Hall Ticket Number :										

R-17

Code: 7G553

III B.Tech. I Semester Supplementary Examinations June 2022

Dynamics of Machinery

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) Explain the working of single plate clutch with sketch. 7M

   b) A single plate clutch, with both sides effective, has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm^2. If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m 7M

OR

2. An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12º, force acting parallel to the plane. If the angle of inclination is increased to 15º, then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. 14M

UNIT–II

3. a) Describe the types of brakes 6M

   b) A bicycle and rider of mass 100 kg are travelling at the rate of 16 km/h on a level road. A brake is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will it make before it comes to rest? The pressure applied on the brake is 100 N and $\mu = 0.05$. 8M

OR

4. a) Describe the construction and operation of a epicyclic-train dynamometer. 8M

   b) A torsion dynamometer is fitted to a propeller shaft of a marine engine. It is found that the shaft twists 2° in a length of 20 meters at 120 r.p.m. If the shaft is hollow with 400mm external diameter and 300 mm internal diameter, find the power of the engine. Take modulus of rigidity for the shaft material as 80 GPa 6M

UNIT–III

5. a) Draw the turning moment diagram of a single cylinder double acting steam engine 7M

   b) A horizontal cross compound steam engine develops 300 k W at 90 r.p.m. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within ± 0.5% of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 meters. 7M

OR

6. Explain the following: a. Sensitiveness, b. Isochronism, and c. Hunting. 14M

UNIT–IV

7. Explain The Balancing of a Single Rotating Mass By Two Masses Rotating in Different Plane. 14M

OR

8. a) A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance 14M

UNIT–V

9. A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m^2. Determine the frequency of longitudinal and transverse vibrations of the shaft. 14M

OR

10. a) Develop an expression for Natural Frequency of Free Torsional Vibrations. 7M

    b) A shaft of 100 mm diameter and 1 meter long has one of its end fixed and the other end carries a disc of mass 500 kg at a radius of gyration of 450 mm. The modulus of rigidity for the shaft material is 80 GN/m^2. Determine the frequency of torsional vibrations. 7M

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Hall Ticket Number :										

R-17

Code: 7G556

III B.Tech. I Semester Supplementary Examinations June 2022

Engineering Metrology

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. Define Fit. Classify and explain its types with suitable examples 14M

OR

2. Differentiate between Hole basis system and shaft basis system with neat sketches 14M

UNIT–II

3. With the help of neat sketches, explain how a sine bar is used to determine the taper angle of an inclined surface? 14M

OR

4. Discuss about Slip gauges and Wringing phenomenon in Slip gauges. 14M

UNIT–III

5. In the measurement of surface roughness, heights of 20 successive peaks and valleys were measured from a datum measured over a length of 25 mm and their values are: 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35 and 20 microns. Calculate Centre Line Average (CLA) value and Root Mean Square (RMS) values of the surface. 14M

OR

6. a) Differentiate between Surface roughness and surface waviness 7M
   b) Identify the symbols used for indicating the surface finish. 7M

UNIT–IV

7. Explain Parkinson Gear Tester with neat diagram 14M

OR

8. Explicate the working of a Tool makers microscope 14M

UNIT–V

9. a) Define Inspection. Explain its types with examples 7M
   b) Discuss assignable and non-assignable causes. 7M

OR

10. a) Explain the characteristics of single sampling plan 7M
    b) Describe various types of Inspection with suitable example 7M

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Hall Ticket Number :										

R-15

Code: 5G555

III B.Tech. I Semester Supplementary Examinations June 2022

Heat Transfer

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Define Thermal conductivity. What is the difference between thermal conductivity and thermal diffusivity?

   b) Give some examples of heat transfer in the field of Engineering.

OR

2. The inner and outer surfaces of a 0.5-cm thick 2-m by 2-m window glass in winter are 10°C and 3°C, respectively. If the thermal conductivity of the glass is 0.78 W/m·K, determine the amount of heat loss through the glass over a period of 5 h.

UNIT–II

3. a) Derive the expression for temperature distribution under one dimensional steady state heat conduction for a plane wall and generate the expression for heat flow through a plane wall.

   b) Define fin. List out various types of fin configurations and its applications.

OR

4. A mild steel sphere of 15 mm diameter is planned to be cooled by an air flow at 20^0C. The convective heat transfer co-efficient is 110 W/m^2K. Calculate the following: (i) Time required to cool the sphere from 700^0C to 150^0C. (ii) Instantaneous heat transfer rate 150^0C. (iii)Total energy transferred up to 150^0C. Take mild steel ρ = 7850 kg/m^3, Cp = 474J/kg k, α = 0.044 m^2/h and k=43W/mk.

UNIT–III

5. Calculate the average co-efficient of heat transfer for natural convection for a vertical plate 30cm high at 50^0C. The surrounding air is at 30^0C. Also Calculate the boundary layer thickness at the trailing edge of plate.

OR

6. Show that Nu=f (Re, Pr) for forced convection by the use of dimensional analysis.

UNIT–IV

7. A wire of 1 mm diameter and 150 mm length is submerged horizontally in water at 7 bar. The wire carries a current of 131.5 A with an applied voltage of 2.15 V. If the surface of the wire is maintained at 180^0C, calculate the heat flux and the boiling heat transfer coefficient.

OR

8. a) Write a short notes on (i) Radiation shape factor (ii) Radiation shields

   b) Describe in detail the process of pool boiling curve with a neat sketch.

UNIT–V

9. Water flows at the rate of 60 kg/min through a double pipe counter flow heat exchanger. Water is heated from 50°C to75°C by oil flowing through the tube. The specific heat of the oil is 1.7 kj/kg.K. The oil enters at 120°C and leaves at 70°C.The overall heat transfer co-efficient is 340 W/m^2K.Calculate the following (i) Heat exchanger area. (ii) Rate of heat transfer.

OR

10. a) Discuss about cross flow heat exchangers.

    b) Discuss briefly on Fouling factor.

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Hall Ticket Number :										

R-17

Code: 7G551

III B.Tech. I Semester Supplementary Examinations June 2022

Industrial Management

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) State and describe the Fayol's 14 principles of management.
   b) Differentiate between Centralization and Decentralization

OR

2. a) Define management. Explain its nature and features of management.
   b) Discuss the importance of management

UNIT–II

3. a) Compare rural and urban sites-methods for selection of plant
   b) Explain different types of production system

OR

4. a) Differentiate between PERT and CPM
   b) Explain the nature of Costs in a project. How a project manager should analyze the cost of project while crashing.

UNIT–III

5. a) Explain the importance of principles of motion economy and state its principles related to human body
   b) Assuming that the total observed time for an operation of assembling an electric switch is 1.00 min. If the rating is 120%, find normal time. If an allowance of 10% is allowed for the operation, determine the standard time.

OR

6. a) Discuss about SIMO chart with its applications.
   b) What is allowance? Describe the types of allowances

UNIT–IV

7. a) Explain the Marketing Mix in detail.
   b) Describe the different stages in Product life cycle.

OR

8. a) Explain the following terms with help of neat sketches:
      i) Lead time ii) Safety stock iii) Reorder point
   b) Describe two bin system

UNIT–V

9. a) What are the objectives of merit rating
   b) Explain methods of job evaluation

OR

10. a) Explain the need of training in an organization
    b) Explain and evaluate the analytical methods of job evaluation

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Hall Ticket Number :										

R-17

Code: 7G552

III B.Tech. I Semester Supplementary Examinations June 2022

Applied Thermodynamics-II

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. Describe the processes of Rankine cycle. Derive the expression for its efficiency. 14M

OR

2. A steam power plant works between pressures of 40 bar and 0.05 bar. If the steam supplied is dry saturated and the cycle of operation is Rankine cycle, find (i) Cycle efficiency and (ii) Specific steam consumption. 14M

UNIT–II

3. a) Discuss the merits and demerits of forced draught over natural draught. 7M
   b) Describe any one type of pressure gauge used in boilers with diagram 7M

OR

4. Derive an equation for condition for maximum discharge, efficiency of chimney. 14M

UNIT–III

5. a) Explain critical pressure ratio of a nozzle? 7M
   b) Discuss about Wilson line. 7M

OR

6. a) A nozzle expands steam from 14 bar and 300^{o}C to 6 bar. If the flow rate is 1 kg/sec find the throat area and exit area. What should be the coefficient of velocity if the exit velocity is 550 m/sec. 10M
   b) Define degree of under-cooling. 4M

UNIT–IV

7. a) Write the function and applications of the condenser. 10M
   b) Define the Vacuum efficiency and Condenser efficiency. 4M

OR

8. a) Explain the working of an evaporative condenser. 8M
   b) Why does an ejector type jet condenser not require a water extraction pump? Explain. 6M

UNIT–V

9. a) Define stage efficiency and nozzle efficiency in impulse turbines. 6M
   b) Illustrate governing of turbines with a suitable diagram 8M

OR

10. In a reaction turbine 5 kg/s steam is admitted at 16 bar dry saturated in the first stage. Turbine has eight pairs on mean diameter of 50 cm and run at 3000 rpm with mean blade speed to steam velocity ratio of 0.8. There occurs tip leakage of steam at all rows amounting to 10% of total and efficiency of working steam is 85%. Considering blade outlet angles for both fixed and moving blades to be 20^{0}, determine the following analytically. i) The output from turbine in hp, ii) The pressure of steam leaving turbine, iii) The mean blade height. 14M

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Hall Ticket Number :										

R-17

Code: 7G555

III B.Tech. I Semester Supplementary Examinations June 2022

Design of Machine Elements-I

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) Discuss the steps involved in design of machine elements.
   b) Classify the different types of loads and explain corresponding stresses induced in machine members in brief.

OR

2. At a critical section in a shaft, the following stresses are induced. Bending stress = 60MPa and torsional shear stress = 40 MPa. Determine the factor of safety, according to i) Maximum normal stress theory ii) Maximum shear stress theory, and iii) Maximum principal strain theory. The proportional limit is a simple tension list is found to be 300 MPa. Take Poisson's ratio as 0.3.

UNIT–II

3. Explain stress concentration in detail and various methods to reduce stress concentration in machine members.

OR

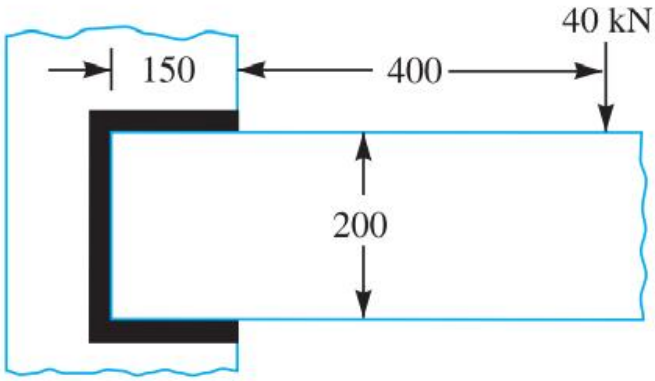
4. a) Explain the following terms: (i) Stress concentration (ii) Endurance limit
   b) A forged steel bar, 50 mm in diameter, is subjected to a reversed bending stress of 250N/mm^2. The bar is made of steel 40C8 (S_{ut} = 600 N/mm^2). Calculate the life of the bar for a reliability of 90%.

UNIT–III

5. a) What are the advantages and disadvantages of welded joints over threaded joints?
   b) A plate 100 mm wide and10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa.

OR

6. A bracket, as shown in Fig. 10.39, carries a load of 40 kN. Calculate the size of weld, if the allowable shear stress is not to exceed 80MPa.



UNIT–IV

7. a) Explain different types of keys with sketches.
   b) Sketch and explain the design procedure for a Cotter joint with Gib.

OR

8. Two rod ends of a pump are joined by means of a socket and spigot type of cotter joint at the ends. Design the joint for an axial load of 120 kN which alternately changes from tensile to compressive. The allowable stresses for the material used are 50 MPa in tension, 40 MPa in shear and 100 MPa in crushing.

UNIT–V

9. Design a clamp coupling to 30kw at 120 rpm. The shaft and the key are made of mild steel for which permissible shear stress is 40MPa. The two halves are connected by 4bolts. And the permissible tensile stress in the bolt sis 70MPa. Th coefficient of friction between the sleeve and the shaft surface may be taken as 0.3.

OR

10. Compare the weight, strength and stiffness of a hollow shaft of the same external diameter as that of solid shaft. The inside diameter of the hollow shaft being half the external diameter. Both the shafts have the same material and length.

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