Generation of VSB modulated wave, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Frequency Division Multiplexing (FDM).

UNIT – III

ANGLE MODULATION: Introduction to Angle modulation, Relation between frequency Modulation and phase modulation, Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow Band FM and Wide Band FM, Transmission bandwidth of FM waves, Carson's Rule, Generation of FM waves, Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator – Zero-crossing detector, Linearized model of PLL, FM demodulation employing first order PLL, Practical Considerations, FM limiters, Applications.

UNIT – IV

DISCRETE MODULATION: Generation and Demodulation of PAM, PWM and PPM; TDM, Comparison of Discrete Modulation Techniques.

NOISE IN ANALOG MODULATION: AM Receiver model, Signal to noise ratios for coherent reception. DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection. AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

TEXT BOOKS:

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001
2. Leon W Couch II, Digital and Analog Communication Systems, Pearson Education, 2004

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, TMH, 2nd Edition, 1986
2. Sam Shanmugam, Analog and Digital Communication Systems, John Wiley, 1992.

EC 351	ANALOG COMMUNICATIONS LAB	L	T	P	M
		0	0	3	75

1. Voltage Shunt Feedback Amplifier
2. Complementary Symmetry Push-pull amplifier
3. Class-A Power Amplifier
4. RC Phase Shift Oscillator
5. Hartley and Colpitts Oscillators
6. Amplitude Modulation and Demodulation
7. DSB SC Modulation and Demodulation
8. SSB SC Modulation and Demodulation
9. Frequency Modulation and Demodulation
10. Pre Emphasis - De Emphasis Circuits
11. Verification of Sampling Theorem
12. PAM and Reconstruction
13. PWM and PPM: Generation and Reconstruction
14. Effect of Noise on the Communication Channel
15. Design of Mixer

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	OOPS AND PSPICE LAB	L	T	P	M
		0	0	3	75

Experiments Based On PSPICE

1. Frequency Response of CE Amplifier
2. Frequency Response of CS Amplifier
3. Design of Wein-Bridge Oscillator
4. Design and Verification of Class-A Power Amplifier
5. Verification of Half-wave and Full-wave rectifier
6. Verification of Amplitude Modulation and Demodulation

Experiments Based on OOPS

7. Over Loading Functions
8. Objects and Classes
9. Arrays
10. Overloading Operators
11. Inheritance
12. Pointers
13. Virtual Functions
14. Console I/O Operations
15. File I/O Operations

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 321	DIGITAL COMMUNICATIONS	L	T	P	M
		4	0	0	100

UNIT – I

PULSE MODULATION:
Quantization Process, Quantization Noise, Pulse Code Modulation: Encoding, Regeneration, Decoding, Delta Modulation, Differential Pulse Code Modulation (DPCM).

BASE BAND PULSE TRANSMISSION:
Matched filter, Properties, Intersymbol interference, Correlative level coding, Nyquist's criterion for distortionless baseband binary transmission, Ideal Nyquist channel, Raised cosine spectrum, Duobinary signaling, Modified Duobinary signaling.

UNIT – II

DIGITAL PASSBAND TRANSMISSION:
Introduction, Pass band transmission model, Gram Schmidt Orthogonalization procedure, Geometric interpretation of signals, Coherent detection of signals in noise, Probability of error, Correlation receiver, detection of signals with unknown phase, Coherent BPSK, QPSK, BFSK, Non Coherent BFSK, DPSK.

UNIT – III

INFORMATION THEORY:
Uncertainty, Information, Entropy, Properties of Entropy, Source Coding Theorem, Shannon Fano Coding, Huffman Coding, Discrete memoryless channels, Mutual information, Properties, Channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Information capacity theorem.

UNIT – IV

ERROR CONTROL CODING:
Linear Block Codes, Hamming Codes, Cyclic Codes, Convolution codes

TEXT BOOKS :

1. Simon Haykin, Communication Systems, 3rd Edition, John Wiley & Sons,
2. Bernard Sklar, Digital Communication, 2nd Edition, Pearson Education, 2001
3. Leon W Couch II, Digital and Analog Communication Systems, Pearson, 2004

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, 2nd Edition, TMH, 1986
2. J Das,S K Mallik and PK Chatterjee, Principles of Digital Communication,NAI(P), 2000

EC/EE 322 LINEAR ICs AND APPLICATIONS

L	T	P	M
4	1	0	100

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/EE/EI 323	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	M
		4	1	0	100

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 DACs and interfacing.
Programmable devices: Introduction to Programmable peripheral devices 8254, 8259, 8251, DMA data transfer, RS232 communication standard and maximum mode of 8086 operation

UNIT – IV

Introduction:-Introduction to microcontrollers, comparing microprocessors and microcontrollers, Architecture:- Architecture of 8051, pin configuration of 8051microcontroller, 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. Interfacing a stepper motor, ADC, temperature sensor and DAC.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

EC/EE/EI 324 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

EC 325 ANTENNAS AND WAVE PROPAGATION

L	T	P	M
4	0	0	100

UNIT – I

RADIATION:

Radiation Mechanism, Potential functions-heuristic approach, Maxwell's equation approach, Potential functions for sinusoidal oscillations, Alternating current element, Power radiated by current element, Application to short antennas, Assumed current distribution, Radiation from quarter wave Monopole / half wave dipole, Traveling wave antennas and the effect of the point of feed on standing wave antennas.

UNIT – II

ANTENNA FUNDAMENTALS:

Isotropic, Directional, Omni-directional patterns, Principle patterns, Field regions, Radiation density, Radiation intensity, Directive gain, Power gain, Half power Beam width, Antenna polarisation, Power loss factor, Radiation efficiency, Effective aperture of antenna, Relation between maximum effective aperture and directivity, Friss transmission equation.

ARRAY ANTENNAS

Two element array, Uniform linear array, Side lobe level and beam width of broadside array, Beam width of end fire array, Principle of multiplication of patterns, Effect of earth on vertical patterns, Binomial array, Basic principle of Dolph-Tschebyscheff array.

UNIT – III

CHARATERISTICS OF TYPICAL ANTENNAS:

V and Rhombic antennas, Folded Dipole, Loop antenna, Yagi Uda array, Helical antenna, Log periodic antenna, Pyramidal and conical Horn antenna, Corner reflector antenna, Parabolic reflector antennas - Paraboloid and parabolic cylinder, Cassegrain system of reflectors, Basic principles of slot antennas and micro strip antennas.

UNIT – IV

RADIO WAVE PROPAGATION:

Ground wave Propagation, Earth constants, Space-wave Propagation, Effect of curvature of an Ideal Earth, Variations of Field strength with height in space-wave Propagation, Atmospheric effects in space-wave Propagation, Radio-Horizon, Duct Propagation, Extended-range Propagation resulting from Tropospheric Scattering, Ionospheric Propagation, Gyro frequency, Refraction and reflection of Sky Waves by the Ionosphere, Critical Frequency, Skip Distance, Maximum Usable Frequency.

TEXT BOOKS:

1. Edward C Jordan and Keith G Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2003
2. Constantine A Balanis, Antenna Theory : Analysis and Design, Harper and Row Publishers, 2002
3. G.S.N.Raju, Antennas and Wave Propagation, 1st Edition, Pearson Publication, Singapore
4. F.E. Terman, Electronic and Radio Engineering, Mc Graw Hill, 1985.

REFERENCE BOOK:

1. J.D.Kraus and Ronald J Marhefka, Antennas For all Applications, TMH, 2003

EC 326	COMMUNICATION SYSTEMS	L	T	P	M
		4	1	0	100

UNIT – I

RADIO TRANSMITTERS:
Frequency allocation for radio communication systems, Block diagrams and functions of radio transmitters for AM and FM systems.

RADIO RECEIVERS:
TRF and super heterodyne receivers, RF, Mixer and IF stages, Choice of IF, Image frequency, Alignment and tracking of radio receivers, AGC, Tone and volume controls, Receiver characteristics and their measurements, FM receivers, Communication receivers, Fading and diversity reception.

UNIT – II

TELECOMMUNICATION SWITCHING SYSTEMS:
Evolution of Telecommunications, Simple telephone communication, Basics of switching system, Electronic space division switching: Stored Program Control, Centralized SPC, Distributed SPC, Two stage networks, Three stage networks, n-stage networks, Time division switching: Basic time division space switching, Basic time division time switching, Combination switching, Three stage combination switching, n stage combination switching.

UNIT – III

TELEVISION:
Vision characteristics and scanning systems, Composite video signal, Camera tubes: Principle of operation, Image Orthicon, Vidicon, Plumbicon, Block diagram of broad cast TV transmitter, Block diagram of broadcast TV receiver.

UNIT – IV

COLOR TELEVISION:
Color fundamentals, Color TV cameras, Picture tubes, TV transmission and reception,
NTSC & PAL systems, Cable television, Digital TV, DTH.

TEXT BOOKS:

1. George Kennedy, Electronic Communication Systems, Mc Graw Hill, 4th Edition, 1999.
2. T Viswanathan, Telecommunication Switching Systems and Networks, PHI, 2004.
3. RR Gulati, Monochrome and Color Television, New Age Publishers, 1996.

REFERENCE BOOKS:

1. RR Gulati, Composite Satellite and Cable Television, New Age International, 2000.
2. William Schweber, Electronic Communication Systems: A Complete Course, 4th Edition, PHI, 2002.

EC 361	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

EC/EE/EI 362	MICROPROCESSORS AND MICROCONTROLLERS LAB	L	T	P	M
		0	0	3	75

Experiments Based on ALP (8086)

1. Programs on Data Transfer Instructions.
2. Programs on Arithmetic and Logical Instructions.
3. Programs on Branch Instructions.
4. Programs on Subroutines.
5. Sorting of an Array.
6. Programs on Interrupts (Software and Hardware).
7. 8086 Programs using DOS and BIOS Interrupts.

Experiments Based on Interfacing & Microcontroller (8051)

8. DAC Interface-Waveform generations.
9. Stepper Motor Control.
10. Keyboard Interface / LCD Interface.
11. Data Transfer between two PCs using RS.232 C Serial Port
12. Programs on Data Transfer Instructions using 8051 Microcontroller.
13. Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.
14. Applications with Microcontroller 8051.

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 363	COMMUNICATION SKILLS LAB	L	T	P	M
		0	0	3	75

The course is divided into four groups. The first group focuses on language skills, the second on writing skills, the third on personality and interaction skills and the fourth on Vocabulary.

GROUP-1: Computer aided instruction:

1. Phonetics: Study of speech sounds
   (a) Vowels
   (b) Consonants
   (c) Accent Training
   (d) Pronunciation
   (e) Intonation
2. Reading Comprehension:
   (a) Reading for main idea
   (b) Scanning and Skimming the text
   (c) Inference of Lexical and Contextual meaning

GROUP-2: Presentation/Reporting Skills:

1. Paper Presentation:
   (a) Identification of source material
   (b) Arrangement of collected data
2. Resume Preparation:
   (a) Identification of information
   (b) Format arrangement
3. Technical Reporting:
   (a) Types of formats & styles
   (b) Data collection
   (c) Organization and clarity

GROUP-3: Personality and Interaction Skills:

1. Fundamentals of Interpersonal skills:
   (a) Body language
   (b) Listening skills
   (c) Role play
2. Situational Rounds:
   (a) Critical thinking
   (b) Analytical thinking
   (c) Creative thinking
   (d) Observation Activity
3. Interview Skills:
   (a) Dress code
   (b) Behaviourial attitude
   (c) Frequently asked questions
4. Group Discussion:
   (a) Modulation of Voice, body language and fluency
   (b) Summarizing
   (c) Team spirit

5. Telephonic Interaction:
   (a) Formal/Informal Interaction
   (b) Receiving Messages/Complaints
   (c) Tone Modulation

GROUP-4: Vocabulary:

(a) Synonyms
(b) Antonyms
(c) Anologies
(d) Idioms
(e) One word substitute

SUGGESTED SOFTWARE:

- Cambridge Advanced Learners' Dictionary with exercises
- The Rosetta Stone English Library
- Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd
- Learning to Speak English - 4 CDs
- Microsoft Encarta
- Murphy's English Grammar, Cambridge

SUGGESTED READING:

1. Developing Language Skills: 1. (Foundation Books)
2. Objective English for Competitive Examinations (Third edition) - Hari Mohan Prasad, Uma Rani Sinha (Tata McGraw Hill)
3. Better English Pronunciation – JD O'Connor (CUP)
4. English Pronuncing Dictionary – Daniel Jones.
5. Effective Technical Communication - M.Ashraf Rizvi (Tata McGraw Hill)
6. English for Engineers
   i. Prepared by Regional Institute of English,
   ii. South India, Bangalore (Foundation Books)
7. Cambridge Preparation Guide for TOEFL.
8. Dictionary of Technical Terms - F.S.Cripsin (Oxford IBH)
9. Cambridge Advanced Learner's Dictionary
10. Cambridge Idioms Dictionary
    (a) Basic Correspondence & Report writing -Sharma (Tata McGraw Hill)
11. Business Correspondence and Report Writing - R.C.Sharma, Krishna Mohan, (Tata McGraw Hill)
12. Dictionary of Misspelled and Easily Confused Words - David Downing, Deborah K.Williams (Tata McGraw Hill)
13. Wings of Fire – Dr.A.P.J.Abdul Kalam.
14. My Experiments with Truth – M.K.Gandhi.

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	COMPUTER NETWORKS	L	T	P	M
		4	0	0	100

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.

UNT – 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, 4th Edition,TMH, 2004.

EC 413	MICROWAVE ENGINEERING	L	T	P	M
		4	0	0	100

UNIT – I

INTRODUCTION: Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure.

MICROWAVE COMPONENTS:
Microwave Cavities - Rectangular and Circular cavity Resonators, Microwave Hybrid Circuits - Waveguide Tees E-plane or Series tee, H-plane or shunt Tee, Magic Tees(Hybrid Tees), Tee junction parameters, fields and currents in Tee junctions, Theorems on Tee junctions, Equivalent circuit of magic Tee, Applications of magic Tee, Hybrid Rings, Waveguide Corners, Bends and Twists, Directional couplers, Coupler parameters, Directional couplers in use, Applications of directional couplers, Circulators and Isolators.

UNIT – II

MICROWAVE SOLID-STATE DEVICES:
Microwave Tunnel diode, Transferred Electron Devices: GUNN-EFFECT Diodes, RWH Theory, Modes of operations, Avalanche Transit Time Devices: Read diode, IMPATT diode, TRAPATT diode, Pin diodes, Varactor diodes, Crystal detectors.

UNIT – III

MICROWAVE LINEAR BEAM TUBES (O TYPE):
Limitations of Conventional tubes at Microwave frequencies, Klystron: Velocity modulation process, bunching process, output power and beam loading, Multicavity Klystron amplifiers: Beam current density, output current and output power of two cavity Klystron, Reflex Klystron: Velocity modulation, Power output and efficiency. Helix Traveling Wave tube: Slow Wave structures, Amplification process, conventional current.

MICROWAVE CROSS FIELD TUBES (M TYPE):
Magnetron Oscillators: Cylindrical Magnetron, CFA and BWO (Qualitative analysis only).

UNIT – IV

MICROWAVE MEASUREMENTS:
Components of Microwave Bench, Detection of Microwaves, Microwave power measurement, Impedance measurements, VSWR measurement, Frequency measurement, scattering coefficient measurements.

TEXT BOOKS:

1. Samuel Y Liao, Microwave Devices and Circuits, 3rd Edition, Pearson Education, 2003.
2. ML Sisodia and V.L.Gupta, Microwave Engineering, New Age International, 2005

REFERENCE BOOK:

1. RE Collin, Foundations for Microwave Engineering, IEEE Press Series, 2003
2. M.L.Sisodia and GS Raghuvamshi, Microwave Circuits and Passive Devices, Wiley Eastern, 1987.

EC 414	SATELLITE COMMUNICATIONS	L	T	P	M
		4	0	0	100

UNIT – I

INTRODUCTION AND ORBITAL ASPECTS OF SATELLITE COMMUNICATIONS:
A brief history of Satellite Communications, Types of Orbits, Kepler's laws of planetary motion, locating the satellite in the orbit, locating the Satellite with respect to the Earth, Orbital elements, Look angle determination, Orbital perturbations, launch and launch vehicles, Orbital effects in Communication System performance.

UNIT – II

SPACE CRAFT:
Introduction, Space craft Sub systems, attitude and Orbit Control system, Telemetry, tracking and command, Power Systems, Communication Subsystems, Spacecraft antennas.
MULTIPLE ACCESS TECHNIQUES:
FDM / FM Satellite Systems, FDMA: SPADE DAMA Satellite System, TDMA CEPT primary Multiplex frame, CDMA: Encoder, decoder, Comparison between CDMA, FDMA & TDMA.

UNIT – III

SATELLITE LINK DESIGN:
Basic transmission theory, System noise temperature and G / T ratio. Design of uplink and down link models, Design of Satellite links for specified C / N ratio.
EARTH STATION TECHNOLOGY:
Earth Station Design, Design of large antennas, tracking, small earth station Antennas, equipment for earth stations. VSAT, Satellite Broadcasting, Satellite TV system.

UNIT – IV

SPREAD SPECTRUM TECHNIQUES:
PN Sequences, Notion of Spread Spectrum, DSSS: DSSS with CBPSK, Processing gain, Probability of error, Acquisition and tracking, FHSS: Slow frequency hopping, Fast frequency hopping. Acquisition and tracking, Practical Jammer types, THSS

TEXT BOOKS:

1. T Pratt and W Bostiain, Satellite Communications, 2nd Edition, John Wiley, 2003.
2. W Tomasi, Advanced Electronic Communication Systems, 4th Edition, Pearson Education, 2002.
3. Taub and Schilling, Principles of Communication Systems, TMH, 2003.
4. Simon Haykin, Communication Systems, 4th Edition, John Wiley & Sons, 2004.

REFERENCE BOOKS:

1. D C Agarwal, Satellite Communications, Khanna Publishers, 2003.
2. Robert M Gagliardi, Satellite Communications.

EC/EI 415/A	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, A further consideration of adders, Multipliers.

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: Design Flow, 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.

EC/EI 415/B DATA BASE MANAGEMENT SYSTEMS

L	T	P	M
4	0	0	100

UNIT – I

Introduction- An Overview of Database Management, database system, database, Data independence, Relational systems and others. Database System Architecture: The three levels of the architecture, Mappings, The database administrator, The database management system, Client/server architecture.

An Introduction to Relational Databases - The relational model, Relations and relvars, Optimization, Base relvars and views, The Relational Model: Relations, Tuples, Relation types, Relation values, Relation variables, SQL facilities.

UNIT-II

An Introduction to SQL: Overview, The catalog, Views, Embedded SQL, Dynamic SQL,

Relational Algebra: Closure revisited, Syntax, Semantics, Examples, Additional operators, grouping and ungrouping, Relational Calculus: Tuple calculus, Examples, Calculus vs. algebra, Computational capabilities, Domain calculus, Query-By-Example,

Integrity: Predicates and propositions, Relvar predicates and database predicates, Checking the constraints, Internal v external constraints, Correctness v consistency, Integrity and views, A constraint classification scheme, Keys, Triggers. Views – concept, View retrievals, View updates, Snapshots .

UNIT – III

Database Design: Functional Dependencies, Basic definitions, Trivial and nontrivial dependencies, Closure of a set of dependencies, Closure of a set of attributes, Irreducible sets of dependencies, Normalization: 1NF, 2NF, 3NF, BCNF, Nonloss decomposition and functional dependencies, First, second, and third normal forms, Dependency preservation, Boyce / Codd normal form, Further Normalization: Higher Normal Forms, Multi-valued dependencies and fourth normal form, Join dependencies and fifth normal form, Other normal forms, Semantic Modeling: The overall approach, The E/R model, E/R diagrams, Database design with the E/R model.

UNIT – IV

Database Protection: Recovery – Transactions, Transaction recovery, System recovery, Media recovery, Two-phase commit, Savepoints, Concurrency - Three concurrency problems, Locking, The three concurrency problems revisited, Deadlock, Serializability, Intent locking, Security - Discretionary access control, Mandatory access control, Data encryption.

TEXT BOOK:

1. C.J. DATE, An Introduction to Database Systems, 8th Edition, Pearson Edition.

REFERENCE BOOKS:

1. Elmasri Navrate, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Data base Management Systems, Johannes Gehrke, 3rd Edition,TATA McGrawHill,
3. Silberschatz, Korth, Data base System Concepts, V edition, McGraw hill.

EC 415/C	BIOMEDICAL ENGINEERING	L	T	P	M
		4	0	0	100

UNIT – I

BASIC CONCEPTS OF MEDICAL INSTRUMENTATION: Generalized Medical Instrument Systems, Classification of Biomedical Instruments, Generalized static characteristics, Dynamic characteristics.

THE ORIGIN OF BIOPOTENTIALS: Electrical activity of excitable cells, Functional Organization of the peripheral Nervous System, ENG, EMG, ECG, ERG, EEG, MEG.

UNIT – II

BIO POTENTIAL ELECTRODES: The Electrode-Electrolyte Interface, Polarization, polarizable and nonpolarizable Electrodes, Internal Electrodes, Electrode Arrays, Microelectrodes, Electrodes for Electric Stimulation of Tissue.

BIOPOTENTIAL AMPLIFIERS: Basic Requirements, The Electrocardiograph, Problems frequently encountered, Amplifiers for other Biopotential Signals, Biotelemetry

MEASUREMENTS OF FLOW AND VOLUME OF BLOOD: Electromagnetic Flow meters, Ultrasonic Flow meters.

UNIT – III

MEDICAL IMAGING SYSTEMS: Radiography, Computed Radiography, Computed Tomography, Magnetic Resonance Imaging, Ultra Sonography, PET.

UNIT – IV

THERAPEUTIC AND PROSTHETIC DEVICES: Cardiac Pacemakers, Defibrillators, Ventilators, Infant Incubators.

ELECTRICAL SAFETY: Macro shock and Micro shock Hazards

TEXT BOOK:

1. John G Webster, Medical Instrumentation –Application and Design,3rd Edition,

EC 415/D	FUZZY SYSTEMS	L	T	P	M
		4	0	0	100

UNIT – I

Classical and fuzzy sets: Classical sets- operations, properties of classical sets, mapping of classical sets to the functions. Fuzzy sets-membership, uncertainty, fuzzy set operations, properties of fuzzy sets. Classical and fuzzy relations: Cartesian product, crisp relations-cardinality, operations and properties of crisp relations, Fuzzy relations-cardinality operations and properties of fuzzy relations. Non interacting fuzzy sets, Tolerance and equivalence relations.

UNIT – II

Membership functions: Futures of membership functions, fuzzification, membership value assignments-intuition, ranking ordering, angular fuzzy sets, neural nets, genetic algorithms, inductive reasoning, Fuzzy-to-crisp conversions: Lambda-cuts for fuzzy sets, lambda-cuts for fuzzy relations, defuzzification methods. Fuzzy arithmetic, numbers and vectors and extension principle: fuzzy members, approximate methods of extension-vertex method, DSW algorithm, restricted DSW algorithm, fuzzy vectors.

UNIT – III

Classical logic and fuzzy logic: Classical predicate logic-tautologies, contradictions, equivalence, exclusive or and exclusive nor, logical proofs, deductive inferences. Fuzzy logic, approximate reasoning, Fuzzy tautologies, contradictions, equivalence and logical proofs, other forms of the implication operation, other forms of the composite operation. Fuzzy rule-based systems: Natural language, linguistic Hedges, rule-based systems-canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, Graphical techniques inference.

UNIT – IV

Fuzzy decision-making: Fuzzy synthetic evaluation, fuzzy ordering, preference and consensus, Multi objective decision making, Fuzzy Bayesian Decision method, Decision making under Fuzzy states and fuzzy actions. Fuzzy classification: Classification by Equivalence Relations-crisp relations, Fuzzy relations, Cluster validity, C-Means clustering-Hard C-Means (HCM). Fuzzy C-Means (FCM), classification Metric, Hardening the Fuzzy C-partition, similarity relations from clustering.

TEXT BOOKS:

1. Timothy J. Ross, Fuzzy logic with engineering applications, Mc Graw Hill, 1997
2. Klir and Ywan, Fizzy sets and Fuzzy logic, Prentice Hall of India
3. S.Rajasekharan & Y.A.Vijayalakshmi Pai, Neural Networks, Fuzzy logic and Genetic Algorithms, Prentice Hall of India

REFERENCE BOOK

1. Fuzzy - Neural Control: Principles, Algorithms and applications by Nie and Linkens, PHI.

EC 416/A	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.

EC 416/B	NEURAL NETWORKS	L	T	P	M
		4	0	0	100

UNIT – I

Introduction: History of Neural Networks, Structure and functions of biological and artificial neuron, Neural network architectures, Learning methods, evaluation of neural networks

UNIT – II

Supervised learning – I: Single layer networks, McCulloch – Plus Neuron, Model Perceptron I carning, Delta learning Widrow – Hoff learning rules, linear seperability, Adaline and modifications

UNIT – III

Supervised learning – II: Multi layer networks: Architectures, Madalines, Backpropagation algorithm, importance of learning parameter and momentum term, radial basis functions, polynomial networks
Unsupervised learning: Winner – Take – all learning, out star learning, learning vector quantizers, counter propagation networks, Kohonen self-organizing networks, Grossberg layer, adaptive resonance theory, Hamming Net

UNIT – IV

Assoctative memories: Hebbian learning rule, continuous and discrete, Hopfield networks, recurrent and associative memory, Boltzman machines, Bi-directional associative memory
Applications of neural networks : Optimization, Travelling Salesman, Problem solving simultaneous linear equations, Applications in pattern recognition and Image Processing

TEXT BOOKS:

1. Kishan Mehrotra, Chelkuri K. Mohan, Sanjav Ranka, elements of Artificial Neural Networks, Tenram International
2. J.M. Zurada Introduction to Artificial Neural Systems, Jaico Publications
3. B. Yegnanarayana, Artificial Neural Networks, PHI, New Delhi
4. Waserman: Neural Computing – Theory and Practice.

EC 416/C **SPEECH SIGNAL PROCESSING** **L T P M**
4 0 0 100

UNIT – I

PRODUCTION AND CLASSIFICATION OF SPEECH SOUNDS:
Anatomy and Physiology of Speech Production, Categorization of Speech Sounds. Acoustics of Speech Production: Physics of Sound, Uniform tube model, A Discrete-Time model based on Tube Concatenation.
Time-Domain Models for Speech Processing: Short-Time energy, average zero crossing rate, Pitch period estimation using autocorrelation.

UNIT – II

SHORT TIME FOURIER TRANSFORM ANALYSIS AND SYNTHESIS:
Short Time Analysis, Signal estimation from STFT, Frequency Domain Pitch Estimation, A Correlation based Pitch Estimator, Pitch estimation based on a Comb Filter.

DIGITAL REPRESENTATIONS OF THE SPEECH WAVEFORM:
Instantaneous quantization, Delta Modulation, DPCM.

UNIT – III

HOMOMORPHIC SIGNAL PROCESSING:
Homomorphic Systems for Convolution, Complex Cepstrum of Speech-like Sequences, Spectral root Homomorphic Filtering, Short-Time Homomorphic Analysis, Short-time Speech Analysis and Analysis/Synthesis Structures.

UNIT – IV

SPEECH CODING:
Linear Prediction, Error minimization, Autocorrelation method, Levinson Recursion, Lattice filter formulation of the inverse filter. Vector Quantization, Distortion Measure, Sub-band coding

SPEAKER RECOGNITION:
Spectral features for Speaker Recognition, Mel- Cepstrum, Speaker Recognition Algorithms, Minimum – distance classifier.

TEXT BOOKS:

1. Thomas F Quatieri, Discrete-Time Speech Signal Processing Principles and Practice, Pearson Education, 2002.
2. L R Rabiner and R W Schafer, Digital Processing of Speech Signals Pearson Education, 2002.

EC 416/D	ARTIFICIAL INTELLIGENCE	L	T	P	M
		4	0	0	100

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, Question answering.
REPRESENTING KNOWLEDGE USING RULES - Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge, Semantic Nets

UNIT – III

Conceptual dependency, Scripts.
Hopfield Networks, Perceptrons, Back propagation networks, generalization, Applications of Neural networks, Expert systems.

UNIT – IV

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

TEXTBOOKS:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, 2nd Edition, (Tata McGraw Hill Edition)
2. Carl Townsend, Introduction to TURBO PROLOG, BPB Publications.

REFERENCE BOOKS:

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

EC 451	TERM PAPER	L	T	P	M
		0	0	3	25

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

EC 452	DIGITAL COMMUNICATIONS AND VHDL LAB	L	T	P	M
		0	0	3	75

Experiments Based on Hardware

1. Generation and Detection of PCM.
2. Generation and Detection of ASK.
3. Generation and Detection of FSK.
4. Generation and Detection of PSK&QPSK.
5. Generation and Detection of TDM
6. Generation and Detection of DPSK
7. Delta Modulation and Demodulation.

VHDL Modeling and Synthesis of the Following Experiments

8. Logic Gates.
9. Multiplexers/De-Multiplexers.
10. Design of ALU.
11. 4 bit Magnitude Comparator.
12. JK, D & T Flip-Flops
13. Synchronous Counters
14. Asynchronous Counters

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 453	DIGITAL SIGNAL PROCESSING LAB	L	T	P	M
		0	0	3	75

Experiments Based On Tool Boxes

1. Simulation of AM.
2. Simulation of FM.
3. Simulation of LPF and HPF.
4. Fourier Transforms.
5. Simulation of M-ary PSK.
6. Simulation of DPCM.
7. Evaluation of DFT and IDFT of 16 Sample Sequence using DIT Algorithm.
8. Evaluation of DFT and IDFT of 16 Sample Sequence using DIF Algorithm.
9. Design of IIR Butterworth Filter using Impulse Invariant Method.
10. Design of FIR Filter using Windowing Technique.
11. Convolution of Two Signals.
12. Correlation of Two Signals.
13. DFT Analysis of a Noise Corrupted Signal.

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

EC 421 MOBILE AND CELLULAR COMMUNICATIONS

L	T	P	M
4	0	0	100

UNIT – I

INTRODUCTION TO MOBILE COMMUNICATION:
Evolution of Mobile Radio Communication, Examples of Wireless Communication Systems. Paging system, Cordless telephones systems, Cellular telephone Systems, Cellular concept: Frequency reuse, Channel Assignment strategies, Hand off strategies. Interference and System capacity, Improving coverage and capacity in cellular systems.

UNIT – II

MOBILE RADIO PROPAGATION:
Large Scale Fading: Free space propagation model: Three basic propagation mechanisms. Reflection, Diffraction scattering, Link budget design using path loss models.
Small Scale Fading: Multipath Propagation, Types of small scale fading, Parameters of Mobile Multipath channels, Fading effects due to multipath time delay, Spread and Doppler spread, Statistical models for multipath fading channels.
Equalization: Fundamentals of Equalizers, Linear equalizers, Nonlinear equalizers, Decision feedback equalizers, MLSE
Diversity Techniques: Space diversity: MRC, EGC Selection diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT – III

WIRELESS NETWORKING (2G)
GSM Architecture: Mobile station, Base station system, Network and switching Sub system, Radio interface, Location Tracking & call set up, GSM short message services-Architecture, IS – 95 Architecture

UNIT – IV

WIRELESS NETWORKING (3G)
Mobile Services (2.5G):
GPRS: GPRS functional groups, GPRS Architecture
WAP: WAP Model, WAP Gateway, WAP Protocol
Mobile Services (3G):
Paradigm Shifts in 3G Systems CDMA 2000: Introduction, CDMA 2000 Layering structure, upper layer, link layer, W-CDMA

TEXT BOOKS:
1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education, 2003.
2. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, MC Graw Hill, 1995.
3. P. Nicopolitidis, Wireless Networks, Wiley, 2003

REFERENCE BOOKS:
1. Kamilo Feher, Wireless Digital Communications, PHI, 2003
2. Yi-BingLin, Wireless and Mobile Network Architectures, Wiley, 2001.

EC 422	OPTICAL COMMUNICATIONS	L	T	P	M
		4	0	0	100

UNIT – I

INTRODUCTION:
Historical development, Elements of an Optical Fiber transmission link, Advantages of Optical Fibers, Applications of Optical Fiber, Ray Theory Transmission, Total internal reflection, Acceptance angle, Critical angle, Numerical Aperture, Fiber types : Step Index, Graded Index : Modes of Propagation : single mode and multimode fibers, Fiber materials.

UNIT – II

TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS:
Attenuation, absorption, scattering and bending losses in fibers, Dispersion: Intermodel
and intramodel.
FIBER OPTIC COMPONENTS:
Splicing, Connectors, Connection losses, Fiber Optic couplers, Fiber Optic Switches.

UNIT – III

OPTICAL SOURCES:
General characteristics, Principles of Light Emission. Light Emitting Diodes types-Planar, Dome, Surface emitting, Edge emitting Super luminescent LED's, Lens coupling to fiber, LED Characteristics – Optical output power & efficiency, output spectrum, modulation bandwidth, reliability. LASER: Working of DH injection laser, DFB laser and Threshold condition for lasing. DETECTORS: Principles of photo detection. PIN Photodiode, Avalanche Photodiode and their characteristics.

UNIT – IV

OPTICAL FIBER SYSTEMS:
Optical Transmitter Circuits - source limitations, LED drive circuits.
Optical Receiver operation-Digital system transmission, error sources, receiver configuration, Preamplifier types, Digital receiver performance-probability of error, Quantum limit, System considerations – Link power budget, rise time budget, Direct intensity modulation, Advanced Multiplexing Strategies – OTDM, WDM.
OPTICAL FIBER MEASUREMENTS:
Numerical Aperture, attenuation, refractive index, dispersion losses, cutback and OTDR.

TEXT BOOS:

1. John M Senior, Optical Fiber Communications: Principles and Practice, 2nd Edition, PHI, 2002.
2. Henry Zanger and Cynthia Zanger, Fiber Optics: Communication and other Applications, Maxwell Macmillan Edition.
3. JC Palais, Fiber Optic Communications, 2nd Edition, PHI, 2001.
4. W.Tomasi, Advanced Electronic Communication Systems, Pearson Education, 2002.

EC 423	RADAR AND NAVIGATIONAL AIDS	L	T	P	M
		4	0	0	100

UNIT – I

Block Diagram of Pulse Radar, simple form of Radar equation, Detection of signals in noise, Receiver noise and signal to noise ratio, integration of Radar pulses, RCS: RCS of simple targets, RCS of multiple targets, PRF and Range Ambiguities, Doppler Effect, Limitations of CW Radar, FMCW Radar, Altimeter.

UNIT – II

MTI Radar, Delay line cancellers: Frequency response of single delay line cancellers, Clutter Attenuation, MTI improvement factor, N-pulse delay line canceller, Non recursive and Recursive filters, Staggered PRF, Doppler filter banks.
TRACKING:
Types of Tracking Radar Systems, Sequential lobing, conical scan and mono pulse tracking (amplitude comparison and phase comparison).

UNIT – III

Superheterodyne Receiver, types of Duplexers and receiver protectors, types of Displays, Radomes.
Electronic Warfare: Objectives an definitions, Noise jamming, Types of Electronic counter measures and Electronic counter to counter measures, Stealth applications.

UNIT – IV

Elementary ideas of Navigation Aids: VOR, DME, DVOR, TACAN, ILS and MLS, GPS, Automatic Direction finder, Hyperbolic Navigation (LORAN, DECA, OMEGA).

TEXT BOOKS:

1. Merrill I Skolnik, Introduction to Radar Systems, 2nd Edition, TMH, 2003.
2. Dr AK Sen and Dr AB Bhattacharya, Radar Systems and Radio Aids to Navigation, Khanna Publishers, 1988.
3. Roger J Suullivan, Radar Foundations for Imaging and Advanced Topics.
4. NS Nagaraja, Elements of Electronic Navigation, TMH.
5. Peyton Z Peebles Jr, Radar Principles, John Wiley Inc., 2004.

EC 424/A	EMBEDDED SYSTEMS	L	T	P	M
		4	0	0	100

Unit – I

Introduction to embedded systems, design challenges, processor technology, IC technology, deign technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, optimizing custom single purpose processors.

General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors

Unit – II

State machine and concurrent process models: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real time systems.

Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Blue Tooth.

Unit - III

Embedded system and RTOS concepts: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

Unit – IV

Embedded system and RTOS concepts: Timers, memory management, priority inversion problem, embedded OS and real time OS, RT Linux, and Handheld OS.

Design technology: Introduction, automation, synthesis, parallel evolution of compilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis, system synthesis, HW / SW co- design, verification, and co-simulation.

TEXT BOOKS:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, John Wily & sons 2002.
2. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.

REFERENCE BOOKS:

1. Raj Kamal, Embedded system architecture, programming and design, TMH edition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson Learning.
4. David E. Simon, An Embedded Software Primer, Pearson edition.

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

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.

EC 424/C	HDL PROGRAMMING	L	T	P	M
		4	0	0	100

UNIT – I

Introduction to verilog HDL and Level of Abstraction. Hierarchical Modeling Concepts- Design Methodologies Modules and instances. Simulation Demonstration. Basic concepts, Data types, System Tasks and Compiler Directives.

UNIT – II

Modules and Ports- List of ports, Port Declaration, Port Connections Rules, Inputs, outputs, inouts, Gate-Level Modeling-Gate types, Gate Delays and Dataflow Modeling-Continuous Assignments, Delays, Expression, Operators, and Operands, Synthesis Demonstration.

UNIT – III

Behavioral Modeling- Structured Procedures, Procedure Assignment, Timing Controls and Conditional Statements, Tasks and Functions.

UNIT – IV

Logic Synthesis with verilog HDL-Synthesis Design flow, RTL and Test Bench Modeling Techniques and Timing and Path Delay Modeling, Timing Checks, Switch Level Modeling

TEXT BOOK:

1. Samir Palnitkar, Verilog HDL, Pearson Education India, 2001.

EC 424/D	JAVA PROGRAMMING	L	T	P	M
		4	0	0	100

UNIT – I

Introduction to Java, Classes, Inheritance, Packages & Interfaces, Exception handling Multi threaded programming

UNIT – II

Applet class, Event handling, AWT

UNIT – III

Swing, Java database connectivity, Servlets

UNIT – IV

RMI, Networking, Java Beans

TEXT BOOKS:

1. Herbert Schildt, The Complete Reference Java2, Tata McGraw Hill, 5th Edition (for Units- I and II).

2. Deitel & Deitel, JAVA – How to program, Pearson Education (for Units-III & IV).

EC 461	PROJECT AND VIVA VOCE	L	T	P	M
		0	0	3	150

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.

EC 462	MICROWAVE AND OPTICAL COMMUNICATIONS LAB	L	T	P	M
		0	0	3	75

Experiments Based on Microwave Engineering

1. Characteristics of Reflex Klystron
2. Verification of the Expression $1/\lambda_o^2 = 1/\lambda_g^2 + 1/\lambda_c^2$
3. Measurement of VSWR using Microwave Bench
4. Measurement of Unknown Impedance Using Microwave Bench
5. Determination of Characteristics of a Given Directional Coupler
6. Measurement of Gain of an Antenna
7. Measurement of Dielectric Constant of a Given Material

Experiments Based on Optical Communication

8. Characteristic of Light Sources/Detectors
9. Fiber Optics Cable: Numerical Aperture Measurement
10. Measurement of Coupling and Bending Losses Of a Fiber
11. Analog Link Set up using a Fiber
12. Digital Link Set up using a Fiber
13. Set up of Time Division Multiplexing using Fiber Optics
14. Study of Cellular Communication.

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.