

SYLLABUS
FOR
B.TECH. PROGRAMME
IN
ELECTRONICS
&
COMMUNICATION ENGINEERING



INSTITUTE OF TECHNOLOGY
ZAKURA CAMPUS
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SRINAGAR
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190006

**COURSE STRUCTURE FOR
B.Tech 2nd Semester Mechanical
AT UNIVERSITY OF KASHMIR**

Course No	Subject	Teaching Periods per week			Credits
		<i>Lect</i>	<i>Tut</i>	<i>Prac</i>	
MTH-2117	Engineering Mathematics-II	2	1	0	3
CHM-2217	Engineering Chemistry	2	1	0	3
ECE-2317	Basic Electronics Engineering	2	1	0	3
CSE-2417	Computer Programming	2	1	0	3
MEE-2517	Engineering Mechanics	2	1	0	3
CHM-2217L	Engineering Chemistry Lab	0	0	4	2
CSE-2417L	Computer Programming Lab	0	0	4	2
ECE- 2317L	Electronics Engineering-Lab	0	0	4	2
MEE-2617W	Workshop Practice	0	0	8	4
	Total	10	5	20	25

MTH-2117
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, 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 III

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, random variables and distribution: random variables, probability distribution, probability density function, discrete and continuous distributions-binomial, poisson, normal distributions, measure of central tendency and dispersion, sampling distribution, standard error, Central limit theorem.

Textbooks:

1. E. Kreyszig, "Advanced Engineering Mathematics", *John Wiley* (2003).
2. R. K. Jain & S. R. K. Iyengar, "Advanced Engineering Mathematics", *Narosa Publishing House* (2014).
3. Frank Ayres, "Matrices", *Tata McGraw Hills* (2003).
4. Malik & Arora, "Advanced Mathematical Analysis", *S. Chand & Co* (2002).

PHY-2217 Engineering Physics

UNIT-I

Vectors and Electrostatics: Work and energy in electrostatics, dielectrics, polarization, electric displacement, susceptibility and permittivity, Clausius-Mossotti equation, transformation of vectors, spherical and cylindrical coordinates system, 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 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.

UNIT-II

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, interference due to division of wave front and division of amplitude, Young's double slit experiment, interference and diffraction: interference and principle of superposition, Theory of bi-prism, interferences from parallel thin film, wedge shaped films, Newton's rings, Michelson interferometer, 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-III

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, 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*, (1998).
2. Beiser, "Perspective of Modern physics" 5th Ed., *McGraw-Hill Ltd.*, (2002).
3. Arya A.P. "Elementary Modern Physics" *Addison-Wesley*, Singapore (2006).
4. Mani, H.S. and Mehta G.K. "Introduction to Modern Physics", *Affiliated East West Press*, (2012)

ECE-2317
Basic of Electronics Engineering

UNIT I

Solid State Physics: 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, EHP's, temperature dependence, conductivity and mobility, drift and resistance, effect of temperature and doping on mobility, Hall Effect, 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.

UNIT II

Diodes: Volt-ampere characteristics, capacitance of P-N junctions, diode as a circuit element, half wave, full wave, rectifiers, centre, tapped and bridge rectifiers, working, analysis and design, C-filter analysis, zener and avalanche breakdown- zener diodes, volt-ampere characteristics, regulated power supplies, IC based regulated power supplies, tunnel diodes, tunneling phenomenon, volt-ampere characteristics, varactor diodes, photo diodes, detection principle, light emitting diodes, volt-ampere characteristics.

UNIT III

Transistors: Bipolar junction transistors, NPN and PNP transistor action, open circuited transistor, biasing in active region, majority and minority carrier distribution, terminal currents, operation, characteristics, types of transistor configurations, CE, CB and CC configurations, transistor as amplifier, field effect transistors, operation, pinch off and saturation, pinch off voltage, gate control, volt-ampere characteristics.

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. Electronic devices and circuits by R. Boylestad and L. Nashelsky, *Prentice Hall Publications*, 7th Edition 2004.
5. Electronic devices by Floyd, *Pearson Education*, 7th Edition, 2008.
6. Electronic Principles: Malvino, *Tata McGraw Hill*, 2012.

CSE -2417 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, conditional statements and loops, decision making within a program, conditions, relational operators, logical connectives, *if* statement, *if-else* statement, loops: *while* loop, *do while* loop, *for* loop, Nested loops, Infinite loops, *Switch* statement, structured programming.

UNIT II

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 III

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, file processing, concept of files, file opening in various modes and closing of a file, reading from a file, writing on to a file, introduction to object oriented programming with C++, objects and classes, object hierarchy, inheritance, polymorphism, introduction to advanced C/C++ compilers viz. *ellipse/netbeans*.

Textbo

ok:

- 1) E. Balaguruswamy, "Programming with ANSI-C", 2003
- 2) Byron Gottfried, "Programming with C", 2002
- 3) A. Kamthane, "Programming with ANSI & Turbo C", 2006
- 4) H. Schildt, "C++: The Complete Reference", 2013.
- 5) B. Stroustrup, "The C++ Programming Language", 2014.

MEE-2517 Engineering Mechanics

UNIT I

Introduction: System of forces, co-planar concurrent force system, composition and resolution of forces, equilibrium of rigid bodies, free body diagram, Lami's theorem, 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 I

Centre of Gravity and Moment of Inertia: Concept of centre of gravity and centroid, position of centroid, theorem of parallel and perpendicular axes, moment of inertia of simple geometrical figures, 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 method b) graphical method.

UNIT III

Physical Properties of fluids: System, extensive and intensive properties: specific, vaporability and vapor pressure, Newtonian and Non-Newtonian fluids, fluids statics: pressure, hydrostatic law, Pascal's law, different types of manometer and other pressure measuring devices, determination of meta centric height, fluid kinematics and dynamics: classification of fluids, streamline, streak line and pathlines, flow rate and continuity equation, Bernoulli's theorem, kinetic energy, correction factor and momentum correction factor in Bernoulli's equation.

Text Books:

1. Bhavikatti S. & Rajashekarappa K.G., "Engineering Mechanics", *New Age International*, New Delhi (1998).
2. Timoshenko SP and Young D H, "Engineering Mechanics", *McGraw Hill (International)*, 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).

PHY-2217L
Engineering Physics Lab

The student's 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 wave length using Fresnel's biprism/ diffraction grating.
10. To Determine Planck's Constant

CSE-2417L

Computer Programming Lab

List of Experiments:

1. Program on Control Structures and Decision making statements.
2. Program using Loops.
3. Program using Switch case statements with use of break, continue and goto.
4. Programs on array operations.
5. Programs on matrix operations and manipulations.
6. Programs on modular programming and functions.
7. Programs on recursive functions.
8. Programs on structures and unions.
9. Programs on pointers and their manipulations.
10. Programs on files.

ECE- 2317L
ElectronicsEngineering Lab

List of Experiments:

1. Study of I-V characteristics of PN junction diode.
2. Study of I-V characteristics of Zener Diode.
3. Study of I-V characteristics of a Light emitting Diode.
4. To assemble a half wave rectifier using power diodes and LEDs and study their performance
5. To assemble a center tapped full wave rectifier using power diodes and LEDs and study their performance
6. To assemble a bridge wave rectifier using power diodes and LEDs and study their performance
7. Study of Zener diodes as voltage regulators.
8. Design of an IC based Voltage regulator.
9. Study V-I characteristics of transistor (PNP and NPN). Calculate the performance parameters of transistor.
10. Use NPN transistor as an inverter /switch.

MEE-2617W

Workshop Practice

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, simple jobs 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, countersinking, 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 equipment's.

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 electrode used in welding, difference between A.C. and D.C. 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 V-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, mouldings and its composition and 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, aluminum, wax etc. by using different types of patterns.

Aim: To prepare a greens and 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, mortise 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 penstand 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, geyser, electrical motor.

Aim: House wiring, stair case 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 Vol.I, 5th edition, 2013.
2. Workshop Technology by HajraChowdhary, Vol. II, 2008.
3. Workshop Technology by Swarn Singh, Vol.I, 2010.
4. Workshop Technology by VirenderNarula, Vol. I, 2012.