DEPARTMENT OF MECHANICAL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY (BHU), VARANASI

Syllabus for Ph.D. admission for the session 2017-18 (Dec, 2017)

Specialization: Machine Design

Analysis of System of Forces, Friction, Centroid and Centre of Gravity, Dynamics of rigid bodies, Stresses and Strains-Compound Stresses and Strains, Bending Moment and Shear Force Diagrams, Theory of Bending Stresses and deflection, Torsion, Thin and thick Cylinders, spherical shells, Columns, Springs, Statically indeterminate beams,

Basic Crystallography, Alloys, composites and Phase diagrams, Heat Treatment, Ferrous and Non Ferrous Metals, Non metallic materials, Basics of Nano-materials, Mechanical Properties and Testing, Corrosion prevention and control, Tribological properties of materials.

Fundamentals of measurements system, Error and uncertainties of measuring instruments, temperature, pressure, force, torque measurements and transducers.

Kinematic links and Pairs, Mobility, Inversions, Kinematic Analysis, Velocity and Acceleration Analysis of Planar Mechanisms, CAM and follower, Gears and Gear Trains, Dynamic Analysis of Slider crank mechanism, turning moment computations, balancing of Revolving & Reciprocating masses, Governors, Gyroscope.

Design for static and dynamic loading, Theories of failure, fatigue strength and the S-N diagram, Design of machine elements such as riveted, welded and bolted joints, power screws, keys and belt drive system, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

Free and forced vibration of single degree & Multi degrees of freedom systems, with & without damping. Free vibration with Coulomb and Hysteretic damping. Determination of natural frequencies of continuous Systems: Transverse vibration of string, longitudinal & torsional vibration of rods, Lateral vibrations of beams. Rayleigh's & Rayleigh-Ritz Methods, Vibration Isolation, Critical Speed of Shafts.

Linear Transformation, Calculus, Differential Equation, Eigen Value Problems, Fundamental of FEM, Curve Generation

Specialization: Production Engineering

Metal Machining, Metal Forming, Engineering Materials, Powder Metallurgy, Casting, Welding, Industrial Metrology, Unconventional Manufacturing Processes, Robotics, CIMS

Specialization: Thermal & Fluid Engg.

Temperature measurement, Work and Heat Transfer, First law of thermodynamics, Second las of thermodynamics, Entropy, Energy, Pure substance, Thermodynamic relations, Fluid statics, Kinematics, Internal flow, External flow, Differential equations, Fluid dynamics, Compressible

flow, Fluid machines, Conduction, Convention, Radiation, Condensation and boiling, Heat exchanger, Mass Transfer, Gas power cycles, Vapor power cycle, Refrigeration cycle, Psychrometry, I C Engine, Renewable energy

Specialization: Industrial Management

The questions will be related to reasoning, quantitative aptitude, data interpretation, and basics of Industrial Engineering. The Industrial Engineering part will cover CPM/PERT, Inventory Management, Quality Control, Time and Motion Study, Plant Layout and Location, Production Planning and Control, Economic Analysis, Financial Statements, Costing, Linear Programming, Transportation and Assignment Models.