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

<table>
<thead>
<tr>
<th>Course No</th>
<th>Subject</th>
<th>Teaching Periods per week</th>
<th>Credits</th>
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<tr>
<td>MTH-2117</td>
<td>Engineering Mathematics-II</td>
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<td>CHM-2217</td>
<td>Engineering Chemistry</td>
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<td>ECE-2317</td>
<td>Basic Electronics Engineering</td>
<td>2</td>
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<td>CSE-2417</td>
<td>Computer Programming</td>
<td>2</td>
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<td>MEE-2517</td>
<td>Engineering Mechanics</td>
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<td>ECE- 2317L</td>
<td>Electronics Engineering-Lab</td>
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<td>MEE-2617W</td>
<td>Workshop Practice</td>
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<td>Total</td>
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MTH-2117
Engineering Mathematics-II

UNIT I

UNIT II

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:
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 super position, Theory of bi-prism, interferences from parallel thin film, wedge shaped films, Newton strings, Michelson interferometer, Fresnel’s diffraction, diffraction at straight edges, Fraunhoffer 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:
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:
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. eclipse/netbeans.

Textbook

1) E.Balaguruswamy, "Programming with ANSI-C", 2003
2) Byron Gottfried, "Programming with C", 2002
3) A. Kamthane, "Programming with ANSI & Turbo C", 2006
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 seuation.

Text Books:
The student’s are required to conduct experiments on following practical work:

1. Measurement of Resistance
2. Measurement of e/m by Helical method
4. Determination of Resistivity of a given wire
5. Determination of Band Gap of a semiconductor
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 Planck’s Constant
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.
List of Experiments:
1. Study of I-V characteristics of PN junction diode.
2. Study of I-V characteristics of Zener 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.
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 450, 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, waxes etc. by using different types of patterns.
Aim: To prepare a green 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 planning 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: