Regulations and Curriculum

for

B. Tech. Electronics and Communication Engineering

2009-2010

PONDICHERRY UNIVERSITY

BACHELOR OF TECHNOLOGY PROGRAMMES

(EIGHT SEMESTERS)

REGULATIONS

1. CONDITIONS FOR ADMISSION:

(a) Candidates for admission to the first semester of the 8 semester B.Tech. Degree programme should be required to have passed:

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (a mere pass for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

(b) For Lateral entry in to third semester of the eight semester B.Tech programme:

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in any B.Sc. course with mathematics as one of the subjects of study with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in main and ancillary subjects excluding language subjects. The list of diploma programs approved for admission for each of the degree programs is given in **Annexure A**.

2. AGE LIMIT:

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme, candidates should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. DURATION OF PROGRAMME:

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

4. ELIGIBILITY FOR THE AWARD OF DEGREE:

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. BRANCHES OF STUDY:

Brach I - Civil Engineering
Branch II - Mechanical Engineering
Branch III - Electronics & Communication Engineering
Branch IV - Computer Science & Engineering
Branch V - Electrical & Electronics Engineering
Branch VI - Chemical Engineering
Branch VII - Electronics & Instrumentation Engineering
Branch VIII - Information Technology
Branch IX - Instrumentation & Control Engineering
Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. SUBJECTS OF STUDY:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. EXAMINATIONS:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination**.**

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows:

5 marks for 95% and above
4 marks for 90% and above but below 95%
3 marks for 85% and above but below 90%
2 marks for 80% and above but below 85%
1 mark for 75% and above but below 80%

A minimum of three tests are to be conducted for every theory subject and, of them two best are to be considered for computation of internal assessment marks.

(b) Practical courses for which there is a university practical examination of 50 marks:

Every practical subject carries an internal assessment mark of 50 distributed as follows: (i) Regular laboratory exercises and records – 20 marks (ii) Internal practical test-15 marks (iii) Internal viva-voce – 5 marks and (iv) Attendance – 10 marks.

The marks earmarked for attendance are to be awarded as follows:

10 marks for 95% and above
8 marks for 90% and above but below 95%
6 marks for 85% and above but below 90%
4 marks for 80% and above but below 85%
2 marks for 75% and above but below 80%

8. REQUIREMENT FOR APPEARING FOR UNIVERSITY EXAMINATION:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by the University along with a medical certificate obtained from a medical officer not below the rank of Assistant Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. PROCEDURE FOR COMPLETING THE COURSE:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous

semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. PASSING MINIMUM:

(i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

(ii) A candidate who has been declared "Failed" in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

(a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

(b) The candidate should have attended all the college examinations as well as university examinations.

(c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.

(d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made up to the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11. AWARD OF LETTER GRADES:

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

Range of Total Marks	Letter Grade	Grade Points
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	F	0
Incomplete	FA	

Note: 'F' denotes failure in the course. 'FA' denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.

(b) The list of courses enrolled during the semester and the grades scored.

(c) The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.

(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$GPA = (\text{Sum of } (C \times GP) / \text{ Sum of } C)$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

(e) The conversion of CGPA into percentage marks is as given below

$$\% \text{ Mark} = (CGPA - 0.5) \times 10$$

12. AWARD OF CLASS AND RANK:

(i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry

candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

(ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.

(iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in **FIRST CLASS**.

(iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

(v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. PROVISION FOR WITHDRAWAL:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. DISCONTINUATION OF COURSE:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. REVISION OF REGULATIONS AND CURRICULUM:

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

ANNEXURE – A

(Diploma programs for admission for B.Tech. Lateral Entry)

B.Tech courses in which admission is sought	**Diploma courses eligible for admission**
Civil Engineering	Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Agricultural Engineering
Mechanical Engineering	Mechanical Engineering Automobile Engineering Agricultural Engineering Mechanical and Rural Engineering Refrigeration and Air-conditioning Agricultural Engineering & Farm Equipment Technology Metallurgy Production Engineering Machine Design & Drafting Machine tool maintenance and Repairs Printing Technology / Engineering Textile Engineering / Technology Tool Engineering
Electrical and Electronics Engineering Electronics & Communication Engineering Electronic and Instrumentation Engineering Instrumentation and Control Engineering Bio Medical Engineering	Electrical Engineering Electrical and Electronics Engineering Electronics and Instrumentation Engineering Instrumentation Engineering / Technology Electronics and Communication Engg. Electronics Engineering Medical Electronics Instrumentation and Control Engineering Applied Electronics
Chemical Engineering	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper & Pulp Technology Polymer Technology
Information Technology Computer Science & Engineering	Computer Science and Engineering Computer Technology Electrical and Electronics Engineering Electronics & Communication Engineering Electronics & Instrumentation Engineering Instrumentation Engineering / Technology

PONDICHERRY UNIVERSITY B.Tech (Electronics and Communication Engineering) CURRICULUM

I Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T101	Mathematics – I	3	1	-	4	25	75	100
T102	Physics	4	-	-	4	25	75	100
T103	Chemistry	4	-	-	4	25	75	100
T110	Basic Civil and Mechanical Engineering	4	-	-	4	25	75	100
T111	Engineering Mechanics	3	1	-	4	25	75	100
T112	Communicative English	4	-	-	3	25	75	100
	Practical							
P104	Physics Laboratory	-	-	3	2	50	50	100
P105	Chemistry Laboratory	-	-	3	2	50	50	100
P106	Workshop Practice	-	-	3	2	50	50	100
	Total	22	2	9	29	300	600	900

II Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T107	Mathematics – II	3	1	-	4	25	75	100
T108	Material Science	4	-	-	3	25	75	100
T109	Environmental Science	4	-	-	3	25	75	100
T104	Basic Electrical and Electronics Engineering	3	1	-	4	25	75	100
T105	Engineering Thermodynamics	3	1	-	4	25	75	100
T106	Computer Programming	3	1	-	3	25	75	100
	Practical							
P101	Computer Programming	-	-	3	2	50	50	100
P102	Engineering Graphics	2	-	3	2	50	50	100
P103	Basic Electrical & Electronics Laboratory	-	-	3	2	50	50	100
P107	NSS / NCC *	-	-	-	-	-	-	-
	Total	22	4	9	27	300	600	900

* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.

III Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T31	Mathematics –III	3	1	-	4	25	75	100
EC T32	Electrical Engineering	4	-	-	3	25	75	100
EC T33	Data Structures and Algorithms	3	1	-	3	25	75	100
EC T34	Electron Devices	4	-	-	4	25	75	100
EC T35	Circuit Theory	3	1	-	4	25	75	100
EC T36	Engineering Electromagnetics and Waves	3	1	-	4	25	75	100
	Practical							
EC P31	Electrical Engineering Laboratory	-	-	3	2	50	50	100
EC P32	Data Structures and Algorithms Laboratory	-	-	3	2	50	50	100
EC P33	Electron Devices Laboratory	-	-	3	2	50	50	100
	Total	20	4	9	28	300	600	900

IV Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T41	Numerical Methods and Techniques	3	1	-	4	25	75	100
EC T42	Electronic Circuits-I	3	1	-	4	25	75	100
EC T43	Signals and Systems	3	1	-	4	25	75	100
EC T44	Networks and Transmission Lines	3	1	-	4	25	75	100
EC T45	Digital Circuits	3	1	-	4	25	75	100
EC T46	Analog Communication Systems	3	1	-	4	25	75	100
	Practical							
EC P41	Electronic Circuits – I Laboratory	-	-	3	2	50	50	100
EC P42	Digital Circuits Laboratory	-	-	3	2	50	50	100
EC P43	Communication Laboratory-I	-	-	3	2	50	50	100
SP P44	Physical Education *	-	-	-	-	-	-	-
	Total	18	6	9	30	300	600	900

* Student is required to secure a pass and no grade will be awarded

V Semester

Code	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UEE	TM
	Theory							
MAT51	Probability and Random Processes	3	1	-	4	25	75	100
EC T52	Electronic Circuits-II	3	1	-	4	25	75	100
EC T53	System Design using ICs	4	-	-	4	25	75	100
EC T54	Digital Signal Processing	3	1	-	4	25	75	100
EC T55	Linear and Digital Control Systems	3	1	-	4	25	75	100
EC T56	Waveguides, Antennas and Wave Propagation	3	1	-	4	25	75	100
	Practical							
EC P51	Electronic Circuits – II Laboratory	-	-	3	2	50	50	100
EC P52	System Design using ICs Laboratory	-	-	3	2	50	50	100
EC P53	Networks and Transmission Lines Laboratory	-	-	3	2	50	50	100
HS P54	General Proficiency – I	-	-	3	2	100	-	100
	Total	19	5	12	32	300	600	900

VI Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EC T61	Information Theory and Coding	3	1	-	4	25	75	100
EC T62	Digital Communication	3	1	-	4	25	75	100
EC T63	Computer and Communication Networks	3	1	-	3	25	75	100
EC T64	Microprocessor and Microcontroller	3	1	-	3	25	75	100
	Elective-I	4	-	-	3	25	75	100
	Elective-II	4	-	-	3	25	75	100
	Practical							
EC P61	Communication Laboratory- II	-	-	3	2	50	50	100
EC P62	Computer Networks Laboratory	-	-	3	2	50	50	100
EC P63	Microprocessor and Microcontroller Laboratory	-	-	3	2	50	50	100
HS P64	General Proficiency - II	-	-	3	2	100	-	100
	Total	20	4	12	28	400	600	1000

VII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EC T71	Engineering Economics	3	1	-	3	25	75	100
EC T72	Microwave and Optical Engineering	4	-	-	4	25	75	100
EC T73	Embedded Systems	4	-	-	4	25	75	100
	Elective-III	4	-	-	3	25	75	100
	Practical							
EC P71	Communication Laboratory- III	-	-	3	2	50	50	100
EC P72	Embedded Systems Laboratory	-	-	3	2	50	50	100
EC P73	Seminar	-	-	3	1	100	-	100
EC P74	Industrial Visit/Training	-	-	-	1	100	-	100
EC PW7	Project Work	-	-	6	2	100	-	100
	Total	15	1	15	22	500	400	900

VIII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EC T81	Industrial Management	4	-	-	3	25	75	100
EC T82	Telecommunication Switching Networks	4	-	-	4	25	75	100
	Elective-IV	4	-	-	3	25	75	100
	Elective-V	4	-	-	3	25	75	100
	Practical							
EC P81	Advanced Communication Laboratory	-	-	3	2	50	50	100
EC P82	Comprehensive Viva	-	-	3	2	50	50	100
EC P83	Professional Ethics	-	-	3	1	100	-	100
EC PW8	Project Work	-	-	9	6	50	50	100
	Total	16	-	18	24	350	450	800

LIST OF ELECTIVES

VI Semester

EC E61 Soft Computing

EC E62 VLSI Design

EC E63 Digital Signal Processors and Applications

EC E64 Operating Systems

EC E65 Consumer Electronics

EC E66 Object Oriented Programming

VII Semester

EC E71 Digital image Processing

EC E72 Special Topics in Communication Engineering

EC E73 Cryptography and Network security

EC E74 Spread spectrum Communication

VIII Semester

EC E81 Cellular Mobile communication

EC E82 Satellite Communication Systems

EC E83 Microwave Integrated Circuit Design

EC E84 Optoelectronic Devices

EC E85 RF Circuit Design

EC E86 Speech Processing

T101 - MATHEMATICS – I

UNIT - I

Calculus: Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT - II

Multiple Integrals and Applications: Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

UNIT - III

Analytical Solid Geometry: Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

UNIT - IV

Differential Equations: Exact equations, First order linear equations, Bernoulli's equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT - V

Differential Equations (Higher order):
Linear differential equations of higher order – with constant coefficients, the operator D - Euler's linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Book:

1. M.K.Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.

Reference Book:

1. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

T102 - PHYSICS

UNIT - I

Acoustics and NDT: Ultrasonics - Ultrasonic Waves Productions (Piezoelectric and Magnetostriction method) – Detections (Acoustic Grating)

Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine's formula for Reverberation Time . NDT applications - Pulse Echo Method - Liquid Penetrant Method

UNIT - II

Optics: Interference - Air Wedge – Michelson's Interferometer – Wavelength Determination– Interference Filter – Antireflection Coatings. Diffraction - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating and Prism. Polarisation - Huygens Theory of Double Refraction – Quarter and Half Wave Plates – Specific Rotary Power – Laurent Half Shade Polarimeter

UNIT - III

Lasers and Fiber Optics: Lasers - Principles of Laser – Spontaneous and Stimulated Emissions - Einstein's Coefficients – Population Inversion and Laser Action – Optical resonators – Types of Lasers - NdYAG, CO_2 laser, GaAs Laser

Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)

UNIT - IV

Wave Mechanics:

Matter Waves – de Broglie Wavelength – Uncertainty Principle – Schrödinger Wave Equation – Time Dependent – Time Independent – Application to Particle in a One Dimensional Box – Quantum Mechanical Tunneling – Tunnel Diode.

UNIT - V

Nuclear Energy Source: General Properties of Nucleus (Size, Mass, Density, Charge) – Mass Defect – Binding Energy - Disintegration in fission – Nuclear Fusion (p-p and C-N cycle) – Nuclear Reactor: Materials Used in Nuclear Reactors. – PWR – BWR - FBTR

Text Books:

1. A S Vasudeva, Modern Engineering Physics, S. Chand & Co, New Delhi, 2006.
2. V Rajendran, Engineering Physics, TMH, New Delhi 2008.

Reference Books:

1. Richtmyer, Kennard and cooper , Introduction to Modern Physics, TMH, New Delhi 2005.
2. Ajay Ghatak, Optics, TMH, New Delhi, 2007.
3. Thiagarajan and Ghatak, Laser and Application, TMH, New Delhi, 2008.
4. Arthur Beiser, Concept of Modern Physics, TMH, New Delhi, 2008.
5. Avadhanulu M N and Kshir Sagar , A Text Book of Engineering Physics, S. Chand & Co, New Delhi, 2007.
6. R. Murugeshan, Modern Physics, S. Chand & Co, New Delhi, 2006.
7. K.R.Nambiar, Lasers, New Age International, New Delhi, 2008.

T103 – CHEMISTRY

UNIT - I

Water: Hardness of water – units and calcium carbonate equivalent. Determination of hardness of water- EDTA method. Disadvantages of hardwater-boiler scale and sludge, caustic embrittlement, priming and foaming and boiler corrosion. Water softening method – internal and external conditioning – lime-soda process, zeolite process and ion exchange process. Desalination – reverse osmosis and electrodialysis.

UNIT - II

Polymers : Classification, types of polymerization reactions - mechanism of radical, ionic and Ziegler-Natta polymerizations. Polymer properties - chemical resistance, crystallinity and effect of temperature. Thermoplastics and thermosets. Polymerization techniques -bulk, suspension, emulsion, solution and gas phase polymerization. Preparation, properties and uses of PVC, TEFLON, Nylons, Bakelite, polyurethane, Mn and Mw. Rubbers - vulcanization, synthetic rubber, buna S, buna N, silicone and butyl rubber. Conducting polymers - classification and applications. Polymer composites – FRP - laminar composites.

UNIT - III

Electrochemical Cells: Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen calomel, Ag /AgCl and glass electrodes. Batteries - primary and secondary cells, laclanche cell, lead acid storage cell, Ni-Cd battery and alkaline battery. Fuel cells - H_2-O_2 fuel cell.

UNIT - IV

Corrosion And Its Control: Chemical and electrochemical corrosion-Galvanic series-galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion-corrosion control methods - cathodic protection and corrosion inhibitors. Protective coating - types of protective coatings-metallic coating-tinning and galvanizing, cladding, electroplating and anodizing.

UNIT - V

Phase Rule: Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems.

Text books:

1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi 2004.
2. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2nd edition. PHI Learning PVT., LTD, New Delhi, 2008.

Reference Books:

1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. New Delhi.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P) Ltd., Meerut, 2001.

T 110 - BASIC CIVIL AND MECHANICAL ENGINEERING

PART-A CIVIL ENGINEERING

UNIT - I

Buildings, Building Materials: Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

UNIT - II

Buildings and their Components: Buildings- Various Components and their functions. Soils and their classification Foundations-Functions and types of foundations, Masonry, Floors-functions and types of floors, Roofs and types of roofs.

UNIT - III

Basic Infrastructure: Surveying-classification, general principles of surveying – Basic terms and definitions of chain, compass and leveling surveying , uses of surveying , contours, their characteristics and uses. Roads-types, Water bound macadam road, cement concrete road, bituminous road. Bridges-components and types of bridges. Dams-Purpose, selection of site, types of dams and components. Water supply-sources and quality requirements. Rainwater harvesting.

PART - B MECHANICAL ENGINEERING

UNIT - IV

Internal and External Combustion Systems: Working principles of IC engines - Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.

Conventional Power Generation Systems: Hydraulic, steam and gas turbines power plants – Schemes and layouts – Selection criteria of above power plants.

UNIT - V

Non-Conventional Energy Systems (Description Only): Solar thermal systems – Solar photovoltaic – Solar pond – wind, wave, tidal, geothermal and ocean thermal energy conversion systems.

Casting : Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

UNIT - VI

Metal Joining: Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications. Sheet Metal Processing-Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications .

Text Books:

1. Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai, 2001.
2. Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications Chennai, 2001.
3. Lindberg, R.A.Process and Materials of Manufacture, PHI, 1999.
4. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi, 1998.

Reference Books

1. Rajput, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2002.
2. Punmia, B.C., et. al., Surveying , Vol-I, Laxmi Publishers, New Delhi, 2002.
3. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2002.
4. El.Wakil, M.M., Power Plant Technology, Mc Graw Hill Book Co.,1985.
5. Hajra Choudhry, et. al., Workshop Technology Vol I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.

T111 - ENGINEERING MECHANICS

UNIT - I

Fundamental of Mechanics: Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

UNIT - II

Plane Trusses: Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses-method of joints, method of sections

Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction.

UNIT - III

Properties of Surfaces: Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

UNIT - IV

Kinematics and Kinetics of Particles: Equations of motion - Rectilinear motion, curvelinear motion, Relative motion, D'Alembert's principle, work- Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.

UNIT - V

Kinematics and Kinetics of Rigid bodies: Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books

1. Bhavikatti,S.S and K.G.Rajashekarappa, Engineering Mechanics, New Age International (p) Ltd, New Delhi,2008.
2. Rajesekaran, S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2002.

Reference Books

1. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill,2001.
2. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 1997.

T112 - COMMUNICATIVE ENGLISH

UNIT - I

Basic Communication Theory: Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

UNIT - II

Comprehension and Analysis: Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing

UNIT - III

Writing: Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

UNIT - IV

Business Writing / Correspondence: Report writing – Memoranda – Notice – Instruction – Letters – Resumes – Job applications

UNIT - V

Oral Communication: Basics of phonetics – Presentation skills – Group Discussions – Dialogue writing – Short Extempore – Debates-Role Plays-Conversation Practice

Reference Books:

1. Ashraf M.Rizvi., Effective Technical Communication. Tata-McGraw, 2005.
2. Boove, Courtland R et al., Business Communication Today, Pearson Education, New Delhi, 2002.
3. Meenakshi Raman and Sangeeta Sharma., Technical Communication Principles and Practice,OUP, 2007.
4. Robert J.Dixson. ,Complete Course in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2006.
5. Robert J.Dixson., Everyday Dialogues in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2007.
6. Sethi,J and Kamalesh Sadanand., A Practical Course in English Pronunciation, Prentice-Hall of India Pvt. Ltd, New Delhi,2007.

P**104 - PHYSICS LABORATORY**

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee's DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton's rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly's experiment – determination of α
10. Magnetism: i – h curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber

P105 - CHEMISTRY LABORATORY

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
6. Estimation of vinegar.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
9. Estimation of available chlorine in bleaching powder.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments (Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

P106 - WORKSHOP PRACTICE

Sl.No.	Trade	List of Exercises
1.	Fitting	Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.
2.	Welding	Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding
3.	Sheet metal work	Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.
4.	Carpentry	Study of tools and Machineries – Exercises on Lap joints and Mortise joints

LIST OF EXERCISES

I - Fitting

1.Study of tools and Machineries
2.Symmetric fitting 3.Acute angle fitting

II - Welding

1. Study of arc and gas welding equipment and tools
2.Simple lap welding (Arc) 3.Single V butt welding (Arc)

III - Sheet metal work

1. Study of tools and machineries
2. Funnel
3. Waste collection tray

IV - Carpentry

1. Study of tools and machineries
2. Half lap joint
3. Corner mortise joint.

T107 - MATHEMATICS – II

UNIT - I

Algebra: Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

UNIT - II

Matrices: Inverse of matrix by row transformation – Eigen values and Eigen vectors - Cayley-Hamilton theorem (without proof) – Diagonalisation – rank of matrix – solution of a general system of m linear algebraic equations in n unknown ($m \leq n$).

UNIT - III

Trigonometry: Expansions for $\sin^n \theta$, $\cos^n \theta$, $\tan^n \theta$, $\sin(n\theta)$, $\cos(n\theta)$, $\tan(n\theta)$. Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts.

UNIT - IV

Vector Analysis: Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

UNIT - V

Statistics: Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Books:

1. M.K. Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.
2. M.K. Venkataraman, Engineering Mathematics (Third Year-Part A), The National Publishing Company, Madras, 2001.

Reference Book:

1. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

T108 - MATERIAL SCIENCE

UNIT - I

Crystal Structure and Defects: Crystal Systems – Bravais Lattices – Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices for a cubic crystal– Powder X Ray Diffraction Method - Lattice defects – Qualitative ideas of point, line, surface and volume defects.

UNIT - II

Dielectric Properties: Dielectric Polarization and Mechanism – Internal or local Field - Clausius-Mossotti relation – Dielectric loss - Temperature and frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and its Applications.

UNIT - III

Magnetic Properties: Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro & Ferri) – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis – Heisenberg Theory of Exchange Interaction (without derivation) – Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications: floppy disks, CD ROM, Magneto optical recording

UNIT - IV

Semiconductors and Superconductors: Derivation of Carrier concentration in intrinsic Semiconductor – Hall effect in Semiconductors -- Application of Hall Effect - Basic Ideas of Compound Semiconductors (II-VI & III-V) - Basic concepts of superconductivity – transition temperature – Meissener effect – Type I and II superconductors – high temperature superconductors – 123 superconductor.

UNIT - V

Advanced Materials: Liquid Crystals – Types – Application as Display Devices – Metallic Glasses – Nanomaterials (one, Two & three Dimensional) – Physical Properties and Applications of Carbon Nano Tubes

Text books:

1. V Raghavan , Materials Science and Engineering- A First Course, PHI Learning, 2008.
2. M Arumugam , Materials Science, Anuratha Printers, 2004.

Reference Books:

1. M Ali Omar, Elementary Solid State Physics, Addison Wesley Publishing Co., 2000.
2. William D Callister Jr., Material Science and Engineering, John Wiley and sons, 2006.
3. Srivatsava J P, Elements of Solid State Physics, PHI Learning, 2001.
4. Charles Kittel, Introduction to Solid State Physics, John Wiley & sons, Singapore ,2007.
5. S.O Pillai , Solid State Physics– New Age International,2005.
6. Charles P Poole and Frank J Owens, Introduction to Nanotechnology, Wiley Interscience, 2003.

T109 - ENVIRONMENTAL SCIENCE

UNIT - I

Environmental Segments and Natural Resources: Environmental segments-lithosphere, hydrosphere, biosphere and atmosphere-layers of atmosphere. Pollution-definition and classification. Pollutants-classification.Forest resources-use and overexploitation, deforestation, forest management. Water resources-sources, use and conflicts over water, dams-benefits and problems. Mineral resources-mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources-world food problems, environmental impact of modern agriculture-fertilizer and pesticides, overgrazing and land resources-land degradation- land slides, soil erosion and desertification. Energy resources-growing energy needs renewable and non-renewable energy resources and use of alternate-energy sources.

UNIT - II

Ecosystem and Biodiversity: Concept of an ecosystem-structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grass land, desert and aquatic (fresh water, estuarine and marine) ecosystem. Biodiversity-definition-genetic species and ecosystem diversity. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity-habitat loss, poaching of wild life, human-wildlife conflicts. Endangered and endemic species. Conservation of biodiversity-in situ and ex-situ conservation of biodiversity.

UNIT - III

Air Pollution: Air pollution-sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluro carbons and particulates. Green house effect-causes and effects on global climate and consequences. Ozone depletion-causes, mechanism and effect on the environment. Smog-sulfurous and photochemical smog-effect on the environment. Acid rain-theory of acid rain and effects.

UNIT - IV

Water Pollution and Solid Waste Management Sources: effects and control measures of –water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and radioactive pollution. Solid waste management – causes, effect and control measures of urban and industrial wastes.

UNIT - V

Social Issues and the Environment: From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, water shed management. Resettlement and rehabilitation of people. Environmental ethics. Consumerism and waste products. Environmental protection act-air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act. Role of an individual in prevention of pollution. Human population and the environment-population growth, variation among nations, population explosion, role of information technology in environment and human health.

Text Books:

1. K. Raghavan Nambiar, "Text Book of Environmental Studies" 2nd edition, Scitech Publications, India, Pvt. Ltd, Chennai, 2008.
2. A. K. De, "Environmental chemistry" 6th edn; New age international (P) Ltd, New Delhi, 2006.

Reference Books:

1. B.K. Sharma, "Environmental chemistry" goel publishing house, Meerut, 2001.
2. G. S. Sodhi, Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi
3. S .S.Dara, " A text book of environmental chemistry and pollution control, S. Chand and Company Ltd, New Delhi, 2002.
4. Richard T. Wright, environmental science, 9th edition, Pearson education inc, New Delhi, 2007
5. P. Meenakshi, "Elements of environmental science and engineering" PHI Learning, New Delhi, 2006.

T104 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

PART A – ELECTRICAL

UNIT – I

Review of Kirchoff's laws - series and parallel circuits, equivalent resistance, star/delta conversion. Concepts of AC circuits – rms value, average value, form and peak factors – real and reactive power – power factor.

UNIT – II

Node and mesh methods of analysis of DC circuits and simple AC circuits - Introduction to three phase circuits, Introduction to three phase system - phase and line parameters – relations, power measurement – voltmeter and ammeter method, two and three wattmeter methods.

UNIT – III

Principle of DC generator and motor - Transformer, synchronous generator, induction motor (single phase). Sources for electrical energy conversion-thermal and hydraulic plant (Block diagram approach only). Components of AC transmission and distributions systems – line diagram.

PART B – ELECTRONICS

UNIT – IV

Half-wave rectifier and Full-wave rectifier- filters - Amplifiers-common emitter and common collector amplifiers- Hartley oscillator and RC phase shift oscillator. Transducers – Resistance temperature detector (RTD) – Linear variable differential transformer (LVDT) - Strain gauge – Piezo electric transducer.

UNIT – V

Boolean algebra – Reduction of Boolean expressions – De-Morgan's theorem – Logic gates – Implementation of Boolean expressions – Flip flops – RS, JK, T and D. Combinational logic – Half adder, Full adder and Subtractors. Sequential logic – Ripple counters and shift registers.

UNIT – VI

Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN.

Text Books:

1. Hughes revised by John Hiley, Keith Brown, Ian McKenzie Smith, Electrical and Electronics Technology, Pearson Education Limited, New Delhi, 2007.
2. Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering, Second Edition, PHI Learning, 2007.
3. George Kennedy and Bernard Davis, Electronics communication Systems, Tata McGraw-Hill Ltd, New Delhi, 2007.

Reference Books:

1. D.P.Kothari and I.J.Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Learning., New Delhi.
2. J.B.Gupta, A Course in Electrical Power, Katson Publishing House, New Delhi,

T105 – ENGINEERING THERMODYNAMICS

UNIT - I

Basic Concepts and Definitions: Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

UNIT - II

First Law of Thermodynamics: The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

UNIT - III

Second Law of Thermodynamics: Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

UNIT - IV

Gas Power Cycles: Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

UNIT - V

Refrigeration Cycles and Systems: Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system (only theory)- Liquifaction and solidification of gases

Text Books:

1. Nag, P. K., “Engineering Thermodynamics”, 4th edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi,1995.
2. Wark, K., “Thermodynamics”, 4th edition, McGraw Hill, N.Y.,1985

Reference Books :

1. Arora, C.P., “Thermodynamics” , Tata McGraw Hill Publishing Co. Ltd., New Delhi,1998.
2. Burghardt, M.D., “Engineering Thermodynamics with Applications”, 4th edition, Harper and Row, N.Y., 1986.
3. Huang, F.F., “Engineering Thermodynamics” 2nd edition , Macmillan Publishing Co. Ltd., N.Y.,1989.
4. Cengel, Y.A. and Boles, M.A., "Thermodynamics - An Engineering Approach", 5th edition, McGraw Hill, 2006

T106 - COMPUTER PROGRAMMING

UNIT – I

History of Computers – Block diagram of a Computer – Components of a Computer system – Classification of computers - Hardware – Software – categories of Software – Operating System – Applications of Computers - Role of Information Technology – Internet and its services – Intranet – Study of word processor – Preparation of worksheets

UNIT – II

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.
Introduction to C – C tokens – data types – Operators and expressions – I/O functions

UNIT – III

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions Storage classes – Strings – String library functions

UNIT – IV

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union
Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures

UNIT – V

Files – operations on a file – Random access to files – command line arguments
Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives

Text Books:

1. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008.
2. K. Venugopal and C.Kavichithra, “Computer Programming”, New Age International Publishers, First Edition, 2007.

Reference Books:

1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, Third edition, 2006.

P101 - COMPUTER PROGRAMMING

LABORATORY List of Exercises:

OS Commands, Word Processor and Spreadsheets

1. Study of OS commands-Compilation and execution of simple C programs
2. Use of mail merge in word processor
3. Use of spreadsheet to create Charts(XY, Bar, Pie) and apply the formulae wherever necessary C Programming (Flowcharts and algorithms are essential for the programming exercises)
4. Greatest of three numbers using conditional operator and if statement
5. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
6. Solve quadratic equation for different sets of inputs.
7. Use of Switch….Case statements
8. Generation of prime and Fibonacci series
9. Evaluate the COSINE series using for, while and do..while loops
10. Matrix operations
    (a) Addition
    (b) Transpose
    (c) Multiplication
11. Evaluate the sin(x) series using functions and recursive functions
12. Read a string and find solution to remove the duplicates of a given string from the given sentence

13. Create an array of structures for a list of items with the following details

Item_Code	Item_ Name
102	Paste – Colgate
102	Paste –Pepsodent
102	Paste –Close-up
101	Soap-Cinthol
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove

Arrange the set of items in ascending order of its Item_Code and descending order of its Item_ name as given below

Item_Code	Item_ Name
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove
101	Soap-Cinthol
102	Paste –Pepsodent
102	Paste –Colgate
102	Paste – Close-up

14. Use of Structure to define a user defined data types, input the data and write the data into the file
15. Use of pointers and array of pointers
16. Functions with static data types
17. Write command line program to implement the following DOS commands using files
    - Del
    - Copy

P102 - ENGINEERING GRAPHICS

Unit - 0

Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit - I

Conic sections, Involutes, Spirals, Helix. Projection of Points, Lines and Planes

Unit - II

Projection of Solids and Sections of Solids.

Unit - III

Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit - IV

Isometric projections and Orthographic projections

Unit - V

Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books

1. K.R. Gopalakrishna and Sudhir Gopalakrishna, Engineering Graphics, Inzinc Publishers, 2007.
2. K.V. Natarajan, A Text Book of Engineering Drawing, Dhanalakshmi Publishers, 2006.
3. BIS, Engineering Drawing practice for Schools & College, 1992.

Reference Books

1. N.D. Bhatt, Engineering Drawing, 49th edition, Chorotar Publishing House, 2006.
2. K. Venugopal, Engineering Drawing and Grahics + Auto CAD, 4th edition, New Age International Publication Ltd., 2004 .
3. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn. 1985.
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int., 1989.

P103 - BASIC ELECTRICAL AND ELECTRONICS LABORATORY

ELECTRICAL LABORATORY

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor's room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places-wiring

ELECTRONICS LABORATORY

1. Rectifiers

Construction of half wave and full wave rectifiers with and without filters – Calculation of ripple factors.

2. Frequency Response of RC Coupled Amplifiers

Determination of frequency response of given RC coupled amplifier-calculation of bandwidth.

3. Verification of Kirchoff's Voltage and Current Laws

Determine the voltage and current in given circuits using Kirchoff"s laws theoretically and verify the laws experimentally.

4. Study of Logic Gates
   (a) Verification of Demorgan's theorems
   (b) Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
   (c) Implementation of digital functions using logic gates
5. Study of CRO
   (a) Measurement of AC and DC voltages
   (b) Frequency and phase measurements (using Lissajou's figures)
6. Study of Transducers
   (a) Displacement and load measurements with transducers
   (b) Temperature measurement with thermocouple

P107 - NCC / NSS

NCC/NSS training is compulsory for all the Undergraduate students:

1. The above activities will include Practical/field activities/Extension lectures.
2. The above activities shall be carried out outside class hours.
3. In the above activities, the student participation shall be for a minimum period of 45 hours.
4. The above activities will be monitored by the respective faculty incharge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.

MA T31 - MATHEMATICS - III

UNIT - I

Laplace Transform: Definitions - Laplace transform of unit impulse and step functions - Laplace transform of periodic functions - Exponential shift formula- Initial and final value theorems - Laplace transform of derivatives and integrals - Convolution theorem - Inverse Laplace transform - Methods of determining inverse Laplace transform -Solution of linear differential equations using Laplace transforms.

UNIT - II

Function of a Complex Variable: Functions of a complex variable - continuity, derivative and analytic function - Cauchy - Riemann equations – Necessary and sufficient conditions for analyticity - Harmonic and orthogonal properties of real and imaginary parts - Conformal mapping - Bilinear transformations.

UNIT - III

Complex Integration: Cauchy's theorem -Cauchy's integral formula - Taylor's and Laurent series - Residue theorem - Contour integration round the unit circle and semi-circular contour.

UNIT - IV

Fourier Series: Dirichlet's conditions - Expansion of periodic functions into Fourier series- Change of interval- Half-range Fourier series.
Complex form of Fourier series - Root mean square value - Parseval's theorem on Fourier coefficients - Harmonic analysis.

UNIT - V

Fourier Transform: Definition and properties - Fourier Integral theorem - statement - Fourier sine transform and cosine transforms - Inverse Fourier transform.

Text Books:

1. M.K.Venkataraman, Engineering Mathematics, Vol. II, National Publishing co. Madras, 2009
2. M.K.Venkataraman, Engineering Mathematics, Vol. III, National Publishing co. Madras, 2009

Reference Books:

1. N.P. Bali & Manish Goyal : A text book of Engineering Mathematics, Laxmi Publications, New- Delhi, 2008.
2. Erwin Kreyszig : Advanced Engineering Mathematics, John- Wiley sons, New-York, 2005.
3. B. S. Grewal, : Higher Engineering Mathematics, Khanna Publishers, New-Delhi, 2008

EC T32 - ELECTRICAL ENGINEERING

UNIT - I

Transformers: Principle of operation – Single Phase transformer – Equivalent circuit – Regulation – Losses and Efficiency – Introduction to 3 phase transformers – Autotransformers – pulse transformers.

UNIT - II

D.C. Machines: Construction, Principles of operation of DC Generators – types -EMF equation – No load and Load characteristics of series and shunt generators – DC motor – Torque – Speed – Torque characteristics of series and shunt motors – Speed control and application.

UNIT - III

A.C. Machines: Principle of operation of 3-phase Induction Motor – Torque, slips characteristics – Speed control methods – Single-phase Induction motor starting methods – Braking concepts.

UNIT - IV

Special Machines: servo motor – DC and AC servomotors; stepper motors – variable reluctance and permanent magnet stepper motors; single phase synchronous motor – reluctance motor and hysteresis motor – universal motor – Linear induction motor(LIM) – linear synchronous motor(LSM).

UNIT - V

Utilisation: Domestic wiring – principle of electrical heating – The law of illumination – Electric lamps – Photometers – Electroplating – Electric Traction – Air conditioning – Earthing.

Text Books:

1. B.L. Theraja, "Electrical Technology Vol.II AC/DC Machines", S. Chand, 2008
2. I.J. Nagrath and D.P. Kothari, "Electric machines", Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2008.

Reference Books:

1. Battacharya S K, "Electrical Machines", Technical Teachers Training institute", 2nd edition.2003.
2. J.B.Gupta,"Theory and Performance of Electrical Machines", J.K.Kataria & Sons, 13th edition, 2004.
3. S.L.Uppal, "Electrical power" Khanna Publications (p) Ltd, Delhi, 2002.
4. G.C.Garg, "Utilisation of Electric power and electric traction" Khanna Publications (p) Ltd, Delhi, 2006.
5. A.Chakrabarti, M.I.Soni, P.V.Gupta,"Textbook on ower sytems engineering", Dhanpat Rai, 2008.

EC T33 - DATA STRUCTURES AND ALGORITHMS

UNIT – I

Introduction to data structures: Information and meaning – Arrays in C – Structures in C
Stack: Definition and examples – Representing stacks in C – Infix, postfix and prefix

UNIT – II

Recursion: Recursive definition and processes – Recursion in C – Writing recursive programs – Simulating recursion – Efficiency of recursion.

Queues and Lists: The queue and its sequential representation – Linked Lists – Lists in C – Simulation using linked lists – Other list structures.

UNIT – III

Trees: Binary trees – Binary tree representations – Huffman algorithm – Representing lists as binary trees – Trees and their applications – Game trees.

UNIT – IV

Sorting: General background – Exchange sorts – Selection and tree sorting – Insertion sorts – Merge and radix sorts
Searching: Basic search techniques – Tree searching – General search trees - Hashing

UNIT – V

Graphs and their applications: Graphs – A flow problem – Linked representation of graphs – Graph traversal and spanning forests
Storage management: General lists – Automatic list management – Dynamic memory management.

Note: It is expected to mention the type of algorithm such as greedy, dynamic programming, divide and conquer, backtracking etc., for every problem discussed in this paper.

Text Book:

1. Yedidyah Langsam, Moshe J. Augenstein and Aaron M. Tenebaum, "Data Structures Using C and C++" Prentice Hall of India, 2008
2. Niklaus wirth, "Algorithms + Data Structures = Programs", PHI, 2008.
3. R.G.Dromey, "How to Solve it by Computer', PHI, 2002.

EC T34 - ELECTRON DEVICES

UNIT- I

Electron Ballistics and Semiconductor Theory: Force on charge in electric field – two dimensional motion- force in a magnetic field - parallel and perpendicular electric and magnetic field – electrostatic and magnetic deflection in CRT. Energy band structure of insulators, conductors and semiconductors – conductivity of an intrinsic semiconductor – Fermi Dirac distribution and energy band diagram – Fermi levels in extrinsic semiconductor – Hall effect.

UNIT- II

Semiconductor Diodes: PN Junction Diode – operation, forward, reverse bias characteristics- Diode equation, Temperature effects – DC and AC resistance – Diode equivalent circuit – Transition and diffusion capacitance – Diode switching times – Diode applications- Logic gates AND and OR, Series and parallel clippers. Zener diode- characteristics – Breakdown concepts- Zener/Avalanche breakdown.

UNIT- III

Transistors: Transistor operation – Current components – CB, CE, CC configuration and characteristics – Early effect – Eber-Moll model of transistor – Transistor as an amplifier- Transistor as a switch – Transistor switching times. Construction and characteristics of JFET – Relation between pinch off voltage and drain current – JFET as voltage variable resistor – MOSFET – Depletion and enhancement types, CMOS – Its construction and characteristics.

UNIT- IV

Special Diodes and Photonic Devices: Construction, Principle of operation, application and characteristics of Schottky barrier diode, Varactor diode, Tunnel diode, PIN diode. LED, LCD, Seven segment display, Photoconductivity – Photodiode, APD, Phototransistor, Solar cells- Concept of DLP.

UNIT- V

Power Devices: SCR, Two transistor model- operation and characteristics, Phase control using SCR, SCS and light activated SCR, Schottky diode, DIAC, TRIAC and their applications. Characteristics and equivalent circuit of UJT – intrinsic standoff ratio –UJT relaxation oscillator, triggering circuit for SCR – programmable UJT.

Text Books:

1. Jacob Millman and Christos C. Halkias, “Electronic Devices and Circuits” Tata McGraw Hill
2. R.L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, PHI Learning Private Limited, Ninth Edition, 2008

Reference Books:

1. David A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Limited, Fourth Edition, 2007

EC T35 - CIRCUIT THEORY

UNIT- I

DC Circuit Analysis: Sources-Transformation and manipulation, Network theorems - Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, Compensation theorem, Maximum power transfer theorem and Tellegen's theorem – Application to DC circuit analysis.

UNIT- II

AC Circuit Analysis: Series circuits - RC, RL and RLC circuits and Parallel circuits -RLC circuits - Sinusoidal steady state response - Mesh and Nodal analysis - Analysis of circuits using Superposition, Thevenin's, Norton's and Maximum power transfer theorems. Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency – Bandwidth - Q factor -Selectivity.

UNIT- III

Transient Analysis: Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by DC and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation.

UNIT- IV

Magnetically Coupled Circuits: Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multiwinding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

UNIT -V

Network Topology: Network terminology - Graph of a network - Incidence and reduced incidence matrices – Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tiesets - Link currents and Tieset schedules -Twig voltages and Cutset schedules, Duality and dual networks.

Text Book:

1. William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", McGraw Hill Science Engineering, Seventh Edition, 2006

Reference Books:

1. Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.
2. David A. Bell, "Electric Circuits", Sixth Edition, PHI Learning, New Delhi, 2003.

EC T36 - ENGINEERING ELECTROMAGNETICS AND WAVES

UNIT-I

Electric Field: Introduction - Orthogonal co-ordinate systems – Divergence theorem, Stoke's theorem. Coulomb's law - Electric field intensity, electric fields due to point charge, line charge, surface charge and volume charge distributions – Electric flux density - Gauss's law and its applications - Electric potential – Potential gradient, Poisson and Laplace equations - Dipole and dipole moment. Capacitors - Capacitance of system conductors – Electric potential energy associated with different charge distribution – Energy density.

UNIT-II

Magnetic Field: Concepts **–** Vector magnetic potential – Force on a current element, Biot-savart's law and applications – Magnetic flux density and magnetic field intensity – Force between current carrying conductors – Torque on closed conductors, Ampere's law and modified Ampere's law, Helmholtz's theorem.

UNIT-III

Electromagnetic Induction: Faraday's law of electromagnetic induction– Inductance of solenoids, toroids, transmission lines and cables – Mutual inductance – Inductors in series and parallel circuits – Energy stored in magnetic fields and energy density – Force and torque on closed circuits .Boundary conditions at the surface of dielectric, conductor and magnetic.

UNIT-IV

EM Waves and Wave Equations: Maxwell's equation in point and integral form– Poynting's theorem – Energy in electromagnetic field, Electromagnetic wave equation, wave equation for free space and conducting medium.

UNIT-V

Electromagnetic Waves: Uniform plane wave - Characteristics impedance or intrinsic impedance – Wave propagation in a lossless medium, conducting medium, good dielectric, good conductor – phase velocity and group velocity – Depth of penetration – Polarization, linear polarization, circular polarization and elliptical polarization - Reflection and refraction of plane waves – Surface waves.

Text Books:

1. David K. Cheng, "Field and Wave Electromagnetics", Second Edition, Pearson Education, Asia, 2008.
2. Edward C.Jordan and Keith G.Balaman, "Electromagnetic waves and radiating systems", Second Edition, PHI Learning, 2007.

Reference Books:

1. K.A.Gangadhar, "Field Theory", Khanna Publishers, 2006.
2. William H. Hayt, "Engineeering Electromagnetics", McGraw Hill, Fifth Edition, 2008.
4. J. D. Kraus, "Electromagnetics", McGraw Hill, 2007.

EC P31 - ELECTRICAL ENGINEERING LABORATORY

1. OC and SC test on single phase transformer.
2. Load test on single phase transformer.
3. Load test on DC shunt motor.
4. OCC characteristics of generator.
5. Two wattmeter method of power measurement.
6. Swinburne's test.
7. Load test on single phase IM.
8. Load test on 3 phase transformer.
9. Load test on 3 phase induction motor.
10. Parallel operation of transformer.

EC P32 - DATA STRUCTURES AND ALGORITHMS LABORATORY

1. Recursion:
   a) Fibonacci Series.
   b) Factorial Computation.

2. Linked list:
   a) Implementing Singly Linked List- Creation, Insertion, Deletion.
   b) Implementing Doubly Linked List- Creation, Insertion, Deletion.
   c) Implementing Circular Linked List- Creation, Insertion, Deletion.

3. Stack:
   a) Implementing Stack Operation- Push, Pop.
   b) Implementing Double Stack Operation- Push, Pop.

4. Queue:
   a) Implementing Queue Operation.
   b) Implementing Circular Queue Operation.

5. Binary tree:
   a) Binary Search Tree – Searching, Insertion & Deletion.
   b) Binary Tree Traversal.

6. Minimum spanning tree:
   a) Prim's Algorithm.
   b) Kruskal's Algorithm.

7. Graph:
   a) All Pair Shortest Path.
   b) 8 – Queen problem.

8. Sort:
   a) Bubble Sorting.
   b) Quick sorting.
   c) Merge Sorting.
   d) Insertion Sorting.

9. Hashing:
   Implementing Hashing Techniques.

EC P33 - ELECTRON DEVICES LABORATORY

1. V-I characteristics of semiconductor diodes
    a) PN Junction diode
    b) Point contact diode
    c) Zener diode

2. Characteristics of BJT in CB configuration
    a) Determination of input and output characteristics
    b) Determination of voltage gain, current gain, input and output resistances from the characteristics

3. Characteristics of BJT in CE configuration
    a) Determination of input and output characteristics
    b) Determination of voltage gain, current gain, input and output resistances from the characteristics

4. Characteristics of JFET
    a) Determination of output and transfer characteristics
    b) Determination of pinch off voltage, r_d, g_m and μ from the characteristics

5. Characteristics of MOSFET
    a) Determination of output and transfer characteristics
    b) Determination of r_d, g_m and μ from the characteristics

6. Characteristics of SCR and TRIAC

7. Characteristics of UJT
    Determination of intrinsic stand off ratio

8. Characteristics of photonic devices
    a) Determination of V-I characteristics of LED
    b) Determination of V-I and intensity characteristics of phototransistor

9. Clipper circuits using diodes
    Positive, negative, biased and combinational clippers

10. Switching circuit
    a) AND and OR logic gates using diodes
    b) NOT gate using transistor

MA T41 - NUMERICAL METHODS AND TECHNIQUES

UNIT - I

Solution of Algebraic and Transcendental Equation and Eigen Value Problem: Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe's Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT-II

Solution of System of Equations and Matrix Inversion: Solution of linear algebraic equation: Gauss and Gauss-Jordan elimination methods- Method of Triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss - Jordan elimination and Crout's methods.

UNIT-III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Numerical differentiation in one variable. Numerical Integration by Trapezoidal and Simpson's rule with respect to one and two variables.

UNIT-IV

Solution of Ordinary Differential Equation: Single step methods: Taylor series method, Picard's method of successive approximation, Euler and Improved Euler methods, Runge-Kutta method of fourth order only. Multistep methods: Milne and Adams - Bashforth methods.

UNIT - V

Solution of Partial Differential Equations: Boundary value problems: Laplace and Poison equations- Liebmann's iterative method. Diffusion equation: Explicit and Crank-Nicholson implicit difference schemes. Wave equation: Explicit difference method.

Text Book:

1. P. Kandasamy, K. Gunavathy and K. Thilagavathy, "Numerical Methods", S. Chand & Company Ltd, New Delhi.

Referencess:

1. M.K. Venkataraman, "Numerical methods in Science and Engineering", National Publishing Company, Madras.
2. B.S. Grewal, "Numerical methods in Engineering & Science", Khanna Publishers, New Delhi.

EC T42 - ELECTRONIC CIRCUITS –I

UNIT- I

Biasing and Stabilization: Operating point and Q-point - Different types of BJT biasing – Fixed bias, Collector to base bias, Self bias - Stabilization of Q point and stability factor – Bias compensation- Thermistor and sensistor compensation –Thermal runaway and thermal stability. FET biasing – gate bias, self bias and voltage divider biasing – MOSFET biasing

UNIT- II

Transistor Low Frequency Analysis: Two port devices and hybrid model – transistor hybrid model and h parameters - determination of h-parameters from the characteristics – Analysis of transistor amplifier using h-parameters – emitter follower -comparison of transistor amplifier configurations – CE amplifier with an emitter resistance; Low frequency FET model –Common source and Common drain amplifiers

UNIT- III

Transistor High Frequency Analysis: Hybrid pi CE transistor model – Hybrid pi conductances and capacitances - CE short circuit current gain and current gain with resistance- CE transistor amplifier response. High frequency FET model – common source and common drain amplifiers at high frequencies.

UNIT- IV

Small Signal Amplifiers: Cascading amplifiers – direct coupled and capacitor coupled two stage CE amplifiers – Differential amplifier - Darlington Pair - Cascode amplifier- Tuned amplifiers - single tuned –double tuned -stagger tuned amplifiers-wideband amplifiers.

UNIT- V

Power Supplies: Rectifiers – Half wave, Full wave and bridge rectifiers – ripple factor and efficiency –capacitor filter. Zener diode voltage regulator– Transistor series regulator – current limiting – short circuit protection and fold back current limiting – Opamp voltage regulator –switching regulator – step up and step down converters.

Text Books:

1. Millman and Halkias, “Integrated Electronics”, Tata McGraw Hill International Edition.
2. Mottershed A, “ Electronic Devices and Circuits”, PHI Learning, 2008.

Reference Books:

1. R.L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, PHI Learning Pvt. Ltd, India, Ninth Edition, 2008
2. David. A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Ltd, India, Fourth Edition, 2008

EC T43 - SIGNALS AND SYSTEMS

UNIT- I

Representation / Classification of Signals and Systems: Continuous time signals – Discrete time signals – Representation of signals – Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential signals, Operation on the signals – Classification of continuous time and discrete time signals – Periodic, Aperiodic, Deterministic, Random, Even, Odd, Energy and Power Signals – Continuous time and discrete time systems – Classification of systems – Properties of systems.

UNIT- II

Continuous Time Signal Representation / Analysis: Fourier series analysis – Representation of periodic signals in trigonometric and exponential forms – Fourier transform analysis of aperiodic signals – Spectral analysis of periodic and aperiodic signals – Parseval's theorem for periodic and aperiodic signals – Laplace transform in signal analysis.

UNIT- III

Continuous Time Systems: LTI continuous time systems – Differential equation – Block diagram representation and reduction techniques – impulse response – Convolution integral – Properties of LTI continuous time systems – Frequency response of continuous time LTI systems – Analysis of LTI systems using Fourier and Laplace transform techniques – State variable representation of LTI systems.

UNIT- IV

Discrete Time Signal Representation / Analysis: Discrete time Fourier series – Discrete time Fourier transform – Spectrum of discrete time periodic and aperiodic signals – Parseval relations – Z transform – Properties and application to discrete time signal analysis – Inverse Z transform.

UNIT- V

Discrete Time Systems: LTI discrete time systems – Difference equation – Block diagram representation and reduction techniques – impulse response – Convolution Sum – Properties of discrete time LTI systems – Frequency response – Analysis of LTI systems using Fourier and Z transform techniques – State variable representation of discrete time LTI systems.

Text Book:

1. Simon Haykins and Barry Van Veen, "Signals and Systems", Second Edition, John Wiley and Sons, 2002.

R**eference Books:**

1. AllanV.Oppenheim, Allan S.Willsky and S.Hamid Nawab, "Signals and Systems", Second Edition, PHI Learning, New Delhi, 2007.
2. Douglas K. Lindner, "Signals and Systems", McGraw-Hill International Edition, 1999.

EC T44 - NETWORKS AND TRANSMISSION LINES

UNIT- I

Network Parameters: Open circuit impedance (Z) parameters - short circuit admittance (Y) parameters - transmission (ABCD) parameters and inverse transmission parameters - Hybrid (h) parameters and inverse hybrid parameters - Conversion between parameters - interconnection of two-port networks.

UNIT- II

Time and Frequency Domain Analysis: Network elements- Network function- driving point and transfer impedances and their properties- Poles and zeros of network function, Time domain response for pole-zero plot. Immittance – loci of RLC networks – frequency response of RLC networks- frequency response from pole-zero plots. Synthesis of one port networks- synthesis of RL, RC, LC by Foster and Cauer method.

UNIT- III

Network Filters: Classification of filters - characteristic impedance in the pass band and stop band, constant K filters - m-derived filters – BPF and BSF. Insertion loss and reflection factor- Attenuators – Equalizer - T section and Pi section filters – Twin T networks, Bridged T and lattice networks.

UNIT- IV

Transmission Line Theory: Transmission line equation – Primary and secondary constants - Infinite line- attenuation and phase constants- skin effect- wavelength- velocity of propagation- group velocity. Waveform distortion- distortion less transmission line- telephone cable- inductance loading of telephone cables. Open and short circuit lines.

UNIT-V

Transmission Line at Radio Frequencies: Line with any termination- Input impedance, input impedance of a lossless line, Reflection coefficient- Standing wave ratio. Ultra high frequency lines- Characteristics impedance, SWR, Smith chart- applications of smith chart- Quarter wave transformer-Stub matching- Single and double.

Text Books:

1. M.E. Van Valkenburg, “Network Analysis”, PHI, Third Edition, 2008.
2. John. D. Ryder, “Network lines and fields”, PHI Learning, Second Edition, 2005.

Reference Books:

1. Umesh Sinha, “Transmission lines and Networks”, Sathya Prakasham Publishers, 1997.
2. Shyammohan and Sudhakar, "Circuits and Networks", Tata McGraw Hill, 1994.
3. Frankline F.Kuo, “Network Analysis and Synthesis”, Wiley Eastern Edition, 1996.

ECT45 - DIGITAL CIRCUITS

UNIT- I

Number System: Review of Binary, Octal and Hexadecimal Number Systems – Conversion methods. Number Representations – Signed Numbers and Complements, Unsigned, Fixed point, and Floating point numbers. Addition and subtraction with 1's and 2's complements.

Codes: Binary code for decimal numbers- Gray code-Codes for detecting and correcting errors: Even and Odd parity codes, Hamming Codes, Checksum codes, m-out–of-n-codes, codes for serial data transmission and storage.

UNIT – II

Boolean Algebra: Basic theorems- Postulates- Duality – Canonical form.

Simplification of Boolean Function: Karnaugh map method – Incompletely specified functions. Realization of logic functions - NAND gate realization - NOR gate realization - Multilevel synthesis.

UNIT - III

Combinational Logic Design: Half adder - Full adder- Full-subtractor – Parallel Adder- Carry Look Ahead Adder – BCD Adder – Magnitude Comparator – Encoders and Decoders – Multiplexers – Code converters – Parity generator, Parity checker- Combinational circuit implementation using multiplexers and decoders.

Programmable Logic Devices: PROM – EPROM – EEPROM- Programmable Logic Array (PLA) – Programmable Array Logic (PAL) -Realization of combinational circuits using PLDs.

UNIT – IV

Sequential Circuits: General model of sequential circuits –latches – Master-slave Configuration- Flip-Flops - Concept of State – State diagram – State Table.

Synchronous Sequential Circuits – Binary ripple counters-Design of Synchronous counters- binary counters- Arbitrary sequence counter - BCD counter – Shift Registers – Ring Counter – Johnson Counter – Timing diagram – Serial Adder – PN sequence generator.

Sequential PLDs - Introduction to CPLD and Field programmable Gate Array (FPGA).

UNIT – V

Memory: Classification of Memories – RAM Organization – Write Operation – Read Operation – Memory Cycle – Timing Waveforms – Memory Decoding – Memory Expansion – Static RAM Cell – Bipolar RAM Cell – MOSFET RAM Cell – Dynamic RAM Cell.

Text Books:

1. John F. Wakerly, "Digital Design Principles and Practices", PHI Privatre Ltd., New Delhi, Fourth Edition, 2006
2. Morris Mano, "Digital design", PHI Learning, Fourth Edition, 2008.

Reference Books:

1. Donald P Leach, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications," 6th edition,Tata McGraw Hill Publishing Company Ltd.,New Delhi,2008.
2. Thomas L. Floyd, "Digital Fundamentals," Dorling Kindersley (India) Pvt. Limited, 8th ed., 2008.
3. Tocci R J, "Digital systems: Principles and Applications", PHI learning, New Delhi, Tenth Edition 2006.

EC T46- ANALOG COMMUNICATION SYSTEMS

UNIT-I

Noise and Amplitude Modulation: General communication systems-external and internal noise-Noise figure and noise temperature-AWGN-Need for modulation-Amplitude modulation-Frequency spectrum-Power relation-Different types of AM modulators-SSB and VSB generation-AM transmitters-Block diagram-Functions of each block-High level transmitter.

UNIT-II

Angle Modulation: Principle of frequency and phase modulation-Relation between FM and PM waves-Bandwidth of FM-Narrow band and wideband FM-Generation of FM wave-Direct and Indirect methods-FM transmitters-Block diagram-Function of each block.

UNIT-III

Detection and Receivers: Detection-Diode detectors-Synchronous detection-FM detectors-Slope detectors-Phase discriminators-Ratio detectors. Receivers- different types-super heterodyne receivers- Block diagram-choice of IF and oscillator frequencies-Tracking-Alignment-AVC, AFC-Communication receivers- AM and FM - Receiver characteristics.

UNIT-IV

Pulse Modulation Systems and RADAR: Sampling theorem-Generation and detection of PAM, PWM and PPM-Conversion of PWM to PPM- TDM and FDM. Basic principles of RADAR system- Range equation- Pulse radar system- MIT radar- CW Radar- FM CW Radar.

UNIT-V

Television: Introduction of Television-Television systems and standards-Black and white transmission-black and white reception-color transmission and reception-Introduction to modern TV cameras, LCD and plasma displays

Text Book:

1. George Kennedy and Bernard Davis, “Electronic Communication Systems”, Tata McGraw Hill, Fourth Edition, 2008.

Reference Books:

1. Roddy and Coolen, “Communication Systems”, PHI learning, 2001.
2. Wayne Tomasi, “Electronic Communication Systems- Fundamentals Theory Advanced”, Fourth Edition, Pearson Education, 2001.
3. A.M. Dhake, “Television and Video Engineering”, McGraw Hill Publications, 2008.

EC P41 - ELECTRONIC CIRCUITS – I LABORATORY

*1. Design and testing of biasing circuits
   i. Fixed bias
   ii. Collector to base bias
   iii. Self bias

*2. Design and measurement of frequency response, signal handling capacity, input and output impedances of CE amplifier

*3. Design and measurement of frequency response, signal handling capacity, input and output impedances of Emitter follower.

*4. Design and measurement of frequency response, signal handling capacity, input and output impedances of common drain FET amplifier.

*5. Design and measurement of frequency response, signal handling capacity, input and output impedances of cascade amplifier.

*6. Design and measurement of frequency response, input and output impedances of Darlington pair.

*7. Design and measurement of frequency response, input and output impedances of Cascode amplifier.

*8. Differential amplifier.
   Differential mode performance, Common mode performance and measurement of CMRR.

*9. Bridge rectifier
   Determination of ripple factor for bridge rectifier with and without filters

10 Voltage regulation characteristics of shunt, series and IC regulators

* Practical performance is to be compared with PSPICE simulated results.

EC P42 –DIGITAL CIRCUITS LABORATORY

1. Adder and Subtractors
    a) Boolean function implementations using NAND/NOR logic gates
    b) Study of half-adder, full-adder, half-subtractor and full-subtractor

2. Code convertors
    Design, realization and study of the following code convertors
    a) Gray to 8421BCD
    b) 8421BCD to Excess-3-code
    c) 8421BCD to Gray code
    d) Excess-3-code to 8421BCD

3. Parity generator/checker, magnitude comparator
    a) Implementation of error detection circuit using odd and even parity generator/checker
    b) Study of 4-bit magnitude comparator IC
    c) Realization of 8-bit magnitude comparator using 4-bit magnitude comparator ICs

4. Multiplexers and Encoders
    a) 4×1 multiplexer IC
    b) Realization of 16×1 multiplexer using 4×1 multiplexer ICs
    c) Realization of combinational circuit using multiplexer
    d) Priority encoder

5. Decoders and Demultiplexers
    a) 3 to 8 line decoder IC
    b) 3 to 8 line decoder as demultiplexer
    c) Realization of 4 to 16 line decoder using 3 to 8 line decoder ICs
    d) Realization of combinational circuits using decoder.

6. Study of Flip-Flops
    a) Flip-Flops using RS,JK, and D type FF ICs
    b) Conversion of one type of FF to another type

7 Shift register
    a) Various modes of operation of shift register
    b) Ring counter and its timing diagram
    c) Johnson counter and its timing diagram

8 Ripple Counters and their timing diagrams
    a) Binary ripple counters
    b) Binary up/down counters
    c) BCD counter using mod-10 counter ICs

9 Design and implementation of Synchronous Counters and study of their timing diagrams
   a) Binary counters
   b) Non-sequential binary counter
   c) Binary up/down counters,

10. Memory chips
   a) READ and WRITE involving memory chips
   b) Expansion of memory size

EC P43 - COMMUNICATION LABORATORY-I

1. AM modulator and demodulator
   a) To construct AM modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.
   b) To determine the modulation index of AM by classical method and trapezoidal method.
2. FM modulator and demodulator
   a) To construct frequency modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.
3. Sample & hold and PAM
   a) To construct sample and hold circuit and to trace the message and sample and hold signal.
   b) To construct PAM circuit and to trace the input and PAM signal.
4. Pre-emphasis and de-emphasis
   a) To construct pre-emphasis and de-emphasis circuit and to determine the frequency response.
5. Tuned and wideband amplifiers
   a) To construct tuned and wideband amplifiers and to determine the frequency response.
6. Frequency mixer and ring modulator
   a) To construct a frequency mixer and to test its operation.
   b) To construct a ring modulator and to trace the DSB-SC waveform.
7. Simple and delayed AGC
   a) To construct simple and delayed with and without AGC circuit and to test its impact.
8. PWM and PPM
   a) To construct PWM and PPM circuit and trace the output waveforms.
9. TDM
   a) To construct TDM circuit and to trace the multiplexed and de-multiplexed waveform.
10. Simulation of AM, FM, PAM, PWM and PPM
    a) To simulate AM modulator and demodulator using PSPICE/EWB and to trace the time domain and frequency domain signal.
    b) To simulate Direct and Indirect FM generation and detection using MATLAB and to trace the time domain and frequency domain waveform.
    c) To simulate PAM, PWM and PPM circuits using PSPICE/EWB and to trace the time domain signal.
    d) To simulate PAM, PWM and PPM using MATLAB and to trace the time domain and frequency domain waveform.
11. Simulation of Pre-emphasis, De-emphasis, TDM and FDM
    a) To simulate TDM and FDM using PSPICE/EWB and to trace the multiplexed and de-multiplexed signal.
    b) To simulate Pre-emphasis and De-emphasis using PSPICE/EWB and to trace their characteristics.

SP P44 - PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The above activities will include games and sports / extension lectures.
2. In the above activities, the student participation shall be for a minimum period of 45 hours.
3. The above activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree.

MA T51 - PROBABILITY AND RANDOM PROCESSES

UNIT - I

Discrete Random Variables: Random Variables and their event spaces The probability mass function Distribution functions Special discrete distributions (Bernoulli, Binomial, Geometric, Negative Binomial, Poisson, Hypergeometric, Discrete Uniform, Constant and Indicator) Probability Generating function.

UNIT - II

Continuous Random Variables: The Exponential distribution The Reliability, Failure density and Hazard function - Some important distributions (Hypoexponential, Erlang, Gamma, Hyper exponential, Weibull, Gaussian, Uniform and Pareto distributions).

UNIT - III

Stochastic Processes: Definition, Classification of Stochastic Processes Strictly Stationary Process, Wide Sense Stationary, Bernoulli Process Poisson process Renewal process (Fundamental Renewal equation only) Availability analysis.

UNIT - IV

Discrete Parameter Markov Chains: Introduction, Computation of n-step transition probabilities Chapman - Kolmogorov equation State classification and limiting Probabilities M/G/1 queueing system, Pollaczek-Khinchin transform equation.

UNIT - V

Continuous Parameter Markov Chain: The Birth and Death process (MM/1, M/M/c, M/M/1/N, MM/c/N (c<N), MM/c/c, M/M/ models only, derivation of mean number of customer in the system, in the queue and waiting time Simple applications) Special case of Birth and Death model (Pure Birth and Pure Death Processes)

Text Books:

1. Kishor S.Trivedi**,** "Probability and Statistics with Reliability," Queueing and Computer Science Applications, John Wiley & Sons Inc. Second Edition, 2002
2. D.Gross and C.M.Harris, "Fundamentals of Queueing Theory," Wiley Students Edition, Third Edition, 1985.
3. T. Veerarajan, "Probability, statistics and Random Processes," Tata Mc.Graw-Hill Publishing Company Ltd., 2005.

Reference Book:

1. J.Medhi, Stochastic Processes, New Age International (P) Ltd., Second Edition, 1994.

EC T52 - ELECTRONIC CIRCUITS –II

UNIT - I

Feedback Amplifiers: Concept of feedback- topological classification-voltage series, voltage shunt, current series, current shunt - effect of feedback on gain, stability, distortion, band width, input and output impedances – practical feed back amplifier circuits and their analysis –multistage feedback amplifier.

UNIT - II

Oscillators: Barkhausen criterion for sustained oscillations - RC oscillators – RC phase shift oscillator and Wein bridge oscillator- resonant circuit oscillators – tuned drain and tuned collector oscillator - LC oscillators- Hartley and Colpitts oscillators – crystal oscillators and frequency stability.

UNIT - III

Wave Shaping Circuits and Multivibrators: Low pass RC circuit – integrator - High pass RC circuit – differentiator- Clamper circuits – positive, negative and biased clampers - Voltage doubler, tripler and quadrupler circuits. Multivibrators – design of transistor astable, monostable and bistable multivibrators using transistors– Schmitt trigger circuit.

UNIT - IV

Time Base Generators: General features of time base signals – RC ramp generator – constant current ramp generator, UJT saw tooth generator – Bootstrap ramp generator – Miller integrator ramp generator – triangular waveform generator – pulse generator circuit – function generator – sine wave converter.

UNIT - V

Large Signal Amplifiers: Classification of power amplifiers - Class A power amplifier- direct and transformer coupled amplifiers; - Class B - Push-pull arrangements and complementary symmetry amplifiers; conversion efficiency calculations, cross over distortion – class AB amplifier - amplifier distortion – power transistor heat sinking – Class C and D amplifiers.

Text Books:

1. Millman and Halkias, “Integrated Electronics”, Tata McGraw Hill International Edition, 2002.
2. David A. Bell, “Solid State Pulse circuits”, PHI Learning Private Ltd, Fourth Edition, 2007

Reference Books:

1. David A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Ltd, Fourth Edition, 2007
2. R. L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, PHI Learning Pvt. Ltd, Ninth Edition, 2008

EC T53 - SYSTEM DESIGN USING INTEGRATED CIRCUITS

UNIT- I

Linear IC- Operational amplifier: Introduction to linear ICs – Operational amplifier IC741 – Block diagram and characteristics – DC and AC performance – Open loop configurations – Feedback configurations – Inverting , non inverting and differential amplifier – Summer, Subtractor, Integrator, Differentiator – Zero crossing detector – Schmitt trigger – Window detector – Astable and monostable multivibrators, V-I and I-V converters. Filter and its types – Instrumentation amplifier – Precision rectifiers - Logarithmic and antilog amplifiers – multiplier- Opamp voltage regulator - IC linear voltage regulator (series 7800 and 7900 ICs) .

UNIT- II

Other LICs and Data Converters: 555 timer – Block diagram and features – Astable multivibrator – applications - Square wave oscillator, Ramp generator, Triangular waveform generator and Voltage to frequency converter – Monostable multivibrator – applications - Frequency divider, PWM and PPM generators. XR2240 Programmable Timer/Counter –Block diagram and operation – applications - Free running oscillator and frequency synthesizer. PLL565, Principle, Building blocks – applications - Frequency multiplication, Frequency translation, AM and FM detection. Data converters – DAC characteristics – Binary weighted DAC, R-2R DAC, Monolithic DAC-08– ADC characteristics–Flash ADC, Successive approximation ADC, dual slope integrating type ADC, Monolithic ADC AD670-Variable Voltage Regulators(LM317).

UNIT- III

Digital Integrated Circuits: Digital IC characteristics, Digital IC families -RTL and DTL, HTL, I^2L, TTL, ECL, MOS and CMOS logic circuits, Comparison of digital IC families.

UNIT- IV

Design of sequential machines: Analysis and design of synchronous sequential machines – Mealey and Moore machines – State table – State diagram – State reduction and assignments – Analysis and design of asynchronous sequential logic – Race conditions – Design problems from specifications – Hazards in combinational and sequential circuits.

UNIT- V

Processor and control unit design: Registers – Register transfer logic – inter register transfer, bus transfer and memory transfer, Arithmetic logic and shift micro operations – Macro operations – Processor logic design – Processor organization- Bus organization – Processor unit employing a scratch pad memory – Accumulator– Design of ALU – Design of status register- Design of processor unit with control variables – Design of accumulator – Control logic design – Single flipflop/state method –Sequence register and decoder method – PLA control – Microprogram control.

Text Books:

1. Robert.F.Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI Learning Pvt. Ltd, Sixth Edition, 2008.
2. M.Morris Mano, " Digital Logic and Computer design", PHI Learning Pvt. Ltd, 2008

Reference Books:

1. Ramakant A. Gayakwad , " Opamp and Linear Integrated Circuits", PHI Learning Pvt. Ltd, Fourth Edition, 2008.
2. M. Morris Mano and Michael D. Ciletti, "Digital Design", PHI Learning Pvt. Ltd, Fourth Edition, 2008.

EC T54 - DIGITAL SIGNAL PROCESSING

UNIT- I

Discrete Time Signals and Systems: DSP advantages – sampling of analog signals - concept of aliasing. DFT – properties – relationship among z transform, DTFT and DFT - Frequency analysis of signals using DFT - FFT algorithms –advantages over discrete computation of DFT – radix 2 algorithms – DIT and DIF algorithms – Computation of IDFT using FFT.

UNIT- II

Infinite Impulse Response Filter Design: Design of IIR filters from analog Butterworth and Chebyschev filters - Impulse invariance and bilinear methods of IIR digital filter design – realization using direct, cascade, parallel and ladder forms.

UNIT- III

Finite Impulse Response Filter Design: Symmetric and asymmetric FIR filters – Linear phase FIR filters – Design of FIR using frequency sampling techniques – Design of FIR filters using windowing technique. Concept of optimum equiripple approximation. Realization of FIR filters – Transversal, linear phase and polyphase realization structures.

UNIT- IV

Finite Word Length Effects: Quantization noise – quantization noise power – fixed point and binary floating point number representations – comparison – overflow error – truncation error – coefficient quantization error – limit cycle oscillations – Scaling to prevent overflow – analytical model of sample and hold operations.

UNIT- V

Spectrum Estimation and Multirate Signal Processing: Periodogram estimation – nonparametric methods – Bartlett and Welch methods – parametric methods – AR, MA and ARMA models. Principles of multirate DSP – Decimation and Interpolation by integer factors – subband coding of speech signals – QMF filters.

Text Books:

1. John G. Proakis and Dimitris G. Manolakis, “Digital Signal Processing: Principles, Algorithms, and Applications”, PHI learning, New Delhi, Fourth edition 2008.

Reference Books:

1. L. R. Rabiner and B. Gold, “Theory and Application of Digital Signal Processing” PHI Learning, New Delhi, 1998.
2. Sanjit K. Mitra, “Digital Signal Processing: A Computer Based Approach, Tata McGraw – Hill, Third Edition, 2005.
3. P.Ramesh Babu, “Digital Signal processing”, Scitech Publications, Fourth Edition, 2007.

EC T55 - LINEAR AND DIGITAL CONTROL SYSTEMS

UNIT - I

System Modelling: Introduction to control system-Basic elements in control system -Open and closed loop control systems – Differential equation representation of physical systems – Transfer function –Mathematical modeling of electrical and mechanical systems (Translational and Rotational) –Analogous system- Block diagram representation of systems- Block diagram reduction techniques – Signal flow graph-control system components-synchros-tachometer-dc and ac servomotors-stepper motors.

UNIT - II

Time Domain Analysis: Standard test signals- First order system - step, ramp and impulse response analysis-Second order system – step response analysis- steady state error – generalized error co-efficients –Effect of adding a zero to system- Principle of PI, PD and PID compensation-stability analysis – Routh Hurwitz criterion – Root locus method

UNIT - III

Frequency Domain Analysis: Frequency response –Frequency domain specifications – Correlation between time domain and frequency domain specifications-Bode plot – Stability analysis using Bode plot- transfer function from bode plot-Polar plot – Nyquist stability criterion.

UNIT - IV

Digital Control System: Basic digital control system –Spectrum analysis of sampling process –Signal reconstruction-Difference equation representation of digital control systems- Z transform and its properties –Pulse transfer function-Inverse Z transform-Response of linear discrete time systems-Z transform analysis of sampled data control systems-Stability analysis – Jury's stability criterion

UNIT - V

State Space Analysis: Introduction – Concepts of state, state variables and state model– State model of linear systems– system realization-State space representation using physical, phase and canonical variables –diagonal canonical form-Jordan canonical form-diagonalization- Time domain solution of state equation-State transition matrix-Laplace transform solution of state equations- Derivation of transfer function from the state model-Controllability and observability- State space representation of discrete time systems

Text Book:

1. I.J.Nagrath, M. Gopal, "Control Systems Engineering", Fifth Edition, New Age International, New Delhi, 2007.

Reference Books:

1. Benjamin C.Kuo, "Automatic Control Systems", Seventh Edition, PHI Learning New Delhi, 1997.
2. Katsuhiko Ogata, "Discrete Time Control Systems", Second Edition, PHI Learning New Delhi, 2006.
3. Kannan M. Moudgalya, "Digital Control," Wiley-India,2009.
4. R.Anandanatarajan, P. Ramesh Babu, "Control Systems Engineering", Second edition, Scitech Publications Pvt. (India) Ltd, 2008

EC T56 - WAVE GUIDES, ANTENNAS AND WAVE PROPAGATION

UNIT - I

Guided Waves: Introduction - Waves between parallel planes - Transverse electric waves, Transverse magnetic waves, Transverse electromagnetic waves and their characteristics - Wave impedances. Rectangular waveguides - TE and TM waves in rectangular waveguide - Dominant mode - Impossibility of TEM waves in wave guides - Wave impedance and characteristic impedance - Excitation methods for various modes.

UNIT - II

Circular Wave Guides: Introduction – TE and TM waves in circular waveguide- Wave impedance - Attenuation factor and Q of wave guides- Wave impedance- Excitation modes in circular wave guides. Microwave resonators introduction – Coaxial resonator- Waveguide, rectangular and circular cavity resonator - Cavity excitation and tuning - Q factor of micro wave cavities (Qualitative treatment only).

UNIT-III

Antenna Fundamentals: Power density, directivity, gain, radiation resistance, input impedance, radiation patterns, beam width, bandwidth and polarization. Retarded potential- Radiation from a current element and monopole – Radiation of half-wave and centre-fed dipole – Near and far fields, current distribution of dipole antennas. Linear and array antennas - Arrays of two point sources – Broad side and end fire arrays, binomial array - Principle of pattern multiplication –Adaptive arrays.

UNIT-IV

Special Purpose Antennas: (Qualitative treatment only) Loop antennas, Travelling wave antennas, V and rhombic antennas, Horn antennas, Yagi-Uda arrays, Wideband antennas, Log periodic antennas. Babinet's principle – Slot radiators- Parabolic reflectors – Radiation pattern, aperture efficiencies – Feeding techniques for parabolic antennas.

UNIT-V

Propagation: Factors involved in the propagation of radio waves - Ground wave, reflection of radio waves by the surface of the earth - Space wave propagation, considerations in space wave propagation, atmospheric effect in space wave propagation - Ionosphere and its effect on radio waves, Mechanism of ionospheric propagation- Ray paths – Skip distance -Critical frequency-Maximum usable frequency -Fading of signal - Types of fading- Diversity reception.

Text Books:

1. Edward C.Jordan and Keith G.Balaman, "Electromagnetic waves and radiating systems", Second Edition, PHI Learning, 2000.

Reference Books:

1. A.R.Harish and M.Sachidananda, "Antennas and wave propagation" , Oxford University Press, 2008.
2. J.D.Kraus, "Antennas", McGraw Hill 1995.
3. R.F.Collins , "Antenna and Radiowave propagation", McGraw Hill , 1995

EC P51 - ELECTRONIC CIRCUITS – II LABORATORY

1. Negative feedback amplifier
   a. To design, construct and test response of
   i. voltage shunt ii. voltage series feedback amplifiers with and without feedback for the given specification
   b. To compare their frequency response through PSPICE simulation

2. RC Phase shift oscillators
   To design, construct and test the
   a. RC Phase shift oscillator b. Wien bridge oscillator for the given specification

3. Hartley and Colpitts oscillators
   To design, construct and test the
   a. Hartley oscillator b. Colpitts oscillator for the given specification

4. Clampers and Voltage Multipliers
   a. To design, construct and observe output of
   i. Positive, negative and biased clampers
   ii. Voltage doubler and tripler
   b. To simulate the circuits using PSPICE

5. Astable multivibrator and Monostable multivibrator
   a. To design, construct and observe output of a transistor astable multivibrator b. To design, construct and observe output of a transistor monostable multivibrator

6. Bistable multivibrator and Schmitt trigger
   To design, construct and observe output of a transistor bistable multivibrator and Schmitt trigger circuits

7. Time base generators
   To construct and observe output waveforms of a Miller integrator and Bootstrap ramp generator

8. UJT saw tooth generator
   To construct and observe output waveforms of a UJT sweep circuit

9. Class A power amplifier
   To obtain the frequency Vs power and load Vs power characteristics

10. Class B complementary symmetry amplifier
    To obtain the frequency Vs power and load Vs power characteristics

EC P52 - SYSTEM DESIGN USING INTEGRATED CIRCUITS LABORATORY

1. Applications of Op-amp
   To study the application of Opamp IC741 as
   a. Inverting amplifier
   b. Non-inverting amplifier
   c. Voltage follower
   d. Summer
   e. Subtractor
2. Differentiator and Integrator
   To study the op-amp performance as differentiator and integrator for various time constants
3. Comparator circuits
   To study zero crossing detector, window detector and Schmitt trigger using opamp 741
4. Signal converters
   To study operation of op-amp as V to I and I to V converters
5. Active filters using Op-amp
   To design and test the performance of a 2^{nd} order LPF, HPF, BPF and BSF
6. Log, antilog and instrumentation amplifier
   To study 1. logarithmic and antilog amplifiers 2.
   Instrumentation amplifier
7. Multivibrators using Op-Amp
   To design and study the working of a. astable multivibrator
   b. monostable multivibrator using IC 741.
8. Data converters
   Construction and study performance of a. DAC circuits – R-2R and ladder type.
   b. Successive approximation type ADC.
9. Multivibrators using IC 555
   To design and study the working of a. astable multivibrator
   b. monostable multivibrator using IC 555.
10. Frequency synthesizers
    To study performance of a.Frequency multiplier using PLL IC 565
    b. Frequency synthesizer using IC XR2240
11. Precision rectifiers
    To study performance of half wave and full wave precision rectifiers using IC 741.

EC P53 - NETWORKS AND TRANSMISSION LINES LABORATORY

1. Design of k type Low pass and high pass filters.
    a. Frequency and phase response of the Low pass filter using Lumped elements.
    b. Frequency and phase response of the High pass filter using Lumped elements.
2. Design of k type Band pass and Band stop filters.
    a. Frequency and phase response of the Band pass filter using Lumped elements.
    b. Frequency and phase response of the Band stop and notch filter using Lumped elements.
3. Design of m derived filters.
    a. Frequency and phase response of the m derived low pass filter.
    b. Frequency and phase response of the m derived high pass filter.
4. Simulation of filters.
    Design of LPF/HPF/BPF/BEF, T / π, constant k/m derived /composite for the given cutoff frequency using MATLAB - phase and frequency response.
5. Design of switched Twin T network.
    Frequency and phase response of a Twin T network.
6. Characteristics of Attenuators and Equalizers.
    a. Measurement of attenuation of a transmission line for various lengths (like 25, 50, 75, 100 meters) - frequency response of the line at a fixed length.
    b. Study of frequency response of an equalizer that can boost or attenuate frequencies 50Hz, 1 KHz and 10 kHz.
7. Simulation of equalizer.
    Design of an attenuator/phase equalizer and obtain the relevant responses.
8. Impedance (Z) and ABCD Parameters of a transmission line
    a. Measurement of Z parameters of a transmission line constructed using Lumped elements.
    b. Measurement of ABCD parameters of a transmission line constructed using Lumped elements.
9. Design of LC resonant circuit
    Frequency response – measurement of quality factor of a LC resonant circuit.
10. Characteristics of a low-loss transmission line.
    a. Measurement of characteristic impedance of the twin pair transmission line.
    b. Measurement of capacitance and inductance per unit length of a coaxial cable.
    c. Measurement of voltage reflection coefficient and voltage standing wave ratio of a twin pair using VSWR meter.
11. Impedance matching on transmission line
    a) Maximizing the power across a given load connected to a twin pair transmission line using a single stub and smith chart analysis
    b) Maximizing the power across a given load connected to a twin pair transmission line using a double stub and smith chart analysis

HS P54 - GENERAL PROFICIENCY-I

UNIT - I

Art of Communication: Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

UNIT - II

Introducation to Soft Skills: Attitude – Self-Confidence – Leadership Qualities – Emotional Quotient – Effective Time Management Skills – Surviving Stress – Overcoming Failure – Professional Ethics – Interpersonal Skills

UNIT - III

Writing: Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

UNIT - IV

Speaking Practice: Dialogue – Telephone Etiquette – Public Speaking – Debate – Informal Discussions – Presentations

UNIT - V

Aptitude: Verbal and Numerical aptitude

References:

1. Nicholls, Anne. Mastering Public Speaking. Jaico Publishing House,2003.
2. Aggarwal, R.S. Quantitative Aptitude. S.Chand &Co.,2004.
3. Leigh, Andrew and Michael Maynard. The Perfect Leader. Random House Business Books,1999.
4. Whetton .A.David and Kim S. Cameron. Developing Management Skills. Pearson Education, 2007.
5. K.R. Lakshminarayan. Developing Soft Skills. Scitech, 2009.
6. Sherfield M Robert. Developing Soft Skills Pearson Education, 2005.
7. Hair O' Dan, Friedrich W. Gustav and Lynda Dee Dixon. Strategic Communication in Business and the Professions. Pearson Education,2008.
8. Chaney Lilian and Jeanette Martin. Intercultural Business Communication, Fourth Edition. Pearson Education, 2008.

EC T61 - INFORMATION THEORY AND CODING

UNIT- I

Introduction to Information Theory: Measure of information- Entropy of symbols - Continuous and discrete cases, Conditional entropies- Basic relationship among different entropies- Mutual information and Trans information, Redundancy and Efficiency

UNIT- II

Channel Classification and Capacity: Continuous and discrete communication channels-Discrete memoryless channels-Channel representations- noiseless channel, lossless channel, deterministic, Binary Symmetric channel, Binary Erasure channel and their capacities - Continuous and discrete channels with noise- Shannon Hartley theorem and its implications.

UNIT- III

Detection of Signals and Channels with Noise: Hypothesis testing- Baye's criterion-Minimum error probability criterion, Neyman pearson criterion, Min-max criterion-Maximum likelihood detector- Wiener filter.

UNIT- IV

Source Coding: Purpose of encoding- Uniquely decipherable codes- Code efficiency and redundancy, Shannon's first and second fundamental theorem, Shannon's encoding algorithm, Shannon Fano code, Huffman code

UNIT- V

Error Correcting Codes: Linear block codes, cyclic codes- Hamming, Block codes, BCH and RS codes, Convolutional codes- Viterbi algorithm, Concatenated codes, Trellis code modulation, Turbo codes- coding, decoding and performance, LDPC codes- construction and decoding

Text Book:

1. Das, S.K.Mullick and P.K.Chatterjee, "Principles of Digital Communication", Wiley Eastern Limited, 1986.

Reference Books:

1. K.Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley and Sons, 1985.
2. Simon Haykin, "Communication Systems", John Wiley and Sons, Fourth Edition.
3. A.J.Viterbi and J.K.Omura, "Principles of Digital Communication and Coding", McGraw Hill.

EC T62 - DIGITAL COMMUNICATION

UNIT- I

Base Band Transmission: Base band transmission - Wave form representation of binary digits - PCM, DPCM, DM, ADM systems - Detection of signals in Gaussian noise - Matched filter - Application of matched filter - Error probability performance of binary signaling - Multilevel base band transmission - Inter symbol interference - Eye pattern - Companding - A law and μ law- correlation receiver

UNIT- II

Band Pass Transmission: ASK, FSK, PSK, QPSK, DQPSK, MSK, QAM - Detection of signals in noise - Coherent and Non-coherent detection of ASK, FSK and PSK - Comparison of error performance of non- coherently and coherently detected ASK, FSK and PSK systems - M-ary signaling - Vectorial view of MPSK and MFSK - error performance

UNIT- III

Spread Spectrum Communication: Spread spectrum technologies - spreading techniques - PN sequences - Direct sequence spread spectrum systems - Frequency hopping spread spectrum systems - Hybrid systems - Demodulation schemes - RAKE Receivers - Use of spread spectrum with code division multiple access

UNIT- IV

Synchronization: Receiver synchronization - Coherent systems - Symbol and frame synchronization - Network synchronization - Open and closed loop transmitter synchronization - Tracking and acquisition in spread spectrum system

UNIT- V

Encryption and Decryption: Model encryptor - decryptor - Classical encryption techniques - Cipher principles - Data encryption standard - Stream encryption- Key management - Diffie-Hellman key exchange - Elliptic curve architecture and cryptography - Public key encryption system- RSA algorithm

Text Books:

1. Bernard Sklar, “Digital Communication”, Second Edition, Prentice Hall, Upper Saddle River, NJ, 2008.
2. Simon Haykin, “Digital Communications”, John Wiley and Sons, 2008.

Reference Books:

1. Bruce Carlson, “Principles of Digital Communication”, Tata McGraw Hill, 2008.
2. Taub and Schilling, “Principles of Communication systems”, Tata Mc Graw Hill, India, 2008.
3. William Stallings, “Cryptography and Network Security - Principles and Practices”, PHI Learning, Third Edition, 2008.
4. Proakis. JG, “Digital Communications”, McGraw Hill Publications, 2008.

EC T63 - COMPUTER COMMUNICATION NETWORKS

UNIT- I

Network Models: Data communications- Networks- LAN, MAN and WAN- Internet, Intranet and Extranets- Protocols and standards- The OSI/ISO reference model- Layers in the OSI model-TCP/IP protocol suite- IP addressing- Broadband ISDN- ATM protocol reference model-ATM layers- SONET/SDH architecture- FDDI-DQDB- Structure of circuit and packet switches.

UNIT- II

Data Link Control: Types of errors- Error detection and correction- Checksum- Framing- Flow control-Error control- Stop and wait protocol- Go-back N- Selective repeat protocols- HDLC-Random access protocols- Controlled access- Wired LANs- Ethernet- Fast Ethernet- Gigabit Ethernet- IEEE standards, IEEE 802.3, 802.4, 802.5 and 802.6- Wireless LANs- IEEE 802.11 and Bluetooth.

UNIT- III

Network Routing Algorithms: Logical addressing- IPv4 addresses- IPv6- Internet protocol- Transition from IPv4 to IPv6- Mapping logical to physical address- Mapping physical to logical address- ICMP-Direct Vs indirect delivery- Forwarding- Unicast and Multicast routing protocols- Routers and gateways.

UNIT- IV

Congestion and Traffic Management: Queuing analysis- Queuing models- Single server and multi server queues- Congestion control in data networks and internets- Effects of congestion- Congestion and control- Traffic management- Congestion control in packet networks- TCP flow control- TCP congestion control- Requirements for ATM traffic and congestion control- Performance of TCP over ATM.

UNIT- V

Network Security: Security issue- threats and responses- Preservation measures-Firewalls, Protection form spam, Home networks security, Intrusion detection systems, intrusion prevention systems- Legal implications- Next generation virus defence- wireless network security- Radiation- Wireless security features- WEP,WPA,TKIP- Defensive strategies- Network auditing and intrusion detection- Network administration.

Text Books:

1. Behrouz. A. Forouzan, “Data Communication and Networking”, Fourth Edition, Tata McGraw-hill, New Delhi, 2006.
2. Houston. H. Carr and Charles. A. Snyder, “Data Communications and Network security”, Tata McGraw-hill, New Delhi, 2007.

Reference Books:

1. William Stallings, “High Speed Networks and Internets”, Second Edition, Pearson Education Asia, New Delhi, 2002.
2. Andrew .S. Tanenbaum, “Computer Networks”, Fourth Edition PHI Learning Private Ltd, New Delhi, 2008.
3. Rainer Handel et al, “ATM Networks”, Addison Wesley, New Delhi, 2008.
4. Peterson. L and Davie. B, “Computer Networks”, Morgan Kauffmann, 2008

EC T64 - MICROPROCESSORS AND MICROCONTROLLERS

UNIT I

8085 Microprocessor:– Evolution of Microprocessors – 8085 architecture – Timing and Control signals - registers, address and data busses, Instruction format, Addressing modes, instruction set, Assembly Language Programming, Stacks and Subroutines - Memory and I/O interfacing.

UNIT II

Microprocessor Peripheral interfacing: Programmable Peripheral interface 8255 – Keyboard and display interface 8279– Programmable timer 8253, USART 8251, Programmable Interrupt controller 8259.

Introduction to 8086 Hardware Architecture and features.

UNIT III

8051 Microcontrollers: Microcontrollers Vs Microprocessors – 8051 Architecture - Instruction set - 8051 Assembly Language programming –Counters and Timers – Serial I/O – Interrupts.

UNIT IV

PIC Microcontroller: Overview of PIC microcontroller – Instruction set – Timer compare and capture mode – watch dog Timer - Synchronous Serial Port – Serial Peripheral Interface – I^2C Bus operation .

UNIT V

Microcontroller based Systems Design: LCD interfacing – ADC, DAC, and sensor interfacing – Real-time clock - Relay, PWM, DC and Stepper motor interfacing.

Case Studies: Data Acquisition System, Temperature monitoring system, Manipulator Robot Arm.

Text books:

1. Ramesh Goankar, "Microprocessor Architecture Programming and Applications with 8085", Penram International Publishing, 1999.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, "The 8051 Microcontroller, and Embedded Systems", PHI Learning, 2002.
3. Muhammad Ali Mazidi, Rolin McKinlay, Danny Causey "PIC Microcontroller and Embedded Systems, Using assembly and C for PIC 18" , Pearson Education.

References:

1. John B Peatman, "Design with PIC Microcontrollers", Pearson Education Asia, 1998.
2. Kenneth J.Ayala, "The 8051 Microcontroller Architecture Programming and Applications", Penram International Publishing (India). 1996.
3. Ajit Paul, "Microprocessor Principles and Applications", Tata McGraw Hill Publishing Co. Ltd, 2000.
4. Uffenbeck, "The 8086/8088 family: The design , Programming and Interfacing", Prentice Hall of India Pvt, Ltd, 2008.
5. M. Gopal, "Digital Control Systems", New Age International, 2000.

EC P61 - COMMUNICATION LABORATORY- II

1. Construct an Amplitude Shift Keying (ASK) modulator and demodulator circuit. Obtain the ASK modulated and demodulated waveforms.

2. Construct a Frequency Shift Keying (FSK) modulator and demodulator circuit. Obtain the FSK modulated and demodulated waveforms.

3. Construct a Binary Phase Shift Keying (BPSK) modulator and demodulator circuit. Obtain the BPSK modulated and demodulated waveforms.

4. To study the different line coding techniques 1) NRZ unipolar format 2) NRZ polar format 3) NRZ bipolar format and 4) Manchester format. Obtain the waveforms of the different formats.

5. Construct a Pulse code modulator and demodulator circuit. Obtain the coded output for the given sine wave.

6. Construct a Delta modulator and demodulator circuit. Obtain the coded output for the given sine wave.

7. To design and construct DS-CDMA circuit and verify its operation. Obtain the DS-CDMA waveform.

8. Construct a time division multiplexing circuit to combine two different data streams onto a single channel by assigning time slots to each. Obtain the TDM output.

9. Construct a frequency synthesizer circuit using PLL for the given frequency. Obtain the synthesized waveform.

10. Simulate BASK, BFSK and BPSK circuits using Matlab. Obtain the time domain and frequency domain response of the above modulation schemes. Compare its bit error performance.
11. Simulate M-ary ASK, FSK and PSK circuits for M = 2, 4,8,16 using Matlab. Compare its bit error performance.

12. Implementation of data encryption and decryption using Matlab.

EC P62 - COMPUTER NETWORKS LABORATORY

1. Simulation of ON-OFF and voice traffic model
   a) To simulate the ON-off traffic model and plot the following waveform
      i. User numbers Vs ON period.
      ii. Time slot Vs number of users.
      iii. Time slot Vs bandwidth allotted.

   b) To simulate voice traffic model and obtain
      i. Time slot Vs bandwidth plot.
      ii. Time slot Vs error plot.
      iii. Average error rate.
      iv. The optimum buffer size for which error rate will be less than stipulated value.
2. Simulation of data traffic and video traffic model
   a) To simulate the data traffic and multiple rate video traffic for multiple users and to obtain
      i. Time slot Vs bandwidth plot.
      ii. Time slot Vs BER plot.
      iii. The optimum buffer size for which error rate will be less than stipulated value.
3. Simulation of ISDN traffic model
   a) To simulate the ISDN traffic model for multiple users and to obtain
      i. Time slot VS bandwidth plot.
      ii. Time slot Vs BER plot.
      iii. Time slot Vs un-served video user.
      iv. Time slot Vs un-served data user.
4. PN sequence generation and testing
   a) To generate maximal and non maximal length PN sequence and test its randomness properties.
5. M/M/I queuing model
   a) To simulate M/M/I queuing model and obtain
      i. Time slot Vs packet loss plot.
      ii. Maximum and average packet loss without buffer.
      iii. Buffer size for the given loss.
      iv. Maximum and average packet loss with buffer.
6. M/G/I and G/G/I queuing model.
   a) To simulate a M/G/I and G/G/I queuing model and obtain
      i. Time slot Vs packet loss plot.
      ii. Maximum average packet loss without buffer.
      iii. Buffer size for the given loss.
      iv. Maximum and average packet loss with buffer.
7. Encryption and decryption
   a) To simulate and test the following encryption and decryption algorithm.
      i. Mono alphabetic cipher- caeser cipher.
      ii. Poly alphabetic cipher- Trithemius key, Vigenere key, Vigenere plain and cipher key.
      iii. RSA with and without digital signature.

8. Flow control
   a) To simulate and test
      i. Stop and wait protocol
      ii. Go back N protocol
      iii. Selective repeat protocol
9. Error control protocol
   a) To simulate and test
      i. Cyclic redundancy check
      ii. Hamming code
10. Routing algorithms
   a) To simulate and test
      i. Shortest path routing algorithm
      ii. Hierarchical routing algorithm
11. Generation of PDF
   a) To study, generate and trace the following PDF
      i. Gaussian distribution
      ii. Uniform distribution
      iii. Exponential distribution
      iv. Rayleigh distribution
      v. Binomial distribution
      vi. Negative binomial distribution
      vii. Gamma distribution
      viii. Poisson distribution

12. Wireless LAN
   a) To establish wireless LAN test bed (or) wireless LAN environment and perform
      i. Uni-cast
      ii. Multicast
      iii. File transfer protocol

EC P63 - MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Experiments based on 8085 Microprocessor

- 8 bit and 16 bit Arithmetic Operations
- Array operations
- Bit Manipulation operations
- Code conversions
- Subroutines
- Digital Clock simulation
- Block operations

Experiments based on 8051/PIC microcontroller

- LCD interface
- ADC /DAC interface
- Stepper motor interface
- Serial communication (kit-to-kit and/or pc-to-kit)
- Watch dog timer
- Real-time clock
- Printer interfacing
- Water level indicator
- Traffic light controller
- Elevator simulation
- Pulse width modulation
- Interfacing of relay switches

HS P64 GENERAL PROFICIENCY – II

UNIT – I

Composition Analysis: Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology

UNIT – II

Writing: Job Application Letter Writing – Resume Writing

UNIT – III

Oral Skills: Group Discussion – Introduction and Practice – Team Work – Negotiation Skills – Organizing and Attending Meetings – Facing Interviews

UNIT – IV

Adapting to Corporate Life: Corporate Etiquette – Grooming and Dressing

UNIT – V

Aptitude: Verbal and numerical aptitude

Reference Books:

1. Pushplata and Sanjay Kumar, Communicate or Collapse : A Handbook of Effective Public Speaking, Group Discussions and Interviews, PHI Learning, Delhi,2007.
2. Thorpe, Edgar. Course in Mental Ability and Quantitative Aptitude. Tata McGraw-Hill, 2003.
3. Thorpe, Edgar, Test of Reasoning, Tata McGraw-Hill,2003.
4. Prasad, H.M, How to prepare for Group Discussion and Interview, Tata McGraw-Hill, 2001.
5. Career Press Editors,101 Great Resumes, Jaico Publishing House,2003.
6. Aggarwal, R.S, A Modern Approach to Verbal and Non-Verbal Reasoning,S.Chand & Co.,2004.
7. Mishra Sunita and Muralikrishna, Communication Skills for Engineers, First Edition, Pearson Education, 2004.

EC T71 - ENGINEERING ECONOMICS

UNIT - I

Introduction to Economics:– Flow in an Economy, Law of supply and Demand, Concept of Engineering Economics – Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of costs, Marginal Cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis – Material selection for product, Design selection for a product, Building material selection, Process Planning.

UNIT - II

Make or Buy Decision, Value Engineering : Function, Aims, Value Engineering procedure, Interest Formulas and their Applications – Time Value of Money, Single Payment Compound Amount Factor, Single Payment Present Worth Factor, Equal Payment Series, Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods.

UNIT - III

Methods of Comparison of Alternatives: Present Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods

UNIT - IV

Replacement and Maintenance Analysis : Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset – Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.

UNIT - V

Depreciation: Introduction, Straight Line Method of Depreciation, Declining Balance Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation/Annuity Method of Depreciation, Service Output Method of Depreciation, Evaluation of Public Alternatives- Introduction, Examples, Inflation Adjusted Decisions – Procedure to Adjust Inflation, Examples on comparison of alternatives and Determination of Economics Life of asset.

Text Books:

1. Panneerselvam. R., Engineering Economics, PHI Learning Pvt. Ltd., New Delhi, 2008.

Reference Books:

1. Degarmo E.P., Sullivan W.G. and Canada, J.R., Engineering Economy, Macmillan, New York.
2. Grant E.L., Ireson W.G. and Leavenworth R.S., Principles of Engineering Economy, Ronald Press, New York.
3. Smith G.W., Engineering Economics, Iowa State Press, Iowa.

EC T72 - MICROWAVE AND OPTICAL ENGINEERING

UNIT - I

Microwave Active Devices: Gunn diode and its mode – PIN modulator - IMPATT and TRAPATT diodes - Bipolar transistor – FET – Transferred electron oscillators – Avalanche diode oscillators – Parametric amplifiers - Two cavity klystron amplifier – Power and efficiency considerations – Reflex Klystron oscillators – Modes and efficiency considerations – Magnetrons – TWT.

UNIT - II

S Parameters: Scattering parameters, properties of S matrix, Conversion of ABCD and S matrix, S matrix representation of Waveguide corners, bends, twists, Directional couplers, Circulators, Isolators, Attenuators, Wave guide Tee, Hybrid Tee, Hybrid rings (rat-race) and Terminator.

UNIT - III

Microwave Measurements: VSWR, power, impedance, insertion loss, scattering parameters and dielectric constant measurement.

Antenna Measurements: Radiation pattern, gain, directivity, phase and polarization measurement

UNIT - IV

Optical Fibers and Devices: Propagation of light - Optical fiber structures, Acceptance angle, Numerical aperture, Optical Windows, Attenuation, Absorption losses - Scattering losses – Dispersion – Radiation losses. Optical Source - LED, ILD characteristics. Optical detectors – PIN – APD characteristics., Erbium Doped Fibre Amplifiers.

UNIT - V

Optical Networks: Optical transmitters and receivers, System block diagram - point to point link – link design, power budget analysis. WDM- DWDM and SONET/SDH. Introduction to AON, PON and FTH.

Text Books:

1. J.Y. Liao, "Microwave devices and circuits", PHI Learning, 1987.
2. Gerd Keiser, "Optical Fiber Communications", The McGraw Hill Companies, 4th Edition, 2008.
3. David Poser, Microwave Engineering, John Wiley, 3rd edition 2004.
4. John. D. Kraus, Antennas, McGraw Hill, 2nd Edition, 1998.

Reference Books:

1. K.C. Gupta, "Microwaves", Wiley Eastern Ltd, 1983,
2. Annapoorna Das and Sisir K. Das, "Microwave Engineering", TMH.
3. Anoop Singh, "Microwave Engineering", PHI Learning, 2009.
4. R. F. Collins, "Foundation of Microwave Engineering", McGraw Hill, 1987.
5. John. M. Senior, "Optical Fiber Communications Principles and Practice", Second Edition, PHI, 1992.
6. Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks – A Practical Perspective", Harcourt Publishers International Company, 2000.

EC T73 - EMBEDDED SYSTEMS

UNIT - I

Introduction to Embedded Processors: Introduction to Embedded Computing, Issues and Challenges in Embedded system Design, Trends: SC, custom designed chips, configurable designed chips, configurable processors and multi-core processors. Embedded processor architecture: General concepts, instruction sets, Levels in architecture, Functional description-hardware/software trade-off Introduction to RISC architecture, Pipelining, Instruction issue and execution, Instruction formats, Addressing modes, Data alignment and byte ordering, Introduction to VLIW and DSP processors.

UNIT - II

Devices and Buses for Devices Network: I/O Devices:- Types and Examples of I/O devices, Synchronous, Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices:- SPI, UART, Parallel Port Devices - Timer and Counting Devices – Serial Communication using: 'I2C', 'USB', 'CAN'- Advanced I/O Serial high speed buses: ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT - III

Programming Concepts and Embedded Programming in C, C++ : Programming in assembly language (ALP) vs High Level Language - C Program Elements:- Macros and functions, Use of Date Types, Structure, Pointers, Function Calls - Concepts of Embedded Programming in C++:- Objected Oriented Programming, Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory needs.

UNIT - IV

Real Time Operating Systems: Definitions of process, tasks and threads – Inter Process Communication:- Shared data problem, Use of Semaphore(s), Priority Inversion Problem and Deadlock Situations, Message Queues, Mailboxes, Pipes, Virtual (Logical) Sockets, Remote Procedure Calls (RPCs) - Operating System Services:- Goals, Structures, Kernel, Process Management, Memory Management, Device Management - Real Time Operating System - RTOS Task scheduling models:- Co-operative Round Robin Scheduling, Cyclic Scheduling with Time Slicing.

UNIT - V

System Design Techniques: Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design. Design Examples:- Telephone PBX- System Architecture, Ink jet printer - Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

Textbooks:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003
2. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001.

References:

1. Steve Heath, Embedded Systems Design, Second Edition, Elsevier India Pvt. Ltd.,2007.
2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware/Software Introduction, John Wiley, 2002.

EC P71 - COMMUNICATION LABORATORY - III

1. Reflex Klystron characteristics
   Mode characteristics measurement of Reflex Klystron Oscillator and estimation of bandwidth, ETS and ETR.

2. Gunn diode characteristics
   a) V-I characteristics of Gunn diode
   b) Measurement of wavelength and operating frequency of Gunn diode using slotted waveguide (without frequency meter).

3. Determination of VSWR and impedance of unknown load

4. Radiation pattern measurement of antenna
   a) Basic microwave setup establishment using Reflex Klystron oscillator
   b) Measurement of E-plane and H-plane radiation patterns of antenna.
   c) Estimation of FNBW, HPBW and side lobe level of the antenna

5. Dielectric constant measurements
   Measurement of relative and absolute dielectric constant of given dielectric materials using basic microwave setup.

6. Characterization of microwave components
   a) Characterization of given passive microwave components (DC, E-plane, Magic Tee etc.).
   b) Validation of the results obtained through simulation using any environment.

7. Study of optical fiber characteristics
   a) Frequency response
   b) Attenuation
   c) Coupling loss
   d) Numerical aperture

8. Study of fiber fault characteristics using OTDR

9. Study of TDM using optical kit and establishment of a digital link

10. Study of fiber sensors
    a) Temperature sensor
    b) Pressure sensor
    c) Strain sensor

EC P72 - EMBEDDED SYSTEMS LABORATORY

1. Voltage Measurement with display
   Designing a voltmeter to measure voltage from 0 to 5 volts and displaying the measured value using 7 segment displays

2. Design of Water Pump Controller to sense the water level in a tank

3. Digital Clock with LCD display

4. Temperature Measurement with 7 segment display

5. PC Communication
   Interfacing the microcontroller to a PC through RS232 interface and displaying the messages sent by the microcontroller on the PC using Visual Basic program running in PC

6. Remote Control through FM Link
   Establishing an FM link between two microcontrollers for data transfer.

7. Hot Chamber Controller to maintain the temperature at the set point.

8. Obstacle Detector using ultrasonic transmitter- receiver

9. Moisture sensor and sprinkler controller design

10. Designing a lamp controller having a light sensor and a timer

EC P73 - SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey of the material available on the assigned topic and prepare a report, running to 30 or 40 pages. The student will make a oral presentation for a period of about 30 minutes, followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by the internal assessment committee (comprising of the Head of the Department and two faculty members) for a total of 50 marks.

EC P74 - INDUSTRIAL VISIT/TRAINING

The students are required to undergo in plant training for a period of two weeks /four industrial visits during the summer vacation after the fourth semester. Each student has to submit a detailed report on the training programme undergone. Each student will be evaluated by an internal assessment committee (comprising of the Head of the Department and two faculty members) for a total of 50 marks

EC PW7 - PROJECT WORK

Each batch of 2 or 3 students will be assigned an experimental or a theoretical project to be carried out under the supervision of a guide. The project work has to be carried out in the 7^{th} and 8^{th} semesters and completed by the end of the 8^{th} semester. In the phase I of the project work, the progress of the work carried out in the 7^{th} semester will be monitored and assessed internally for a total of 50 marks. A committee of departmental faculty members comprising the project guide, the Head of the Department and one more faculty member will conduct the internal assessment.

EC T81 - INDUSTRIAL MANAGEMENT

UNIT - I

Plant Location, Layout and Material Handling: Plant Location: Influencing factors – evaluation of location alternatives (Simple problems) Plant layout: Classification of production systems – principles of layout – basic types of layout – Line balancing – Ranking Positional weight Method (simple problems)Material Handling: functions – principles – classification of material handling equipments (only classification and no description) – factors to be considered in selection of material handling equipments.

UNIT - II

General Management: Basic concepts of management – Scientific management – Henry Fayal's principles of management – Types and functions of management. Types of organization – characteristics, merits and demerits. Types of industrial ownership – characteristics, merits and demerits.

UNIT - III

Production Management: Production, Planning and control: functions – qualitative and quantitative techniques of forecasting – simple problems in forecasting using moving average, weighted moving average, simple exponential smoothing and regression methods (simple problems) – routing – loading and scheduling – different methods of scheduling – product sequencing (simple problems using Johnson's Algorithm) – expediting – dispatching – Introduction to inventory control and materials management.

UNIT - IV

Financial Management: Fixed and variable costs – cost ladder – Break even analysis (simple problems) – Types of capital – working capital – Sources of finance (internal and external) - Evaluation of investments – Present Worth Method, Future Worth Method, Annuity Method and Rate of return Methods (simple problems) – Preparation of balance sheet and profit and loss statements.

UNIT - V

Marketing and Human Resources Management: Marketing Management: Core concepts of marketing; needs, wants and demands; marketing Vs selling – products and markets - pricing and relative factors: channel of distribution; promotion, advertising; market research. Human Resource Management: individual and group behaviour – motivation and morale - fatigue – accidents: causes and remedies - manpower planning – Job evaluation and merit rating.

Text / Reference Books:

1. O.P. Khanna, "Industrial Engineering and Management", Dhanpat Rai & sons,1999.
2. R.Panner Selvam, "Production and Operations Management", PHI Learning, 2002.
3. Martand Telsang – Industrial Engineering and Production Management, S.Chand and Co., 1998.
4. Joseph Monks – Operations Management, McGraw Hill, New York, 1986.

EC T82 - TELECOMMUNICATION SWITCHING NETWORKS

UNIT-I

Principles and Evolution of Switching Systems: Basics of switching system, manual switching system, rotary dial telephone, signaling tones, strowger switching components, step-by-step switching, design for 100 line, 1000 line, 10,000 line exchange, touch tone dial telephone, cross bar switching and exchange organization. Four wire concept, operation of hybrid, echo suppressors. Centralized and distributed SPC, software architecture, application software, enhanced services offered by SPC.

UNIT-II

Space Division Switching: Two, three and multistage space division networks, blocking probability calculations using Lee's method.
Time Division Switching: Basic time division space switching, time division time switching, time multiplexed space switching, time multiplexed time switching.
Combination Switching: S-T, T-S, S-T-S, T-S-T and other multistage combination switching.

UNIT-III

Traffic Engineering: Network traffic load and parameters, GOS and blocking probability, modeling switching systems, incoming traffic and service time characterization, blocking models and loss systems, delay systems.

UNIT-IV

Telephone Networks: Subscriber loop systems, high data rate digital subscriber loop, asymmetric digital subscriber loop, VDSL, transmission plan, transmission systems, numbering plan, charging plan, basics of signalling, In channel signalling, common channel signalling.

UNIT-V

Data Networks: Data transmission in PSTN, switching techniques for data transmission, OSI reference model, Satellite based data networks, fiber optic networks, protocol stacks, internetworking. ISDN services, transmission channels and user network interface in ISDN, ISDN protocol architecture, ISDN standards, ISDN numbering and addressing. Introduction to the basic principles of frame relay, TCP/IP and ATM.

Text Books:

1. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", PHI Learning, New Delhi, 2008.
2. John C. Bellamy, "Digital Telephony", John Wiley and Sons, Third edition, 2000.

Reference Book:

1. J.E.Flood, "Telecommunication switching traffic and networks", Pearson Education Ltd, New Delhi, 2001.

EC P81 - ADVANCED COMMUNICATION LABORATORY

1. Study of Microwave Communication Systems

2. Demonstration of ISDN concept with optical link or microwave link and the study of link response at various stages.

3. Study of Radio Communication Analyzer (RCA)

4. Spectrum analysis of modulated signals using Spectrum Analyzer and validating the results through simulation.

5. Spectrum analysis of TV signals using Spectrum Analyzer

6. Design and testing of LP/HP/BP/BS filters for FM range using Vector Network Analyzer and validating the results through simulation.

7. Design and testing of antenna using Vector Network Analyzer
   a) Antenna response (for FM range)
   b) Impedance measurement of the designed antenna.

8. Study of Radar trainer kit
   a) Detection of moving/static objects
   b) Range of the objects
   c) Velocity of the moving objects

9. Study of computer communication
   a) A secure PC to PC communication (wire/wireless).
   b) Voice and data transmission
   c) Performance evaluation

10) a) Simulation of spread spectrum, microwave, optical and satellite communication systems
   b) Simulation to determine the response of atleast any two of the following using any environment:
   - Error performance of CDMA in AWGN and fading channel for multiuser environment
   - Characterizing the given microwave link and validating through analytical measure
   - Power budget and rise time link analysis of a given optical link
   - A satellite link.

EC P82 - COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of the basic principles of the core engineering subjects. The internal assessment for a total of 50 marks will be made by a committee comprising of the faculty members of the department. The committee will conduct three written examinations of short questions type from the subjects (Test1-Analog and Digital Electronic Circuits, Electric Circuits, Microprocessor and VLSI; Test 2-Signal Processing, Electromagnetic Waves and Waveguides, Antennas Control Systems; Test 3-Analog and digital communication, Advanced communication systems). The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.

EC P83 - PROFESSIONAL ETHICAL PRACTICE

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer's responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics

Reference Book:

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999

EC PW8 - PROJECT WORK (PHASE II)

Extension and completion of project work started in the previous semester. On completion of the project work, each student has to prepare a project report and submit the same to the department. In the Phase II, the project work and the report will be evaluated by the internal assessment committee by conducting two reviews and one demo for a total of 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.

ELECTIVES OF SIXTH SEMESTER

EC E61 - SOFT COMPUTING

UNIT-I

Fuzzy Systems: Crisp sets – Fuzzy sets – Operation and properties. Fuzzy relations – Equivalence and tolerance relations. Fuzzy membership function- Types and definitions. Membership value assignments – Rule based systems. Type of fuzzy inference. Structure and parameters of a Fuzzy system- Computer assignment.

UNIT-II

Neural Networks: Biological inspiration – Neuron model and Network architectures perception – Architecture, learning rule. Limitations of multiplayer perception- Back propagation algorithm – Learning rule – Computer assignments.

UNIT-III

Genetic Algorithm: Goals of optimization – Introduction to GA – Terminologies. Simple GA - Data structure. Genetic operation – Crossover, mutation, fitness scaling, Inversion- A Multi parameter mapped fixed point coding – Computer assignments.

UNIT-IV

Evolutionary Programming: Single and multi objective optimization-General algorithm-Binary GA, Real parameter GA, constraint handling in GA Evolution strategies general programming – Computer assignments.

UNIT-V

Applications: Applications to various branches of Engineering and science- Application of fuzzy, neural, GA and EP in computer science, electrical, communication, instrumentation and control, mechanical and civil engineering.

Text Books:

1. Timothy J. Ross 'Fuzzy logic with Engineer application' McGraw Hill.
2. Martin T. Hagam Howard B. Deruth and Mark Beale 'Neural Network Design', Thompson Learning, 1996
3. David E. Gold Berg 'Genetic Algorithm' Pearson Education 2002.
4. Multi- objective optimization using Evolutionary Algorithm – by Kalyanmoy Deb. John Wiley and sons, 2002

EC E62- VLSI DESIGN

UNIT I

Introduction: Introduction to VLSI and VLSI fabrication- Introduction to power reduction techniques-Dynamic Power Reduction-Static Power Reduction- CMOS inverter– propagation delays – power dissipation - Stick Diagram. MOS layers - design rules and layout- choice of layers.

UNIT II

VLSI Logic Circuits, Design Process and Layout: Pass transistor and transmission gates-inverter-NAND gates and NOR Gates for n MOS, CMOS and Bi CMOS – parity generator – multiplexers- code converters – PLA – Clocked sequential circuits- Memories and Registers.

UNIT III

Arithmetic Circuits: One bit adder- multibit adder –Ripple carry-Carry Skip Adder-Carry Look Ahead Adder- design of signed parallel adder-comparison of different schemes in terms of delay - multipliers – Design of serial, parallel and pipelined multipliers- different schemes and their comparison. 2's complement array multiplication-Booth encoding-Wallace Tree multiplier.

UNIT IV

Programmable ASIC's and FPGAs: Actel,Altera and Xilinx FPGA devices.

UNIT V

Introduction to Verilog: Basics of Verilog, operators, Data Types, Continuous assignments, Sequential and parallel statement groups. Timing control (level and edge sensitive) and delays, tasks and functions, control statements, Blocking & nonblocking assignments, If-else and case statements, For-while-repeat and forever loops, Rise, fall, min, max delays, Behavioral and synthesizable coding styles for modeling combinational logic, Behavioral & synthesizable coding styles for modeling sequential logic, Parameters and Defines for design reuse.Verilog and logic synthesis.

TEXT BOOKS:

1. Neil H.E. Weste and K.Eshraghian, "Principles of CMOS VLSI design," Addison Wesley Publishing Company,1985.
2. Neil He Weste,David Harris and Ayan Banerjee, "Principles of CMOS VLSI design-A circuits and Systems Perspective," Dorling Kindersley (india) Pvt Ltd, 2006.
3. Sebastian Smith, "Application Specific Integrated Circuits", Pearson Education,2001
4. J. Bhasker "A Verilog HDL Primer," Star Galaxy Press,1997.
5. Wayne wolf, "Modern VLSI Design: System on Chip Design," Prentice Hall of India, 2005.

REFERENCEBOOKS:

1. E.D.Fabricious, "Introduction to VLSI design", Mc Graw Hill, 1990.
2. Thomas, D . E .,Philip.R. Moorby "The Verilog Hardware Description Language", 2nd ed.,Kluwer Academic Publishers,2002.
3. Jan M Rabaey, Anantha Chandrakasan and Borivoje Nikolic, "Digital Integrated Circuits: A Design Perspective", Prentice Hall India, 2007.

EC E63 - DIGITAL SIGNAL PROCESSORS AND APPLICATIONS

UNIT-I

Freescale DSP56XXX Architecture and Programming: Introduction, Core Architecture Overview, Data Arithmetic Logic Unit, Address Generation Unit, Program Control Unit, PLL and Clock Generator, Debugging Support, Instruction Cache, External Memory Interface, DMA Controller, Operating Modes and Memory Spaces, Instruction Set, Benchmark Programs.

UNIT-II

FFT and Filter Implementation using DSP56XXX: Implementation of FFT : Radix- 2 fast Fourier transforms – Block floating point scaling – Optimized radix- 2 DIT FFT- Leakage- Implementation of digital filters: single and double precision FIR Filters – IIR Filters – Multirate filters.

UNIT-III

TMS320C6x Architecture: CPU Operation – Pipelined CPU- VelociTI – C64x DSP- Software tools: EVM – DSK Target C6x board – Assembly file – Memory management- Compiler utility- Code initialization – Code composer studio – Interrupt data processing.

UNIT-IV

Code Optimization: Word – wide optimization – Mixing C and assembly- software pipelining – C64x improvements - Real time filtering – Circular buffering- Adaptive filtering.

UNIT-V

Frame Processing, Real Time Analysis and Scheduling: Frame processing: DMA DSP Host Communication- DFT and FFT Implementation- Real time FFT – Real time analysis- Real time scheduling – real time data exchange – DSP / BIOS – Data synchronization and communication.

Text Books

1. Digital Signal Processing Applications using the ADSP – 2100 Family, Volume 1 Analog devices , DSP Division Prentice Hall, 1992(Unit I,II).
2. Nasser Kehtarnavaz and Mansour Keramat, “DSP System design using the TMS320C600 Prentice hall 2001(Unit III,IV ,V)

Reference Books

1. Mohammed El-Sharkawy,Digital Signal Processing Applications With Motorola's DSP56002.
2. Sophocles J.Orfanidis, “ Introduction to signal processing “ , Prentice Hall, 1996.
3. Sen M.Kuo , Bob H.Lee,” Real – time digital signal processing- Implementations, applications and experiments with the TMS320C55x” , John Wiley and Sons, 2001.
4. John G.Proakis and Dimitris G. Manolakis, “ Digital processing – Principles , Algorithms and applications”, Third Edition PHI,1997.
5. DSP56300 Family Manual from Freescale Semiconductors.

EC E64– OPERATING SYSTEMS

UNIT - I

Operating Systems - An Overview :Introduction to OS - Mainframe systems - Desktop Systems - Multiprocessor Systems - Distributed Systems - Clustered Systems - Real Time Systems - Handheld Systems. Computer-System Operation - I/O Structure - Storage Structure - Storage Hierarchy - Hardware Protection - Network Structure. System Components - Operating-System Services - System Calls - System Programs - System Structure - Virtual Machines - System Design and Implementation - System Generation.

UNIT - II

Process Management :Process Concept - Process Scheduling - Operations on Processes - Cooperating Process - Interprocess Communication - Communication in client-server systems. Threads - Overview - Multithreading models - Threading issues- CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple-Processor Scheduling - Real Time Scheduling - Process Scheduling Models. The Critical-Section Problem - Synchronization Hardware - Semaphores - Classic problems of Synchronization - Critical regions - Monitors - Atomic transactions. System Model - Deadlock Characterization - Methods for handling Deadlocks -Deadlock Prevention - Deadlock avoidance - Deadlock detection - Recovery from Deadlock.

UNIT - III

Storage Management :Storage Management - Background - Swapping - Contiguous Memory allocation - Paging - Segmentation - Segmentation with Paging. Virtual Memory - Background - Demand Paging - Process creation - Page Replacement - Allocation of frames - Thrashing. File System Implementation - File Concept - Access Methods - Directory Structure - File - System Mounting - File Sharing - Production. File System Structure - File System Implementation - Directory Implementation - Allocation Methods - Free-space Management - Efficiency and Performance - Recovery.

UNIT - IV

I/O Systems :I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Transforming I/O to Hardware Operations - Streams - Performance. Disk Structure - Disk Scheduling - Disk Management - Swap-Space Management - RAID Structure - Disk Attachment - Stable - Storage Implementation - Tertiary Storage Structure.

UNIT - V

Distributed Systems: Background - Topology - Network Types - Communication - Communication Protocols - Robustness - Design Issues. Naming and Transparency - Remote File Access - Stateful Versus Stateless Service - File Replication. Event Ordering - Mutual Exclusion - Atomicity - Concurrency Control - Deadlock Handling - Election Algorithms - Reaching Agreement.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts, Windows XP Update", Sixth Edition, John Wiley & Sons (ASIA) Pvt. LTD, 2003

References Books:

1. Harvey M. Deitel, Operating Systems, Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, Modern Operating Systems, Prentice Hall of India Pvt. LTD, 2003
3. William Stallings, Operating System Prentice Hall of India, 4th Edition, 2003

EC E65- CONSUMER ELECTRONICS

UNIT – I

Loudspeakers and Microphones: Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT – II

Television Standards and systems: Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT – III

Optical Recording and Reproduction: Audio Disc – Processing of the Audio signal – read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT – IV

Telecommunication Systems: Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT – V

Home Appliances: Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Text Book:

1. S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.

EC E66 - OBJECT ORIENTED PROGRAMMING

UNIT - I

Introduction: Comparison of programming paradigms - merits and demerits of object oriented methodology - object model- features of object oriented languages - **C++** Program Elements: Data types- variables- dynamic initialization- scope and life time of variables- arrays- strings- operators- operator overloading- type conversion and casting- input / output- enumeration types-expressions-statements.

UNIT - II

Object Creation: Classes- constructors- destructors- member functions- inline implementation – overloading – inheritance – types - virtual functions - overloading functions – polymorphism – templates - exception handling. Storage classes - storage operators new – delete - I/O stream – console I/O operations - File streams – modes - file I/O manipulations.

UNIT - III

Java: Introduction – variables- data types – operators – expressions – statements – control structures- loops – functions – arrays – classes – wrapper classes – strings – simple input/output- inheritance.

UNIT - IV

Files and Threads: Files – serialization – threads- life cycle – multiple threads- synchronization – exception handling- throw catch blocks - Packages and Interfaces importing package - strings

UNIT - V

Object Oriented Design: Classification and Overview of methodologies, Object-Oriented Software life cycle models, process, analysis, design, prototyping, implementation, Testing, documentation and maintenance.

Textbooks:

1. H.M.Deitel, P.J.Deitel, “Java: How To Program”, Seventh edition, PHI Learning, 2007. (Unit III, IV, V)
2. Robert Lafore, “Object Oriented Programming in C++”, Fourth Edition, Pearson Education, 2002. (Unit I, II)
3. Grady Booch, “Object-Oriented Analysis and Design with Applications”, Addison-Wesley, 2007. (Unit V)

References:

1. H.M.Deitel, P.J.Deitel, “C++: How To Program”, Sixth edition, PHI Learning, 2006
2. M.P.Bhave, S.A.Patekar, “Programming with Java” Pearson Education, 2009

ELECTIVES OF SEVENTH SEMESTER

EC E71 - DIGITAL IMAGE PROCESSING

UNIT-I

Introduction to Digital Image Fundamentals: Digital image processing system –Image processing applications and problems: Image representation and modeling – image enhancement – image restoration – image analysis – reconstruction – compression. Elements of visual perception. Image sampling and Quantization and their limitations – image perception.

UNIT-II

Mathematical Preliminaries and Image Transform: Two dimensional system and mathematical preliminaries, Image transforms – 1D DFT, 2D DFT, Discrete Cosine transform, Discrete Sine transform, Hadamard transform, Haar transform, Slant transform, KL transform, SVD transform, Wavelet transform.

UNIT-III

Image Enhancement and Restoration: Image Enhancement: Point operation – Spatial operation – Transform operation – Pseudo colouring. Image Restoration: Image restoration process- Noise models – Mean filters – Inverse filtering – Wiener filtering – Constrained least mean square filtering – Geometric transformation.

UNIT-IV

Colour Image Processing and Image Compression: Colour Image: Colour fundamentals – Colour models – HIS to RGB and RGB to HIS. Image Compression: Need for compression – Coding Redundancy - Interpixel Redundancy - Psycho visual Redundancy -Bit plane coding - Variable length coding – Adaptive coding – Arithmetic coding – LZW coding – Hybrid coding – Wavelet – JPEG – MPEG.

UNIT-V

Image Segmentation and Object Recognition: Segmentation: Edge detection – Gradient operator – Compass operator – Laplace operator and Zero crossing – Stochastic gradient – Line and Spot detection. Edge linking and Boundary detection – Region based segmentation. Object Recognition: Patterns and pattern classes – matching.

Text Books:

1. Anil K Jain, “Fundamentals of Digital Image Processing”, PHI Learning, 1999.
2. R.C. Gonzalez, “Digital Image Processing”, Addison Wesley.

Reference Book:

1. Pratt, “Digital Image Processing”, John Wiley.

EC E72 - SPECIAL TOPICS IN COMMUNICATION ENGINEERING

UNIT - I

ISDN Overview: A conceptual view of ISDN- ISDN standards- service capabilities- Teleservice protocol architecture- facsimile- teletex message handling system. ISDN interfaces and function; transmission structure- user network interface configuration- ISDN protocol architecture- ISDN connection- terminal adaptation- addressing- internet working. ISDN physical layer: line coding techniques, basic user network interface- primary user role- network interface.

UNIT - II

ISDN Data Link Layer: Hap D, bearer channel link control using 465/ v 120, frame mode bearer service and protocol. ISDN network layer: ISDN call control, Frame relay connection control. Signaling system number Z: SS7 architecture, signaling- data link level-link level, network level- signaling connection control part- ISDN user part. ATM networking capabilities - ATM networking asynchronous technology problems address by ATM, ATM solution, ATM cell and its structure.

UNIT - III

ATM Network Concepts and Architecture: ATM's position in the OSI model- BISDN protocol reference model- ATM functions and layers. ATM signaling principals, ATM performances: merging voice, audio, data and video, ATM traffic control, ATM operation and maintenance, ATM reference configuration. ATM protocol stack: lower layers fiber based networks and its advantages- ATM physical layer media. ATM transmission convergence sub layer - ATM switching principles, OAM function and signaling.

UNIT - IV

Internet Concepts: The net and its features main Internet features, email news groups, telnet, gopher, browsing in WWW. Control modems: speed/ time continuum, communication software Internet finding tools, Archie, gopher commands: TCP/IP pictures, graphics and binary files via news groups: compression software: processing files-sound and images: animation. Internet resources- library card catalogues: establishing web services intranet- creating web home page.

UNIT - V

Mobile Communication Systems: GSM – IS95 – Network aspects – Radio aspects – Security aspects – Low speed circuit switched data in digital cellular networks – High speed circuit switched data in GSM – Packet switched data in digital cellular networks – Data services over DECT, CT2 and PACS – GPRS – CDMA 1x, CDMA 3x, CDMA 2000 and WCDMA.

Reference Books:

1. R.G. Winch "Telecommunication transmission systems", McGraw Hill 1996.
2. W. Stallings, "ISDN and B.ISDN" Macmillan, 1995.
3. A.Glosshrenner, "Internet 101 Computing", McGraw Hill.
4. M. Y. Rhee, "Cryptography and secure communications", McGraw Hill 1994.
5. Raj Pandya, "Mobile and Personal communication system and services", PHI Learning, 2001.

EC E73 - CRYPTOGRAPHY AND NETWORK SECURITY

UNIT-I

Security Problems: Security problem in computing- Security Attacks – Security Services – Security Mechanisms – OSI security attack-Standards and standard setting organizations

UNIT-II

Data Security: Basic encryption and decryption-Substitution-Transposition-Block ciphers-Data encryption standard encryption and decryption-Differential and linear crypto analysis-Advanced encryption–Standard encryption and decryption-Block cipher models-Triple DES with two keys-Stream cipher-RC4- RSA algorithm – Diffie-Hellman key exchange algorithm.

UNIT- III

Message Authentication: Hash Functions – MD5-Hash algorithm - SHA 512 logic - Authentication Protocols-Digital signature standards

UNIT- IV

Network Security: IP security overview, IP security architecture, Authentication header, Encapsulating security pay load, combining security association, Key management-Web security considerations, Secure socket layer, Secure electronic transaction.

UNIT- V

System Security: Intruders and intrusion detection-Malicious software, Viruses and related threats, virus counter measures, distributed denial of services attack-Firewalls design principles-Trusted systems.

Text Book:

1. William Stallings, ”Cryptography and Network Security – Principles & Practice”, Third Edition Pearson Education.

Reference Book:

1. Charles P. Pleeger, “Security in Computing”, PHI Learning, 1998.

EC E74 - SPREAD SPECTRUM COMMUNICATION

UNIT-I

Introduction: Origins of SS communications – Advantages of Spectrum spreading – Types of techniques used for spread spectrum – Processing gain and other fundamental parameters – Jamming methods – Linear Feedback shift register sequence generation – M-sequence and their statistical properties. Introduction to Non-linear sequences – Gold codes; Kasami sequences & chaotic sequences

UNIT-II

Direct Sequence Spread Spectrum System: Coherent direct sequence systems – Model of a DS/BPSK system, Chernoff bound – Performance of encoded DS/BPSK – Constant power and pulse jammer. Coded DS/BPSK Performance for known and unknown channel states

UNIT-III

Frequency Hopping SS System: Non-coherent FH system model – Uncoded FH/BFSK performance under constant power broadband jammer – Partial band noise jammer – Multitone jammer. Coded FH/BFSK performance for partial and multitone jammer. Performance of FH/MDPSK in the presence of partial band mutitone jamming

UNIT-IV

Synchronization of SS Receivers: Acquisition and tracking in DS SS receivers & FH SS receivers – Sequential estimation – Matched filter techniques of acquisition and tracking – Delay locked loop – Tau-Dither loop.

UNIT-V

Applications: Space systems – Satellite communication. Anti jam military communication – Low probability of intercept communication – Mobile communications.

Reference Books:

1. R.C. Dixon, “Spread spectrum systems”, John Wiley, 1984.
2. M.K. Simon, J.K.Omura, R.A. Schiltz and B.K.Levitt, “Spread spectrum communication”, Vol-I, II & IV, Computer Science Press, USA, 1985.
3. G.R.Coopeand, CD.Mc.Gillem, “Modern communications and spread spectrum”, McGraw Hill, 1986.

ELECTIVES OF EIGHTH SEMESTER

EC E81 - CELLULAR MOBILE COMMUNICATION

UNIT-I

Introduction: The cellular concept – Frequency reuse – Interference and system capacity – Trunking and Grade of service – Improving coverage and capacity in cellular systems - Advanced Mobile Phone service - Global system for mobile communication - EIA/T IA IS-136 Digital cellular system - EIA/T IA IS-95 Digital cellular system - cordless telephony and low tier TCS - Third generation wireless system

UNIT-II

Mobility Management: Handoff - Roaming management - Handoff detection – channel Assignment techniques - Radio link transfer IS-41 Network signaling – Intersystem handoff and Authentication - PACS Network Signaling - cellular digital packet data

UNIT-III

GSM: GSM Network signaling - GSM Mobility management GSM short message service - International roaming for GSM - GSM operation, Administration and maintenance - Mobile number Mobile number portability's, VoIP service for mobile networks.

UNIT-IV

Wireless Application Protocol: WAP model - WAP Gateway - WAP Protocol, WAP UAProf and caching - Wireless bearer for WAP - WAP developer tool kits – Mobile station application execution environment.

UNIT-V

Special Topics: Third generation mobile services - Wireless local loop – Wireless enterprise networks - Bluetooth technology.

Text Book:

1. Yi-Bing Lin and Imrich chlantae, "Wireless and Mobile Network Architecture", John Wiley 2006

Reference Books:

1. Kauch Pahlavan and Prahant Krishna moorthy, "Principles of Wireless Networks", PHI Learning, 2007
2. T. S. Rappaport, "Wireless and Mobile Communication", Pearson Education, 2008

EC E82 - SATELLITE COMMUNICATION SYSTEMS

UNIT-I

Introduction to Satellite Communication: Types of satellites- Satellite orbit- satellite constellation- orbital mechanics- equation of orbit-orbital elements- look angle determination- limits of visibility- eclipse- sub satellite point- sun transit outage- space craft technology structural, primary power, attitude and orbit control, thermal, propulsion, telemetry, tracking and command, communication and antenna subsystems- launching procedures and launch vehicles

UNIT-II

Earth Station and Satellite Link Design: Earth station technology- terrestrial interface, receiver and transmitter, antenna systems-Basic transmission theory- satellite uplink and down link analysis and design for IMMARSAT, INTELSAT etc. Link budget and E_b/N_o calculation. Performance impairments – system noise, inter modulation and interference. Propagation characteristics and frequency consideration- system reliability and design life time

UNIT-III

Satellite Access: Types- FDMA concepts- inter modulation and back off- SPADE system- TDMA concept- frame and burst structure- satellite switch TDMA- CDMA concept- DS & FH CDMA system- comparison of multiple access scheme

UNIT-IV

Laser Satellite Communication: Inter satellite links- optical communication for satellite networks- laser cross link analysis- optical beam acquisition, tracking and pointing.

UNIT-V

Satellite Services: Packet satellite networks and services, fixed satellite services, broadcast satellite services, mobile satellite services- VSAT, global positioning satellite system maritime satellite services, gateways, ATM over satellite, role of satellite in future network.

Text Book:

1. Pratt and Bostian, “Satellite communication”, John Wiley and Sons, 2007

Reference Books:

1. Tri. T. Ha, “Digital satellite communication system”, Mc Graw Hill
2. Pritchend and sciulli, “Satellite communication systems engineering”, PHI Learning, 1986
3. Robert M. Gagliendi, “Satellite communication”, John Wiley and Sons, 1988
4. M. Richharia, “Satellite communication system design and analysis”, Mc-Millan publishers, 1996

EC E83 - MICROWAVE INTEGRATED CIRCUIT DESIGN

UNIT-I

Transmission Lines: Characteristics of conventional transmission structures, various planar transmission lines for MICs, comparison of various MIC transmission media. Design of stripline and microstrip transmission lines. Design of coupled striplines and microstrip lines. Stripline and microstrip discontinuity. Losses of microstrip lines and frequency effects. Review of scattering, ABCD, impedance and admittance matrices for two port networks.

UNIT-II

Microwaves Integrated Circuits Components: Lumped elements for MIC**:** Design of lumped elements, design of inductors, capacitors and resistors. Resonators**:** Resonator parameters, resonant frequency, quality factor, rectangular microstrip resonator. Hybrids and couplers: Basics of hybrids and couplers, types of hybrids and couplers, design of hybrids, directional couplers using aperture coupled lines.

UNIT-III

Active and Passive Microwave Devices: Microwave transistor, equivalent circuit .Basic operation principles of FET, MESFET model, power FETs. Introduction, equivalent circuit and figure of merit of schottky barrier junctions, varactor diodes, step recovery diodes and pin diodes.

UNIT-IV

Microwave Semiconductor Sources and Amplifiers: Oscillators**:** Introduction, concept of negative resistance, three port S-parameter characterization of transistors, oscillation and stability conditions, design of fixed frequency oscillators. Amplifiers**:** Two port representation of transistor, stability consideration, amplifier characterization, Non-linear behavior, biasing networks, and linear amplifier design.

UNIT-V

Fabrication of MMC's/MMIC's: Introduction, materials, mask layouts and mask fabrication, hybrid MIC, Mimics- design considerations, design procedures and MMIC fabrication. Hybrid versus Mimics.

Text Book:

1. I. J. Bahl and P. Bhartia, "Microwave solid state circuit design", John Wiley and Sons, 1988.

Reference Book:

1. G.D.Vendelin, A.M.Pavio and U.L.Rohde, "Microwave circuits design using linear and non- linear techniques", John Wiley and Sons, 1990.

EC E84 - OPTOELECTRONIC DEVICES

UNIT-I

Physics of Light and Fiber Basics: Electromagnetic waves- Wave nature of light, basic optical laws and definition-Introduction to optical fibers-Principles of light propagation through optical fiber-Different types of fibers-Structures and their properties.

UNIT-II

Optical Sources and Detectors: LED- Structures-efficiency-LASER principle- optical feedback- Threshold condition-types of laser-PIN photodetector-Avalanche photodetector - detector performance-spectral response

UNIT-III

Opto Electronic Modulator and Optical Sensors: Electro optic modulator-Magneto optic devices-Acousto optic devices-All fiber modulators- Interferometric Sensors, Fabry perot, Mach Zender, Michelson and Sagnac interferometric sensors.

UNIT-IV

Optical Amplifier and Fiber Optic Network Components: Semiconductor laser amplifier-Raman fiber amplifier - Brillouin fiber amplifier-Optical filters-Fixed and tunable-circulators-isolators-attenuators-optical switches- couplers-splitters-wavelength converters.

UNIT-V

Optoelectronic Integrated Circuits: Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

Text Book:

1. Bhattacharya "Semiconductor Opto Electronic Devices", PHI Learning, New Delhi, 1995.

2. Gerd Keiser, "Optical Fiber Communications", TMH, 2000.

Reference Books:

1. Jasprit Singh, "Opto Electronics – As Introduction to materials and devices", Tata Mc Graw-Hill International Edition, 1998.
2. Djafar K.Mynbaev and Lowell L.Scheiner " Fiber optic communication Technology" Pearson education, 2001.
3. Eric Udd, Fiber Optic Sensors, John Wiley, New York, 1991.
4. J.H. Franz and V. K. Jain, " Optical Communication - Components and systems", Narosa Publishing house, 2000.

EC E85 - RF CIRCUIT DESIGN

UNIT-I

RF ISSUES: Importance of RF design, Electromagnetic Spectrum, RF behaviour of passive components, Chip components and Circuit Board considerations, Scattering Parameters, Smith Chart and applications.

UNIT II

RF FILTER DESIGN: Overview , Basic resonator and filter configuration, Special filter realizations, Filter implementations,Coupled filter.

UNIT III

ACTIVE RF COMPONENTS & APPLICATIONS:RF diodes, BJT, RF FETs, High electron mobility transistors; Matching and Biasing Networks –Impedance matching using discrete components, Microstripline matching networks, Amplifier classes ofoperation and biasing networks.

UNIT IV

RF AMPLIFIER DESIGNS: Characteristics, Amplifier power relations, Stability considerations, Constant gain circles, Constant VSWR circles, Low Noise circuits, Broadband , high power and multistage amplifiers.

UNIT V

OSCILLATORS, MIXERS & APPLICATIONS: Basic Oscillator model, High frequency oscillator configuration, Basic characteristics of Mixers; Phase Locked Loops ; RF directional couplers and hybrid couplers ; Detector and demodulator circuits.

Text Books:

1. Reinhold Ludwig and Powel Bretchko, RF Circuit Design – Theory and Applications, Pearson Education Asia, First Edition, 2001.
2. Pozar, Microwave Engineering, John Wiley,3rd ed.,2004.

References:

1. Joseph . J. Carr, Secrets of RF Circuit Design , McGraw Hill Publishers, Third Edition, 2000.
2. Mathew M. Radmanesh, Radio Frequency & Microwave Electronics, Pearson Education Asia, Second Edition, 2002.

3. Ulrich L. Rohde and David P. NewKirk, RF / Microwave Circuit Design, John Wiley & Sons USA 2000.
4. Roland E. Best, Phase - Locked Loops : Design, simulation and applications, McGraw Hill Publishers 5TH edition 2003.
5. Ian Hickman, " RF HandBook ", Butter Worth Heinemann Ltd., Oxford, 1993.
6. James Hardy, " High Frequency Circuit Design ", Resto Publishing Co., NewYork, 1979.

EC E86 - SPEECH PROCESSING

UNIT – I

Speech Recognition Overview: Pattern classification, statistical pattern classification, wave basics, acoustic tube modeling of speech production, music production, room acoustics.

UNIT- II

Auditory perception: Ear physiology, psychoacoustics, models of pitch perception, Speech perception, human speech recognition.

UNIT – III

Speech features: The auditory system as filter bank, the cepstrum as a spectral analyzer, linear prediction.

UNIT – IV

Automatic Speech recognition: Feature extraction for ASR, linguistic categories for speech recognition, deterministic sequence recognition for ASR, statistical sequence recognition, statistical model training, discriminant acoustic probability estimation, Speech recognition and Understanding.

UNIT – V

Speech Coding: Formulation of linear prediction problem in time domain, solution of normal equations, interpretation of linear prediction in autocorrelation and spectral domains, vo-coders.

Text Book:

1. B.Gold and N. Morgan, “Speech and Audio Signal Processing”, John Wiley, 1999.

References:

1. A. M. Kondoz, “Digital Speech”, John Wiley, 2007.
2. L.R.Rabiner and K.W. Sahafer, “Digital Processing of Speech Signals”, Dorling Kindersley (India) Pvt. Ltd., 2008.
3. J. L. Flanagan, “Speech Analysis, Synthesis and Perception”, Second edition, Spriger, 1983.
4. I. H. Witten, “Principles of Computer Speech”, Academic Press, 1982.

INFRASTRUCTURE AND FACULTY REQUIREMENTS

Infrastructure and faculty requirement for I year B.Tech programme

Space requirement:

SI.No	Classroom/laboratory	Batch size	Area(Sqm)	No.required
01.	classroom	66	66	Total intake/60
02.	Drawing hall	66	175	1
03.	Physics laboratory	30	150	1
04.	Chemistry laboratory	30	150	1
05.	Basic electrical laboratory	15	75	1
06.	Basic electronics laboratory	15	75	1
07.	Computer laboratory	30	150	1
08.	Workshop practice	30	200	1

Requirement of Teaching and Non-Teaching Staff:

Teaching:

The number of faculty members required would be as per AICTE norms and course curriculum.

Faculty : student ratio=1:15

A minimum of two faculty members in each of the following disciplines are required

(i) Maths
(ii) Physics
(iii) Chemistry
(iv) Mechanical

A minimum of one faculty member in each of the following disciplines are required

(i) English
(ii) Electronics & Electronics Engineering/Electronics and Communication Engineering
(iii) Civil Engineering
(iv) Computer Science and Engineering

Non-Teaching:

Total number of non-teaching staff (includes technical & ministerial) shall be in the ratio of ***Teaching : Non- teaching = 1:1.2***

FACULTY QUALIFICATION:

Science and Humanities

A first class Master degree in the respective discipline with Net qualification / M.Phil / Ph.D.

Engineering discipline

A first class B.E / B.Tech degree in the respective discipline.

(or)

A first class ME / M.Tech degree in the respective discipline.

COMPUTER PROGRAMMING LABORATORY

(*For a batch of 30 students*)

Hardware

1. 1 No. of computer system : Server
2. 35 Nos. of computer system : Node with Pentium 4 or above processor
3. 1 UPS 5k VA
4. Dot Matrix Printer / Laser Printer – 3 nos.
5. Node with Pentium 4 or above processor

Software

1. Licensed Microsoft Server OS / Linux Server OS / UNIX Server Software / Any other open source server software
2. Licensed client OS / Open source client OS for minimum of 30 user
3. Borland 'C' Complier / Microsoft 'C' Complier with 30 user license

   MS Office / any other open source word processor, spread sheet and presentation software with 30 user license.

BASIC ELECTRICAL AND ELECTRONICS LABORATORY

(For a batch of 30 students)

Electrical

1. 15 boards
2. 15 tool sets

   Each set includes Screw Driver, Poker, Cutting pliers, Tester, Knife etc.
3. Accessories such as PVC pipes, boards, Ts, Wires, (single and multispread) electrical accessories like switches (SPST, SPDT, OPDT), lamp holders, bulbs etc.
4. Demo experiment with few workshop tools –fan, tube light, wiring etc.

Electronics

1. Regulated power supply (0-15v)	-	2
2. Signal Generator (0-1 MHz)	-	2
3. CRO (20 MHz)	-	2
4. Digital IC trainer kit	-	1
5. Transformer (230/6, 230/12)	-	2
6. Strain Gauge / Thermocouple / LVDT / Transducer kit	-	1

PHYSICS LABORATORY

(For a batch of 30 students)

List of Major equipments required

1. Lee's Disc Apparatus	-	3 nos.
2. Calorimeter with sterer	-	6nos.
3. Spectrometer	-	6nos.
4. Traveling Microscope	-	6nos.
5. Laurent Halt Shade Polari meter	-	3nos.
6. Jolly Bulb Apparatus	-	3nos.
7. Deflection Magnetometer	-	3nos.
8. He Ne Laser	-	3nos.
9. Stop watch, Vernier Caliper, Screw gauge	-	6nos. each
10. Electronic Weighting Machine	-	2nos

CHEMISTRY LABORATORY

(For a batch of 30 students)

1.	Burette	- 35 nos.
2.	Pipette	- 35nos.
3.	Conical flask	- 35nos.
4.	Wash bottle 500 ml	- 35nos.
5.	Funnel	-35nos
6.	Volumetric flask 1000 ml	-5nos
	100 ml	-70nos
7.	Beakers 1000 ml	-10nos
	500 m	-10nosl
	250 ml	-70nos
	100 ml	-15nos
8.	Reagent bottle 5000 ml	-5nos
	250 ml	-35nos
	60ml	-35nos
9.	Measuring jar 100ml	-10nos
	25ml	-10nos
	10ml	-10nos
	5ml	-10nos
	2ml	-10nos
10.	Round bottom flask 250ml	-35nos
11.	Condenser 300mm	-35nos
12.	COD bottle	-5nos

EQUIPMENT

1.	Electronic weighing balance 0.1mg-200gm	-2nos
2.	Conductivity meters	-7nos
3.	Caloriometer	-7nos
4.	Potientiometer	-7nos
5.	Hot plates	-7nos
6.	Polythene cans 10 liters	-10nos
	5liters	-10nos
7.	Viscometers	-35nos
8.	Burners	-35 nos.
9.	Water distillation plant 5 lit cap	-1 no.
10.	Burette stands with clamp	-35 nos.

BASIC WORKSHOP

(For a batch of 30 students)

1. Work benches fitted with bench-wise / carpentry wise of 8 for a batch size of 30.
2. Fitting tools – 8 sets
3. Carpentry tools – 8 sets
4. Welding tools – 8 sets
5. Sheet metal tools – 8 sets
6. Power hacksaw – 1 no.
7. Drilling machines – 1 no.
8. Anvil – 1 no.
9. Welding work tables – 2 nos.
10. Welding Transformer – 2 nos.
11. Hand shear for sheet metal
12. Pedestal Grinder
13. Surface table with light gauge
14. Different stag for forming shapes

Infrastructure and Faculty Requirement for B.Tech. Electronics and Communication Engineering

Infrastructure

Sl.No.	Name of the Laboratory	Area(sq.m)	Maximum batch size	No. Required
1	Class Rooms	66	66	3
2	Electronics Lab	75	22	2
3	Communication Lab	75	22	2
4	Computer Lab	75	22	1

Requirement of Teaching and Non-Teaching Staff:

Teaching:

The number of faculty members required would be as per AICTE norms and course curriculum.

Faculty: Student Ratio=1.15

A total of 12 faculty members are required including a teaching faculty for mathematics (180/15).

Non-Teaching Staff:

Teaching: Non-Teaching=1:1.2

Each laboratory should have one laboratory attender/Mechanic. In addition, one more attender is required for department office.

Total requirement of Non-Teaching Staff is =6(5 Teaching +1 Non Teaching).

Faculty Qualification:

A First Class B.E. /B.Tech. Degree in Electronics and Communication Engineering.

(or)

A First Class M.E. /M.Tech. Degree in any one of the specialization of Electronics and Communication Engineering.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
LABORATORY EQIPMENTS LIST
[BASED ON REVISED SYLLABUS 2009-2010]

S.No.	REQUIREMENTS	QTY.
1	Regulated power supply	40
2	CRO (20MHz/30MHz/60MHz/100MHz)	45
3	Signal generator and Function generator	40
4	Multimeter	20
5	Digital trainer kit	10
6	Microwave test bench(Klystron)	4
7	Microwave test bench(Gunn diode)	3
8	Fiber optic trainer	3
9	Spectrum analyzer	1
10	Vector Network Analyser	1
11	OTDR	1
12	Radio communication	1
13	Arbitrary waveform generator	1
14	**VLSI trainer kit:** List of software required a) Simulator and Synthesizer tool with down loader (VHDL/Verilog)	5 user license
	No. of FPGA kits required with a) I/O cards Add on card for FPGA	5 nos.
15	DC Ammeter (100mA,10mA,250μA)	7(each)
16	DC Voltmeter(3V,10V,30V,300V)	7(each)
17	Decade resistance box	12
18	Decade inductance box	12
19	Decade capacitance box	12
20	Audio power meter	1
21	PC with LAN connection	30
22	Network Simulator Software	10
23	Microcontroller 8051 kit with facility a. 16×4(12×3) Keyboard b. 16×2 LCD display c. Four digit 7 segment display d. Parallel I/O pins are all available(Terminated) to interface to the circuits assembled while conducting experiments. e. Bread board to mount circuit components to build the interfaces. f. Connect to PC and on board programmable facility.	7

S.No.	REQUIREMENTS	QTY.
24.	Pspice / Orcad / Multisim – Design Software.	10
25.	Flash Programmer	7
26.	Matlab software	10 users

The requirement specified below can be shared with the CSE, EEE or IT department lab.

S.No.	REQUIREMENTS	QTY
	Microprocessor and Microcontroller kit	
1.	8085	12
2.	Microcontrollers Kit (8051) a. 16 x 2 LCD display. b. Four digit 7 segment display. c. Parallel I/O pins are all available (terminated) to interface to the circuits assembled. d. Bread board to mount circuit components to build the interface.	12
3.	8257, ARM, PIC Processors	2(each)
4.	Various Interface Kits (Stepper motor, Key board, D/A, A/D converters, PI controller, serial.)	3(each)