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GGSIPIU Syllabus

SCHEME OF EXAMINATION

&

SYLLABUS

OF

B.TECH PROGRAMME

IN

ELECTRONICS & COMMUNICATION ENGINEERING

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
KASHMERE GATE
DELHI-110006

SCHEME OF EXAMINATION
B.TECH DEGREE COURSE (Common to all branches)

FIRST SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
THEORY PAPERS						
ETMA 101	Applied Mathematics-I	3	1	0	0	4
ETPH 103	Applied Physics-I	2	1	0	0	3
ETCH 105	Applied Chemistry-I	2	1	0	0	3
ETME 107	Manufacturing Process	2	0	0	0	2
ETCS 109	Introduction to Computers	2	1	0	0	3
ETEL 111	Communication Skills-I	2	1	0	0	3
ETEL 113	Impact of Science & Technology on Society	2	0	0	0	2

PRACTICAL/VIVA VOCE

ETPH	151	Applied Physics Lab.-I	-	-	2	0	1
ETCH	153	Applied Chemistry Lab.-I	-	-	2	0	1
ETCS	155	Introduction to Computers Lab.	-	-	3	0	1 ½
ETME	157	Workshop Practice-I	-	-	3	0	1 ½
ETME	159	Engg. Graphics Lab.	-	-	2	0	1
TOTAL:			15	5	12	0	26
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SCHEME OF EXAMINATION
B.TECH DEGREE COURSE (Common to all branches)

SECOND SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
THEORY PAPERS						
ETMA 102	Applied Mathematics-II	3	1	0	0	4.
ETPH 104	Applied Physics-II	2	1	0	0	3
ETCH 106	Applied Chemistry-II	2	½	0	0	2 ½
ETCS 108	Programming & Auto CAD	2	0	0	0	2
ETME 110	Engineering Mechanics	3	1	0	0	4
ETEC 112	Electrical Science	3	1	0	0	4
ETEL 114	Communication Skills-II 1	½	0	0	1 ½	

PRACTICAL/VIVA VOCE

ETPH	152	Applied Physics Lab.-II	-	0	2	0	1
ETCH	154	Applied Chemistry Lab.-II	-	0	2	0	1
ETCS	156	Programming & Auto CAD Lab	-	0	3	0	2
ETME	158	Engineering Mechanics Lab.	-	0	2	0	1
ETEC	160	Electrical Science Lab.	-	0	2	0	1
TOTAL :			16	5	11	0	27

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
THEORY PAPERS						
ETMA 201	Applied Mathematics-III	3	1	0	0	4
ETEC 203	Analog Electronics I	3	1	0	0	4
ETEC 205	Circuits & Systems	3	1	0	0	4
ETCS 207	Foundations of Computer Science	3	1	0	0	4

ETCS	209	Object Oriented Progg.	3	1	0	0	4
ETCS	211	Data Structures	3	1	0	0	4

PRACTICAL/VIVA VOCE

ETEC	251	Analog Electronics I Lab.	0	0	2	0	1
ETEC	253	Circuits & Systems Lab.	0	0	2	0	1
ETCS	255	Object Oriented Progg. Lab.	0	0	2	0	1
ETCS	257	Data Structures Lab.	0	0	2	0	1
TOTAL :			18	6	8	0	28

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

FOURTH SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
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THEORY PAPERS

ETEC	202	Electro-magnetic fields & Transmission lines	3	1	0	0	4
ETEC	204	Analog Electronics-II	3	1	0	0	4
ETEC	206	Digital Circuits & Systems-I	3	1	0	0	4
ETEC	208	Communication Systems & Circuits	3	1	0	0	4
ETCS	210	Computer Graphics & Multimedia	3	1	0	0	4
ETCS	212	Operating Systems & System Programming -I	3	1	0	0	4

PRACTICAL/VIVA VOCE

ETEC	252	Analog Electronics-II Lab.	0	0	2	0	1
ETEC	254	Digital Circuits & System-I Lab	0	0	2	0	1
ETEC	256	Communication Systems & Circuits Lab.	0	0	2	0	1
ETCS	258	Computer Graphics & Multimedia Lab.	0	0	2	0	1
ETCS	260	Operating Systems & System Programming- I Lab.	0	0	2	0	1
TOTAL:			18	6	8	0	29

Note: An in-house Training Programme of 6 weeks is to be conducted during the Summer-break after the IV Semester. This carries two credits, which will be accounted for in the V Semester (ETEC 363)

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

FIFTH SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
THEORY PAPERS						
ETEC 301	Digital Circuits and Systems-II	3	1	0	0	4
ETEC 303	Microprocessor System-I	3	1	0	0	4
ETCS 305	Computer Architecture	3	1	0	0	4
ETEC 307	Telecommunication Networks	3	1	0	0	4
ETCS 309	Data Base Management System		3	1	0	0
						4
PRACTICAL/VIVA VOCE						
ETEC 351	Digital Circuits & Systems-II Lab.	0	0	2	0	1
ETEC 353	Microprocessor System-I	0	0	2	0	1
ETCS 355	Computer Architecture Lab.	0	0	2	0	1
ETEC 357	Telecommunication Networks					
	Lab	0	0	2	0	1
ETCS 359	Data Base Management					
	System Lab.	0	0	2	0	1
ETCS 361	Programming I Lab. (or CAD)	0	0	2	0	1
Any other similar PCB design software Lab.						
SESSIONAL						
ETEC 363	Practical training undergone					
	At the end of Fourth Semester	0	0	0	0	2
TOTAL :		15	5	12	0	28

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

SIXTH SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
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THEORY PAPERS

ETEC	302	Microprocessor System-II	3	1	0	0	4
ETEC	304	Microwave Engineering	3	1	0	0	4
ETEC	306	Digital Signal Processing	3	1	0	0	4
ETEC	308	Data Communication Networks	3	1	0	0	4
ETEC	310	VLSI Design	3	1	0	0	4

PRACTICAL/VIVA VOCE

ETEC	352	Microprocessor System-II Lab	0	0	2	0	1
ETEC	354	Microwave Engg. Lab.	0	0	2	0	1
ETEC	356	Digital Signal Processing	0	0	2	0	1
ETEC	358	Data Communication					
		Networks Lab.	0	0	2	0	1
ETEC	360	VLSI Design Lab.	0	0	2	0	1

TOTAL:			15	5	10	0	25
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Note : Training Programme of 6 weeks is to be conducted during Summer-break after VI Semester. This carries three credits which will be accounted for in the VII Semester ETEC 461

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

SEVENTH SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
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CORE

ETEC	401	Control Systems	3	1	0	0	4
ETCS	403	Software Engineering	3	1	0	0	4
ETEC	405	Network Technology	3	1	0	0	4

ELECTIVES (Select any two)

ETEC	407	Advanced VLSI Design	3	1	0	0	4
ETIT	409	Mobile Computing	3	1	0	0	4
ETIT	411	Reliability Engineering	3	1	0	0	4
ETEC	413	Power Electronics	3	1	0	0	4
ETIT	415	Advanced Computer Architecture	3	1	0	0	4
ETEC	417	Optical Communication	3	1	0	0	4
ETIT	419	Artificial Intelligence	3	1	0	0	4

PRACTICAL/VIVA VOCE

ETEC	451	Control Systems Lab.	0	0	2	0	1	
ETCS	453	Software Engineering Lab.	0	0	2	0	1	
ETEC	455	Network Technology Lab	0	0	2	0	1	
ETEC	457	Practical based on ELECTIVES		0	0	2	0	1

ETCS	459	Programming II Lab. (Mat Lab)	0	0	2	0	1
SESSIONAL							
ETEC	461	Practical Training undergone at the end of Sixth Semester	0	0	0	0	3
TOTAL :			15	5	10	0	28

SCHEME OF EXAMINATION
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

EIGHTH SEMESTER EXAMINATION

Code No.	Paper	L	T	P	S	Credits
CORE						
ETEC 402	Consumer Electronics	3	1	0	0	4
ETEC 404	Satellite & Mobile Comm.	3	1	0	0	4
ELECTIVES (Select any two)						
ETEC 406	Instrumentation	3	1	0	0	4
ETEC 408	Integrated Circuit Technology	3	1	0	0	4
ETIT 410	Digital Image Processing	3	1	0	0	4
ETIT 412	Microwave Devices	3	1	0	0	4
ETIT 414	Network Management and Security	3	1	0	0	4
ETEC 416	Embedded Systems	3	1	0	0	4

PRACTICAL/VIVA VOCE

ETEC	452	Consumer Electronics Lab.	0	0	2	0	1	
ETEC	454	Satellite & Mobile Comm. Lab.	0	0	2	0	1	
ETEC	456	Practical based on ELECTIVES		0	0	2	0	1

SESSIONAL

ETEC	458	Project	0	0	8	0	8
TOTAL:			12	4	14	0	27

ETMA 101	Applied Mathematics -I	L	T	C
		3	1	4

Calculus of Functions of One Variable

- I. Successive Differentiation, Leibnitz’s theorem (without proof). Mean value theorem, Taylor’s theorem, Remainder theorem, Asymptotes, Curvature.
- II. **Infinite Series:** Convergence, divergence, Comparison test, Ratio test, Cauchy Leibnitz’s theorem (without proof), Absolute and Conditional Convergence. Taylor and Maclaurin series, Power Series, Radius of Convergence.
- III. **Integral Calculus:** Fundamental theorems, Reduction Formulae, Properties of definite Integral, Applications of length, area, volume, surface of revolution, moments, center of gravity. Improper integrals, Beta-Gamma functions, Numerical Integration using Trapezoidal and Simpson’s rules.
- IV. **Calculus of Functions of Several Variables** Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials. Tangents and Normals. Maxima, Minima and Saddle points. Method of Lagrange multipliers. Errors and Approximations. Differentiation under integral sign Jacobians and transformations of coordinates. Multiple Integrals-Double and Triple integrals. Applications to areas, volumes etc.
- V. **Ordinary Differential Equations:** Formation of ODE’s, definition of order, degree and solutions. ODE’s of first order: Method of separation of variables, homogeneous and nonhomogeneous equations, exactness and integrating factor General linear ODE’s of the nth Order: solution of homogeneous and non homogeneous equations, operator method, method of undetermined coefficients and variation of parameters. Solutions of simple simultaneous ODE’s .

ETPH 103	Applied Physics-I	L	T	C
		2	1	3

Kinematics:

- ❖ Need of frames of reference in describing motion
- ❖ One Dimensional motion
- ❖ Two Dimensional motion

Dynamics

- ❖ Central forces, Inverse square force
- ❖ Satellite including applications in remote sensing and communication
- ❖ Oscillations, General potential with stable equilibrium point, Solution of differential equation with emphasis on initial conditions, Damped and forced oscillations.

Waves

- ❖ Waves on a stretched string, Differential equation of wave, Description of general solution $f(x \pm vt)$ Longitudinal and transverse waves
- ❖ Superposition of waves, Plane monochromatic waves, $\lambda = n\lambda$, plane, spherical and cylindrical wavefronts.
- ❖ Pressure equation, decibel, reverberation, ultrasonic

Optics

- ❖ Optical Instruments – Telescope, Microscope, Radio Telescope, Electron Microscope.
- ❖ Interference of light – Newton’s rings, testing of flatness, curved surfaces, alignment.
- ❖ Diffraction, Resolution, Polarisation with application

- ❖ Principle of laser, design of laser, stimulated radiation, population inversion, laser action, properties and application of laser light.

Modern physics

- ❖ Theory of Relativity
- ❖ Elements of Quantum Mechanics including atomic spectra, X-rays, Ultrasound, Infrared radiations, Nuclear radiations and detectors.

ETCH 105

Applied Chemistry -I

L T C
2 1 3

- Water** : Specifications for water, Analysis of water-Alkalinity, hardness and its determination (EDTA Method only), water for domestic use, Water-softening-Lime-Soda process, Ion exchangers polished water, Boiler-feed water, boiler problems-scale, sludge, priming and foaming, caustic embrittlement and corrosion, their causes and prevention, removal of silice, removal of dissolved gases, carbonates phosphate conditioning, colloidal conditioning, Calgon treatment, conditioning, Numerical problems of Alkalinity, hardness Lime-Soda process and EDTA method.
- Fuels** : Definition and classification, combustion and chemical principles involved in it. Calorific value : Gross and net Calorific values and their determination by Buoy’s Gas Calorimeter and Bomb Calorimeter.
 - Solid Fuels** : Proximate and ultimate analysis of coal and their importance.

Carbonization: High and Low temperature carbonization, coke, its manufacture by Otto Hoffman Oven and uses.
 - Liquid Fuels:** Conversion of coal into liquid fuels (Bargius process and Fischer Tropsch Process and mechanism, Petroleum: its Chemical composition and Fractional distillation, Cracking of heavy oil residues : thermal cracking and catalytic cracking, knocking-chemical structure and knocking : Octane and Cetane number and their significance, Power alcohol.
 - Gaseous Fuels:** Natural gas, producer gas, water gas, carbureted water gas, coal gas and oil gas, fuel and fuel gases and their analysis by Orsat’s apparatus.
 - Numerical on calorific value, combustion, Proximate and ultimate analysis of coal and fuel gas analysis.
 - Nuclear Fuels:** Nuclear reaction, nuclear fission and nuclear fusion, Nuclear reactor
- Transition Elements:** General Properties with special reference to electronic configuration colour and magnetic properties of transition metal compounds.
- Inorganic Polymers:** Types of polymers, Phosphazenes, polysiloxanes and sulphur containing polymers-their structures and properties
- Solutions** : Ideal and non ideal solutions Raoult’s Law. Distillation of binary solutions. Henry’s Law, Nernst distribution law, Arrenius theory and special behavior of strong electrolytes.

ETME 107

Manufacturing Processes

L T C
2 2

Casting Processes :

Principles of metal casting: Pattern materials, types and allowance; Study of moulding, sand moulding, tools, moulding materials, classification of moulds, description and operation of cupola: special casting processes e.g. die-casting, permanent mould casting, centrifugal casting, investment casting.

Smithy and Forging:

Basic operation e.g. upsetting, fullering, flattening, drawing, swaging: tools and appliances: drop forging, press forging.

Metal joining:

Welding principles, classification of welding techniques; Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Carbon arc, submerged arc and atomic hydrogen welding, Electric resistance welding: spot, seam, butt, butt seam and percussion welding; Flux; composition, properties and function Electrodes; Types of joints and edge preparation, Brazing and soldering.

Sheet Metal Work:

Common processes, tools and equipments; metals used for sheets, standard specification for sheets

Bench Work and Fitting

Fitting, sawing, chipping, thread cutting (die), tapping; Study of hand tools, Marking and marking tools.

ETCS 109	Introduction to Computers	L	T	C
		2	1	3

1. Introduction :
- ❖ Overview of Computer organization and historical perspective computer applications in various fields of science and management.

❖ Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions.

❖ Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers.

❖ Concept of computing, contemporary, Operating Systems such as DOS, windows 95, UNIX, Client Server Technology, etc. (only brief user level description).

❖ Introduction to E-mail, ftp, login and other network services, World Wide Web, MS-Word, MS-Excel, MS-Power Point.

Introduction to Programming:

- ❖ Concept of algorithms, Flow-charts, Data Flow diagrams etc.
- ❖ Introduction to the Editing tools such as vi or MS-VC editors.
- ❖ Concepts of the finite storage, bits, bytes, kilo, mega and gigabytes. Concepts of character representation.

Programming using C

The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

- ❖ Example of some simple C program. Dissection of the program line by line. Concept of variables, program statements and function calls from the library (Printf for example)
- ❖ C data types, int, char, float etc.
- ❖ C expressions, arithmetic operation, relational and logic operations.
- ❖ C assignment statements, extension of assignment to the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions.
- ❖ C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.
- ❖ Concepts of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned.
- ❖ One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations.
- ❖ Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables.
- ❖ Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments.
- ❖ Strings and C string library.
- ❖ Structures and Unions. Defining C structures, passing strings as arguments Programming examples.

ETEL 111	Communication Skills -I	L	T	C
		2	1	3

1. Remedial Grammar

- a) Simple sentences-their phrase structure
- b) Parts of speech
- c) Tense and Concord
- d) Gerunds, Participles and Infinitives
- e) Complex and Compound sentences (Use of connectives)
- f) Conditional clauses
- g) Question tags and short responses
- h) Common errors

2. Vocabulary and Usage

- a) Synonyms and Antonyms
- b) One-word substitutions
- c) Words often confused

- d) Idioms/Idiomatic Expressions
- e) Foreign Phrases (Greek and Latin)

Presentation of Technical Information

Technical description of

- a) Simple objects, tools, appliances
- b) Processes and operations
- c) Scientific principles

Composition:

- a) Comprehension unseen passages
- b) Precis Writing

Prose

Selected prose pieces from prescribed texts

ETEL 113	Impact of Science & Technology on Society	$\frac{L}{2}$	T	$\frac{C}{2}$
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Introduction to some of the important social realities and Institutions in India: interrelationship between Science. Technology: socio-cultural context of Scientific and Technological growth.

History and Science of technology, Impact of technology., Man made hazards, Technology and productivity., Technology and culture, Technology inputs for social change, Technology, economy and social behavior linkages

Stage of Science and Technology in Indian Society today and the policy options for the future.

ETPH 151	Applied Physics Lab-I	$\frac{P}{2}$	$\frac{C}{1}$
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- ❖ Measurement of short time intervals using electronic timer sensors.
- ❖ Study of rotational motion of cycle wheel
- ❖ Study of oscillatory systems
- ❖ Study of stationary waves
- ❖ Use of prism spectrometer

- ❖ Measurement of wavelength of light by bi-prism/Newton rings/Diffraction grating
- ❖ Diffraction of light using Sodium source and Helium Neon source.
- ❖ Study of polarization of light
- ❖ Study of laser parameters/diffraction at a circular aperture
- ❖ Experiment on Ultrasonic.

ETCH 153	Applied Chemistry Lab-I	P	C
		2	1

- To determine the percentage composition of a mixture of Sodium hydroxide and Sodium chloride.
- To determine the amount of Sodium Carbonate in the given mixture of Sodium Carbonate and Sodium bicarbonate.
- Determine the amount of oxalic acid and Sulphuric acid/Hydrochloric acid in one litre of solution given standard sodium hydroxide and Potassium per magnate.
- To determine the carbonate, bicarbonate and chloride contents in irrigation water.
- To determine the number of water molecules of crystallization in Mohr salt provided standard dichromate solution using internal indicator.
- Determine the amount of Cu in the copper ore solution provided hypo solution
- Iodimetric titration of $K_2Cr_2O_7$ V/S $Na_2S_2O_3$ to determine the percentage purity of $K_2Cr_2O_7$ sample.
- Argentometric titration one each of Vohlard’s method and of Mohr’s method.
- Determination of dissolved oxygen in the given sample of water
- Determine the surface tension of a liquid using drop weight method.

ETCS 155	Introduction to Computer Lab-I	P	C
		3	1 ½

1. Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions after reading necessary values from the user
 - ❖ $(ax+b)/(ax-b)$
 - ❖ $2.5 \log x - \cos 30^\circ + |x^2 - y^2| + \sqrt{2xy}$
 - ❖ $(x^5 + 10x^4 + 8x^3 + 4x + 2)$
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series
 $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{20}$
8. Write a program to search whether a given substring exist in an input string or not and then delete this sub string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The fibonacci sequence of numbers is 1,1,2,3,5,8,..... Based on the recurrence relation
 $F(n) = F(n-1) + F(n-2)$ for $n > 2$
 Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
 - a) Addition of two matrices
 - b) Subtraction of two matrices
 - c) Finding upper and lower triangular matrices
 - d) Trace of a matrix
 - e) Transpose of a matrix
 - f) Check of matrix symmetry
 - g) Product of two matrices.
12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer
13. Write a program to print the following outputs:

1				
2	2			
3	3	3		
4	4	4	4	
5	5	5	5	5

		1		
	2		2	
3		3		3
4	4		4	4
5	5	5	5	5
14. Write functions to add, subtract, multiply and divide two complex numbers $(x+iy)$ and $(a+ib)$ Also write the main program.
15. Write a menu driven program for searching and sorting with following options:-
 - a) Searching
 - (1) Linear searching
 - (2) Binary searching
 - b) Sorting
 - (1) Insertion sort
 - (2) Selection sorting
16. Write a program to copy one file to other, use command line arguments.
17. Write a program to mask some bit of a number (using bit operations)
18. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.

ETME 157 **Workshop Practice-I**

P *C*
3 1 ½

- 1. Welding
 - (a) Arc Welding - Butt Joint
 - Lap Joint
 - T Joint
 - (b) Gas Welding - Butt Joint
 - Lap Joint
 - Brazing of Broken pieces

- 2. Foundry
 - Pulley Block
 - Lathe Stand Block
 - Screw Jack Body
 - Bracket with cores

- 3. Sheet Metal
 - Dust Bin
 - Funnel
 - Cylindrical Mug with handle-Rectangular Box

- 4. Fitting Shop
 - Sawing M.S. Steel strip
 - Filling the Job

Marking and Finishing the Job

ETME 159 **Engineering Graphics Lab**

P *C*
2 1

- 1. **General:** Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

- 2. **Projections of Point and Lines:** Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

- 3. **Planes other than the Reference Planes:** Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

- 4. **Projections of Plane Figures:** Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both

reference planes). Obtaining true shape of the plane figure by projection.

- 5. **Projection of Solids:** Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.
- 6. **Development of Surface:** Development of simple objects with and without sectioning.
- 7. **Isometric Projection**
- 8. **Nomography :** Basic Concepts and use.

ETMA 102	Applied Mathematics-II	L	T	C
		3	1	4

Inner product spaces, Matrices and determinates, Linear transformations. Systems of linear equations-consistency and inconsistency, Hermitian, Skew-Hermitian Forms, Eigenvalues and Eigenvectors of matrix, diagonalization of a matrix, Cayley-Hamilton Theorem (without poof)

Complex Variables: Curves and Regions in the Complex Plane, Complex Functions, Limits, Derivative, Analytic Function, Cauchy-Riemann Equations, Laplace’s Equation, Rational, Exponential, Trigonometric, Hyperbolic Function’s Linear Fractional Transformations, Conformal Mapping, Complex Line Integral, Cauchy’s Integral Theorem, Cauchy’s Integral Formula, Derivatives of Analytic Function, Power Series, Taylor Series, Laurent Series. Methods for obtaining Power Series, Analyticity at Infinity, Zeroes, Singularities, Residues, Residue Theorem, Evaluation of Real Integrals.

- 1. **Vector Calculus:** Scalar and vector fields, Curves, Arc length, Tangent, Directional Derivative, gradient of Scalar field, divergence and curl of a vector field. Line integrals (independent of path,) Green’s theorem, Divergence theorem and Stoke’s theorem (without proofs), Surface Integrals.
- 2. **Probability and Statistics :** Random Variables, Discrete and Continuous Distribution, Mean and Variance of a Distribution, Moment Generating Functions, Skewness, Kurtosis, Binomial, Poisson, Normal Distributions, Testing of Statistical Hypothesis, F Test, T-Test, X² test.

ETPH 104	Applied Physics-II	L	T	C
		2	1	3

- 1. **Heat:** Temperature measurement and controls, Resistance thermometer, thermo emf, high and Low temperature measurements, thermistor, thermostatic and other temperature control devices. Black body radiation, Kirchoff’s Law, Stefan-Boltzman’s Law, Wien’s Law, Rayleigh jeans’s Law, Planck’s Law.
- 2. **Ultrasonic:** Piezo-electric effect, production-(using Quartz, Ceramics and Magnetostriction), Detection, velocity measurement and application of ultrasonic waves (cavitations, thickness, Echo, chemical reactions).
- 3. Motion of charged particle in Electric and magnetic fields. Magnetic and electrostatic focussing, Determination of e/m by cathode ray tube, Functions and block diagram of CRO Positive rays, Thomson parabolic method, Isotopes, Mass spectrograph (Aston and Bainbridge). Cyclotron.
- 4. **Semiconductors and Electronics:** Characteristics of p-n junction, static and dynamic resistance, Zener diode and LED, diode as a rectifier, Transistor (pnp and npn) characteristics, Current and voltage gain.

5. **Solid State Physics:** Crystal structures, X-Ray diffraction, Superconductivity, Meissner effect, London Equation, BCS theory, Properties and applications of super conductors.
6. **Fibre Optics:** Type of fibres, step index and graded index, Numerical aperture, Uses of Optical fibres in communication.
7. Heisenberg uncertainty principle, de Broglie's hypothesis (matter waves), Davisson and Germer expt., Development of Schrodinger wave equation, solution of the Sch. Wave eqn for free and bound state, Sch. Wave eqn applied to Metals & Semiconductors, Vector atomic model, Pauli's spin quantum numbers, Stern Gerlach expt, Electro-optical Effect (Stark effect), Magneto-optical effect (Zeeman effect)
8. Basic introductory concepts of creation of Universe: Big Bang, Steady state, Pulsating state, Quasars, Pulsars, Black hole

ETCH 106 **Applied Chemistry-II**

L T C
2 1/2 2 1/2

1. **Chemical Bonding:** Ionic bond energy changes, lattice energy Born Haber Cycle, Covalent bond-energy changes, Potential energy curve for H₂ molecule, characteristics of covalent compound, co-ordinate bond-Werner's Theory, effective atomic numbers, isomerism in coordinate compounds. Hydrogen bonding, Vander Waal's forces, hybridization and resonance, Valence Shell Electron Repulsion theory (VSEPR). Discussion of structures of H₂O, NH₃, BF₃ SiF₄, Molecular orbital theory, Linear combination of atomic orbitals (LCAO) method. Structure of simple homo nuclear diatomic molecule like H₂, N₂, O₂, F₂
2. **Gaseous State:** Gas Laws and kinetic theory of gases, Distribution of Molecular velocities, mean free path. Real gases-non ideal behaviours, Causes of deviation from ideal behaviour Vander Waal's equation. Liquefaction of gases.
3. **Thermochemistry:** Hess's Law, heat of a reaction, effect of temperature on heat of reaction at constant pressure (Kirch off's Equation), heat of dilution, heat of hydration, heat of neutralization and heat of combustion, Flame temperature.
4. **Catalysis:** Criteria for Catalysis- Homogeneous Catalysis, acid-base, Enzymatic catalysis, Catalysis by metal salts, Heterogeneous Catalysis-concepts of promoters, inhibitors and poisoning, physisorption, Chemisorption, Surface area, Industrially important process, Theories of Catalysis.
5. **Plastic:** Thermosetting and Thermoplastic, properties and applications. Conducting Polymer-properties and application.
6. **Composites:** Classification, micro-mechanics of fibre and particle reinforced composites, strength, stiffness and factors affecting failure modes.

ETCS 108 **Programming and Auto CAD**

$\frac{L}{2}$ $\frac{T}{2}$ $\frac{C}{2}$

1. Programming using C++ Identifiers and keywords, constants, operators, type conversion, conditional expressions, loops statements, breaking loop statements, functions, preprocessor directives, arrays, pointers, structures.
2. Object Oriented Programming: Classes and structure, constructors, destructors, inheritance, function overloading, operator overloading, polymorphism, binding, virtual functions, pure virtual functions opening and closing of file, classes and file operations.
3. Use of Auto CAD for Engineering drawing practices and graphic problems.
4. Internet Technologies, World Wide Web, electronic mail, internet protocols, news, FTP, telnet, gopher, archie, TCP/IP, SMTP, HTTP, HTML, search engines, Audio & Video teleconferencing, practical examples using DHTML and Static HTML, languages used for WEB Technology.

ETME 110 **Engineering Mechanics**

$\frac{L}{3}$ $\frac{T}{1}$ $\frac{C}{4}$

1. **Force system:** Free body diagram, Equilibrium equations and applications.
2. **Structure:** Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section and graphical method.
3. **Friction:** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, friction in journal-bearing, friction in screws, Belt drive- derivation of equation.

$T_1/T_2 = e^{\mu\theta}$ and its application

4. **Distributed Force:** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.
5. **Kinematics of Particles:** Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.
6. **Kinetic of Particles:** Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.
7. **Kinematics of Rigid Bodies:** Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli’s component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.
8. **Kinetics of Rigid Bodies:** Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.
9. **Material Testing:** Tensile, torsion, hardness and impact testing, creep and fatigue-factors affecting ; ductile and brittle behavior and transition temperature.

ETEC 112	Electrical Science	L	T	C
		3	1	4
1.	Properties of Conductors and Insulators: Basic laws of Electrical Engineering Temperature Resistance Coefficients			
2.	D.C. Circuits Network theorems and applications Division of current Potentiometer Circuit Parameters Energy and Power Superposition Theorem Thevenin and Reciprocity theorems Star Delta Transformations			
3.	Alternating Currents Peak, Average and RMS values for alternating currents Power and Power factor Resistance, Inductance and Capacitance Resonance Q Factor			
4.	Electromagnetism Magnetic Induction Permeability Hysteresis Moving Coil and Moving Iron Instruments, Various types of bridges for measuring resistance, capacitance, Inductance, Galvanometers			
5.	D.C. Generators & Motors Principle of Operation of Generators & Motors Speed Control of Shunt motors Flux control, Rheostatic control, and voltage control Speed control of series motors			
6.	A.C. Generators & Motors Principle of Operation Revolving Magnetic Field Squirrel cage and phase wound rotor Starting of Induction motors Director on line and Star Delta starters Synchronous Machines			
7.	Transformers Construction Regulation and Efficiency calculations Open and short circuit tests.			

ETEL 114	Communication Skills-II	L	T	C
		1	½	1 ½

1. **Some Key concepts:** Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.
2. **Writing:** Selecting material for expository, descriptive, and argumentative pieces; business letters; formal report; summarizing and abstracting; expressing ideas within a restricted word limit; paragraph division, introduction and the conclusion; listing reference material, use of charts, graphs and tables; punctuation and spelling; semantics of connectives, modifiers and modals; variety in sentences and paragraphs.
3. **Reading Comprehension:** Reading at various speeds (slow, fast, very fast); reading different kinds of texts for different purpose (e.g. for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.
4. **Speaking:** Achieving desired clarity and fluency; manipulating paralinguistic features of speaking (voice quality, pitch, tone, etc.) pausing for effectiveness while speaking ,task oriented, interpersonal, information and semiformal speaking; making a short classroom presentation.
5. **Group Discussion:** Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).
6. **Listening Comprehension:** Achieving ability to comprehend material delivered at relatively fast speed.

ETPH 152 **Applied Physics Lab-II**

$\begin{matrix} P & C \\ 2 & 1 \end{matrix}$

1. **Heat:** Platinum resistance thermometer, Calibration of thermocouple, Lee’s method, Stefan’s Constant, Emissive Power.
2. **Optics:** Dispersive power of prism, Polarization, He-Ne Laser, fibre optics, Diffraction grating, Newton’s rings
3. **Sound:** Ultrasonic, to find ultrasonic velocity in different materials, ultrasonic diffraction grating
4. Measurement of resistances of various orders, AC and DC voltages using digital millimeters.
5. Measurement of voltage, and frequencies of AC waveform from a function generator using CRO, formation of Lisajous figure.
6. Determination of e/m by J.J. Thomson’s method
7. Charging and discharging
8. Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature

9. Design and use of potentiometer

10. Use of Carey Foster bridge.

ETCH 154 **Applied Chemistry Lab-II**

P *C*
2 1

1. Determine the heat of hydration of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ / $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
2. Determine the heat of neutralization of Strong Acid (say $\text{H}_2\text{SO}_4/\text{HCl}$) with strong base NaOH
3. Determine the heat of Weak Acid with strong base
4. Determine the molecular weight of a substance by Rast method
5. Determination of reaction rate constant for a Ist Order reaction
6. Complexometric titrations
7. To determine the viscosity of the given liquid (density also to be determined)
8. Preparation of Polymer
9. To determine the cell constant of a conductivity cell
10. Titration of strong acid/strong base conductometrically.

ETCS 156 **Programming and Auto CAD Lab**

P *C*
3 2

1. Write a program to find area of a triangle given its sides. Define a class with sides and area of a triangle as data members.
2. Write a program to find odd and prime number in 1 to 100

3. Write a program to sort a list of numbers using bubble sort using object and classes.
4. Write a program to find fibonacci/factorial using recursion function
5. Write a program to read the radius, height and density of a cylinder and evaluate it's volume. Use classes Circle and Cylinder and use a class derived from Cylinder to find the weight.
6. A program to evaluate the radius of a circle with an area equal to the area of a rectangle. It uses public data members.
7. Do addition and subtraction of complex numbers using operator overloading.
8. Write overloaded operator functions to imitate the following library functions for string manipulation
 - (a) Strcat ()
 - (b) Strcmp ()
9. A time expressed in hours, minutes, seconds can be expressed in hours only (as a real, number), Declare a class to store the time as a real number, with member functions to read the time and display the same in hours, minutes and seconds. Use friend class to use the function.
10. It is required to read a real number and display it's square, square root, cube root. Use a virtual function to display any one.
11. Write a program for binary search using strings.
12. Use of Drawing & Editing Properties: Modify Object Properties and a know how of layers, colors and prototype drawing.
13. Draw line (Poly line, multi line, linear line), polygon, ellipse, circle, arc, rectangle and use cross hatching, regions, boundary, spline, donut, fillet and extent commands.
14. Dimensioning commands, styles, control scale factors, drawing set-up, grip editing objects snaps, utility commands.
15. Projection of points, lines and solids
16. Section of Solids
17. Development and Intersection of Surface
18. Isomeric Projections
19. Create a WEB page containing hyperlinks to the pages having information about Science and Technology.

ETME 158 Engineering Mechanics Lab

$\frac{P}{2}$ $\frac{C}{1}$

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle
7. To determine the MA, VR, h of Worm Wheel (2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation method.

ETEC 160 Electrical Science Lab

$\frac{P}{2}$ $\frac{C}{1}$

1. Verification of Thevenin's theorem
2. Verification of Superposition theorem
3. Phasor Diagram and Power factor of LCR circuit.

4. Measurement of Power and Power factor in single phase Load using three ammeters/voltmeters.
5. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
6. Two wattmeter method of measuring power in three phase circuit (resistive load only)
7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
8. Short Circuit/Open Circuit tests on Single Phase transformer
9. Measure the armature and field resistance of a D.C. Machine
10. Connection and starting of a Three Phase Induction Motor using direct on line or Star Delta Starter.
11. Starting and Speed Control of a D.C. shunt motor
12. Resonance

ETMA 201 **Applied Mathematics-III**

L	T	C
3	1	4

Laplace Transformation: Laplace Transformation, Inverse Laplace transformation Convolution Theorem, application to linear differential equations with constant coefficients, Unit step function, impulse functions/periodic functions

Fourier Series: Fourier Series, Euler's formulae, even and odd functions, having arbitrary periods, half range expansion, Harmonic analysis

Fourier Transforms: Fourier transform, Sine and Cosine transforms, Application to differential equations

Special Functions: Beta and Gamma functions, Bessels functions of first kind, Recurrence relations, modified Bessel functions of first kind, Ber and Bei functions, Legendre Polynomial, Rodrigue's formula, orthogonal expansion of function

Partial Differential Equation: formation of first and second order linear equations, Laplace, Wave and heat conduction equation, initial and boundary value problems.

ETEC 203 – ANALOG ELECTRONICS – I

L T C
3 1 4

Semiconductor Diodes and Rectifiers:

Introduction, general characteristics, energy levels, extrinsic materials n & p type, ideal diode, basic construction and characteristics, DC & AC resistance, equivalent circuits, drift & diffusion currents, transition & diffusion capacitance, reverse recovery times, temperature effects, diode specifications, different types of diodes (Zener, Varactor, Schottky, Power, Tunnel, Photodiode & LED). Half wave & full wave rectifiers.

Switched Mode Power Supply

Bipolar junction transistor:

Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations Eber-moll’s model.

Bias stabilization:

Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co} , V_{BE} & β , Stabilization factors, thermal stability.

Small signal amplifiers:

CB, CE, CC configurations, hybrid model for transistor at low frequencies, RC coupled amplifiers, mid band model, gain & impedance, comparisons of different configurations, Darlington pair, Hybrid p-model at high frequencies, Cascaded amplifiers.

Multistage Amplifiers: Cascaded amplifiers, Calculation of gain Impedance and bandwidth, Design of multistage amplifiers.

Feedback Amplifiers: Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers

Field Effect Transistor:

Introduction, Classification, FET characteristics, Operating point, Biasing, enhancement & Depletion type MOSFETS.

ETEC 205 Circuits & Systems

L T C
3 1 4

Signal: The unit step, unit impulse, unit ramp, sinusoidal and exponential function, Periodic wave forms. Classification of signals and system modeling in terms of differential and difference equation for linear time invariant (LTI)

Laplace Transform: Applications of Lapace Transform to system Analysis, Waveform synthesis and Laplace Transform of complex waveform, Graph Theory and its applications. Concept of Transform impedance; network function, two port parameters, Interconnection of 2-port network

Network Theorems: Reciprocity, Millman Theorem, Maximum Power Transfer Theorem, Tellegen’s theorem

Elements of Network Synthesis: Two elements kind one port network, Elementary two port network, Introduction to z-transform and its applications.

ETCS 207	Foundations of Computer Science	L	T	C
		3	1	4

Formal Logic:

Statement, Symbolic Representation and Tautologies, Quantifiers, Predicate and validity, Normal form, Propositional Logic, Predicate Logic, Logic Programming and Proof of correctors.

Proof, Relation and Analysis of Algorithm

Technique for theorem proving : Direct Proof, Proof by Contra position, proof by exhausting cases and proof by contradiction, Principle of mathematical induction, principle of complete induction, recursive definition, solution methods for linear, first-order recurrence relations with constant coefficients, analysis of algorithms involving recurrence relations-recursive selection sort, binary search, quick sort, solution method for a divide-and-conquer recurrence relation.

Sets and Combinations:

Sets, Subsets, powersets, binary and unary operations on a set, set operations/set identities, fundamental set principles, principle of inclusion, exclusion and pigeonhole, permutation and combination, pascal's triangles, binomial theorem, representation of discrete structures.

Relation/function and matrices:

Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, properties of function, composition of function, inverse, binary and n-ary operations, characteristics for, permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.

Lattices & Boolean Algebra:

Lattices: definition, sublattices, direct product, homomorphism
Boolean algebra: definition, properties, isomorphic structures (in particular, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

Graph Theory

Terminology, isomorphic graphs, Euler’s formula (Proof) four color problem and the chromatic number of a graph, five color theorem. Trees terminology, directed graphs, Computer representation of graphs, Warshall’s algorithms, Decision Trees, Euler path & Hamiltonian circuits, Shortest path & minimal spanning trees, Depth-first and breadth first searches, analysis of research algorithm, trees associated with DFS & BFS Connected components, in order, preorder & post order trees traversal algorithms.

ETCS 209 – OBJECT ORIENTED PROGRAMMING	L	T	C
	3	1	4

Review of C++ as Oriented Programming Language.

Introduction to Java: Features of Java, Data types, Control Statements, identifiers, arrays, operators.

Inheritance: Multilevel hierarchy, method overriding, Abstract classes, Final classes, String Class.

Packages and Interfaces: Defining, Implementing, Applying Packages and Interfaces, Importing Packages.

Exception Handling: Fundamentals, Types, Uncaught Exceptions, Multiple catch Clauses, Java’s Built-in Exception.

Multithread Programming: Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads

String Handling : Constructors, Various Types of String Operations.

Exploring Various Basic Packages of Java: Java.lang, Java. util, Java.i.o

Event Handling: Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces

AWT: Working with Windows, AWT Controls, Layout Managers

Applets: Class, Architecture, Skeleton, Display Methods.

Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.

Networking: Networking Basics, Java and the Net, Inet Address TCP/IP Client Sockets

Servlets : A Simple Servlet, The Servlet API, The javax.servlet Packages, Reading Servlet parameters, Reading Initializations Parameters, The javax.servlet.http Package, Handling HTTP Requests and Responses

RMI {Remote Method innovation}: A Simple Client/Server Application Using RMI Introduction To Beans and Enterprise Java Beans.

ETCS 211 Data Structures	L	T	C
	3	1	4

Problem solving approaches, Structured Programming Concepts, Guidelines for good Program Structure

Arrays, Order List, Multidimensional arrays and their storage in contiguous memory, sparse matrices, Stacks and queue implementation using arrays, Linked list (singly, doubly and circular linked list), Stacks and queue implementation using linked list, Polished expression, Conversion of infix to postfix, Infix to prefix conversion, (and vice versa), Prefix to Postfix conversion using Stacks, Polynomial representation using linked list and basic operation.

Trees: Definition and concepts, Properties, representation, operations (traversal algorithm)

Graphs: Definition and concepts, Properties, representations, operations (traversal algorithm), spanning trees.

Sorting: Concepts, Selection sort, Double sort, Merge sort, Merge sort, Partition Exchange sort, Shell Sort.

Searching : Sequence searching, Binary Searching, Search Trees, height balanced trees, hash function, hashing table, collision resolution techniques.

File Structures: Sequential File, Index sequential file, Hashed index, Tree index, Random File, Linked organization of file, inverted file.

ETEC 251

Analog Electronics I Lab

P

C

2

1

The practical will be based on the Analog Electronics-I (ETEC-203)

List of the Experiments

1. To study and draw V-I Characteristics of Junction Diode (Ge, Si)
2. To study and draw reverse Characteristics of Zener diode.
3. To draw i/p and o/p characteristics of Common-Emitter Transistor
4. To draw i/p and o/p characteristics of Common-Base Transistor
5. To draw i/p and o/p characteristics of Common-collector Transistor
6. To study the Rectifier (Half wave, Full wave and Bridge) and Filter circuit.
7. To study the waveform of OP-AMP as Differentiator.
8. To study the waveform of OP-AMP as an Integrator
9. To draw characteristics curve of JFET
10. To draw characteristics curve of MOSFET
11. To verify the following applications of OP-AMP
 - (i) Subtractor
 - (ii) Adder in both inverting & non-inverting modes
12. To Calculate the gain and plot the frequency response of Double stage RC coupled amplifier
13. Bias stabilization using various types of stabilizations.

ETEC 253

Circuits and Systems Lab

P

C

2

1

The practicals will be based on Circuits and Systems (ETEC 205)

LIST OF EXPERIMENTS

- 1. To determine a Fourier component of square wave
- 2. To determine a Fourier component of Clipped Sine waveform
- 3. To determine z and y Parameters
- 4. To verify Reciprocity theorem
- 5. To verify Max Power Transfer theorem
- 6. To design cascade connection and determine ABCD parameters (Transmission parameter)
- 7. To design series-series connection and determine z parameters
- 8. To design parallel-parallel connection and determine y parameters
- 9. To design series-parallel connection and determine h parameters.

ETCS 255	Object Oriented Programming Lab	P	C
		2	1

The practicals will be based on the Object Oriented Programming (ETCS 209)

ETCS 257	Data Structures Lab.	P	C
		2	1

The practicals will be based on the course Data Structure (ETCS 211)

Active RC Filters: Idealistic & Realistic response of filters(LP, BP, HP), Butter worth & Chebyshev filter functions All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.

Applications of IC Analog Multiplier: IC phase locked loops, IC voltage regulators, IC function generators.

ETEC 206

DIGITAL CIRCUITS & SYSTEMS-I

314

LTC

Analog & Digital signals, AND, OR, NOT,NAND, NOR & XOR gates, Boolean algebra.

Standard representation of Logical functions, K-map representation and simplification of logical functions Don't care conditions, X-OR & X-NOR simplification of K-maps

Combinational circuits: Multiplexers, demultiplexers, Decoders & Encoders, Adders & Subtractors, Code Converters, comparators, decoder/drivers for display devices, Logic Implementations using ROM, PAL, & PLA.

Flip Flops: S-R, J-K, D&T filp-flops, excitation table of a flip-flop, race around condition.

Sequential circuits: Shift registers, Ripple counter, Synchronous counters.

555 Timer and its application as mono-stable and astable multi-vibrator, A/D and D/A converters.

TTL and CMOS Logic families

Semiconductor Memories: Memory organization & operation, classification and characteristics of memories, RAM,ROM and content addressable memory

1. **Analog Modulation:**

Amplitude Modulation

Generation & Demodulation of AM waves, DSBSC waves, Coherent Detection of DSBSC Signal, Quadrature-Carrier Multiplexing, Generation of SSB waves, Demodulation of SSB waves.

Angle Modulation:

Frequency & phase Modulation, narrow & Wide-Band FM, BW of FM waves, Generation & Demodulation of FM waves, S/N ratio, Comparison of AM, FM & PM.

Random Process

Probability, Random variable, probability density, mean, moments, transformation of random variables, Stationary Process, mean, autocorrelation and covariance functions, ergodicity, power spectral density, response of linear systems to random signals, Gaussian distribution, central limit theorem.

Pulse analog Modulation:

Sampling theorem, Sampling of Low Pass and band pass signals, Aliasing, Aperture effect, PAM, PWM and PPM generation and demodulation, TDM, Cross talk, Spectral analysis of PAM, PWM and PPM Waves, S/N ratio for different pulse modulation.

Pulse-Digital Modulation:

Pulse Code modulation signal to quantization noise ratio, Companding, probability of error for PCM in AWGN Channel, DPCM, DM and ADM modulators and demodulators, Prediction Filter, line coding, Inter symbol Interference.

Digital transmission through Carrier Modulation

Amplitude, Frequency and phase shift keying, Differential phase shift keying, CPFSK, MSK QPSK and QAM modulation & detection, probability of error calculation, Matched Filter.

Introduction to Information Theory:

Measurement of Information, mutual information Shannon's Theorem Source coding, channel coding and channel capacity theorem. Huffman code, Lempel –ziv code.

ETCS 210 – COMPUTER GRAPHICS AND MULTIMEDIA L T C
3 1 4

Basic raster graphics, algorithms for drawing 2 D Primitives lines, circles, ellipses, arcs, clipping, clipping circles, ellipses & polygon.

Polygon Meshes in 3 D, curves, cubic & surfaces, Solid modeling.

Geometric Transformation: 2 D, 3 D transformations, window to viewport transformations, achromatic and color models.

Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners

Shading Techniques: Transparency, Shadows, Object reflection, Gouraud & Phong shading techniques. Visible surface determination techniques for visible line determination, Z-buffer algorithm, scanline algorithm, algorithm for oct-trees, algorithm for curve surfaces, visible surfaces ray-tracing, recursive ray tracing, radio-city methods.

Image manipulation & storage: File formats for BMP, GIF, TIFF, IPEG, MPEG-II, & Introduction to animation techniques.

Elementary filtering techniques, elementary Image Processing techniques, Geometric & multi-pass transformation mechanisms for image storage & retrieval.

Procedural models, fractals, grammar-based models, multi-particle system, volume rendering.

ETCS 212 - OPERATING SYSTEMS AND SYSTEM PROGRAMMING-I L T C 3 1 4

Overview:

Importance of Operating Systems (highlighting the salient features of UNIX) Basic Concepts and Terminology used in OS Functions performed by OS (using case study of UNIX)

Memory Management:

Single Contiguous Allocation: H/W Support, S/W Support, Advantages, Disadvantage: Introduction to Multiprogramming : Concept of Multiprogramming, Measure of System i/o Wait Percentage, Relevance of Multiprogramming to Memory Management; Partitioned Allocation, Relocatable Partitioned Memory management, Paged Memory management, Demand-Paged Memory management, Segmented Memory Management, Segmented and Demand-Paged Memory Management, Other Memory management Schemes (Swapping, Overlays).

Processor Management:

State Model: Job Scheduler, Process Scheduling, Job and Process Synchronization, Structure of Processor Management; Job Scheduling: Functions, Policies, Job Scheduling in Nonmultiprogrammed Environment, Job Scheduling in multiprogrammed environment ; Process Scheduling, Multiprocessor Systems: Separate Systems, Coordinated Job Scheduling, Master/Slave Scheduling, Homogeneous Processor scheduling ;

Process Synchronization: Race Condition, Synchronization Mechanism, Deadly Embrace, Synchronization Performance Considerations.

Device Management: Techniques for Device Management: Dedicated Devices, Shared Devices, Virtual Devices; Device Characteristics-Hardware Considerations: Input or Output Devices, Storage Devices; Channels and Control Units: Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing; Device Allocation Considerations; Virtual Devices.

Information Management: Introduction; A Simple File System; General Model of a File System; Symbolic File System; Basic File System, Access Control Verification; Logical File System; Physical File System.

ETEC 252 Analog Electronics-II lab P C 2 1

The practical will be based on the Analog Electronics-II Papers (ETEC-204)

LIST OF EXPERIMENTS

1. To Study and construct class-A and class-B Power amplifier

2. To Study voltage series & element shunt feedback amplifier using BJTS & op-amp
3. To Study & construct IC oscillators (op-amp Hartley & Colpitts oscillators)
4. To Study active (i) low pass, (ii) hard pass and (iii) high pass filters and construct a low pass filter using op-amp
5. To Study RC phase shift and Wein bridge oscillators using Op-amp
6. To design a common emitter amplifier
7. To design a common collector amplifier
8. To design a common source (CS) JFET amplifier

ETEC 254 **Digital Circuits & Systems-I Lab**

2 1 P C

The practicals will be based on Digital Circuits and Systems-I (ETEC-206)

LIST OF EXPERIMENTS

1. To verify Truth table (OR, NOR, NAND, EX-OR)
2. To verify Truth table of half and full adder and subtractor
3. To verify RS Flip flop
4. To verify JK/D Flip flop
5. To design Binary counter
6. To design Synchronous counter
7. To design Ripple counter
8. To convert BCD number in to Excess-3 form
9. To design Decade counter

ETEC 256 **Communication Systems and Circuits Lab** P C
2 1

The practicals will be based on Communication Systems and Circuits (ETEC-208)

ETCS 258	Computer Graphic & Multimedia Lab	P	C
	2	1	

The practicals will be based on Computer Graphic & Multimedia (ETCS-210)

ETCS 260 **Operating Systems & System Programming-I Lab P** C
2 1

The practicals will be based on Operating System & System Programming-I (ETCS-212)

ETEC 301 – **DIGITAL CIRCUITS & SYSTEMS-II**

314

LTC

Introduction: Hardware development language: VHDL Review of sequential circuits. State tables, state diagrams, State Assignment, Digital system design with state Diagrams, Design of Digital Circuits (with Hard Ware Programming Language) like counters, multiplexers, demultiplexers code converters, memory interfaces for DRAM, Timing Diagrams etc. Introduction to the design of 8-bit Processor. PLD Devices PROM, PAL, EPLD, like, GAL, FPLA, FPGA, etc. and their applications. FPGA Programming. Design exercises like a watch and other digital systems ,ASIC design using CAD tools. Concepts of ASM and realization through Gate, MUX, PLD
Design of FSM/Microprocessor through Algorithmic state machine concept.
Concept of ASM’s realizations through GATES, MUX, PLD devices.
Design of FSM /Microprocessor through Algorithmic State Machine concept.
Overview of at least one assembler/compiler like ABEL, PALASAM, VERILOG, SYNOPSIS etc.

ETEC 303 – **MICROPROCESSOR SYSTEM-I**

314

LTC

Introduction to Microprocessors and microcomputers. Study of 8 bit Microprocessor, its internal architecture, addressing modes, Microprocessor programming System timing, Various data transfer schemes. Interfacing with memory (ROM,SRAM,DRAM etc.) Cache controller and cache memory system. Input/Output Interface (Chips like 8212, 8255, 8155,8279,8237 etc.) Interrupts and their processing, 8259, Interrupt interface circuits using 8259. Microcontrollers Interfacing techniques with A/D, D/A, stepper motor, printer, keyboard, output displays etc. Introduction to 16/32, bit processor, Real mode, virtual 808 Protected mode.

ETCS 305 – **COMPUTER ARCHITECTURE**

314

LTC

Register Transfer and Microoperations : Register Transfer language register transfer, Bus and memory transfers, Arithmetic Microoperations, Logic micro operation, shift micro operations, ALU Design
Bus based architecture, IBM PC , EISA, PCI, VME bus, RS 232, IEEE 488, RS-422, RS-485, IEEE 1394 Peripheral Devices, Device Drivers, IDE driver for HDD, communication in inter parallel ports, Kernel and Device Drivers, Power PC

Architecture, Information representation, Instruction formats, Instruction types, ALU Design Instruction sequencing and Interpretation, Hardwired control, Micro programmed virtual memory, Parallel processing, Pipe line processing, Multiprocessing, IBM PC architecture, comparison of SISC and RISC Architectures.

ETEC 307 – TELECOMMUNICATION NETWORKS

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Evolution of Tele-Communication Networks, Basic Switching System, Simple Tele-phone Communication, Brief Introduction to Electromagnetic Exchanges, Electronic Switching – Space Division Switching Stored Programme Control – Centralized SPC, Distributed SPC, Software Architecture, Application Software – Enhanced Services, Multi Stage Switching Networks.

Speech Digitization, Quantization Noise, Compounding, Differential Coding, Delta Modulation, Vocoders, Pulse Transmission on Transmission line concepts, Line Coding, NRZ and RZ Codes, Manchester Coding, AMI Coding, Walsh Codes, TDM,

Time Division Switching – Time Division space switching, Time Division Time Switching, Time multiplexed space switching, Time multiplexed Time Switching, Combination Switching.

Traffic Engineering, Grade of Service and Blocking Probability – Telephone Networks, Subscriber Loops, Switching Hierchy and Routing, Transmission Plans and Systems, Signaling Techniques, In Channel, Common Channel.

Access Technology; WLL, (Wire less loop), ADSL (Asymmetrical Digital Subscriber Loop) AVCC(Advanced Intelligent Network), BMFB

Wired, Wireless, broadcast, point to point, Satellite medium-SCPC, VSAT broadcast medium etc, link budget analysis, Link behavior, Peburst, error, Optimum packet size, error control, Elementary coding ideas , ATM transport mechanism, ISDN.

ETCS 309 – DATA BASE MANAGEMENT SYSTEM

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Introduction : Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.

DBMS models: Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

Hierarchical model: Concepts, Data definition, Data manipulation and implementation.

Relation Model: Relational database, Relational Algebra, Relational Calculus

Network Model: Network Data Model, DBTG Set Constructs, and Implementation.

Relational Database Design and Query Language : SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.

Concurrency Control: Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery.
New Applications: Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

ETEC 351 - DIGITAL CIRCUITS & SYSTEMS –II Lab *P* *C*
2 1

Experimental work based upon the course Digital Circuits & Systems-II (ETEC 301)

ETEC 353 – MICROPROCESSOR SYSTEM –I LAB *P* *C*
2 1

Experimental work based upon the course Microprocessor System-I (ETEC 301)

ETCS 355 – COMPUTER ARCHITECTURE LAB *P* *C*
2 1

Experimental work based upon the course computer Architecture (ETCS 305)

ETCS 357 - TELECOMMUNICATION NETWORKS LAB *P* *C*
2 1

Experimental work based upon the course Telecommunication Networks (ETEC 307)

ETCS 359 – DATA BASE MANAGEMENT SYSTEM LAB *P* *C*
2 1

Experimental work based upon the course Data Base Management System (ETCS 309)

ETCS 361 - PROGRAMMING –I LAB (OR CAD) OR	<i>P</i>	<i>C</i>
ANY OTHER SIMILAR PCB DESIGN SOFTWARE LAB	2	1

ETCS 363 – PRACTICAL TRAINING	<i>P</i>	<i>C</i>
-	2	

ETEC 302 – MICROPROCESSOR SYSTEM-II	<i>L</i>	<i>T</i>	<i>C</i>
3	1	4	

Review of 16/32 bit Microprocessor (8086,8088, 80186, 80286 DX, 80286 SX, 80286 SL, 80386, 80486, 80586 etc.)
Review of RISC, CISC architectures. Architecture of 8086/8088, addressing modes and instruction set of 8086. Memory segmentation,
Assembler and Debugger, System design , PC architecture, 8088 PC/XT Microcomputer system, PC/AT System, various bus protocols like IBM bus, EISA, VESA, EURO, local etc. Multiprocessing, Numeric data processor and its interfacing.
Introduction to bit slice processor, Signal processing processors and Transputers. Introduction to Development Tools : MDS, Logic analyzer, in circuit emulators. Introduction to a typical Mother Board design using CAD tools.

ETEC 304 –MICROWAVE ENGINEERING:	<i>L</i>	<i>T</i>	<i>C</i>
3	1	4	

Review of Maxwell’s equations

Wave Guide: Rectangular, cylindrical wave guide solution of wave equation, modes, propagation properties, power transmission, power losses in wave guides, choice of Excitation of modes.

Microwaves: Introduction, areas of applications,

Components & Elements: Joints, Bends and Irises. Posts and screws, Cavity Resonators, Hybrid couplers, Isolator, Circulator, Attenuator, Frequency meter, short-circuit, Phase shifter, S-parameters.

Microwave Tubes: Klystron Amplifier, Reflex-Klystron, Magnetron TWT, CFA, Gyrotrons, Microwave Ovens.

M/W Solid-State Devices & MICS: M/W Bipolar Transistor, FETS, Varactor and Step-Recovery Diodes, Parametric Amplifiers, Tunnel Diode, Gunn Diode, Read Diode, Impatt, Trapatt, Pin Diode, Schottky Diode, Backward Diode, introduction to MIC, Stripline and Microstrips, Fabrication of MICs etc., MASERS and LASERS.

Introduction to Microwave Detectors, Mixers Switches, Microwave Measurements Microwave filters.
Introduction to Radar.

ETEC -306 DIGITAL SIGNAL PROCESSING

Sampling of signals in time and frequency domain; Convolution, Correlation, Hilbert Transform, Discrete Fourier Transform, Fast Fourier Transform; Bilinear Transformation; Stability, FR and IIR filters; Structure of digital filters; Windows, Effect of finite word length in Digital filters; algorithms for optimization and design of digital filters.

ETEC- 308 DATA COMMUNICATION NETWORKS

Introduction: Data Networks, WAN, MAN, LAN
Data Transmission in PSTNs. Modem, ASK, FSK, PSK, QAM, Modulator, Demodulator, Switching Tehniques for Data Transmission, :- Circuit Switching, Store and Forward Switching – Message switching, Packet Switching, Data gram service, Virtual Circuit Service, Data Communication Architecture, ISO-OSI Reference Model, PDU, IDU, SDU, SAP Link to Link layers, Physical Layer, Data Link layer, Network layer, Transport layer, Session Layers, Presentation layers, (Encryption, Decryption)- Application layer :- Satellite Based Data Networks
Typical application areas of LAN
LAN Technologies - Transmission, Topology, Access methods
Multiple Access Bus LAN – CSMA, Token Passing Ring LAN, Token Passing Bus LAN
Metropolitan Area Networks:- Data Network Standards, Protocol Stacks, MAP, TOP, LAP
Internetworking:- Introduction to ISDN.
Introduction to telemetry and telecontrol -telemetry links-telemetry error.
Classification of signals-their suitability for telemetry, Analog and digital telemetry.
Telemetry and carrier communication systems-distinction and design criteria overview of modulation techniques-AM, FM and PM, suitability for wire and wireless telemetry, power-line carrier communication.

ETEC 310 –V L SI DESIGN

Evolution of VLSI. MOS Devices and Circuits, MOS Transistors-Depletion and enhancement mode transistors, Transistor as a Switch, MOS inverter, inverter delay, Parasitic effects Pull up/Pull-down ratios for inverting logic. Basic NAND, NOR, XOR, and XNOR gates, multiplexes, Memory, bars transistors, super buffers, NMOS combinational Network with bars transistors and inverters, PLAs clocked logic, two-phase clock, register stage, Introduction to CMOS gates.

Processing Technology, Explanation of different stages in fabrication.

Design Methodology, Steps in the Design of a VLSI, VLSI design tools.

ETEC 352 – MICROPROCESSOR SYSTEM-II

Experimental work based upon the course Microprocessors System-II (ETEC 302)

ETEC 354 – MICROWAVE ENGINEERING LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course Microwave Engineering (ETCS-306)

ETEC 356- DIGITAL SIGNAL PROCESSING LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course Digital Signal Processing (ETCS 306)

ETEC 358-DATA COMMUNICATION NETWORKS LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course Data Communication Networks (ETEC 310)

ETEC 360- VLSI DESIGN LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course VLSI Design (ETEC 310)

ETEC 401 –CONTROL SYSTEMS	<i>L</i>	<i>T</i>	<i>C</i>
3 1 4			

Different forms of control with industrial control examples; transducers, controllers and actuators, mathematical models, Differential equations, Difference equations and their solutions. Laplace Transforms and Z-Transforms Convolution, Superposition, block diagram representation and simplification; Open loop and closed loop transfer function. Signal flow graphs, Transient and steady state analysis; Proportional Integral and Derivative control system. PID controllers. State space analysis, Stability, Nyquist and Routh Herwitz Criteria, effect of feedback on stability and sensitivity; Root locus technique; Frequency response analysis; Bode Plots, Gain and phase margin, constant M and N Loci, use of Nichols Chart. Design of control systems: different types of compensators and their design through Bode plots and Root Locus techniques. Components: Potentiometer, Synchros, Armature and field controlled DCG servometers, A.C. servomotors, stepper motor, Rotating amplifiers, magnetic amplifiers, tachogmenerators.

ETCS403 – SOFTWARE ENGINEERING	<i>L</i>	<i>T</i>	<i>C</i>
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- Introduction:**
Software Crisis Software processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM
- Software Metrics:**
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.
- Software Project Planning**
Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.
- Software Requirement Analysis and Specifications**
Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioral and non-behavioral requirements, Software Prototyping.
- Software Design**
Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design
- Software Reliability**
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation
- Software Testing**
Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.
- Software Maintenance**
Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering, Configuration Management, Documentation

ETEC - 405 NETWORK TECHNOLOGY	<i>L</i>	<i>T</i>	<i>C</i>
3	1	4	

- Evolution of Internet, Address and domain Management, SNMP, Transport Layer issues, TCP/IP, FTP, WWW undergoing technology, E mail talent, FTD, Gateway, Dial-up, SLIP/PPP Dedicated lines, Internet searching tools, gopher, Archie, Veronica, WWW, Lynx, Mosaic, WAIS, Usenet, Security issues, CGI, PERL, HTML, VRML, JAVA, VB script and other internet development tools, internet networking TCP/IP protocols –
- Application Layer Services and protocols (RPC, NFC, SMTP, FTP, TELENET) Network Security and Management, Review of LAN, Principles of IBASE5 (Strain), Transmitter and receiver of IBASE5 (Strain), Node, LAN Manager, Software of IBASE5 Node, 10BASE5 Ethernet and 10BASE2

(Cheaper net), Twisted pair Ethernet, Serial Communication, Connecting LANs and WANS, Serial Communication Circuits, Modems, USART-Processor Interface Data Buffer Block of 8251A, Control logic of USART, PROTOCOLS, Transmitter, Receiver, Synchronous Modems and Asynchronous Modems. SYNDET/BRKDET ion 8251A, Monitoring of 8251A, writing characters to be transmitted to 8251A, Monitoring of 8251A. Read status, ISDN: Technology, devices, Architecture Protocols, Flow Control Error detection and Correction, ATM, Technology, Inter Networking SDH/SONET

B.Tech (Electronics & Communication Engg)		VII Semester		
ETEC - 407 OPTICAL COMMUNICATION		L	T	C
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Comparison of Optical Fiber Cables and Conventional Metallic cables and Advantages. Optical Fibers - Step-index, Single and Multimode, Graded – index, Other types of Fibers, Light propagation – Total Internal Reflection, Acceptance Angle and Numerical Aperture, Fiber Losses and Dispersion.

Optical Sources – Light Emitting Diodes – Spontaneous Emission – Materials for Visible & IR LEDs, LED efficiency, Surface Emitting LED, Edge Emitters, Semiconductor Diode LASER – Stimulated Emission – Double Heterostructure LASER – Laser Tuning and Degradation, Drivers for LED and LASER.

Photo Detectors – Characteristics of Photodetector – Photoconductor, p-n Photodiode, Schottky Barrier and Heterojunction Photodiodes, Avalanche Photodiode, Phototransistor, Optocouplers, Other Detectors – UV and Infrared Detectors.

Fiber End Preparation, Fiber Splicing, Fiber Connectors, Connection Losses, Fiber Couplers, Fiber Materials – Fiber Fabrication, Mechanical Properties of Fibers, Fiber Cables, Fiber Cable Installation.

Fiber Optic Communication System – Basic System Components, Coupling to and from the Fiber, Modulation, Multiplexing and Coding, Repeaters, Bandwidth and Rise time Budgets, Noise, Bit Error Rate and Eye Pattern.

Applications of Fiber Optics – Long Haul Communication, Local Area Networks, Undersea Communication, Fiber Optic Sensors – Intensity Modulated Sensor, Phase Sensors, Diffraction Grating Sensors (for Measurement of Displacement, Force, Temperature), Medical Applications, Military Applications, Coherent Optical Communication, Integrated Optics.

ETEC - 407 ADVANCED VLSI DESIGN		L	T	C
3	1	4		

Integrated Circuit Devices and Modeling: MOS and BJT transistor modelling for MOS Transistor & BJT – SPICE modelling parameters – CMOS and bipolar processing – CMOS and analog layout consideration.

CMOS current mirror – CS, CG & CD amplifier – cascade gain stage – bipolar current mirror – bipolar gain stages – frequency response – SPICE simulation examples.

Noise Analysis: Time and frequency domain analysis noise models and analysis – Op Amp: Two stage CMOS Op Amp – Op Amp Compensation – Folded cascade and differential Op Amp – SPICE simulation examples – CMOS and BiCMOS comparators.

MOS and CMOS sample and hold circuit – bipolar and BiCMOS sample and hold – switched capacitor circuits – data converters – various types of D/A and A/D converters.

Over sampling with and without noise shaping – digital decimation filter – multibit oversampling converters – continuous time filters and phases locked loops.

ETIT - 409 Mobile Computing

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Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

ETIT - 411 RELIABILITY ENGINEERING

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Reliability Fundamentals: Introduction, Need for Reliability Engineering, Definition, Causes of Failures, Catastrophic Failures and Degradation Failures, Characteristic Types of Failures, Useful Life of Components, The Exponential Case of Chance Failures, Reliability Measures, Failure Data Analysis.

Reliability Mathematics: Fundamentals of Set Theory, Probability Theory, Random Variables, Discrete Distributes, Continuous Distributions, Stochastic Processes, Markov Chains

Reliability Analysis of Series Parallel Systems: Introduction, Reliability Block Diagrams, Series Systems, Parallel Systems, Series Parallel Systems, K-out-of-M Systems, Open and Short Circuit Failures, Standby Systems.

Reliability Analysis Nonseries Parallel Systems: Introduction, Path Determination, Boolean Algebra Methods, A Particular Method, Cut Set Approach, Delta-Star Method, Logical Signal Relations Method, Baye’s Theorem Method.

Reliability Prediction: Introduction, Purpose, Classification, Information Sources for Failure Rate Data, General Requirements, Prediction Methodologies, Software Prediction Packages, Role and Limitation of Reliability Prediction.

Reliability Allocation: Introduction, Subsystems Reliability Improvement, Apportionment for New Units, Criticality.

Redundancy Techniques for Reliability Optimization: Introduction, Signal Redundancy, Time Redundancy, Software Redundancy, Hardware Redundancy.

Maintainability and Availability: Introduction, Forms of Maintenance, Measures of Maintainability and Availability, Maintainability Function, Availability Function, Two Unit Parallel System with Repair, Preventive Maintenance,

Provisioning of Spares.

Reliability Testing: Introduction, Kinds of Testing, Component Reliability Measurements, Parametric Methods, Confidence Limits, Accelerated Testing, Equipment Acceptance Testing, Reliability Growth Testing.

ETEC - 413 POWER ELECTRONICS

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Power Semiconductor Devices: Two-transistor Model of Thyristor, Methods of Triggering a Thyristor, Thyristor Types.

Triggering Devices: Triggering Devices, Unijunction Transistor, Characteristics and Applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon-Controlled Switch, Silicon Unilateral Switch, Silicon Bilateral Switch, Shockley Diode, Opto-Isolators.

Thyristor Firing Circuits Turn on systems: Requirements for Triggering Circuits, Thyristor Firing Circuits, Full Wave Control of AC with One Thyristor, Light Activated SCRs (LASCR) Control Circuit, Pulse Transformer Triggering, Firing SCR by UJT, TRIAC Firing Circuit, Phase Control of SCR by Pedestal and Ramp

Controlled Rectifier: Types of Converters, Effect of Inductive Load, Commutating Diode or Free-Wheeling Diode, Controlled Rectifiers, Bi-Phase Half-Wave (Single Way), Single-Phase Full-Wave Phase Controlled Converter Using Bridge Principle (Double Way), Harmonics

Inverters: Types of Inverters, Bridge Inverters, Voltage Source Inverters (VSI), Pulse Width Modulated Inverters, Current Source Inverter

AC Voltage Controllers: Types of AC Voltage Controllers, AC Phase Voltage Controllers, Single-Phase Voltage Controller with R-L Load, Harmonic Analysis of Single-Phase Full-Wave Controller with R-L Load, Gating Signals

DC to DC Converters (Choppers): DC Choppers, Chopper classification, Two Quadrant Chopper, Four Quadrant Chopper, Morgan Chopper.

Cycloconverters: Types of Cycloconverters, Single-Phase Cycloconverter, Three-Phase Cycloconverters. **Thyristor Protection:** Protection, dv/dt Protection, di/dt Protection, Over Voltage Protection

Industrial Applications: “One Shot” Thyristor Trigger Circuit, Overvoltage Protection, Simple Battery Charger, Battery Charging Regulator, AC Static Switches DC Static Switch **Microprocessor based Applications:**

ETIT - 415 ADVANCED COMPUTER ARCHITECTURE

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Parallel Computer Models: The state of computing, multiprocessors and multicomputers, multivector and SIMD computers, architectural development tracks.

Program and Network Properties: conditions of parallelism, program partitioning and scheduling, program flow mechanisms.

System Interconnect Architectures: Network properties and routing, static interconnection networks and dynamic interconnection networks.

Processors and Memory Hierarchy: Advanced processor technology- CISC, RISC, Superscalar, Vector, VLIW and symbolic processors, Memory hierarchy technology, Virtual memory technology.

Bus, Cache and Shared Memory.

Linear Pipeline Processors, Nonlinear Pipeline processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Multiprocessors System Interconnects, Cache Coherence and Synchronization Mechanisms, Vector Processing Principles, Multivector Multiprocessors and Data Flow Architecture.

Code No: ETEC 417	L	T
Paper : Optical Communication	2	0

Introduction:
Measurement of Information, Channel Capacity, Communication System Architecture, Basic Optical Communication System, Advantage of Optical Communication System.

Propagation in Dielectric Waveguides:
Introduction, Step-index Fibers, Graded Index Fibers, Modes & Rays, Slab Wave Guide.

Attenuation in Optical Fibers:
Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers

Wave Propagation:
Wave Propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

Source & Detectors:
Design of LED’s for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System, Semiconductor Photodiode Detectors, Avalanche Photodiode Detectors & Photo multiplier Tubes.

Optical Fiber Communication System:
Telecommunication, Local Distribution Series, Computer Networks Local Data Transmission & Telemetry, Digital Optical Fiber Communication System-First Generation, System, Second Generation System, Future System.
Data Communication Networks – Network Topologies, Mac Protocols, Analog System.
Advanced Multiplexing Strategies – Optical TDM, Sub carrier Multiplexing, WDM Network Architectures; SONET/SDH, Optical Transport Network, Optical Access Network, Optical Premise Network.

Applications-Military Applications, Civil, Consumer & Industrial Applications.		
Code No: ETIT 419- ARTIFICIAL INTELLIGENCE	L	T
	2	0

Scope of AI
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

Knowledge Representation
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking.Rule based Systems : Forward reasoning: conflict resolution, backward reasoning: use of no backtrack.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

Handling uncertainty

Non-Monotonic Reasoning, Probablistic reasoning, use of certainty factors, fuzzy logic.

Learning

Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

Expert Systems

Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.

ETEC 451 –CONTROL SYSTEMS LAB	<i>P</i>	<i>C</i>
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Experimental work based upon the course Control System (ETEC 401)

ETEC 453 SOFTWARE ENGINEERING LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course Software Engineering (ETEC 403)

ETEC 455- NETWORK TECHNOLOGY LAB	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course Network Technology (ETEC 405)

ETEC 457 – Practical based on ELECTIVES	<i>P</i>	<i>C</i>
2 1		

Experimental work based upon the course ELECTIVES

ETCS 459 - PROGRAMMING II	<i>P</i>	<i>C</i>
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ETEC 461 – PRACTICAL TRAINING	<i>P</i>	<i>C</i>
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ETEC – 402 CONSUMER ELECTRONICS

Audio and Video Systems:- High-fi Stereophonic audio system, Recording and Reproduction, Review of AM, FM Transmission and Reception, Video System, Color TV, Terrestrial and Satellite Broad casting, Cable TV, HDT and Digital TV, DTH TV, LCD, Plasma TV.

VCD, DVD, VCR, Video Camera, Remote Control, Touch Tone Telephone Set, Value addition in telephone sets, Fax, Mobile telephone hand set.

Convergence Technology

Video Signal Processing Algorithm for video signal processing.

ETCS 404 –SATELITE AND MOBILE COMMUNICATION

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Introduction to Transmission Media, Copper, Fiber, Space. Antennas – Concepts of a radiating dipole, Directional and Omni Directional antennas, Radiation patterns, Phased array, , Rhombic, Parabolic, gain, efficiency, gain to noise temp. ratio, Capture area.

Orbital mechanics of Satellite:- Apogee, perigee, elliptical, spherical,

Some Communication Satellites:- Historical perspective and recent Status.

Communication Building Block:- Sub Systems and systems, up-link and down-link, isolators, circulators, mixers, filters, demodulators, threshold extension.

Concepts of Microstrip lines, MICs, Review of Microwave components like Wave guide-rectangular, circular, cut-off frequency, bends, twists, and attenuators

Review of modulation techniques like TDMA, FDMA, FM. Analogue and digital techniques, encoding, decoding, quadrature modulation, channel capacity, phase locked loop techniques.

Optical Communication: - System model, optical sources, semiconductor lasers, light emitting diodes, optical modulation, space channels, guided channels, optical fiber wave guides, coupling components, optical receivers, typical optical communication systems and their performance.

Cellular Communication Cells, Frequency allocation and control, Base System and Master System, GSM, DCS 1800, Various value added services. Algorithm for mobile communication.

ETEC - 406 INSTRUMENTATION

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Review of Instrumentation Amplifier, Magnetic Recorder, Digital recorders of memory type, Storage Oscilloscope, Sampling Oscilloscope and Spectrum Analyser

Special Purpose Transformers, Constant Voltage Transformer, Types of Rectifiers – Signal Phase Rectifier, Three Phase Rectifier, Three Phase Controller Rectifier, Switch Mode Power Supply (SMPS), Inverter and Uninterrupted Power Supply (UPS)

Timers, Dashpot timers, Motor driven Timers, Stepper motor and their types, Permanent magnet and variable reluctance type, a.c. Motor Controllers – Variable Frequency inverters and cycloconverters.

Automatic weighing system, Carbon dioxide controller for a carburising furnace, Control of relative humidity in a textile moisterning process and warehouse, Induction Heating, Dielectric Heating.

Programmable Logic Controller (PLC), General characteristics and system layout, Operational procedures, Control of coils and contacts, PC ladder Instruction – Address and Registers, Timers and Counters, The sequencer, analog operation and loop control.

Robotics – Robot and their uses, Robot Auxillary control devices and systems, Controlling and Programming, A Pick-and-Place Robot, Work cells controlling and programming.

ETEC - 408 INTEGRATED CIRCUITS TECHNOLOGY

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Classification of ICs. Electronic grade Silicon, Czochralski and Flot Zone Crystal Growing Methods, Oxygen and carbon in Silicon, Zegregation coefficients, Silicon shaping and wafer preparation, Vapour Phase Epitaxy.

Oxidation – Thermal, Dry & Wet, High Pressure and Plasma Oxiadation, Lithography – Optical Lithography, Photomask, Photo resist and Process, Electron Lithography, X-ray Lithography, Ion Beam Lithography.

Etching – Wet Chemical Etching, Reactive etching, Impurity Doping – Diffusion, Ion Implanatation, Metallization – Desired Properties, Applications, Ohmic contacts, Choices and Problems.

Integrated Elements: Isolation of circuit elements, Bipolar Technology: NPN Transistors, PNP Transistors, Integrated Diodes, Semiconductor Resistors, Capacitors and Inductors, MOS Technology: NMOS and CMOS IC Technology

Design of typical ICs, Back side of preparation, Wafer sort, Device Separation, Die Bonding, Wire Bonding, Package Types and Considerations, Testing of ICs.

Fabrication Facilities and Environment – pure water system, clean room and personnel, Characteristics of VLSI, Problem of raising the scale of integration – Causes of IC failures – Electronistatic Discharge Damage and Alpha Particle Induced soft errors, Yield and Reliability, Methods of reliability evaluation, Nonsilicon Technology (GaAs ICs), Future trends.

ETEC - 410 DIGITAL IMAGE PROCESSING

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Introduction And Digital Image Fundamentals

Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry.

Image Transforms

Discrete Fourier Transform, Some properties of the two-dimensional fourier transform, Fast fourier transform, Inverse FFT.

Image Enhancement

Spatial domain methods, Frequency domain methods, Enhancement by point processing, Spatial filtering, Lowpass filtering, Highpass filtering, Homomorphic filtering, Colour Image Processing.

Image Restoration

Degradation model, Diagonalization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain.

Image Compression

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.

Image Segmentation

Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

Representation and Description

Representation schemes like chain coding, Polygonal Approximation, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology.

Recognition and Interpretation

Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

Code No: ETEC 412

Paper : MICROWAVE DEVICES

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Microwave tubes: Klystron amplifier – two cavity – multi cavity – description – operating characteristics – performance characteristics – pulse modulation – bandwidth, Travelling wave tube amplifier – construction – operation – crossed field amplifier – grid controlled tube, Magnetron oscillator – conventional magnetron – coaxial magnetron – mode jumping – frequency pushing and pulling – performance chart & rieke diagram.

Avalanche transit-time devices: Introduction – the physics of IMPATT diodes – small signal and large signal analysis – effects of tunnelling on IMPATT diodes – performance – application – TRAPATT devices – present trends in IMPATT devices – Lateral IMPATT devices – monolithic IMPATT oscillator circuits.

Transferred – electron devices and circuits: Introduction – physical basis of Gunn effect – modes of operation – study of TEDs and modelling – Gunn diode or TED oscillators – multiple Gunn-device oscillators or power combiners – generation of mm waves – Gunn diode amplifier – present status of GaAs and Inp TEDs – new materials and new ideas – applications.

Microwave Transistors: Introduction – n-p-n junction transistor – microwave BJT – HBT, MESFET, - power frequency limitations – noise figure – low noise microwave HEBT – MOSFETs – Multi octave YIG – tuned GaAs FET oscillators – dielectric – tuned FET oscillators for stable oscillations – microwave transistor amplifier.

Technology of microwave devices and measurements: GaAs Gunn diode fabrication – fabrication of silicon IMPATT diode – fabrication of low noise HEMT – MICs: HMICs, MICs and QMICs – fabrication of MMICs using FETs – measurement of s-parameters of microwave semiconductor electron devices – power, frequency and spectral response measurements – Rieke diagram and noise measurements of semiconductor circuits – wafer measurements of MMICs.

Code No: ETIT 414

Paper : Network Management and Security

L	T
2	0

Introduction:
Codes and Ciphers – Some Classical systems – Statistical theory of cipher systems-Complexity theory of crypto systems – Stream ciphers, Block ciphers.

Stream Ciphers: Rotor based system – shift register based systems – Design considerations for stream ciphers – Cryptanalysis of stream ciphers – Combined encryption and encoding.

Block Ciphers – DES and variant, modes of use of DES.

Public key systems – Knacksack systems – RSK – Diffle Hellman Exchange – Authentication and Digital signatures, Elliptic curve based systems.

System Identification and clustering

Cryptology of speech signals – narrow band and wide band systems – Analogue & Digital Systems of speech encryption.

Network Security: Hash function – Authentication:
 Protocols – Digital Signature standards.
 Electronics Mail Security – PGP (Pretty Good Privacy) MIME, data Compression technique.
 IP Security: Architecture, Authentication Leader, Encapsulating security Payload – Key Management.
 Web security: Secure Socket Layer & Transport Layer security, Secure electronics transactions.
 Firewalls Design principle, established systems.

Telecommunication Network architecture, TMN management layers, Management information Model, Management servicing and functions, Structure of management information and TMN information model.

Code No: ETEC 416	L	T
Paper : Embedded Systems	2	0

Architectures: Basic definitions, The bottlenecks in the Non Neuman paradigm cache memories: Principles, alternative organization, figure of merit, performance evaluation, Cache management issues, Multiple level caches, Innovative CPU architectures: basic figures of merit for performance evaluation, Pipelining: the RISC approach hints at pipelined CISC CPUs. The basic MIPS pipeline exception handling.

ILP Architectures: The basic idea, Dynamic scheduling, static scheduling, super scalar architecture, basic principles and problems, Out of order execution and its management. Score boarding, reservation stations, the reorder buffer, Hazard problem and management in super scalar CPUs. Speculative execution and its optimization. Exception handling, Reference to some real world super scalar CPUs. Basic characteristics of DSP processors Multiprocessor system: The cache coherence problem, NUMA, CC-NUMA systems, Basic concepts of multithreading, simultaneous multithreading, speculative multithreading, Testing techniques, fault diagnosis and fault tolerance techniques, fault tolerant softwares.

Introduction to compilers, cross compilers, building blocks and interfaces of front-ends, Code Scanning, parsing, semantic analysis, intermediate representations.

PCI (Compact PCI), ISA (PC 104) and VME bus architecture and programming, device firmware, system firmware architectures, ECC/FDAC memory architectures, Interrupt service routine (ISR), real time clock/Timer, real time kernel configuration, main loop design, multitasking, inter-task communication, hard real time scheduling theory and design (RMA and DMA), latency response time, system performance, development and testing techniques.

ETEC 452 – CONSUMER ELECTRONICS LAB	P	C
	2	1

Experimental work based upon the course Consumer Electronics (ETEC 402)

ETCS 454 – SATELLITE & MOBILE COMMUNICATION LAB	P	C
	2	1

Experimental work based upon the course Mobile and Satellite Communication (ETCS 404).

ETEC 456 - Practicals based on ELECTIVES	P	C
	2	1

Experimental work based upon the course (ELECTIVES)

ETEC 458 - PROJECT	P	C
	8	8

From the following 11 Groups of Electives, 4 Papers have to be chosen :

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|----|---------------------------------|----|----------|
| 1. | Data Processing | -- | 2 Papers |
| 2. | Web Technology | -- | 2 Papers |
| 3. | Graphics & Multimedia | -- | 2 Papers |
| 4. | Optical Communication & Medical | -- | 2 Papers |
| 5. | Expert System | -- | 2 Papers |
| 6. | Signal Processing | -- | 2 Papers |

7.	E CAD/ASICS Design	--	2 Papers
8.	E-Commerce & E-Governance	--	2 Papers
9.	Compilers and system Prog.	--	2 Papers
10.	Artificial Intelligence & Robotics	--	2 Papers
11.	Network Management	--	2 Papers