B.Tech Mechanical Engineering (AKU Syllabus) SEMESTER- III

ORGANIZATIONAL BEHAVIOR & INDUSTRIAL PSYCHOLOGY Credit : 3

1. Concept of organization & organizational Behavior. **Lecture : 2**

2. (a) Personality : meaning, concept , determinants, personality theories (psychoanalytic Theory, Trait Theory and Self Theory).
(b) Perception-meaning , concept, process of perception, significance of perception.(c) Leaning- meaning, concept, nature, component of leaning process.(d) Attitude-meaning, concept, factors in attitude formation, method of finding Employee's attitude.(e) Value - Meaning and types, value and attitude – similarity and difference.(f) Motivation- meaning, theory of motivation (Maslow's Theory & Herzberg's Theory). **Lecture : 11**

3. (a) Group & Group Dynamics - concept, importance, classification of groups , reason for group, formation, group cohesiveness.
(b) Team work :meaning , concept, types , creating, an effective team. **Lec: 4**

4. (a) Communication- concept, process, importance, barrier.
(b) Organizational conflict- meaning, concept, types, stages of conflict, resolution of conflict.(c) Power & politics- nature and concept, Ethics of power & politics, types of power.(d) Leadership- concept, qualities and functions of a leader, approaches to the analysis of leadership **Lecture 8**

5. Concept of organization theory, concept of organization structure, form of organizational structure,form of
organizational culture. **Lecture : 7**

6. (a) Organizational effectiveness - concept , approaches, criteria of effectiveness.(b) Organizational change - meaning, factors in Organizational change, process of planned change.
(c) Organizational Development - concept ,need of organizational development, difference between organizational
development & management development. **Lecture : 7**

FLUID MECHANICS

Introduction, fluid properties: density, viscosity, compressibility, ideal and real fluids. **Lecture : 04**

1. Hydrostatics; fluid force on plane and curved surfaces, manometry, buoyancy, uniformly accelerated motion. **Lecture : 06**

2. Kinematics of fluid flow. Generalized continuity equation, Irrotational motion and solution to Laplace
equation. Concept of stream lines, Equipotential Lines, Flow Nets. **Lecture : 09**

3. Dynamics of fluid flow, Control volume concepts, Euler and Bernoulli's theorems and various application like pivot tube, venturimeter, orifice meter, notches and weir etc; Impulse momentum theory and application.
Lecture : 10

4. Introduction to Navier Stokes Equation. Flow of fluid in closed conduits, Laminar flow of viscousincompressible fluids, Darcy-Weisbach equation, Moody's diagram, and Minor losses Hardy-cross method forpipe networks. **Lecture : 09**

5. Forces on immersed bodies, concepts of separation, drag force, circulation and lift force. DimensionalAnalysis, Model Similitude : Theory and application. **Lecture : 08**

MATERIAL SCIENCE

1. Classification and application of engineering materials, recent development in metallic material – cermets. **Lecture : 4**
2. Phase rule, phase diagram, binary system, binary eutectic systems, eutectoid and peritectic reaction, The iron carbon system, the iron – iron carbide phase diagram. **Lecture : 10**
3. Phase transformation in metals – Isothermal transformation diagrams (or Time-Temperature-Transformation plots), Martensite, Continuous cooling transformation diagram – annealing, Normalizing, Tempered Martensite. **Lecture : 10**
4. Cast iron – grey cast iron, ductile (nodular) cast iron, white cast iron, malleable cast iron. **Lecture : 8**
5. Composite materials – Influence of fiber orientation and concentration, Continuous and aligned fiber composites, Tensile stress – strain behaviour – Longitudinal loading, Elastic behaviour – Longitudinal loading, Elastic behaviour – Transverse loading, Whiskers, Glass fiber – reinforced polymer (GFRP) composites. **Lecture : 10**

STRENGTH OF MATERIAL

1. Introduction and fundamental concept : Introduction, purpose & scope of the subject, basic assumption, types of forces (external & internal forces), classification of materials, st. venant's principles, principle of super position, generalized hook's law for isotropic & elastic material. Simple stresses & strain – Axial loads – safety concepts : general concepts; stress analysis of axially loaded base : axial strains and deformation in bars : Strains and deformation axially loaded bars – stress – strain relationship – Possion's ratio, analysis of bars of varying sections. Composite bars, thermal stresses, Relationship between elastic constants. **Lecture : 13**

2. Torsion : Torsion stress and deformation in circular member, design of circular member in torsion. **Lecture 4**

3. Shear force and bending moment diagram of the transverse section of the beam. **Lecture : 4**

4. Deflection of beams : Deflection of integration, deflection by moments – area method. **Lecture : 5**

5. Two dimensional stress analysis : Plane stress components on general plane at a point, Mohr's circle of stress. **Lecture : 5**

6. Introduction to advance mechanics of solid : thin cylinder, thick cylinder – radial and hoop stresses, application of compound stress theories, elastic strain energy and its application : Elastic strain energy of a rod under various kinds of loading elastic strain energy for various states of stress. Simple application, Castiglione theorem. **Lecture : 11**

MATHEMATICS – III

1. ORDINARY DIFFERENTIAL EQUATIONS &SPECIAL FUNCTIONS : Series solution of differential equations (Frobenious method), Bessel's equation, Its solution, Bessel's

function of first & second kind, Recurrence formula, Legendre's equation, Its solution, Legendre polynomials, Rodrigue's formula, Orthogonality of Legendre polynomial. **Lecture : 10**

2. PARTIAL DIFFERENTIAL EQUATION : Basic concept, 1st & 2nd order linear & quasi – linear partial differential equation, Classification of second order P.D.E., Boundary and initial conditions, wave equations, Separation of variables, use of fourier series, D'Alembert's solution of wave equation, Heat equation, Solution by fourier series. **Lecture : 10**

3. COMPLEX ANALYSIS - I : Function of complex variables – limit, continuity, differentiability and analyticity of functions Cauchy-Riemann equations, Laplace's equation, harmonic function, Cauchy's integral theorem, Cauchy's integral formula, Taylor's and Laurent series, Residues and its applications to evaluating real integrals. **Lecture : 10**

4. PROBABILITY & STATISTICS : Theorems on probability, including Baye's rule, Random variable –cumulative distribution function, Probability mass function, probability density function, Mathematical expectation, mean variance, moment, generating function & characteristics function, standard probability models Binomials, Poisson exponential, Weibull, normal and lognormal, sampling & sampling distribution, Chi- square and F distributions, large and small sample tests of significance. **Lecture : 12**

THERMODYNAMICS

1. Basic concept : Thermodynamic system and their properties, thermodynamic equilibrium, quasi-static and non quasi-static process, zeroth law and temperature equilibrium concepts. **Lecture : 3**

2. First law of thermodynamics : concept of heat and work, first law applied to closed and open system, internal energy and enthalpy, flow work, laws of perfect gas, specific heat, first law applied to flow & non flow process. **Lec : 5**

3. Second law of thermodynamics : concept of heat engine, refrigerator, heat pump and their range of working temperature, Kelvin-planck's and claussius' statements and their equivalence, Entropy, calculation of entropy change for processes, reversibility, entropy principles, in equality of claussius, available and unavailable energy. **Lecture : 8**

4. Properties of pure substances : Properties of steam and process with steam, Use of steam tables and mollier charts. **Lecture : 4**

5. Helmhotz and Hibb's function, Maxwell's relation. **Lecture : 3**

6. Ideal cycles : Air standard cycles, Otto, Diesel, Dual and Brayton cycle, Comparison of Otto, Diesel and Dual cycle. **Lecture : 6**

7. Vapour cycle : Carnot and Rankine cycle, Regenerative and reheat cycle. **Lecture : 6**

8. Non reacting mixture : Mixture of two ideal gases and their properties. **Lec : 2**

9. Psychometry : Air and water-vapour mixture and their properties, adiabatic saturation, Use of psychrometrycharts, Simple introduction to psychrometric process.