

Syllabus

for

**B. Tech. Programme
(Electrical, Mechanical and Electronics &
Communication Engineering)**

*At College of Engineering, Zakura Campus
University of Kashmir*

for

1st & 2nd Semesters
(Common to All Branches)

(Prepared by Expert Committee constituted by the Vice-chancellor)

Faculty of Engineering
University of Kashmir
Hazratbal, Srinagar-6, J & K

PROPOSED COURSE STRUCTURE FOR

B.Tech. (1st Semester)

AT UNIVERSITY OF KASHMIR B.Tech. Programme

Course No	Subject	Teaching Periods per week			Credits	Marks			
		Lect	Tut	Prac		Sessional	Theory	Practicals	Total
MTH-101	Engineering Mathematics-I	2	2	0	3	50	100	-	150
PHY-102	Engineering Physics-I	2	2	0	3	50	100	-	150
CHM-103	Engineering Chemistry	2	2	0	3	50	100	-	150
CSE-104	Introduction to Computing	2	0	4	4	50	100	100	250
HUM-105	Communication Skills	2	0	0	2	50	100	-	150
MEC-106	Engineering Graphics & Drawing	1	0	4	3	50	-	100	150
PHY-107L	Engineering Physics Lab	0	0	4	2	50	-	100	150
CHM-108L	Engineering Chemistry Lab	0	0	4	2	50	-	100	150
MEC-109W	Workshop Practice-I	0	0	4	3	50		100	150
	Total	11	6	20	25	450	500	500	1450

PROPOSED COURSE STRUCTURE FOR

B.Tech. (2nd Semester)

AT UNIVERSITY OF KASHMIR B.Tech. Programme

Course No	Subject	Teaching Periods per week			Credits	Marks			
		Lect	Tut	Prac		Sessional	Theory	Practicals	Total
MTH-201	Engineering Mathematics-II	2	2	0	3	50	100	-	150
PHY-202	Engineering Physics-II	2	2	0	3	50	100	-	150
ECE-203	Principles of Electronics & Electrical Engineering	2	2	0	3	50	100	-	150
CSE-204	Computer Programming	2	2	2	4	50	100	100	250
CIV-205	Engineering Mechanics	2	2	0	3	50	100	-	150
HUM-206	Professional Communication	2	0	0	3	50	100	-	150
MEC-207	Machine Drawing	1	4	0	3	50	100	-	150
ECE- 208L	Electronics & Electrical Engineering-Lab	0	0	4	2	50	-	100	150
ECE-209W	Workshop Practice-II	0	0	2	1	50	-	100	150
	Total	13	14	8	25	450	700	300	1450

DETAILED SYLLABUS

SEMESTER – 1

Course No: MTH-101

ENGINEERING MATHEMATICS-I

UNIT-I

Calculus: Differential calculus of functions of several variables, Partial differentiation, Homogeneous functions and Euler's theorem, Taylor's and Maclaurin's series, Taylor's theorem and

UNIT-II

Mean value theorem for functions of two variables, Errors and approximations.

Applications of Differential Calculus: Maxima and minima of several variables, Lagrange's method of multipliers for maxima and minima,

UNIT-III

Curvature of cartesian curves, Curvature of parametric & polar curves.

Applications of Definite Integrals: Application of definite integrals to area, arc length, surface area and volume, Double integrals, Triple integrals.

UNIT-IV

Vector Calculus: Scalar and vector fields, differentiation of vectors, Velocity and acceleration,

Vector differential operator, Del, Gradient and Divergence, Physical interpretation of the above operators, Line, surface and volume integrals.

UNIT-V

Application of Vector Calculus: Flux, solenoidal and irrotational vectors, Gauss divergence theorem, Green's theorem in plane, Stoke's theorem, Applications to electromagnetics and fluid mechanics.

Books Recommended

1. Kreyszig E, "Advanced Engineering Mathematics", 8th Ed., John Wiley, Singapore (2001).
2. Jain, R K and Iyengar S R K, "Advanced Engineering Mathematics", 2nd Ed., Narosa Publishing House, New Delhi (2003).
3. Das & Mukherjee, "Differential Calculus", U.N. Dhur & Sons Pvt. Ltd.
4. Das & Mukherjee, "Integral Calculus", U.N. Dhur & Sons Pvt. Ltd.

ENGINEERING PHYSICS

UNIT-I

Electrostatics: Gradient of a scalar, Divergence and curl of a vector, Gauss's law and its applications, Electric potential and electric field (in vector form), Potential due to a monopole, Dipole and multipoles (multipole expansion), Work and energy in electrostatics; dielectrics, Polarization, electric displacement, Susceptibility & permittivity, Clausius Mossotti equation.

UNIT-II

Magneto-statics: Lorentz Force Law; magnetic field of a steady current (Biot-Savart law), Ampere's law and its applications, Ampere's law in magnetized materials, **Electrodynamics** Electromotive force, Faraday's law, Maxwell's Equations, Wave Equation. Poynting Vector, Poynting Theorem (Statement only), Propagation of EM-Wave in conducting and non-conducting media.

UNIT-III

Interference due to division of wavefront and division of amplitude. Young's double slit experiment, Interference and principle of superposition. Theory of biprism, Interferences from parallel thin film, wedge shaped films, Newton's rings, Michelson Interferometer.

Diffraction: Fresnel's Diffraction, Diffraction at straight edges, Fraunhofer diffraction due to N-Slits, Diffraction grating, dispersive power of grating, resolving power of prism and grating.

UNIT-IV

Theory of Relativity: Invariance of an equation and concept of ether, Michelson Morley experiment, Einstein's postulates and Lorentz transformation equations, length, time and simultaneity in relativity, addition of velocity, variation of mass with velocity, mass-energy relation, energy-momentum relation.

UNIT-V

Quantum Theory: The Compton effect, matter waves; group and phase velocities, Uncertainty principle and its application; time independent and time dependent, Schrodinger wave equation, Eigen values and Eigen functions, Born's interpretation and normalization of wave function, orthogonal wave functions, applications of Schrodinger wave equation (particle in a box and harmonic oscillator).

Text Books:

1. Griffiths D, "Introduction to Electrodynamics", 2nd Ed., Prentice Hall of India, New Delhi (1998).
2. Beiser, "Perspective of Modern physics" 5th Ed., McGraw-Hill Ltd., NewDelhi (2002).
3. Arya A P "Elementary Modern Physics" Addison-Wesley, Singapore
4. Mani,H S and Mehta G K "Introduction to Modern Physics", Affiliated East West Press, New Delhi.

ENGINEERING CHEMISTRY

UNIT-I

Molecular Structure and Bonding: The VSEPR model, Valence-bond theory, Molecular orbital theory, Molecular orbitals of polyatomic molecules, The molecular orbital theory of solids.

UNIT-II

Reduction Potentials, Redox stability in water, The diagrammatic presentation of potential data, The effect of complex formation on potentials. Electrolytes and non-electrolyte solutions, Kinds of Electrodes, Concentration Cells, The Lead Storage Cell and Fuel Cell.

UNIT-III

Laws of Photochemistry, Photo physical processes, Fluorescence and Phosphorescence, Photochemical reactions: photolysis of HI, Photochemical reaction between H₂ and Br₂, Rotational and Vibrational Spectroscopy-Principles and application to simple molecules, magnetic Resonance Spectroscopy-Principles and Applications to simple molecules.

UNIT-IV

Coordination Bond and its Implications: Bonding in tetrahedral and octahedral complexes, Applications in analytical chemistry, Biological system, Catalysis and sandwich Compounds, Oxygen Storage and Transport.

Basic principles of Organic Synthesis: Substitution, Elimination, Addition and Rearrangement Reactions, Reagents used in organic synthesis.

UNIT-V

Introduction to Solid State Chemistry, Semiconduction and Superconduction, Thermodynamic and Kinetic Aspects of Chemical Conversion: Free energy and its Implications in Occurrence of a Chemical Reaction, Physical and Chemical Adsorption, Theories of Adsorption, Adsorption Isotherms, Laws of Diffusion and its Implications, Kinetic Aspects of Occurrence of a Chemical Reaction and Examples of Significant Chemical Reactions.

Text Books:

1. Shriver D F and Atkin A W, "Inorganic Chemistry", 3rd Ed., ELBS, Oxford Press, Delhi (1999).
2. Castellan G W "Physical Chemistry" 3rd Ed., Narosa (1995).
3. Puri, Sharma & Kalia "Inorganic chemistry" (2012)
4. Puri, Sharma & Pathania "Principles of Physical chemistry" (2012)
5. Skoog D A, and Holles F J, "Principles of Instrumental Analysis", 5th Ed., Hecourt Asia PTE Ltd., Singapore (2001).
6. Hill J W "Chemistry for changing times" 6th Ed., Macmillan , Canada (1995).

INTRODUCTION TO COMPUTING

UNIT-I

Computer Appreciation and Organization - Characteristics, Input, Output, storage units, Binary number system, BCD Code, ASCII Code, Hardware Organization of Computer, Central Processing unit, Memory, Secondary Storage Devices, Input Devices, Output Devices, Computer Software & its various types.

UNIT-II

Operating Systems – File and directory operations on Windows and Linux Operating Systems, Use of various tools and utilities in Windows and Linux. Fundamentals of Networking, Internet, and various services offered through the Internet: Email, WWW, Search engines.

UNIT-III

Office Automation Tools – Word processing, Spreadsheets and presentation software. MS Word, Ms Excel, MS PowerPoint. MS word: Mail-merge, indexing, tables, formatting, etc. MS Excel: Functions and formulas, charts, etc. PowerPoint: Presentation and Animations.

UNIT-IV

Introduction to Programming and Problem Solving – Types of Programming Languages- Machine Level, Assembly level, and High Level language, Algorithms, Flow-charts, Compilation, Assembling, Linking and Loading, Testing and Debugging, Documentation, Algorithms for GCD (Greatest Common Division) of two numbers, Test whether a number is prime or not, Sorting Numbers, Finding Square root & factorial of a number, Generation of Fibonacci sequence, Finding largest number in an array, Evaluation of a Polynomial.

UNIT-V

Introduction to CAD-Various types of CAD software's, features, functions and usage of (ElectriCAD, MechCAD, AutoCAD, pSpice, Solid Works)

Text Books:

1. P.K. Sinha and P. Sinha, "Foundation of Computers" BPB Publishers.
2. C.V Rajaramn, "Fundamentals of computers" PHI publishers

Course No: HUM-105

COMMUNICATION SKILLS

UNIT-I

Communication: Meaning, its types, significance, process, Channels, barriers to communication, making communication effective, role in society, Communication model.

UNIT-II

Discussion Meeting and Telephonic Skills: Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids. Grammar: Transformation of sentences, words used as different parts of speech one word substitution, abbreviations, technical terms etc.

UNIT-III

Reading Skills: Process of reading, reading purposes, models, strategies, methodologies, reading activities. Writing Skills: Elements of effective writing, writing style, scientific and technical writing.

UNIT-IV

Listening Skills: The process of listening, the barrier to listening, the effective listening skills, feedback skills. Speaking Skills: Speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

UNIT-V

Business Letters: Structure of business letters, language in business letters. Letters of inquiry & their places. Sales Letters, Memorandum, Quotations/tenders, Bank correspondence, Letters of application and appointments, Resume writing, Report Writing, Conducting a Meeting, Minutes of Meeting, Oral Presentation, Group Discussion, CV writing, Purchase order, Job Application Letter.

Text Books:

1. Rodrigues M V, "Effective Business Communication", Concept Publishing Company New Delhi, 1992, reprint (2000)
2. Bhattacharya. Indrajit, An Approach to Communication Skills. Dhanpatrai Co., (Pvt.) Ltd. New Delhi
3. Wright, Chrissie, Handbook of Practical Communication Skills. Jaico Publishing House. Mumbai
4. Gartside L, Modern Business Correspondence. Pitman Publishing London
5. Day, Robert A., How to Write and Publish a Scientific Paper. Cambridge University Press Cambridge
6. Gimson A C, "An Introduction to the Pronunciation of English", ELBS. (YP) Bansal, R K and Harrison J B "Spoken English", Orient Longman Hyderabad.

ENGINEERING GRAPHICS & DRAWING

UNIT-I

Introduction to drawing equipment and use of drafting tools, symbols and conventions in drawing. Types of lines and their use, material section representation, introduction to dimensioning. Using any available CAD software to draw simple machine parts and blocks. Use of various fundamental commands to edit a drawing, e.g. erase, copy, mirror offset, array, move, trim. Use of features, extrude, extrude cut and revolve.

UNIT-II

Orthographic projections, projection on horizontal and vertical planes, principal views, different system of projections- symbols-notations. Projection of points: Projection of points in the first, the second, the third and the fourth quadrant. Projection of lines: Line parallel to both the planes – line parallel to the horizontal plane and perpendicular to the vertical plane, line parallel to HP and inclined to VP, line parallel to HP and inclined to profile plane, line parallel to VP and inclined to PP, line inclined to both the planes.

UNIT-III

Projection of solids, projection of solids in first and third quadrant, axis parallel to one and perpendicular to other. Section of solids: definition of sectioning and its purpose, procedure of sectioning, application to few typical examples. Development of surfaces: Purpose of development, parallel line method. Insertion of new planes and drawing necessary features on the plane. Drawing 2D views of 3D drawing. Sectioning and obtaining sectioned views, dimensioning 2d drawing and labelling.

UNIT-IV

Orthographic projections of simple machine parts, Drawing of blocks and machine parts. Isometric projection: Basic principle of isometric projection, Isometric projection of simple machine parts for which orthographic views are given. Introduction to temporary and permanent fasteners: Representation of screw threads and threaded fasteners. Rivets and riveted joints. Welding symbols.

UNIT-V

Introduction to shaft couplings and bearings: assembly of various components of universal coupling and Oldham's coupling, types of bearings, assembly of various components of bushed bearing and foot step bearing. Surface modelling of simple components.

Text Books:

1. Gill P S, "*Engineering Graphics and drafting*", Katria and Sons, Delhi (2001).
2. Bhat N D, "*Elementary Engineering Drawing-Plane and Solid Geometry*", Chartotar Publishing House, Anand (1988).
3. Naryana K L and Kanaiah P, "*Engineering Graphics*", Tata Mc GrawHill Publishing Company Limited, New Delhi (1992).
4. Luzzadde Warren J, "*Fundamentals of Engineering Drawing*", Prentice Hall of IndiaPrivate Limited, New Delhi (1988).
5. Bertoline G R, Wiebe E N, Miller G L, and Mother J L, "*Technical Graphics Communication*", Irwin McGraw Hill New York (1997).

Course No: PHY-107L

ENGINEERING PHYSICS LAB

The students are required to conduct experiments on following practical work:

1. Measurement of Resistance.
2. Measurement of e/m by Helical method.
3. Measurement of Numerical Aperture of Optical Fiber.
4. Determination of Resistivity of a given wire.
5. Determination of Band Gap of a semiconductor.
6. Verify Biot-Savart law.
7. To determine the refractive index of the prism material using spectrometer.
8. To verify the laws of vibrating strings by Melde's experiments.
9. To determine the wavelength using Fresnel's biprism/diffraction grating.
10. To Determine Plank's Constant.

ENGINEERING CHEMISTRY LAB

The students are required to conduct experiments on following practical work:

1. To draw the pH-titration curve of strong acid vs. strong base
2. Standardization of KMnO_4 using sodium oxalate.
3. Determination of Ferrous iron in Mohr's salt by potassium permanganate.
4. Determination of partition coefficients of iodine between benzene and water.
5. Determination of amount of sodium hydroxide and sodium carbonate in a mixture
6. Determination of total hardness of water by EDTA method.
7. To verify Beer's law for a coloured solution and to determine the concentration of a given unknown solution.
8. Synthesis of some polymers like Crazy ball.

WORKSHOP PRACTICE-I

1. Machining section

(a) Theoretical Instructions:

Safety Precautions, Brief introduction/ description and use of machines and tools of various metal cutting operations. Working principal of Lathe machine, Drilling machine etc. Parts of lathe and drilling machine. Brief description of material of cutting tools. Basic operations of various machines. Importance of material removal processes. Introduction and demonstration of basic measuring instruments.

(b) Practical Demonstrations :

Demonstration on lathe and drilling machines, General idea of re- sharpening of cutting tools. A simple jobs involved all the basic operations on lathe and drilling machines. such as drilling, facing, turning, taper turning, step turning, chamfering etc. Demonstration of basic measuring instruments.

Aim: TO MANUFACTURE THE JOBS ON THE CENTRE LATHE AS PER THE DRAWING.

2. Sheet Metal and Spray Painting section:-

(a) Theoretical Instructions:

Safety Precautions, Brief Introduction of sheet metal. Difference between sheet and plate. Name of basic tools and simple machines. Description of various tools used in sheet metal. Types of sheet metal. Joints and operations of sheet metal. Knowledge of Paints and varnishes.

(b) Practical Demonstrations:

Demonstration of all basic hand tools and equipments. Fabrication of simple joints. A simple jobs involved all the basic operations of sheet metal such as sheet metal measuring, laying out, bending, blanking, punching, trimming, shaving, stripper, nibbling, etc. Demonstration of basic measuring instruments. Development of cylinder. Preparation and painting of surfaces for varnish and painting etc.

Aim: TO DEVELOP THE VARIOUS SIZES OF CYLINDRICAL SHAPES OF SHEET METAL AND PREPARING THE SURFACES FOR PAINTING.

3. Fitting and Bench work section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction to fitting and bench work, classification of tools such as clamping, measuring, marking, cutting, striking, drilling and threading tools. Introduction and demonstration of basic measuring instruments. Importance of bench work. Introduction of basic fitting operations such as marking, punching, filing, chamfering, chiseling, drilling, tapping, fitting etc.

(b) Practical Demonstrations:

Demonstration of all basic hand tools/ measuring tools and equipments such as steel rule, tri-square, measuring tape height guage, vernier caliper etc. Demonstration of simple operations such as marking, punching, filing, sawing, chiseling etc.

Aim: TO FABRICATE THE MILD STEEL WORK PEICE 50X50X8 MM WITH A WITH A THREADED HOLE AS PER THE DRAWING.

4. Welding Section:-

(a) Theoretical Instructions:

Safety Precautions, Brief Introduction to welding process, application and classification of welding, Introduction of electric arc welding, Hand tools and equipments used for electric arc welding, introduction to simple welding joints, edge preparation for welding, Introduction to soldering and brazing. various types of electrodes.

(b) Practical Demonstrations:

Demonstration of all basic tools and personal protective equipments such as welding helmet, safety goggles, safety apron, hand gloves etc. and role of some of the welding tools and equipments such as wire cables, chipping hammer, tongs, wire brush, welding transformer AC and DC, welding torch etc.

Aim: TO MAKE BUTT JOINT OF MILD STEEL 80X50X8mm BY PERFORMING SHEILD METAL ARC WELDING/ STICK WELDING USING COATED CONSUMABLE STICK ELECTRODES

5. Foundry and Casting Section:-

(a) Theoretical Instructions:

Safety Precautions, Brief Introduction to foundry and casting, brief description of common hand tools used in foundry work, Introduction of risers, runners, gates etc. Introduction of Sand moulding, Introduction of moulding sand, types and properties and composition of moulding sand, use and selection of pattern, Name of the common metals for casting

(b) Practical Demonstrations:

Demonstration and practice for preparation the moulding sand, Use of hand tools to prepare the mould,

Aim: TO PREPARE A GREEN SAND MOULD BY USING SOLID PATTERN FOR CASTING.

6. Smithy And Forging Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of Forging tools such as Tongs Blowers, hammers, chiesels, punch, anvil, swage block etc. Description of all forging operations such as hand forging, upsetting, drawing, punching, drifting, flattering etc. Basic introduction of materials and their heat treatment.

(b) Practical Demonstrations:

Demonstration and practice of different smithy operation like forging, cutting, punching, drifting, bending etc.

Aim: TO PREPARE MS-SQUARE 20X20MM FROM MS ROUND BY USING DIFFERET SMITHY HAND TOOLS.

7. Carpentry and Pattern Making Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of carpentry and joinery, different tools used in carpentry their identification and application. various types of joints such as framing joints, broadening joints, lengthening joints etc. Types of wood, Defects in wood, Structure and seasoning of wood. Brief description of pattern making.

(b) Practical Demonstrations:

Demonstration and practice of different Carpentry operation like marking and measuring, sawing, cutting, planning, mortising and tenoning, boring moulding, grooving, rebating etc. Classification of the carpentry tools and major equipments/ machines. Demonstration of pattern making tools and material.

Aim: TO PREPARE HALF LAP CROSS JOINT AND MORTOISE & TENNON JOINT.

8. Electrical and Electronics Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of basic hand tools, Introduction of electricity rules and symbols, Types of electric wires and materials, Different types of electrical instruments.

Introduction of basic electronics, use of testing instrument, tools and equipments, Various types of tools. Basic introduction of joining process of soldering and brazing.

(b) Practical Demonstrations:

Demonstration and practice of simple electric materials like wires, fuses, ceiling roses, battens, plates and allied items. Demonstration of Volt meter, Ammeter etc.

Identification and use of the basic electronic instruments.

Aim: TO PREPARE WIRING PRACTICE IN BATTEN WIRING, PLASTIC CASING - CAPING AND CONDUTE.

TO CONTROL OF ONE LAMP BY ONE SWITCH.

TO CUT, STRIP, JOIN AND INSULATE TWO LENGTHS OF WIRES/CABLES.

List of books recommended: -

- 1 Workshop Technology by Chapman.
- 2 Workshop Technology by Hajra Chowdhary.
- 3 Workshop Technology by Swarn Singh.
- 4 Workshop Technology by Virender Narula.

Course No: MTH- 201

ENGINEERING MATHEMATICS – II

UNIT-I

Ordinary and Linear Differential Equations: Formation of ordinary differential equations, Solution of first order differential equations by separation of variables, Homogeneous equations, Exact differential equations, Equations reducible to exact form by integrating factors, Linear differential equations with constant coefficients, Cauchy's homogeneous linear equations, Legendre's linear equations

UNIT-II

Partial Differential Equations: Formulation and classification of PDE's, Solution of first order linear equations, Four standard forms of non-linear equations, Separation of variable method for solution of heat, wave and Laplace equation

UNIT-III

Matrices: Rank of a matrix, Elementary transformations, Consistency and solutions of a system of linear equations by matrix methods, Eigen values & Eigen vectors, Properties, Cayley-Hamilton's theorem

UNIT-IV

Probability: Basic concepts of probability, Types of probability: Marginal, joint and conditional, probability rules: Addition, Multiplication, complement; Probability tree, probability under conditions of statistical independence and dependence, Baye's Theorem

UNIT-V

Random Variables and Distribution: Random variables, Probability distribution, Probability density function, Discrete and continuous distributions- Binomial, Poisson, Normal distributions, Measures of central tendency and dispersion, Sampling distribution, standard error, Central limit theorem

Text Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley.
2. R. K. Jain & S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House.
3. Frank Ayres, "Matrices", Mc Graw Hills.
4. Malik & Arrora, "Advanced Mathematical Analysis", S. Chand & Co.

ENGINEERING PHYSICS-II

UNIT-I

Energy bands and charge carriers in semiconductors: energy bands- metals- semiconductors and insulators- direct and indirect semiconductors- charge carriers in semiconductors: electrons and holes- intrinsic and extrinsic material- n-material and p-material- carrier concentration: Fermi level- EHPs- temperature dependence- conductivity and mobility- drift and resistance- effect of temperature and doping on mobility, Hall Effect.

UNIT-II

Diffusion of carriers- derivation of diffusion constant D-Einstein relation- continuity equation- p-n junctions: contact potential- equilibrium Fermi levels- space charge at junctions- current components at a junction: majority and minority carrier currents- p-n junction diodes: volt-ampere characteristics- capacitance of p-n junctions.

UNIT-III

Zener and avalanche breakdown- Zener diodes: volt-ampere characteristics- Tunnel diodes: tunneling phenomena- volt-ampere characteristics- Varactor diodes- Photo diodes: detection principle- light emitting diodes- volt-ampere characteristics.

UNIT-IV

Bipolar junction transistors NPN and PNP transistor action- open circuited transistor- biasing in active region- majority and minority carrier distribution- terminal currents- photo transistors.

UNIT-V

Field effect transistors: operation- pinch off and saturation- pinch off voltage- gate control- volt-ampere characteristics- MOS capacitance- MOSFETS: NMOS and PMOS: comparison- enhancement and depletion types- control of threshold voltage.

Text Books:

1. Semiconductor Physics and Devices, *Basic Principles* by Donald E. Neaman, McGraw-Hill Publishing, 3rd Edition, 2003.
2. Physics of Semiconductor Devices by S. M. Sze, John Wiley and Sons, 2nd Edition, 1981.
3. Solid State Electronic Devices by B. G. Streetman, Prentice Hall of India Ltd, N. Delhi, 5th Edition, 2000.
4. Semiconductor devices. Nagchoudhary- Tata Mc Graw Hill.
5. Integrated electronics – Millman and Halkias- Mc Graw Hill.

Course No: ECE-203

PRINCIPLES OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT-I

Basic electric circuit terminology, Ohm's law, Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL) circuit parameters (Resistance, Inductance and capacitance). Series and Parallel combinations of resistance, Inductance and capacitance. Ideal and practical voltage and current sources and their transformation. Dependent voltage sources and dependent current sources. Power and energy relations, Analysis of series parallel d.c. circuits, Delta star (Y) Transformation, Loop and Nodal methods.

UNIT-II

A. C. Circuit analysis and Three Phase Motors:

Basic terminology and definitions, Phasor and complex number representations, solutions of sinusoidal excited, RC circuits, Power and energy relations in A.C circuits. Concept of a 3 phase voltage, star (Y) circuits. Delta circuits, current and voltage relations in Star and Delta Circuits, characteristics of 3 phase systems.

UNIT-III

Introduction to P N junction diodes. Diode as circuit element. Half wave- full wave, Rectifiers: Centre Tapped and bridge rectifiers- working- analysis and design- C filter analysis- regulated power supplies: series and shunt- design of regulated power supplies for specified output conditions- current limiting- short circuit protection- IC regulated power supplies.

UNIT-IV

Bipolar Junction Transistors (BJT's) - Transistor Construction, operation- characteristics- small signal model, Types of Transistor Configurations: - CE, CB and CC configurations. Transistor as Amplifier. RC Coupled amplifier: working- analysis and design- phase and frequency response

Text Books:

1. Del Torro, "Electrical Engineering Fundamentals", 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi (1994).
2. B.C. Theraja, "Principles of Electrical Engineering."
3. Kothari D P and Nagrath I J, "Basic Electrical Engineering", Tata McGraw Hill, New
4. Electronic devices and circuits by R. Boylsted and L. Nashelsky, Prentice Hall Publications, 7th Edition.
5. Electronic devices by Floyd, Pearson Education, 7th Edition, 2008.
6. Electronic Principles: Malvino- Tata Mc Graw Hill.

COMPUTER PROGRAMMING

UNIT-I

Introduction to 'C' Language - Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple 'C' programs

UNIT-II

Conditional Statements and Loops -Decision making within a program, Conditions, Relational Operators, Logical Connectives, *if* statement, *if- else* statement, Loops: *while* loop, *do while*, *for* loop, Nested loops, Infinite loops, *Switch* statement, structured Programming.

UNIT-III

Arrays - One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices,
Functions- Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.

UNIT-IV

Structures and Unions - Structure , nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions, **Pointers**- Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays.

UNIT-V

File Processing - Concept of Files, File opening in various modes and closing of a file, Reading from a file, writing onto a file. Introduction to Object Oriented Programming with C++ . Objects and Classes. Object hierarchy. Inheritance, Polymorphism. Introduction to Advanced C/C++ Compilers viz. Eclipse/Netbeans.

Text Book:

1. E. Balaguruswamy, "Programming with ANSI-C"
2. Byron Gottfried "Programming with C"
3. A. Kamthane, "Programming with ANSI & Turbo C"
4. H. Schildt, "C++: The Complete Reference"
5. B. Stroustrup, "The C++ Programming Language"

ENGINEERING MECHANICS

UNIT-I

Introduction: System of forces, Coplanar concurrent force system, Composition and Resolution of forces, Equilibrium of rigid bodies, Free body diagram, Lami's Theorem.

Analysis of Framed Structure: Reaction in different types of beams with different end conditions, bending moment and shear stress diagrams. Determination of reactions in members of trusses:

a) Analytical Methods b) Graphical Method

UNIT-II

Centre of Gravity and Moment of Inertia: Concept of C.G. and Centroid, Position of Centroid, Theorem of Parallel and Perpendicular Axes, Moment of inertia of simple geometrical figures.

UNIT-III

Stress and Strain: Concept of Stress and Strain, Simple Stresses, Tensile, Compressive, Shear, Bending and Torsion, Stress-Strain Curves, Elongation of bars, Composite bars, Thermal Stresses, Elastic Constants, Mohr's Circle

UNIT-IV

Physical Properties of fluids: System, Extensive and intensive properties: specific weight, mass density, specific gravity, viscosity, surface tension and capillarity, evaporability and vapour pressure, Newtonian and Non-Newtonian fluids

UNIT-V

Fluids Statics : Pressure, Hydrostatic law, Pascal's law, Different types of manometer and other pressure measuring devices, Determination of metacentric height.

Fluid Kinematics and Dynamics: Classification of fluids, Streamline, Streakline and Pathlines, Flow rate and continuity equation, Bernoulli's Theorem, Kinetic energy correction factor and momentum correction factor in Bernoulli's equation.

Books Recommended

1. Bhavikatti S S and Rajashekarappa K G, "*Engineering Mechanics*", New Age International, NewDelhi (1998).
2. Timoshenko S P and Young D H, "*Engineering Mechanics*", McGraw Hill(International) 4/e, New Delhi (1984).
3. Kumar D S, "*Fluid Mechanics*", S.K.Katira and Sons, Delhi (1998).
4. Modi P N and Seth S N, "*Fluid Mechanics*", Standard Book House, New Delhi (1998),
5. Engineering Mechanics by R.S. Khurmi

PROFESSIONAL COMMUNICATION

UNIT-I

The Seven C's of the Effective Communication 1. Completeness 2. Conciseness 3. Consideration 4. Concreteness 5. Clarity 6. Courtesy 7. Correctness

UNIT-II

Communication: Its interpretation: 1. Basics 2. Non-verbal Communication 3. Barriers to Communication

Business Communication at Work Place: 1. Letter Components and Layouts 2. Planning a letter 3. Process of Letter writing 4. Email Communication 5. Memo and Memo Reports 6. Employment Communication 7. Notice Agenda and Minutes of Meeting 8. Brochures

UNIT-III

Report Writing: 1. Effective Writing 2. Types of Business Reports 3. Structure of Reports 4. Gathering Information 5. Organization of the Material 6. Writing Abstracts and Summaries 7. Writing Definitions 8. Visual Aids 9. User Instruction Manual

UNIT-IV

Required Skills: 1. Reading Skills 2. Note-making 3. Précis Writing 4. Audio Visual Aids 5. Oral Communication

UNIT-V

Mechanics of Writing: 1. Transitions 2. Spelling Rules 3. Hyphenation 4. Transcribing Numbers 5. Abbreviating Technical and Non Technical Terms 6. Proof Reading.

Text Books:

1. Koneru Aruna, Professional Communication McGraw Hill Pub. 1998, New Delhi
2. Murphy Herta, Herbert W Hilderbrandt, Jane P Thomas Effective Business Communication, 1997, McGraw Hill
3. Petit Lesikkar, Business Communication, 1994, McGraw Hill
4. Willey, Communication Skills Handbook, Summers Willey Pub. India

MACHINE DRAWING

Objectives:

1. Understand the principles of drawings.
2. Understand the various symbols used in drawing.
3. Assemble and disassemble the following: -
 - a) Various types of couplings
 - b) Pipe fittings
 - c) Boiler mountings
 - d) Types of bearings
 - e) Few machine tool parts
4. Use bill of materials in each of the above drawings.

Detailed Contents:

UNIT-I

Principles of dimensioning, sectioning and conventional representation, dimensioning, symbols of standard tolerances, machining symbols, incremental and absolute dimensioning.

UNIT-II

FASTENERS : Various types of screw threads, types of nuts and bolts, screwed fasteners, foundation bolts, locking devices, welding symbols, welding joints and riveted joints.

UNIT-III

Principal of sectioning: Types of sections, standard sectioning practices.

Couplings: Solid or rigid Coupling, Protected type flange coupling, Pin type flexible coupling, muff coupling, Oldham, universal coupling, claw coupling.

UNIT-IV

Conefriction clutch, free hand sketch of single plate friction clutch.

Pipe and Pipe fittings: flanged joints, spigot an socket joint, union joint, hydraulican expansion joint.

UNIT-V

IC Engine Parts : Piston, connecting rod.

Bearings : Types of bearings, journal bearing, pivot bearing, ball bearing, thrust bearing, plummer block, bearing bracket and hangers. Pin and cotter joints: sleeve type cotter joint, knuckle joint, Gib and cotter joint.

Text Books:

1. Machine Drawing by PS Gill,
2. Machine Drawing by ND Bhatt
3. Machine Drawing by N Sidheshwar

ELECTRONICS & ELECTRICAL ENGINEERING LAB

The students are required to conduct experiments on following practical work:

1. To get familiar with the working knowledge of the following instruments:
 - ii. Cathode Ray Oscilloscope (CRO).
 - iii. Multimeter (Analog and Digital).
 - iv. Function Generator.
 - v. Power supply.
2.
 - i. To measure phase difference between two waveforms using CRO.
 - ii. To measure an unknown frequency from Lissajous figures using CRO.
3. To convert a galvanometer into ammeter.
4. To convert a galvanometer into voltmeter.
5. Verification of Ohm's law.
6. Verification of KVL and KCL.
7. Verification of Thevenin's and Norton's theorem.
8. Verification of Maximum Power Transfer Theorem.
9. To plot the resonance curve for a series and parallel resonance.
10. Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC supply.
11. To design a voltage rectifier using diodes.
12. To draw the frequency response of an RC coupled amplifier.
13. To use a transistor as a switch.

WORKSHOP PRACTICE-II

1. Machining section

(a) Theoretical Instructions:

Safety Precautions, Working principal of Milling, Shaper, Slotter, Grinding, power hacksaw and other related metal cutting machine. Basic operations of various machines. Introduction of various types of cutting tools (Nomenclature).

(b) Practical Demonstrations:

Demonstration of knurling thread cutting, boring etc on lathe machine, Simple operations on Milling, Shaper, Slotter/planner and grinding machines, A simple job involved all the basic operations on shaper, milling and grinding machines.

Aim: TO PREPARE A CYLINDRICAL JOB ON LATHE FOR MANUFACTURING OF A GEAR ON MILLING MACHINE

2. Sheet Metal and Spray Painting section:-

(a) Theoretical Instructions:

Safety Precautions, Soldering, brazing and shearing, fluxes in use and their applications, study of material used for painting, knowledge of different machines such as shearing, bending, wiring and power presses, method of pattern development in detail, study of air compressor and air guns-its use, care, maintenance and operating instructions. Advantages of spray painting, Knowledge of different sheet metal materials.

(b) Practical Demonstrations:

Exercise in rating, soldering and brazing of making jobs of various materials such as Trays, Flower vases, photo frame etc. preparation of surfaces for painting by using a spray gun with the help of air compressor.

Aim: TO DEVELOP A FUNNEL AS PER THE DRAWING WITH SOLDERING.

3. Fitting and Bench work section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of common materials using in fitting shop, description and demonstration of various work holding devices such as surface plate and V-block, Introduction and use of measuring tools like Vernier caliper, micro-meter, height gauge, profile projector, surface roughness tester and other gauges.

(b) Practical Demonstrations:

Demonstration of angular cutting, practice of 45° , preparation of stud to cut external threads with the help of dies, drilling, counter sinking, counter boring and internal thread cutting with taps, pipe cutting practice and thread cutting on G.I pipe with pipe dies. Demonstration of Tap sets and measuring equipments.

Aim: TO ASSEMBLE THE MILD STEEL WORK PIECES WITH RADIUS FITTING.

4. Welding Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of all welding processes like Gas welding, MIG Welding, TIG welding, Submerged arc welding and spot welding, Advantages and disadvantages over electric arc welding and their applications. Welding techniques like right ward, left ward and over head, various fluxes and electrodes used in welding. Difference between AC and DC welding. Characteristics, size and class of electrodes.

(b) Practical Demonstrations:

Demonstration of different types of joints by using gas welding and arc welding etc.

Aim: TO MAKE BUTT JOINT, OUT-SIDE CORNER JOINT AND HEAD Tee-JOINT.

5. Foundry and Casting Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction to casting processes, basic steps in casting processes, types of pattern, allowances, risers, runners, gates, moulding sand and its composition, Sand preparation, moulding methods, Core sand and core making, mould assembly, casting defects and remedies. Introduction of Cupola. Various test of moulding sand like, shatter index test, moisture content test, grain fineness test etc.

(b) Practical Demonstrations:

Demonstration and practice of mould making with the use of split patterns and cores, sand preparation and testing, casting practice of various materials like brass, alluminium, waxes etc. by using different types of patterns

Aim: TO PREPARE A GREEN SAND MOULDS BY USING SPLIT AND SELF CORED PATTERN FOR CASTING.

6. Smithy And Forging Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of various forging methods like hand forging, drop forging, press forging and machine forging and defects, brief description of metal forming processes, comparison of hot and cold working. Introduction of forging machines such as forging hammer and presses.

(b) Practical Demonstrations:

Demonstration and practice of MS rod into forged MS ring and octagonal cross section.

Aim: TO PREPARE A SQUARE HEADED BOLT FROM MS-ROUND.

7. Carpentry and Pattern Making Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of wood, different methods of seasoning, quality of good timber, wood working machines like band saw, circular saw, jig saw, lathe, grinder, thickness planing machine, mortoise machine and radial saw.

(b) Practical Demonstrations:

Demonstration and practice of different types of joints, technical terms related to joinery their description, identification and application. polishing, putting and material use,, their names, ingredients, methods of preparation and use, joining materials like nuts, screws, dovels, hinges, glue, window and roof trusses.

Aim: TO PREPARE SCARF JOINT AND PEN STAND AS PER THE DRAWING.

8. Electrical and Electronics Section:-

(a) Theoretical Instructions:

Safety Precautions, Introduction of different types of wiring, circuit breakers, protective relays. power supply, system and its types. various types of circuits, electrification of a workshop. Polarity test, earthing. electrical symbols.

Soldering technique of a circuit board and soldering joint quality.

(b) Practical Demonstrations:

Demonstration and practice of transformer, extension cord, gyser, electrical motor.

**Aim: HOUSE WIRING, STAIRCASE WIRING FOR FLUORESCENT TUBE LIGHT, THREE PHASE WIRING FOR ELECTRICAL MOTORS.
TO MASS SOLDERING OF PRINTED CIRCUIT BOARDS AS PER THE INSTRUCTIONS.**

List of books recommended: -

- 1 Workshop Technology by Chapman.**
- 2 Workshop Technology by Hajra Chowdhary.**
- 3 Workshop Technology by Swarn Singh.**
- 4 Workshop Technology by Virender Narula.**