III B.Tech. I Semester Supplementary Examinations Nov/Dec 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	CO	Blooms Level

UNIT–I

1. Derive an expression for frictional torque required for flat pivot bearing considering i) Uniform Pressure theory ii) Uniform wear theory.   **14M**   1   L5

OR

2. The mean diameter of the screw jack having pitch of 10mm is 50 mm. A load of 20 kN is lifted through a distance of 170 mm. Find the work done in lifting the load and efficiency of the screw jack when 1. The load rotates with the screw, and 2. The load rests on the loose head which does not rotate with the screw. The external and internal diameter of the bearing surface of the loose head are 60 mm and 10 mm respectively. The coefficient of friction for the screw as well as the bearing surface may be taken as 0.08   **14M**   1   L3

UNIT–II

3. a) Explain about the various planes and axes of gyroscopic couple   **7M**   2   L2

   b) An airplane makes a complete half circle of 50 meters radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it   **7M**   2   L3

OR

4. The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: 1. when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h. 2. When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees   **14M**   2   L3

UNIT–III

5. A loaded Porter governor has four links each 250 mm long, two revolving masses each of 3 kg and a central dead weight of mass 20 kg. All the links are attached to respective sleeves at radial distances of 40 mm from the axis of rotation. The masses revolve at a radius of 150mm at minimum speed and at a radius of 200mm at maximum speed. Determine the range of speed. | 14M 3 L3

OR

6. The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows: +52, −124, +92, −140, +85, −72 and +107 mm^2, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m | 14M 3 L3

UNIT–IV

7. Explain the 'direct and reverse crank' method for determining unbalanced forces in radial engines | 14M 4 L2

OR

8. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions | 14M 4 L3

UNIT–V

9. Develop an expression for Natural Frequency of Free Transverse Vibrations of a Shaft Subjected to a Number of Point Loads by Dunkerly's method. | 14M 5 L5

OR

10. A shaft of length 0.75 m, supported freely at the ends, is carrying a body of mass 90 kg at 0.25 m from one end. Find the natural frequency of transverse vibration. Assume E = 200 GN/m2 and shaft diameter = 50 mm | 14M 5 L3

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Code: 7G551

III B.Tech. I Semester Supplementary Examinations Nov/Dec 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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			Marks	CO	BL
		UNIT–I			
1.	a)	Explain the concept, and applications of committee organization	7M	CO1	L1
	b)	Describe the functional organization and applications of functional organization	7M	CO1	L1
		OR			
2.	a)	Explain the concept, advantages, disadvantages and applications of line and staff organization	7M	CO1	L1
	b)	Describe matrix organization.	7M	CO1	L1
		UNIT–II			
3.		Define plant layout. Explain the types of Plant layout in detail	14M	CO2	L1
		OR			
4.	a)	Discuss the factors affecting plant location	7M	CO2	L1
	b)	Suggest suitable layout to establish a cement industry	7M	CO2	L2
		UNIT–III			
5.	a)	Define time study and explain its objectives	7M	CO3	L1
	b)	Explain various steps involved in time study	7M	CO3	L2
		OR			
6.	a)	Describe the various methods involved for Performance rating in Work study.	7M	CO3	L1
	b)	Discuss the procedure of Method study	7M	CO3	L1
		UNIT–IV			
7.	a)	Explain the periodical review inventory control system	7M	CO4	L1
	b)	A manufacturer has to supply his customers 3600 units of its products per year. Inventory carrying cost amounts Rs 1.2 per unit per annum. The set up cost per run is Rs 80. Determine i)Economic order quantity ii)Number of orders per year	7M	CO4	L1
		OR			
8.	a)	Describe the costs associated with the inventories	7M	CO4	L2
	b)	A manufacturing company places a annual order of 48,000 units at a price of Rs 20 per unit. Its carrying cost is 15% of unit price and the order cost is Rs 12 per order. Determine i)Economic order quantity ii)Number of orders per year iii)Time between orders	7M	CO4	L2
		UNIT–V			
9.	a)	Describe job analysis	7M	CO5	L2
	b)	How do you determine the labour turnover rate?	7M	CO5	L2
		OR			
10.	a)	Is personnel manager is Line or staff manager? support your answer with an example	7M	CO5	L2
	b)	Explain off the job training and on the job training methods	7M	CO5	L2

END

Code: 7G554

III B.Tech. I Semester Supplementary Examinations Nov/Dec 2022
Machine Tools
(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	CO	Blooms Level
	UNIT–I				
1. a)	With a neat sketch explain the geometry of a single point cutting tool?		10M	CO1	L1
b)	Explain about ASA system in detail.		4M	CO1	L1
	OR				
2. a)	Why chip breakers are used? List various types of chip breakers and explain their significance.		7M	CO1	L3
b)	Explain tool wear and flank wear with neat sketches?		7M	CO1	L2
	UNIT–II				
3.	Classify the lathe machines. Draw the Lathe machine with neat sketch and show its parts?		14M	CO2	L4
	OR				
4. a)	Describe any two work holding devices used in Lathe. With neat sketches?		7M	CO2	L1
b)	List out the various types of Dead centers in Lathe machine? Explain any two with neat sketches.		7M	CO2	L1
	UNIT–III				
5.	Explain with a neat sketch the construction and working principle of a Radial Drilling machine.		14M	CO3	L2
	OR				
6.	Show with neat sketch a Twist Drill and label the important elements.		14M	CO3	L2
	UNIT–IV				
7. a)	Explain different types of Grinding process in detail.		7M	CO4	L2
b)	Write short notes on Abrasive types & usage		7M	CO4	L2
	OR				
8.	Clearly indicate the difference between Push and Pull type of Broaches.		14M	CO4	L1
	UNIT–V				
9.	What is the general function of Locators? List out the various types of Locators and explain any two with neat sketches		14M	CO5	L1
	OR				
10.	Define a Jig? List out the various types of Drill Jigs and explain any two with neat sketches		14M	CO5	L2

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Code: 7G552

III B.Tech. I Semester Supplementary Examinations Nov/Dec 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	CO	Blooms Level
		UNIT–I			
1.		Discuss Reheat Rankine cycle with a neat sketch.	14M	CO1	L2
		OR			
2.		Explain the working construction of steam engines.	14M	CO1	L2
		UNIT–II			
3.	a)	Sketch Babcock and Wilcox boiler and explain its working.	10M	CO2	L2
	b)	Illustrate about fusible plug.	4M	CO2	L3
		OR			
4.		Derive an expression for natural draught and maximum discharge rate of gases through the chimney for a given height of chimney, clearly stating the assumptions made.	14M	CO2	L6
		UNIT–III			
5.	a)	Describe the function of nozzle & discuss various types of nozzles.	7M	CO3	L1
	b)	Discuss about super saturation flow of steam in nozzles.	7M	CO3	L2
		OR			
6.	a)	In a steam nozzle, steam expands from 4 bar to 1 bar. The initial velocity of steam is 60 m/s and the initial temperature is 200^0C. Determine the exit velocity if the nozzle efficiency is 92%.	10M	CO3	L3
	b)	Define metastable state.	4M	CO3	L1
		UNIT–IV			
7.	a)	With the help of a neat sketch explain the working principle of Barometric jet condenser.	8M	CO4	L2
	b)	Differentiate jet condensers with surface condensers.	6M	CO4	L4
		OR			
8.	a)	Steam enters a condenser at 36^0C and with barometer reading 760 mm of Hg. If vacuum of 695 mm of Hg. is produced, find the vacuum efficiency?	8M	CO4	L3
	b)	Explain parallel flow jet condenser and explain its working principle.	6M	CO4	L2
		UNIT–V			
9.	a)	Explain velocity compounding in steam turbines with neat sketch	8M	CO5	L2
	b)	Compare impulse turbine with reaction turbine.	6M	CO5	L5
		OR			
10.		Steam leaves the nozzle of a single stage impulse turbine at 850 m/s. The nozzle angle is18^0 and the blade angles are 29^0 at the inlet and outlet. The friction coefficient is 0.9. Calculate blade velocity and steam mass flow rate in kg/hr to develop 300 W power.	14M	CO5	L3

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III B.Tech. I Semester Supplementary Examinations Nov/Dec 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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UNIT–I

1. a) What are the manufacturing considerations to be considered by design?   7M

   b) An unknown weight falls through 10 mm on a collar rigidly attached to the lower end of a vertical bar 3 m long and 600 mm^2 in section. If the maximum instantaneous extension is known to be 2 mm, what is the corresponding stress and the value of unknown weight? Take E = 200 kN/mm^2.   7M

OR

2. a) Enumerate any four most commonly used engineering materials and state at least one important property and one application of each.   7M

   b) Find out the numbers of R10 basic series from 1 to 10.   7M

UNIT–II

3. a) Define endurance limit? Discuss the factors which affect the endurance limit of the material.   7M

   b) Determine the size of a piston rod subjected to a total load having cyclic fluctuation from 150 kN (tension) to 25 kN (compression). The endurance limit is 360 MPa and yield strength is 400 MPa. Take factor of safety = 1.5; surface finish factor = 0.88 and stress concentration factor = 2.25.   7M

OR

4. a) Describe Soderberg's criteria And derive the equation for designing of machine members subjected to dynamic load.   7M

   b) Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal), σ_e =265MPa and a tensile yield strength of 350MPa. The member is subjected to a varying axial load from W_{min}=– 300 × 10^{3}N to W_{max}=700×10^{3}N and has a stress concentration factor = 1.8. Use factor of safety as 2.0.   7M

UNIT–III

5. a) List out the advantages and disadvantages of screw joints.   7M

b) An electric motor weighing 10 kN is lifted by means of an eye bolt. The eye bolt is screwed into the frame of the motor. The eye bolt has coarse threads. It is made of plain carbon steel 30C8 (S_{yt}=400 N/mm^2) and the factor of safety is 6. Determine the size of the bolt. 7M

OR

6. a) A bracket is bolted to a column by 6 bolts of equal size as shown in Fig. It carries a load of 50 kN at a distance of 150 mm from the centre of column. If the maximum stress in the bolts is to be limited to 150MPa, determine the diameter of bolt.

14M
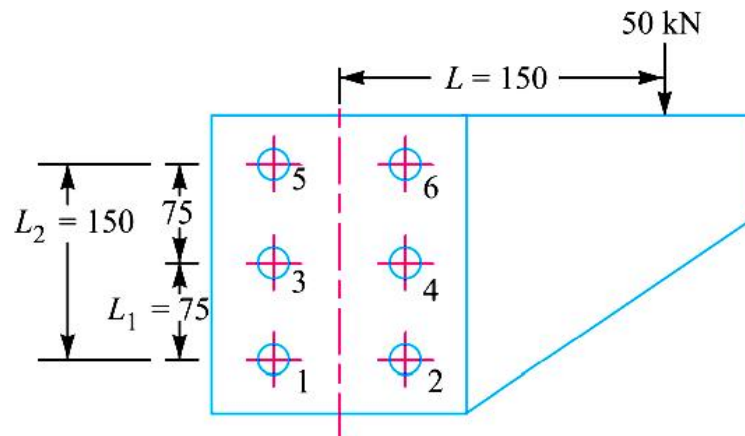
UNIT–IV

7. a) Design a sleeve and cotter joint to resist a tensile load of 60 kN. All parts of the joint are made of the same material with the following allowable stresses: $_t$ = 60 MPa ; = 70 MPa ; and $_c$ = 125 MPa 14M

OR

8. a) What are the applications of knuckle joint? 4M

b) Design a knuckle joint to transmit 140 kN, with permissible stresses in tension; shear and compression are 75 Mpa; 60 Mpa and 150 Mpa respectively. 10M

UNIT–V

9. a) How the shaft is designed when it is subjected to twisting moment and bending moment? 6M

b) A shaft is transmitting 100 kW at 180 r.p.m. If the allowable shear stress in the material is 60 MPa, find the suitable diameter for the shaft. The shaft is not to twist more than 1° in a length of 3 m. Take C = 80 GPa. 8M

OR

10. a) Classify the shaft coupling. 6M

b) Design of a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa. 8M

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