UNIVERSITY OF CALICUT

Faculty of Engineering

Curriculum, Scheme of Examinations and Syllabi for B.Tech Degree Programme with effect from Academic Year 2000-2001

EC: Electronics & Communication Engineering

COMBINED FIRST AND SECOND SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
EN2K 101	Engineering Mathematics I	3	-	-	50	3	100
EN2K 102	Engineering Mathematics II	3	-	-	50	3	100
EN2K 103A	Engineering Physics(A)	2	-	-	50	3	100
EN2K 103A(P)	**Physics Lab(A)**	-	-	1	25	-	-
EN2K 104A	Engineering Chemistry(A)	2	-	-	50	3	100
EN2K 104A(P)	**Chemistry Lab(A)**	-	-	1	25	-	-
EN2K 105	Humanities	2	-	-	50	3	100
EN2K 106A	Engineering Graphics(A)	1	-	3	50	3	100
EN2K 107A	Engineering Mechanics(A)	2	1	-	50	3	100
EN2K 108	Computer Programming in C	2	1	-	50	3	100
EC2K 109	Basic Electrical Engineering	2	1	-	50	3	100
EC2K 110(P)	**Mechanical Workshop**	-	-	2	50	-	-
EC2K 111(P)	**Electrical & Electronics Workshop**	-	-	2	50	-	-
TOTAL		**19**	**3**	**9**	**600**	**-**	**900**

EN2K 101 : MATHEMATICS I

(common for all B. Tech. programmes)

3 hours lecture per week

Module I: Differential Calculus (15 hours)

Indeterminate forms - L` hospital`s rule - radius of curvature - centre of curvature - evolute - functions of more than one variable - idea of partial differentiation - Euler`s theorem for homogeneous functions - chain rule of partial differentiation - applications in errors and approximations - change of variables - Jacobians - maxima and minima of functions of two or more variables - method of Lagrange multipliers

Module II: Infinite Series (15 hours)

Notion of convergence and divergence of infinite series - ratio test - comparison test - Raabe`s test - root test - series of positive and negative terms - idea of absolute convergence - test for alternating series - power series - interval of convergence - Taylors and Maclaurins series representation of functions - Leibnitz formula for the n^{th} derivative of the product of two functions - use of Leibnitz formula in the Taylor and Maclaurin expansions

Module III: Matrices (21 hours)

Concept of rank of a matrix - reduction of a matrix to echelon and normal forms - system of linear equations - consistency of linear equations - gauss` elimination - homogeneous linear equations - fundamental system of solutions - inverse of a matrix - solution of a system of equations using matrix inversion - Eigen values and Eigen vectors - Cayley-Hamilton theorem - Eigen values of Hermitian, Skew-Hermitian and unitary matrices - quadratic forms - matrix associated with a quadratic form - technique of diagonalization using row and column transformations on the matrix - definite, semidefinite and indefinite forms - their identification using the Eigen values of the matrix of the quadratic form

Module IV: Fourier series and harmonic analysis (15 hours)

Periodic functions - trigonometric series - Fourier series - Euler formulae - even and odd functions - functions having arbitrary period - half range expansions - approximation by trigonometric polynomials - minimum square error - numerical method for determining fourier coefficients - harmonic analysis

Reference books

1. *Piskunov N., Differential and Integral calculus , MIR Publishers*
2. *Wylie C.R., Advanced Engineering Mathematics , McGraw Hill*
3. *Ayres F., Matrices , Schaum's Series, McGraw Hill*
4. *Kreyszig E., Advanced Engineering Mathematics , Wiley Eastern*
5. *Thomas G.B., Calculus and Analytic Geometry , Addison Wesley*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 1 5marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 102 : MATHEMATICS II

(common for all B. Tech. programmes)

3 hours lecture per week

Module I: Ordinary differential equations (21 hours)

A brief review of the methods of solutions of first order equations - separable, homogeneous and linear types - exact equations - orthogonal trajectories - general linear second order equations - homogeneous linear equation of the second order with constant coefficients - fundamental system of solutions - method of variation of parameters - Cauchy's equation - simple applications of differential equations in engineering problems, including problems in mechanical vibrations, electric circuits and bending of beams

Module II: Laplace transforms (15 hours)

Gamma and beta functions - definitions and simple properties - Laplace transform - inverse transform - Laplace transform of derivatives and integrals - shifting theorems - differentiation and integration of transforms - transforms of unit step function and impulse function - transform of periodic functions - solution of ordinary differential equations using Laplace transforms

Module III: Vector differential calculus (15 hours)

Vector function of single variable - differentiation of vector functions - scalar and vector fields - gradient of a scalar field - divergence and curl of vector fields - their physical meanings - relations between the vector differential operators

Module IV: Vector integral calculus (15 hours)

Double and triple integrals and their evaluation - line, surface and volume integrals - Green`s theorem - Gauss` divergence theorem - Stokes` theorem (proofs of these theorems not expected) - line integrals independent of the path

Reference books

1. *Wylie C.R., Advanced Engineering Mathematics, McGraw Hill*
2. *Spiegel M.R., Vector Analysis , Schaum Series, McGraw H ill*
3. *Kreyszig E., Advanced Engineering Mathematics , Wiley Eastern*
4. *Thomas G.B., Calculus and Analytic Geometry , Addison Wesley*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answe r any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 103A : ENGINEERING PHYSICS(A)

(common for AI, CS, EE, EC, IT, IC, PT)

2 hours lecture per week

Module I (11 hours)

Interference of light - interference from plane parallel thin films - colours of thin films by reflected light - newtons rings - measurement of wave length - thin wedge shaped air film - air wedge - testing of optical planes of surfaces - diffraction of light - introduction of fresnel and fraunhofer diffraction - distinction between the two diffractions - simple theory of plane transmission grating - polarisation of light - double refraction - nicol prism - quarter and half

wave plates - production and detection of elliptically and circularly polarised light - rotatory polarisation - lawrent's half shade polarimeter - applications of polarised light

Module II (11 hours)

Quantum mechanics - Newtonian mechanics and quantum mechanics - the wave function - Schrodinger's wave equation for free particle - potentials in Schrodinger equation - time dependent Schrodinger equation - time independent Schrodinger equation - expectation values - derivation of Schrodinger equation -application - particle in a box (motion in one dimension) - ultrasonics - Piezo effect - Piezo electric crystal production and detection of ultrasonics - applications of ultrasonics - NMR and ESR - basic principles of Nuclear Magnetic Resonance (NMR) and Electron Spin Resonance (ESR) - experimental method for detection of NMR and ESR - applications

Module III (11 hours)

Laser physics - basic concepts of laser - spontaneous and stimulated emission - absorption - population inversion - optical pumping - construction and components of laser - ruby laser - helium - neon laser and semiconductor laser - applications - basic principle of holography and its application - fibre optics - basic principle - Fibre constructions - Fibre dimensions - light propagation in fibre - signal distortion in optical fibres and transmission losses (brief ideas only) - light wave communication using optical fibres and its advantages - applications

Module IV (11 hours)

Semiconductor physics - energy band diagrams - classifications of semiconductors on the basis of Fermi level and Fermi energy - impurity level in N-type and P-type semiconductors - applications of semiconductors - Zener diode, light emitting diode, solar cell, phototransistor, photo resister (LDR) - hall effect introduction - measurement of hall voltage and hall coefficient - importance of hall effect - super conductivity - properties of superconductors - Josephson effect and tunnelling (qualitative) - BCS theory of superconductivity (qualitative) - applications of superconductivity

Text and reference books

1. *Sreenivasan M.R., Physics for Engineers , New Age International*
2. *Vasudeva A.S., Modern Engineering Physics , S. Chand*
3. *Brijlal & Subrahmanyam, N, Text book of Optics , S.Chand*
4. *Jenkins F.A & White, H.E, Fundamentals of Optics , McGraw Hill*
5. *Kale Gokhale; Fundamentals of Solid State Electronics , Kitab Mahal*
6. *Gupta S.L. & Kumar, V; Solid State Physics , K. Nath*
7. *Srivastva C.M. & Sriniva san, C; Science of Engineering Materials , New Age International*
8. *Rajam J.B; Modern Physics , S. Chand*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 104A : ENGINEERING CHEMISTRY(A)

(common for AI, CS, EE, EC, IT, IC, PT)

2 hours lecture per week

Module I (13 hours)

Structure of solids - geometry of crystalline solids - space lattices - crystal structure - Bragg's law of X-ray diffraction - covalent solids - ionic solids - metals and alloys - noncrystalline states - crystal imperfections - point defects - dislocations - conductors and resistors - free electron theory - super conductors - semiconductors - intrinsic and extrinsic - semiconductor materials and their fabrication - liquid crystals - dielectric materials - polarization - feroelectric materials

Module II (9 hours)

Electrochemistry - electrode potentials - types of electrodes - salt bridge - emf measurement - concentration cells - acids and bases - buffer solutions - ph measurement - glass electrode - polarization - over voltage - secondary cells and fuel cells

Module III (9 hours)

Corrosion - protective coatings and pollution - dry corrosion - oxidation processes - wet corrosion - electrochemical theory - different forms of corrosion - prevention and control - protective coating - pretreatment of surface - metallic and nonmetallic coatings - electro deposition - cementation - metal spraying - air pollution - types - causes - power generation pollution - thermal pollution - petrochemical smog - methods of control

Module IV (13 hours)

High polymers and lubricants - polymerisation and functionality - chain, condensation and copolymerisation - mechanism - coordination polymerisation - polymerisation processes - structure, properties and molecular weight of polymers - thermosetting and thermoplastics materials - application in electrical and electronic industries - elastomers - vulcanization - synthetic rubbers - lubricants - theory of friction - mechanisms of lubrication - classification and properties of lubricants - additives - synthetic lubricants - solid lubricants

Reference books

1. *Kuriakose J.C. & Rajaram J., Chemistry in Engineering and Technology Vols 1 & 2 , Tata McGraw Hill*
2. *Raghavan V., Materials Science and Engineering - A First Course , Prentice Hall*
3. *Sawyer C.N. & McGarpy P.L., Chemistry for Environmental Engineering , McGraw Hill*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 mar ks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with c hoice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 105 : HUMANITIES

(common for all B. Tech. programmes)

2 hours lecture per week

Module I (10 hours)

Introduction to English usage and grammar

Review of grammar - affixes, prefixes, suffixes, participles and gerunds - transformation of sentences - commonly misspelt words - correction of mistakes - punctuation - idioms - style - vocabulary building

Reading comprehension

Exposure to a variety of reading materials, articles, essays, graphic representation, journalistic articles, etc.

Writing comprehension

Skills to express ideas in sentences, paragraphs and essays

Module II (10 hours)

Technical communication and report writing

Growing need and importance of technical communication - aspects of technical description of machinery, equipment and processes - giving instructions in an industrial situation - note taking and note making - correspondence on technical topics - different types of technical reports

Module III (10 hours)

Humanities in a technological age

Importance of humanities to technology, education and society - relation of career interests of engineers to humanities - relevance of a scientific temper - science, society and culture introduction to writings of modern thinkers on society and culture

Technology

Historical concepts and current usage (*this module should be a window to the world of western and eastern mind with an emphasis on exposition of topical ideas through cohere nt language*).

Module IV (14 hours)

History of science and technology

Science and technology in the primitive society - development of science and technology in early civilised societies - Science and classical Greece - the rise and development of early Indian science - contributions of the Arabs to science and technology - European science and the

revolutionary (industrial, American and French revolutions) era - recent advances in Indian science

Reference books

1. *Huddleston R, English Grammer - An outline , Cambridge University Press*
2. *Pennyor, Grammar Practice Activities , Cambridge University Press*
3. *Murphy, Intermediate English Grammar , Cambridge University Press*
4. *Hashemi, Intermediate English Grammar - Supplementary Exercises with answers ", Cambridge University Press*
5. *Vesilind; Engineering, Ethics and the Environment , Cambridge University Press*
6. *Larson E; History of Inventions , Thompson Press India Ltd.*
7. *Bernal J. D, Science in History , Penguin Books Ltd*
8. *Dampier W. C, History of Science ", Cambridge University Press*
9. *Encyclopedia Britannica, History of Science, History of Technology*
10. *Subrayappa; History of Science in India , National Academy of Science, India*
11. *Brownoski J, Science and Human Values , Harper and Row*
12. *Schrodinger, Nature and Greeks and Science and Humanism , Cambridge University Press*
13. *Bossel, H, Earth at a Crossroads - paths to a sustainable Future , Cambridge University Press*
14. *McCarthy, English Vocabulary in Use , Cambridge University Press*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 f rom each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice t o answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 106A : ENGINEERING GRAPHICS(A)

(common for AI, CS, EE, EC, IT, IC, PT)

1 hour lecture and 3 hours drawing

Module 0 (12 hours - 1 drawing exercise)

Introduction to engineering graphics - drawing instruments and their uses - different types of lines - lettering and dimensioning - familiarisation with current Indian standard code of practice for general engineering drawing - construction of ellipse, parabola and hyperbola - construction of cycloid, involute and helix (only practice, no university examination)

Module I (18 hours - 3 drawing exercises)

a) Introduction to orthographic projections - vertical, horizontal and profile planes - principles of first angle and third angle projections - projections of points in different quadrants - orthographic projections of straight lines parallel to one plane and inclined to the other plane - straight lines

inclined to both the planes - true length and inclination of lines with reference planes - traces of lines

b) Projections of polyhedra and solids of revolution - frustums - projections of solids with axis parallel to one plane and paralel to or perpendicular to the other plane - projections of solids with the axis inclined to both the planes (solids to be drawn - cube, prism, pyramid, tetrahedron, cone and cylinder)

Module II (18 hours - 3 drawing exercises)

a) Sections of solids - sections by planes parallel to the horizontal or vertical planes and by planes inclined to the horizontal or vertical planes - true shape of section by projecting on auxiliary plane (solids to be drawn: - cube, prism, pyramid, tetrahedron, cone and cylinder)

b) Development of surfaces of solids - method of parallel line, radial line, triangulation and approximate developments - development of polyhedra, cylinder, cone and sectional solids - development of solids having hole or cut

Module III (18 hours - 3 drawing exercises)

a) Introduction to isometric projection - isometric scale - isometric views - isometric projections of prisms, pyramids, cylinders, cones, spheres, sectioned solids and their combinations - principle of oblique projection - cavalier, cabinet and general oblique projections of solids and simple objects

b) Introduction to multiview projection of objects - principle of six orthographic views - conversion of pictorial views of simple engineering objects into orthographic views

Module IV (22 hours - 6 drawing exercises)

a) Introduction to machine drawing - types of sectional views - full-sectional and half-sectional views of simple machine components

b) Conventional representation of threaded fasteners - drawing of nuts, bolts, washers and screws - locking arrangements of nuts - bolted and screwed joints - foundation bolts of eye end type, hook end type and split end type

Note: All drawing exercises mentioned above are for class work. Additional exercises wherever necessary may be given as home assignments

Reference books

1. *John K.C. & Varghese P.I, Engineering Graphics , Jet Publications*
2. *Bhatt N.D, Elementary Engineering Drawing , Charotar Publishing House*
3. *John K.C. & Varghese P. I, Machine Drawing , Jovast Publishers*
4. *Bhatt N.D, Machine Drawing , Charotar Publishing House1.*
5. *Narayana K.L & Kannaiah, P, Engineering Graphics , Tata McGraw Hill*
6. *Luzadder W.J, Fundamentals of Engineering Drawing , Prentice Hall of India*

Sessional work assessment

Drawing exercises (Best 10)	*10x3 = 30*
2 tests	*2x10 = 20*
Total marks	*= 50*

University examination pattern

No question from module 0
Q I - 2 questions A and B of 20marks from module I with choice to answer any one
Q II - 2 questions A and B of 20marks from module II with choice t o answer any one
Q III - 2 questions A and B of 20marks from module III with choice to answer any one
Q IV - 2 questions A and B of 40marks from module IV with choice to answer any one

EN2K 107A : ENGINEERING MECHANICS(A)

(common for AI, CH, CE, CS, EE, EC, IT, IC, PT

2 hours lecture and 1 hour tutorial per week

Objectives

To build a strong foundation in Engineering Mechanics to serve as a basis for strength of materials, Mechanics of Solids and Structural Analysis
To acquaint the student wi th general methods of analysing engineering problems
To illustrate the application of the methods to solve practical engineering problems

Module I (17 hours)

Principles of statics - freebody diagrams - composition and resolution of forces - resultant and equilibrant- concurrent forces - triangle of forces - Lami's therem - method of projections - method of moments-theorem of varignon - parallel forces - couples - centre of parallel forces and centre of gravity - conditions of equilibrium for general system of coplanar forces - polygon of forces - resultant of a system of coplanar forces - friction - laws of friction - angle of friction - equilibrium of a body on a rough inclined plane

Module II (17 hours)

Plane trusses - different types of supports - reactions at supports - method of joints - method of sections -graphical method - funicular polygon - maxwell diagrams - distributed forces in a plane - flexible suspension cables - introduction to vector approach - concurrent and parallel forces in space - couples in space - equilibrium of general system of forces in space - solution of problems by scalar and vector approach

Module III (16 hours)

Principle of virtual work - application to practical problems - stable and unstable equilibrium - simple machines - centroids and moments of inertia of plane figures of various shapes-rectangle, triangle, circle, semicircle and builtup sections - parallel and perpendicular axes theorems - product of inertia - principal axes and principal moments of inertia - moment of inertia of a rigid body - moment of inertia of a lamina -moment of inertia of three dimensional bodies

Module IV (16 hours)

Principles of dynamics - differential equation of rectilinear motion - motion of a particle acted upon by a constant force - force as a function of time - force proportional to displacement - free vibrations - D'Alembert's principle - momentum and impulse - work and energy - ideal systems - conservation of energy - impact - plastic, semielastic and elastic - curvilinear motion - differential equation - D' Alembert's principle - work and energy - moment of momentum - projectiles -

rotation - equation of motion - D' Alembert's principle - rotation under the action of constant moment - torsional vibration - compound pendulum

Text books

1. *Timeshenko & Young; Engineering Mechanics , McGraw Hill*
2. *Shames I. H, Engineering Mechanics - Statics and Dynamics , Prentice Hall of India*

Reference books

1. *Beer F. P & Johnston E. R, Mechanics for Engineers - Statics and Dynamics , McGraw Hill*
2. *Meriam J. L & Kraige L. G, Engineering Mechanics - Statics and Dynamics , John Wiley*
3. *Langhaar H. L & Boresi A. P, Engineering Mechanics , McGraw Hill*
4. *Rajasekaran & Sankarasubramanian, Engineering Mechanics , Vikas Publishing Company*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EN2K 108 : COMPUTER PROGRAMMING IN C

(common for all B. Tech. programmes)

2 hours lecture and 1 hour practical per week

Module I (11 hours)

Programming and problem solving - computer organisation - high level and low level languages - steps involved in computer programming - developing algorithms and flow charts - efficiency of algorithms - running - debugging and testing of programs - program design methods - top-down modular programming - measures of program performance

Module II (20 hours)

Basics of C - overview of C - lexical elements - operators and the c system - fundamental data types - flow of control - functions

Module III (20 hours)

More on C - arrays - pointers and strings - bit-wise operators and enumeration types - structures and unions - linear linked lists and list operations - basic I/O functions

Module IV (15 hours)

Introduction to object oriented programming - principles of OOP - object oriented programming paradigm - basic concepts of OOP - benefits of OOP - object-oriented languages - applications of

OOP - moving from C to C++ - input /output functions - classes and abstract data types - overloading - constructors and destructors - inheritance - polymorphism - templates

Text book

Kelley A & Pohl I, A Book on C , Addison Wesley

Reference books

1. *Schneider G.M., Weigngart S.W. & Perlman D.M.; An introduction to Programming and Problem Solving with Pascal , John Wiley*
2. *Balag urusamy E, Object Oriented Programming with C++ ", Tata McGraw Hill*
3. *Venugopal K.R. & Prasad S. R, Programming with C , Tata McGraw Hill*
4. *Gotfried B., Programming in C ++, Schaum's Outline Series, McGraw Hill*

Sessional work assessment

Assignments	*2x10 = 20*
2 tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choic e to answer any one

EC2K 109 : BASIC ELECTRICAL ENGINEERING

(common with AI2K 109, EE2K 109, IC2K 109)

2 hours lecture and 1 hour tutorial per week

Module 1 (20 hours)

Introductory circuit analysis - two terminal resistance - independent voltage and current sources - dependent voltage and current sources - Ohm's law - Kirchoff's laws - solution of simple series, parallel, series-parallel circuits with DC excitation - solution of resistive circuits with dependent sources - node analysis and mesh analysis - nodal conductance matrix and mesh resistance matrix and effect of dependent sources on these matrices - source transformation - Thevenin's theorem and norton's theorem - magnetic circuits - MMF - magnetic flux - reluctance - comparison of ferromagnetic material - magnetisation curves of ferromagnetic materials - energy stored in a magnetic field - solution of magnetic circuits - inductance - Faraday's law of electromagnetic induction - Lenz's law - statically and dynamically induced e.m.f - self and mutual inductance - inductances in series and parallel - mutual flux and leakage flux - coefficient of coupling - dot convention - cumulative and differential connection of coupled coils - BH curve and inductance - hysteresis loop - capacitance - electrostatics - capacitance - parallel plate capacitor - capacitors in series and parallel - charging and discharging of capacitor - energy stored in electrostatic fields - potential gradient - dielectric strength

Module II (16 hours)

Two terminal element relationships - v-i relationship for inductance and capacitance - constant flux linkage theorem and constant charge theorem - v-i relationship for independent voltage and current sources - v-i relationship for dependent voltage and current sources - source functions - unit impulse - unit step - unit ramp and inter relationship - sinusoidal input - generalised exponential input - linearity - concept of a linear element - concept of time invariance - concept of a linear circuit - superposition theorem - substitution theorem - passive vs active elements - bilateral elements - time domain analysis of circuits - linear differential equations for series RC,

parallel RC, series RL, parallel RL, series RLC, parallel RLC and coupled circuits - complete solution for step/impulse/sinusoid voltage/current inputs - natural response - transient response - time constant - rise and fall times - concept of d.c steady state and sinusoidal steady state - frequency response of simple circuits from steady state solution - solution of two mesh circuits by differential equation method - determination of initial conditions

Module III (15 hours)

Single phase a.c circuits - alternating quantities - generation of sinusoidal e.m.f - average value - effective value - form and peak factors for square, triangle, trapezoidal and sinusoidal waveforms - phasor representation of sinusoidal quantities - phase difference - addition and subtraction of sinusoids - symbolic representation - Cartesian, polar and exponential forms - analysis of a.c circuits R, RL, RC, RLC circuits using phasor concept - concept of impedance, admittance, conductance and susceptance - relation between s-domain immittance functions and phasor impedance/admittance - power in single phase circuits - instantaneous power - average power - active power - reactive power - apparent power - power factor - complex power - solution of series, parallel and series-parallel a.c circuits - application of Thevenin's theorem and Norton's theorem for a.c. circuits - maximum power transfer theorem - series and parallel RLC resonant circuits - frequency response - resonance - Q factor - half power frequencies - bandwidth

Module IV (15 hours)

Analysis of polyphase circuits - polyphase working - two phase and three phase systems - 3 phase a.c systems - balanced system - phase sequence - star delta transformation theorem - balanced 3 phase a.c source supplying balanced 3 phase star connected and delta connected loads - three phase loads with mutual coupling between phases - 3 wire and 4 wire systems - neutral shift - neutral current - active power, reactive power, complex power, apparent power and power factor in balanced and unbalanced three phase systems - measurement of power in balanced and unbalanced systems - symmetrical components - analysis of unbalanced systems using symmetrical components - sequence impedances - analysis of three phase unbalanced systems with mutual coupling between phases using symmetrical components - sequence coupling

Reference books

1. Kothari D.P & Nagarath I. J, *Theory & Proble ms of Basic Electrical Engineering* , Prentice Hall of India
2. Hayt & Kimmerly; *Engineering Circuit Analysis* , McGraw Hill
3. Siskind C.S, *Electric Circuits* , McGraw Hill
4. Nilsson J.W. & Riedel S.A., *Electric Circuits* , Addison Wesley
5. Edminister J.A., *Electric Circui ts, Schaum's Series* , McGraw Hill
6. Desoer C.A. &Kuh E. S, *Basic Circuit Theory* , McGraw Hill

Sessional work assessment	
Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern
Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15marks from module I with choice to answer any one
Q III - 2 questions A and B of 15marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15marks from module III with choice to answer any one
Q V - 2 questions A and B of 15marks from module IV with choice to answer any one

EC2K 110(P) : MECHANICAL WORKSHOP

[common with AI2K 110(P), EE2K 110(P), IC2K 110(P)]

2 hours practicals per week

Module I (12 hours)
Machine shop practice - study of different machine tools - lathe - shaper - milling machine - drilling machine - grinding machine - exercises on lathe-models involving straight turning straight turning, taper turning, facing, knurling, boring and thread machining - thread standards and specifications

Module II (12 hours)
Fitting practice - study of hand tools and measuring tools used in fitting work - fabrication exercises involving cutting, chiseling, filing and drilling - use of thread dies and taps

Module III (10 hours)
Welding practice - study of electric arc welding and gas welding equipment, accessories and tools - safety practices - exercises involving preparation of different types of welded joints - lap and butt joints - defects in welding - testing of welded joints - gas cutting equipment and demonstration

Module IV (10 hours)
Sheet metal practice - study of shearing bending and folding machines, press brake etc. used in sheet metal work - hand tools in sheet metal work - development and fabrication of simple sheet metal components like cylindrical dish, funnel, rectangular duct, tray, panel board etc, - soldering and brazing of joints - die cutting operations

Sessional work assessment	
Workshop practicals and record	= 30
2 tests	2x10 = 20
Total marks	= 50

EC2K 111(P) : ELECTRICAL & ELECTRONICS WORKSHOP

[common with AI2K 111(P), CS2K 111(P), IT2K 111(P), IC2K 111(P), PT2K 111(P)]

2 hours practicals per week for AI, EC, IC

3 hours practicals per week for CS, IT, PT

Part A: Electrical Workshop (2/3 hours per alternate weeks)

1. Familiarisation of various types of service mains - wiring installations - accessories and house-hold electrical appliances
2. Methods of earthing - measurement of earth resistance - testing of electrical installations - precautions against and cure from electric shock
3. Practice of making Britannia joints on copper / aluminium bare conductors
4. Practice of making Married joints on copper / aluminium conductors
5. Practice of making T joints on copper / aluminium conductors

6. Wiring practice of a circuit to control 2 lamps by 2 SPST switches
7. Wiring practice of a circuit to control 1 lamp by 2 SPDT switches
8. Wiring practice of a circuit to control 1 fluorescent lamp and 1 three-pin plug socket
9. Wiring practice of a main switch board consisting of ICDP switch, DB, MCB's, and ELCB's
10. Familiarisation of various parts and assembling of electrical motors and wiring practice of connecting a 3-phase / 1-phase motor with starter

Sessional work assessment	
Workshop practicals and record	= 15
Test/s	= 10
Total marks	= 25

Part B - Electronics Workshop (2/3 hours per alternate weeks)

1. Familiarisation of various electronics components such as resistors, capacitors, transistors, diodes, IC's and transformers
2. Assembling and soldering practice of single phase full wave bridge rectifiers circuit with capacitor filter
3. Assembling and soldering practice of common emitter amplifier circuit
4. Assembling and soldering practice of common emitter amplifier circuit on PCB
5. Assembling and soldering practice of non inverter amplifier circuit using OPAMP on PCB
6. Assembling of a timer circuit IC555, phase shift oscillator circuit using OPAMP and JK flip-flop using NAND gates on a bread-board
7. Coil winding - Single layer and multi layer - Demonstration
8. Miniature transformer winding - Demonstration
9. PCB fabrication - Demonstration

Sessional work assessment	
Workshop practicals and record	= 15
Test/s	= 10
Total marks	= 25