

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

INFORMATION SECURITY Credit : 3

- 1. Introduction, CRYPTO BASICS** : Classic Crypto, Simple Substitution Cipher,, Cryptanalysis of a simple substitution, Double Transposition Cipher, One-time Pad, Project VENONA, Codebook Cipher.
- 2. SYMMETRIC KEY CRYPTO** : Stream Ciphers, A5/1, RC4, Block Ciphers, Fiestel Cipher, DES, Triple DES, AES.
- 3. PUBLIC KEY CRYPTO** : Knapsack, RSA, Diffie-Hellman, Uses for Public Key Crypto.
- 4. HASH FUNCTION :**
AUTHENTICATION : Authentication Methods, Keys versus Passwords, Biometrics, Two-Factor Authentication.
AUTHORIZATION : Access Control Matrix, Multilevel Security Models, Firewalls, Intrusion Detection.
- 5. SOFTWARE FLAWS AND MALWARE** : Software Flaws, Malware, Miscellaneous Software-Based Attacks.
- 6. OPERATING SYSTEM AND SECURITY** : Operating System Security Functions, Trusted Operating System, Next Generation Secure Computing Base.

FLUID MACHINERY Credit : 5

- 1. Introduction** – classification of fluid machinery. **Lecture : 1**
- 2. Dynamic action of fluid jet** – Impact of fluid jet on fixed and moving flat plates, impact of jet on fixed and moving curved vanes, flow over radial vanes, jet propulsions. **Lecture : 4**
- 3. Euler's fundamental equation**, degree of reaction. **Lecture : 2**
- 4. Hydraulic turbines, introduction**, classification, impulse turbine, construction details, velocity triangles, power and efficiency calculations, reaction turbines; constructional details, working principle, velocity triangles, power and efficiency calculations, draft tube, cavitation, governing. **Lecture : 10**
- 5. Principle of similarity in fluid machinery**; unit and specific quantities, testing models and selection of hydraulic turbines. **Lecture : 3**
- 6. Positive displacement pumps** : Reciprocating pump; working principle, classification, slip, indicator diagram, effect of friction and acceleration, theory of air vessel, performance characteristics gas gear oil pump and screw pump. **Lecture : 4**
- 7. Rotodynamic pumps** : Introduction, classification, centrifugal pump; main components, working principle velocity triangle, effect of shape of blade specific speed, heads, power and efficiency, calculations minimum steering speed, multi stage pumps, performance characteristic, comparison with reprobating pump. **Lecture : 7**
- 8. Air compressor** : Reciprocating compressor, introduction, P-V diagram, calculation of isothermal and adiabatic work and efficiency, free air delivery, slippage, volumetric efficiency, effect of clearance, multistage compression, inter cooling. **Lecture : 5**
- 9. Rotary compressor** : Introduction fans, blower and compressor, state and total head, centrifugal compressor, velocity triangles, slip factor, losses and efficiencies, performance characteristic. **Lecture : 6**

STEAM POWER SYSTEM

- 1. Analysis of steam power cycle**, Reheat pressure and degree of regeneration process heat & power generation. **Lecture : 3**
- 2. Boilers** : Classification, boiler mounting & accessories, draft system, chimney height calculation, induced & forced draft fans, Boiler energy balance. Constructional details of boiler furnace, waterwall, Pulverized fuel burning. Different types of furnaces for burning coal, fuel oil & gas. Circulation theory. Feed water treatments. **Lecture : 14**
- 3. Steam nozzles** : Flow through nozzles shapes & flow area, Effect of friction supersaturated flow, Estimation of flow area, Effect of divergence. **Lecture : 5**
- 4. Steam turbines** : Construction & working of steam turbines, Impulse & reaction inlet & outlet velocity diagram. Work output & efficiencies. Pressure & velocity compounding regenerative feed heating cycle reheat cycle, reheat factor, governing of turbine, back pressure & pass out turbine. **Lecture : 12**
- 5. Steam condensers** : Types, cooling water requirement, air leakage & air pump capacity, vacuum & condenser, efficiency steam ejector, spray pond 7 cooling tower. **Lecture : 6**
- 6. Instrumentation** in steam turbine plan. **Lecture : 2**

DYNAMICS OF MACHINERY

L-T-P : 3-0-3 Credit : 5

1. Force analysis of mechanism : Dynamics of plane motion of a rigid body, dynamically equivalent two mass

system, correction torque, forced in mechanism and machines. **Lecture : 3**

2. Turning moment diagram : Fluctuations of crankshaft speed and energy in a direct acting engine mechanism, flywheels.

Lecture : 3

concentric and offset radial cam profiles by graphical method. cams with specified contours tangent cam with

roller follower, circular arc cam with flat follower. **Lecture : 8**

4. Analysis of gyroscopic motion : Principle of gyroscope, gyroscopic couple and gyroscopic reaction couple, Gyroscopic effects on the movement of ships, aeroplanes, two wheeled and four wheeled vehicles, gyro stabilizers. **Lecture : 7**

5. Effects of inertia of reciprocating masses on engine frame : Unbalanced primary and secondary forces and couples, balancing of primary and secondary forces, partial balancing of locomotives, balancing of multicylinder in line and radial engines, direct and reverse cranks methods for balancing of radial engines. **Lecture : 9**

6. Mechanical vibrations : Basic concepts degree of freedom, types of damping and viscous damping; natural

free, damped free and damped forced vibrations of a single degree of freedom spring mass system, reciprocating and rotating unbalance, vibration isolation and transmissibility, whirling of shaft, elementary treatment of two degree of freedom systems torsional vibrations of single rotor and two rotor systems, transverse vibration of simply supported beam energy method, Rayleigh's and Dunkerley method. **Lecture : 12**

MACHINE TOOLS AND MACHINING

1. Metal cutting and Machine Tools : Metal cutting : Mechanics of metal cutting, Geometry of tool and nomenclature, Tool materials, Orthogonal vs oblique cutting. Mechanics of chip formations, types of chips, tools

angles, shear angle, Merchant's force circle diagram, Cutting forces, power required, Cutting fluids/lubricants,

Tools wear and tool life. **Lecture : 12**

2. Machine Tools :

(a) Lathe : Principle, types, operations, turret/capstan, semi/automatic, Tool layout.

(b) Shaper, slotted, planer, operation, drive.

(c) Milling, Milling cutter, up & down milling, dividing head indexing, Max chip thickness, power required.

(d) Drilling and boring, reaming tools, Geometry of twist drill, Grinding, Grinding wheel, Abrasive, cutting action, grinding wheel specification, Grinding wheel wear, alterations, wear, fracture wear, dressing and trimming. Max chip thickness and guest criteria, Flat and cylindrical grinding, Centreless grinding, Super finishing, Honing lapping, Polishing. **Lecture : 12**

3. Computer controlled manufacturing process : NC, CNC, DNC, part programming, Introduction to computer aided manufacturing and robotics. **Lecture : 10**

4. Metrology : Tolerance and limit systems, limit gauges, Measurement of surface roughness, Inspection of gears and screw threads. **Lecture : 4**

5. Jigs and Fixtures : Locating elements, clamping devices, principles of Jigs and fixtures design. **Lecture : 4**

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATION Credits: 3

1. Meaning, concept, function, & importance of personnel management, role of a personnel manager, personnel policies - Need of a personnel policies, organization of personnel Department (functional basis, service basis and chentile basis) **Lecture : 5**

2. Manpower planning : Meaning & concept, need for manpower planning, types of manpower planning, meaning and concept of job analysis, job description & job specification, uses of job analysis information, Recruitment, selection – meaning and steps of selection process, meaning of induction **Lecture : 8**

3. Training and develop : Meaning, need & importance for training, method of training, development – meaning of development, method of development. **Lecture : 5**

4. (a) Performance appraised : Meaning, Objective, method of performance appraisal .

(b) Transfer : meaning objective, types.

(c) Promotion : Meaning , policies, basis of promotion.

(d) Separation : Resignation, Discharge & Dismissal, Suspension & Retrenchment, Layoff.

Lecture : 6

5. Wages and salary administration :

- (a) Meaning purpose & principle of wage & salary administration, factors influencing wage & salary administration.
- (b) Meaning of wage & salary, minimum wage , fair wage& living , wage.
- (c) Meaning of money and real wage.
- (d) Methods of wage payment - time rate & piece rate.
- (e) Incentive- Financial Incentive& non financial Incentive, method of wage payment based on result.

Lecture : 7

- 6. (a) Health, safety and welfare facilities.**

(b) social security -

(i) meaning and concepts, objective.

(ii) form of social security- social insurance & social assistance.

(c) Problem arising from disease , invalidity , accident, old age and unemployment. **Lecture : 5**

7. (a) Industrial Relation : meaning & concept, changing concept of industrial relation, role played by the employer, trade union & government, current I. R. position in India, I.R. policies of government of India.

(b) Trade Union : Meaning and concept, objective, functions, type, method of trade union. **Lecture : 6**

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