

Syllabus for the post of Assistant Professor- Mechanical, Government Engineering College, Maharashtra Engineering College Teachers Service, Group - A

Steps of Exam: Written Exam - 200 Marks

Interview - 50 Marks

Level: - Degree

No. of Questions: - 100

Medium: English

No. of Marks: - 200

Nature of Paper - Objective Type

Duration: - 1 hour

Final merit list will be prepared by considering the marks obtained in Written test & Interview.

SYLLABUS

<i>MECHANICAL ENGINEERING</i>	
1	Applied Thermodynamics:
	Thermodynamic Concepts, First Law of Thermodynamics, One dimensional Flow of Compressible Fluid, Second Law of Thermodynamics, Availability, Properties of Steam.
2	Strength of Materials:
	Simple Stress and Strain, S. F. and B. M. in Beams, Simple Theory of Bending, Shear Stress in Beams, Simple Theory of Torsion, Bending moment combined with Torsion and Axial Loads, Principal Stresses, Deflection of Beams, Strain Energy, Theories of failure.
3	Material Science: Strain Hardening, Constitution of Alloys, Iron-Carbon Equilibrium Diagram, Heat-Treatment of Steels, Cast Irons, Introduction to International Standards/Codes, Non-Ferrous Metals and Alloys, Fatigue Failure, Creep, Alloy Steels, Strengthening mechanism, Powder Metallurgy.
4	Heat Transfer:
	Conduction, convection & radiation, emissivity, heat exchangers, mass transfer (mechanism, fick's law of diffusion, isothermal evaporation of water into air, convective mass transfer)
5	Machine design & vibration:
	Design consideration in castings & forgings, theories of failure, Design for static loadings, Design against fluctuating loads, Design of shafts, Design of springs, Design of belts. Free un-damped single degree of freedom vibration system, Free damped single degree of freedom vibration system, Free un-damped multi degree of freedom vibration system, forced single degree of freedom vibration system, vibration measuring system, rotor dynamics, balancing.
6	Mechatronics:
	Introduction to mechatronics, overview of microprocessors(8085), hydraulic & pneumatic system in automation, PLC in automation, transient response, root locus concepts.
7	Theory of Machines:
	Basic Kinematics, Special Mechanisms, Velocity Analysis of mechanisms, Acceleration analysis of Mechanism, Static and dynamic force analysis, Flexible connector mechanisms, Spur gear mechanism, Gear Trains, Cam Mechanism ,clutches, brakes dynamometer, gear trains, cam & follower.
8	Dynamics of Machinery:
	Governors, Gyroscope, (Static and dynamic balancing of single rotor & multi rotor system.

9	Balancing of reciprocating masses:
	In-line engines, Radial Engines, V-Engines.) VIBRATIONS (Classification of Vibrations), Free Undamped Multi degree of freedom vibratory systems, Forced single degree of freedom vibratory system
10	Internal Combustion Engines:
	Classification of I.C. Engines, Cycle Analysis of I.C. Engines, S.I. Engines, C.I. Engines, Supercharging/Turbo charging, Performance Characteristics of S.I. & C.I. Engines, Air Pollution due to I.C. Engines, Fuels of I.C. Engines, Engine Lubrication, Engine Cooling, Introduction to CNG, LPG, Stratified Charge and Wankel engines. Recent Developments in I.C. Engines.
11	Production Process:
	Metal Casting Process, Forming Processes, Welding and Joining Processes, Powder Metallurgy, Moulding with polymers, Non Destructive Techniques, CNC machines, Metal Cutting & Tool Engineering, Surface Finish, Cutting Tool Materials, Coolants, Design of Cutting Tools or Tool design
12	Fluid Mechanics:
	Fluid Kinematics, Fluid Dynamics, Real fluid flows, Boundary Layer Flows Compressible Fluid flow., Hydraulic Machinery (Turbines, Pumps, compressors).
13	Measurement & Metrology:
	Static characteristics, Displacement measurement, strain measurement, measurement of angular velocity, pressure measurement, temperature measurement, vacuum measurement, acceleration measurement, metrology.
14	CAD/CAM/CIM:
	Introduction & Elements Of Interactive Computer Graphics, Techniques For Geometric Modeling, transformation, manipulation & data storage, NC & CNC Technology, Group Technology, CAPP, and CAQC, Computer Integrated Manufacturing & Technology Driven Practices.
15	REFRIGERATION AND AIR CONDITIONING:
	Introduction to Refrigeration Carnot refrigerator, Carnot heat pump, Co-efficient of Performance, unit of refrigeration. Aircraft Air refrigeration systems, Vapor Compression Refrigeration System, Vapor Absorption Refrigeration, Psychrometry, Air-Conditioning, Duct Design.
16	MANUFACTURING PLANNING AND CONTROL:
	Manufacturing Planning and control System, Forecasting, Planning Function, Planning for Material requirements, Scheduling & Sequencing, Project management, Advanced concepts in production planning .
17	FINITE ELEMENT ANALYSIS:
	Introductory Concepts: Introduction to FEM. Brief History. General FEM procedure. Applications of FEM in various fields. Advantages and disadvantages of FEM Differential Equations in different Approximate solution of differential equations in fields, Matrix Algebra, FEM Procedure, Minimization of a functional. Principle of minimum total potential. Piecewise Rayleigh-Ritz method Example problems in one-D Isoperimetric. Algorithms for solution of equations dimensional structural analysis, Two dimensional finite element formulations, Finite element formulation of dynamics.
18	INDUSTRIAL ENGINEERING AND ENTERPRISE RESOURCE PLANNING:
	Work Study & Ergonomics, Method Study, Work Measurement, Value Engineering, resource utilization (Inventory Management, Statistical Quality Control), Enterprise Resource Planning, ERP-Implementation methodologies, Success and failure cases, ERP Audit, Future.
