Syllabus for Lateral Entry Common Entrance Test for Admission to 3rd Semester in B.E./B. Tech. Programme, University of Kashmir, Effective from Academic Session 2016

1. Mathematics

Differential Equations:

Solution in Series. Partial differential equations of first order and higher order Lagrange's Linear Equations. Homogenous Linear equation with constant coefficients, non-homogenous linear differential equations. Applications of partial differential equations, Heat Flow Equation. Wave equation. Solution by methods of Separation of Variables.

2. Physics

Phase Space and thermodynamic probability. Boltzmann distribution and Maxwell's distribution. Black-body radiation; Stefan's Law, Ray-Leigh-Jeans Law and ultraviolet catastrophe; Wiens Displacement Law and Planck's Law. Compton effect, uncertainty relation and its applications. Schrodinger equation and its application to One dimensional problem-Simple harmonic oscillator. Bohr's quantization condition and its application to material oscillators.

3. Chemistry

i) Molecular Structure and Bonding: The VSEPR model, Valence bond theory, molecular orbital theory, molecular orbital theory of solids, semiconductors

ii) High Polymers: Monomers and their function. Polymer definition. Classification of Polymers. Constituents of Plastics, thermosetting and thermoplastic resins, silicones and their industrial applications. Natural Rubber, Vulcanization and uses of rubber

iii) Probes (Tools) for Structural Elucidation: Molecular Absorption Spectroscopy, Chronophers. Magnetic Resonance Spectroscopy-Principles and application to simple molecules and Introduction to Photoelectron Spectroscopy

iv) Lubricants: Lubrication mechanism, classification of Lubricants semisolid and liquid lubricants, viscosity and viscosity index criteria for selection of Lubricants for specific purposes.

4. Machine Drawing and Engineering Graphics

Types of Sections. Standard Sectioning Practices. Representation of screw threads, various types of screw threads, lacking devices. Foundation Bolts. Types of Bearings. Journal bearings. Pivot bearings. Thrust bearings. Ball bearings. Working drawing with the help of computer software link, AutoCAD. Engineering graphics Technical drawing-a Visual Science, Types of engineering Drawing. Theory of Projections: Relevance of Projection. Theory of Projections, Perspective, Orthographic. Axonometric and their basic principles, systems of orthographic projection. Illustration of simple problems of Projection.

5. Basics of Electrical Engineering

Electric circuit parameters (Resistance, Conductance, Inductance, Capacitance, Reactance, Impedance), Ideal and practical voltage and current sources and their transformation, dependent Sources, Power and energy relations. Resistors: color coding, Types, circuit model, Variable Resistor Types, potentiometers and rheostats, Power Rating. Ohm's law. Series and Parallel combinations of resistance, Voltage and current Dividers, Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL). Analysis of series parallel D.C.

Circuits. Alternating Voltage & Current: (Signal, Parameters, Generation, Applications, non-sinusoidal A.C.'s, EMF Equations, Mean, Average, RMS, Peak, Form Factor).

6. Basics of Electronics Engineering

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. Diodes: volt-ampere characteristics- capacitance of p-n junctions. Diode as 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-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.

7. Basics of Computation and Computer Programming

Hardware Organization of Computer, Central Processing unit, Memory, Types of Primary memory, Secondary Storage Devices and their types, Input Devices and their types, Output Devices and their Types. Various types of ports and their specifications and usage. Computer Software & its various types, Types of system and application software. File and directory operations on Windows, DOS and Linux Operating System. Types of Programming Languages: Machine Level, Assembly level, and High Level language. Algorithms, Flow-charts. Compilation, Assembling, Linking and Loading, Testing and Debugging. 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. Conditional Statements: 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.

8. Basics of Engineering Mechanics

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