

Government Polytechnic Korea

Session Plan Jan - Jun 2025

Department- **Mechanical Engineering**

Subject - **Power Plant Engineering 2037672(037)**

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
CO-01	Use the concept of thermodynamics in different cycle for power plants.				
1	Power plant: General layout of modern thermal power plant, Site selection, Presents status of power generation in India. Elements of power plant, function of each element, steam condition and dryness fraction.	2	09.01.25 10.01.25	All Topics Covered	
2	Rankine cycle: Representation on PV, TS, HS plane, efficiency of Rankine cycle, Revision & improvement of thermal efficiency of Rankine cycle by lowering exhaust pressure, increasing boiler pressure and superheating of steam, Numerical problems.	2	11.01.25 14.01.25	— 11 —	
3	Reheat cycle- representation on T-S and H-S Planes, flow diagram and advantages.	1	16.01.25	— 11 —	
4	Simple regenerating cycle Flow diagram, representation on T-S and H-S plants, bleeding and feed power heating and pumping, advantages of regenerative cycle.	1	17.01.25	— 11 —	
5	Power station- Types of power station such as central power station, industrial power station, captive power station, advantages, and classification of power station on the basis of prime-movers.	1	20.01.25	— 11 —	
CO-02	Use steam boilers, prime mover and condensing unit as per requirement.				
1	Steam Generators:- Classification according to working pressure. (a) Low pressure boilers- Cochran, Lancashire and locomotive boilers	2	21.01.25 22.01.25	All Topics Covered	
2	(b) High pressure boilers in modern steam power plants such as Velox, Benson, La-mont, Leofler, supercritical boilers.	2	24.01.25 28.01.25	— 11 —	
3	Boiler mountings-Safety valves, water level indicator, pressure gauge, blow off cock etc.	1	30.01.25	— 11 —	
4	Accessories –Super heater, economizer, pre heater and draft equipment. Superheat control methods Pulverized fuel and necessity Storing systems etc.	1	31.01.25	— 11 —	
5	Steam Prime mover-Steam nozzle-types Velocity of steam at outlet Weight of discharge Area of cross section at throat and outlet Critical pressure ratio Nozzle efficiency Concept of prime mover	1	01.02.25		
6	Steam turbine – working principle, method of compounding and governing, losses in steam turbines.	2	03.02.25 04.02.25		
7	Condensing Unit -Functions of Steam condenser and its types: jet and surface Limitations and advantages of steam condenser Elements of condensing unit, cooling towers.	1	05.02.25		
CO-3	Analyze thermodynamic cycles of gas turbine power plant and Diesel engine power plant.				

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
1	Gas Turbine Power Plants: Brayton cycle, classification of Brayton or Joule Cycle. Open and Close cycle, representation of cycle on P.V. and T.S. diagram.	2	10.02.25 11.02.25	All Topics Covered	
2	Thermal efficiency: Efficiency in terms of terminal temperature and pressure. Effect of pressure ratio on thermal efficiency. Advantages and disadvantages of open and close cycle gas turbines. Important components of gas turbine power plant.	2	12.02.25 13.02.25	— 11 —	
3	Methods of improving thermal efficiency: Essential auxiliaries and controls of a gas turbine power plants. Fuels for gas turbines.	1	17.02.25	— 11 —	
4	Diesel Engine Power Plants: Diesel power plant layout. Functions & components of diesel power plant.	2	20.02.25 21.02.25	— 11 —	
5	Diesel power plant systems such as: Cooling and lubrication system.	1	24.02.25	— 11 —	
6	Fuel injection system. Solid injection system – common rail system, individual pump system. distribution system, data recording.	1	27.02.25	— 11 —	
CO-4 Analyze the site for setting of nuclear power plant.					
1	Nuclear Power Station Evolution of nuclear energy from atoms by fission and fusion. Chain reactions, fission materials, types of reactors, gas cooled, boiling water liquid, metal cooled and fast reactor,	1	03.03.25	All topics Covered	
2	Arrangements of various elements in a nuclear power station, steam cycles and boilers coolant heat exchangers, Reactor control, Reactor shielding and safety methods.	1	04.03.25	— 11 —	
3	Setting of Nuclear plants: Site evaluation Stages, Site Rejection Criteria, Earthquake, Geological criteria, Meteorological considerations, Flooding, Tsunami, Shoreline erosion, chemical explosion, Radiological impact study, Radioactivity pathways to humans, environmental Impact study. chemical explosion, Radiological impact study, Radioactivity pathways to humans, environmental Impact study.	2	08.03.25 10.03.25	— 11 —	
4	Hazards in nuclear power station – units of radiations, safe and dangerous dozes of radiations, safety precautions in nuclear power station, Nuclear power plants in India	1	11.03.25	— 11 —	
CO-5 Analyze the site for Hydro Electric Power Plant.					
1	Potential power Reference to rainfall and catchments area, Water storage, element of hydro electric power stations.	1	12.03.25	All Topics Covered	
2	Characteristics of hydraulic turbines- Comparison of the factors governing the cost of hydro, steam and diesel power stations.	1	13.03.25	— 11 —	
3	Selection of prime mover- Speed and pressure regulation, methods of governing, starting and stopping of water turbines, operation of hydro turbines. Maintenance of hydropower plants.	2	18.03.25 19.03.25	— 11 —	
CO-6 Analyze the power station control and power plant economics.					

S.no.	Topic to taught	no. of Lecture required	Date of theory Delivery	Topic Covered	Remark
1	Effect of load variation Shaft speed, steam admission, valve opening, steam flow rate, steam pressure and combustion control system.	1	20.03.25	All topic covered	
2	Necessity of controlling factors in load variation- Control system (area system, centralized control system) Basic elements of control system, controls and instruments located in modern control station.	2	24.03.25 26.03.25	— II —	
3	Power plant economics- Concept of occurrence of fluctuating loads, Load curve and its significance. Definition and terminology of connected load, maximum demand, demand factor, average load, load factor, diversity factor, plant capacity factor, plant use factor, effect of variable load and remedies.	2	07.04.25 09.04.25	— II —	

BK

Bhushan Ku. Nayal

Government Polytechnic Korea


Department- Mechanical Engineering

Subject - Theory Of Machines 2037471(037)

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
CO-1 Select suitable mechanism for various applications.					
1	Kinematics of Machines: Introduction to Statics, Kinematics, Kinetics, Dynamics. Mechanism and machine, rigid and resistant bodies, Kinematic links, joints, pairs, chain and its types, degree of freedom, Constrained motion and its types.	2	27.01.25 28.01.25	All topic covered	
2	Four link planar mechanisms and Inversions	1	29.01.25	— " —	
3	Four bar chain: Locomotive coupler, Beam engine and Pantograph	1	30.01.25	— " —	
4	Single slider Crank chain: Pendulum pump, Rotary I.C. engine mechanism, Oscillating cylinder engine, Whitworth quick return Mechanism, Quick return mechanism of shaper.	1	31.01.25	— " —	
5	Double Slider chain: Scotch Yoke mechanism, Elliptical trammel, Oldham's Coupling.	1	01.02.25	— " —	
CO-2 Estimate velocity and acceleration of planar mechanisms					
1	Concept of relative velocity and relative acceleration of a point on a link, angular acceleration, Inter-relation between linear and angular velocity and acceleration.	1	03.02.25	All topic covered	
2	Analytical method and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	2	04.02.25 05.02.25	— " —	
3	Velocity and acceleration diagrams for simple mechanisms	1	06.02.25	— " —	
4	Determination of velocity and acceleration of point on link by relative velocity method (Excluding Coriolis component of acceleration)	2	10.02.25 11.02.25	— " —	
5	Mechanical advantage calculation	1	12.02.25	— " —	
CO-3 Select relevant brakes and clutches for various applications					
1	Clutches: Classification, Functions and Applications, Construction and principle of working of i. Single-plate clutch, ii. Multi-plate clutch, iii. Centrifugal Clutch iv. Cone clutch v. Diaphragm clutch	2	13.02.25 17.02.25	All topic covered	
2	Calculation of power loss assuming uniform pressure and uniform wear theory	1	20.02.25	— " —	

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	••••
4	Gear trains- Types of gear, simple, compound, reverted and epicyclic gear train. Computation of velocity ratio in gear train	1	09.04.25	All topic Covered	
CO-6	Select suitable flywheel and governor for various applications				
1	Dynamics of reciprocating engine mechanism, inertia force due to reciprocating mass	1	15.04.25	All topic Covered	
2	Piston effort, crank effort, turning moment of crank shaft	1	19.04.25	— 11 —	
3	Principle and application of flywheel, Fluctuation of energy and speed, coefficient of fluctuation of energy and speed	1	21.04.25	— 11 —	
4	Governor- Function of governor and its comparison with flywheel	1	22.04.25	— 11 —	
5	Classification of governor, Watt, Porter, Proell, Hartnell governor their construction and working	1	23.04.25	— 11 —	
6	Equation for lift of governors	1	28.04.25	— 11 —	
7	Terms related to governor like Sensitivity, stability, Isochronous, Governor effort and power	1	29.04.25	— 11 —	
CO-7	Estimate magnitude and location of unbalanced rotating mass and fundamental information about vibration phenomenon				
1	Balancing- Need and types of balancing, Effects of unbalanced masses	1	30.04.25	All topic Covered	
2	Balancing of rotating masses in same plane- Analytical and Graphical methods for balancing of several masses revolving in same plane	1	06.05.25	— 11 —	
3	Balancing of reciprocating masses	1	07.05.25	— 11 —	
4	Elements of vibrations, natural frequency of single degree of freedom systems	1	17.05.25	— 11 —	

Faculty Name & Signature


Bhushan Kumar Nayak



S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
3	Brakes: Functions, Types, Applications	1	21.02.25	All topic covered	
4	Construction and working principle of i. Shoe brake ii. Band brake iii. Internal expanding shoe brake iv. Disc Brake	1	24.02.25	— " —	
5	Braking force, braking torque and power for shoe and band brakes	1	25.02.25	— " —	
6	Dynamometer: Meaning, need and type				
7	Bearings: Classification of bearings – rolling contact and sliding contact bearings, types of rolling contact bearings and types of sliding contact bearings, advantages and disadvantages of rolling and sliding contact bearing and their application, Designation of bearings	2	27.02.25 03.03.25	All topic covered	
CO-4 Estimate motion related parameters for different cam-follower combinations					
1	Introduction to Cams and Followers. Cam and follower terminology, Classification of Cams and Followers Applications of Cams and Followers	1	04.03.25	— " —	
2	Types of follower motions-uniform velocity, uniform acceleration and S.H.M and their displacement, velocity and acceleration diagrams	1	10.03.25	— " —	
3	Drawing of profile of a radial cam based on given motion of reciprocating knife-edge and roller follower with and without offset	1	11.03.25	— " —	
CO-5 Select relevant belts, chains and gear drives for different power transmission applications					
1	Belt Drives – Introduction to Flat belt, V-belt & its applications, materials used for flat and V-belts. Introduction of timing belt and pulley. Angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission. Merits, demerits and selection of belts for given applications.	2	17.03.25 18.03.25	All topic covered	
2	Chain Drives – Introduction to chain drives, Types of chains and sprockets, Methods of lubrication. Merits, demerits and selection of chains for given applications	1	19.03.25	— " —	
3	Gear Drives – Introduction to gear drives, Classification of gears, Law of gearing, gear terminology	1	08.04.25	— " —	

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
CO-5	Estimate the cooling load as per the requirement	18			
1	Classification – Industrial, Comfort air conditioning, Summer, winter and year round air conditioning, Construction and working of window type, package type and central plant systems	03	11.11.24 13.11.24 27.11.24	All topics covered	
2	Cooling load calculations: Sources of heat gain – External and internal source, solar radiation through windows, heat addition by occupants and equipments, infiltration of air – ventilation, Sensible heat load, Latent heat load, Total cooling load	04	29.11.24 30.11.24 02.12.24 03.12.24	— 11 —	
3	Doubt class/ Quiz / Discussion				

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Government Polytechnic Kerala

Session - July - Dec 24

Department- **Mechanical Engineering**

Subject - **Refrigeration and air conditioning**

S.no.	Topic to taught	No. of Lecture required	Date of Theory Deleivery	Topic Covered	Remark
CO-1	Select refrigeration method as per the given situation	18			
	Introduction to Refrigeration, different terminology of RAC machineries	01	09.09.24	All topics covered	
	Conventional Methods of Refrigeration-Ice refrigeration, Dry ice, Steam jet, Gas throttling ,Liquid Gas, Air refrigeration, Vapour absorpion, Vapour compression	02	09 - 10.09.24	- 1 -	
	Non conventional methods of refrigeration -Thermo electric, magnetic, Thermo acoustic, Pulse tube, Vortex tube	01	17.09.24	- 1 -	
	Concept of heat pump Refrigerating effect, Units of refrigeration, COP, Reversed Carnot cycle and its representation on PV and TS diagram	01	18.09.24	- 1 -	
	Air Refrigeration Cycles: Bell Coleman cycle - representation on PV and TS diagram, determination of COP, Application of the air refrigeration cycle such as Aircraft refrigeration. Simple numerical	01	18.09.24	- 1 -	
	Vapour Compression Cycle: Schematic diagram, representation on PV, TS and PH diagrams and it's working. Actual VCC, calculation of COP, Effect of Wet /Dry -compression, superheating and Sub cooling, simple numerical, Multistage vapour compression cycle- need and advantages, cascade refrigeration and its application	03	19.09.24 - 23.09.24	- 1 -	
	Doubt class/ Quiz / Discussion		23.09.24		
CO-2	Use vapour compression and vapor absorpion system as per the given situation	26			
1	Construction and working of various components- Open type, hermetically sealed, Centrifugal, Screw type compressors, Application of the compressors	01	24.09.24	All topics covered	
2	Evaporators- their functions and types such as extended surface, Plate coil type, Flooded, Dry Direct and Indirect expansion types Capacity of evaporator. Frosting /defrosting of evaporators	01	25.09.24	- 1 -	
3	Condensers – types of condensers such as Evaporative type, Air cooled [forced and natural convection) Water cooled	01	26.09.24	- 1 -	
4	Construction and working of various types of expansion devices such as – capillary tube auto expansion and thermostatic expansion valves, solenoid control valves and Low side High side valves	01	27.09.24	- 1 -	

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
5	Vapour Absorption System – Schematic diagram, principle, components and working of Ammonia vapour absorption system, Lithium Bromide absorption system, Electrolux Refrigerators , Comparison with vapor compression system	02	30.09.24 07.10.24	All topics Covered	
	Doubt class/ Quiz / Discussion		04.10.24	—	
CO-3	Use refrigerants as per the situation	16			
	Refrigerants, Description, Function, Composition and its application, Thermodynamic properties and characteristics of ideal refrigerants	04	07.10.24	—	
	Types of refrigerants as primary / secondary, Properties of the Commonly used refrigerants such as – CO ₂ , Ammonia, SO ₂ , Freon 11, Freon 12 , Freon 22, Azeotropes, Azeotropic and Zeotropic blends	04	14.10.24	—	
	Secondary Refrigerants, Properties of brines and glycols. Application of various brines, Inhibitor and other secondary refrigerants Environmental impact of different refrigerants	04	15.10.24	—	
	Nomenclature of refrigerant, Selection of refrigerants	01			
	Next generation refrigerant, Alternatives of cfcs	04			
	Types of cylinder, color coding, refrigerant recovery method	04	16.10.24	All topics Covered	
	Safe practices in handling of refrigerants	04			
	Doubt class/ Quiz / Discussion	04			
CO-4	Apply the concept of psychrometric behavior of air in air conditioning system	18			
	Difference between refrigeration and air-conditioning, Necessity of air conditioning, Concept of body comfort	04	17.10.24	All topics Covered	
	Properties of air - DBT, WBT , Dew Point Temperature, Relative humidity, Sensible heat, Latent heat, Air as mixture of different gases and water vapour, Daltons law of partial pressure	04	18.10.24 23.10.24	—	
	Concept of humidity of air, absolute humidity, relative Humidity, Psychrometers and their types , Enthalpy of air, Sp. Volume of air, Dew Point Temperature of moist air	03	24.10.24 26.10.24	—	
	Psychrometric charts, psychrometric processes such as sensible heating and cooling , latent heating and cooling , heating and humidification , cooling and dehumidification , evaporative cooling , sensible heat factor , By-pass factor , apparatus dew point, simple numerical	03	06.11.24 09.11.24	—	
5	Doubt class/ Quiz / Discussion		09.11.24		

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
CO-5	Estimate the cooling load as per the requirement	18			
1	Classification – Industrial, Comfort air conditioning, Summer, winter and year round air conditioning, Construction and working of window type, package type and central plant systems	03	11.11.24 13.11.24 27.11.24	All topics covered	
2	Cooling load calculations: Sources of heat gain – External and internal source, solar radiation through windows, heat addition by occupants and equipments, infiltration of air – ventilation, Sensible heat load, Latent heat load, Total cooling load	04	29.11.24 30.11.24 02.12.24 03.12.24	— 11 —	
3	Doubt class/ Quiz / Discussion				


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Government Polytechnic Korea

Department- Mechanical Engineering

Subject - Strength of Materials 2037352(037)

S.no.	Topic to taught	No. of Lecture required	Date of Theory Delivery	Topic Covered	Remark
CO-1	Estimate direct stresses and strains in machine members/components.				
1	Different types of Structures and Loads.	01	09.08.24		
2	Direct Stress, linear Strain, Hook's Law Calculation of Direct Stress and Linear Strain, Stress- Strain curve of Mild Steel, Modulus of Elasticity, Yield, Breaking and Ultimate Stress and factor of Safety	01	09.09.24		
3	Lateral Strain and Poisson's ratio.	01	10.09.24		
4	Temperature Stresses and Strain with and without yielding	01			
5	Shear Stress, Shear Strain and Shear Modulus	01	20.09.24		
6	Bulk Modulus and Volumetric Strain	01			
7	Differentiate Sudden, Gradual and Impact Load, Strain Energy and Proof Resilience for Sudden, Gradual and Impact Load with numerical problems	02	23.09.24 25.09.24		
8	Doubt class/ Quiz / Discussion	01	25.09.24		
O-1	Determine bending moment and shear force values in different types of beams/ components subjected to transverse loading.				
1	Statically Determinate Beams Like Cantilever, Simply Supported and Over Hang Beam.	01	30.09.24		
2	Relation between Shear Force and Bending Moment	01	01.10.24		
3	Sagging and Hogging Bending Moment and its importance	01	03.10.24		
4	Point of Contra flexure and its importance	01			
5	SF and B.M Diagram for Cantilever, Simply Supported and Over Hang Beam	01	07.10.24		
6	Components like shaft, axle, and spindle subjected to Point Load and/ or Uniformly Distributed Load (UDL)	02	14.10.24		
7	Doubt class/ Quiz / Discussion	01	15.10.24		
CO-3	Calculate bending stresses and shear stresses in different types of beams/components subjected to transverse loading				
1	Bending Theory Equation Bending stress, Sectional Modulus	01	16.10.24		
2	Neutral Axis, application of Bending theory to Statically determinate beams elements	01	17.10.24		
3	Structural components subjected to Axial Eccentric Loads	01	18.10.24		

S.no.	Topic to taught	No. of Lecture required	Date / Theory Delivery	Topic Covered	Remark
4	Shear stress-Average and Maximum shear stress for rectangular,circular section	02	17.10.24		
5	Doubt class/ Quiz / Discussion	01	22.10.24		
			22.10.24		
CO-4	Calculate slope and deflection in cantilever and simply supported beams subjected to transverse loading.				
1	Slope and Deflection	01	23.10.24		
2	Deflection Formulae for Cantilever Beam subjected to Point Load at free end and with full UDL	02	24.10.24 26.10.24		
3	Formulae for Simply supported Beam subjected to Point Load at Mid Span and with full UDL	02	06.11.24 08.11.24		
4	Doubt class/ Quiz / Discussion	01	05.11.24		
CO-5	Select Springs for given situation based on stiffness and deflection	02			
1	Definition, types and use of springs	01	11.11.24		
2	Spring classification based on size, shape and load- leaf spring, helical and spiral spring	01	13.11.24		
3	Stiffness, deflection and maximum stress in helical open and closed coil springs and leaf springs	02	27.11.24 29.11.24		
4	Doubt class/ Quiz / Discussion	01	29.11.24		
CO-6	Calculate principal stress and strain in machine members subjected to multi-load situation				
1	Multi load situations and need of estimating principal stresses	01	30.11.24		
2	Definition of principal plane and principal stresses	01	02.12.24		
3	Expression for normal and tangential stress, maximum shear stress	01	03.12.24		
4	Stresses on inclined planes	01	04.12.24		
5	Graphical solution using Mohr's circle of Stresses	01	06.12.24		
6	Doubt class/ Quiz / Discussion (10m Test)	01	09.12.24		
CO-7	Determine buckling load in Columns and Struts type high slenderness ratio components				
1	Column and Strut	1	11.12.24		
2	Short and Long Column	1			
3	End Condition of Column and	1	12.12.24		
4	Effective Length of Column and Modes of Failure in column	03	20.12.24		

S.no.	Topic to taught	No. of Lectures required	Date of Theory Delivery	Topic Covered	Remark
5	Radius of Gyration, Slenderness Ratio	02	21.12.24		
6	Euler's Crippling Load and its application	01	22.12.24		
7	Hankin's load / Buckling Load and its application in screw of screw jack	01			
8	Open class/ Quiz / Discussion	01			
CO-8 Estimate shear stresses in shafts subjected to twisting moment					
1	Torsion, Angle of Twist, Polar Moment of Inertia, Torsional Rigidity	02	24.12.24		
2	Formula of Torsional Stress	01	24.12.24		
3	Formula for Power Transmitted / Consumed for shaft, spindle and axle of solid and hollow sections subjected to Torsion	01	30.12.24		
4	Open class/ Quiz / Discussion	01	31.12.24		


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