Hall Ticket Number :										

R-17

Code: 7G564

III B.Tech. II Semester Supplementary Examinations May/June 2022

Instrumentation and Control Systems

(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.		Explicate the working principle of variable inductive transducers.	14M
		OR	
2.		Explain the sources of errors in measurements and measuring instruments	14M
		UNIT–II	
3.		Discuss briefly about the temperature measurement instruments.	14M
		OR	
4.		Explain the following vacuum gauges i) Thermocouple type conductivity gauge and ii) Pirani gauge	14M
		UNIT–III	
5.		Describe briefly about the Strain gauge accelerometer with a neat sketch.	14M
		OR	
6.		Explain the working principle of Pneumatic load cell with a neat sketch.	14M
		UNIT–IV	
7.		Distinguish the bonded and unbounded type of resistance strain gauges.	14M
		OR	
8.		Describe the properties of materials used for strain gauges.	14M
		UNIT–V	
9.	a)	Explain briefly about the Servomechanisms.	7M
	b)	Discuss about any three methods of block diagram reduction.	7M
		OR	
10.	a)	What are the standard test inputs?	7M
	b)	Write short note on (i) bode plots (ii) gain and phase margin	7M

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Hall Ticket Number :										

R-17

Code: 7GA61

III B.Tech. II Semester Supplementary Examinations May/June 2022

Managerial Economics and Financial Analysis

(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 managerial economics. Illustrate how it is helps in solving managerial problems. 14M

OR

2. a) List out Managerial Economics, relationship with other areas. 7M

   b) Write about elasticity oy demand factors 7M

UNIT–II

3. Define cost. Explain the difference cost concepts used in the process of cost analysis. 14M

OR

4. Define Cost Analysis? Explain different Cost concepts and Determinants of cost, 14M

UNIT–III

5. Distinguish between public and private sector companies. 14M

OR

6. a) Advantages and disadvantages of joint Hindu family business. 7M

   b) Features of government companies 7M

UNIT–IV

7. Narrate the capital budgeting and elaborate nature and significance, budgeting decisions. 14M

OR

8. A business firm is thinking of choosing the right machines for their purpose after financial evolution of the proposals the initial cost and the net cash flow over five years to the business firm have been calculated for each machine as follows.:

	Machine 1 (Rs)	Machine 2 (RS)
Initial cost	(20000)	(28000)
annual cash inflow 1year	8000	10000
2year	12000	12000
3year	9000	12000
4year	7000	9000
5year	6000	9000
Choose the machine based on 1) payback period 2) accounting rate return		

14M

UNIT–V

9. Briefly discuss accounting concepts and conventions with examples. 14M

OR

10. a) Activity ratios are illustrated suitable examples. 7M

    b) Capital structure ratios are illustrated suitable example. 7M

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Hall Ticket Number :										

R-17

Code: 7G562

III B.Tech. II Semester Supplementary Examinations May/June 2022

Design of Machine Elements-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. a) What are journal bearings? Give a classification of these bearings. 4M

   b) Design a full hydrodynamic journal bearing with following specification for machine tool application: Journal diameter=75 mm, radial load=10 kN, Journal speed=1440 rpm, Minimum oil film thickness=22.5 microns, inlet temperature=40^0 C, bearing material=Babbitt. Determine the length of the bearing and select suitable oil for this application. 10M

OR

2. a) Distinguish the "Hydrodynamic" and "Hydrostatic Bearings" with figures and suitable applications. 7M

   b) A journal bearing 60 mm is diameter and 90 mm long runs at 450 r.p.m. The oil used for hydrodynamic lubrication has absolute viscosity of 0.06 kg / m-s. If the diametral clearance is 0.1 mm, find the safe load on the bearing. 7M

UNIT–II

3. a) Explain the different types of antifriction bearings 6M

   b) A bearing is required to carry 4500 N stationary radial load. The shaft rotates at 1000rpm and the life desired is 30000 hrs. The running conditions are steady, no shock loading select a suitable bearing. 8M

OR

4. Select a single row deep groove ball bearing for a radial load of 4000 N and an axial load of 5000 N, operating at a speed of 1600 r.p.m. for an average life of 5 years at 10hours per day. Assume uniform and steady load. 14M

UNIT–III

5. Design a cast iron piston for a single acting internal combustion engine having 200 mm as the cylinder bore. The maximum explosion pressure is 4 MPa. Draw a neat dimensional sketch of the piston to bring out the details. 14M

OR

6. Describe the design procedure for the connecting rod of an I.C.Engine. 14M

UNIT–IV

7. In a horizontal belt drive for a centrifugal blower, the blower is belt driven at 600 r.p.m. by a 15 kW, 1750 r.p.m. electric motor. The centre distance is twice the diameter of the larger pulley. The density of the belt material = 1500 kg/m^3; maximum allowable stress=4 MPa; μ_1 = 0.5 (motor pulley); μ_2 = 0.4 (blower pulley); peripheral velocity of the belt = 20 m/s. Determine the following: a. Pulley diameters; b. belt length; c. cross-sectional area of the belt; and d. minimum initial tension for operation without slip; 14M

OR

8. Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, G=84kN/mm^2. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils. 14M

UNIT–V

9. Design a pair of steel spur gears σ_0 = 180 MPa full depth to transmit 40 kW at 4000 rpm of 20 tooth pinion at a transmission ratio of 5.The teeth are 20^0 full depth involute form. Find the module, face width and pitch diameters. Recommend suitable hardness for both gears. 14M

OR

10. a) Explain Lewis beam strength equation. 7M

    b) Explain design procedure for helical gears. 7M

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Hall Ticket Number :										

R-17

Code: 7G563

III B.Tech. II Semester Supplementary Examinations May/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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Marks

UNIT–I

1. a) Define heat transfer? Briefly explain three modes of heat transfer with examples? 10M

   b) A hot plate of area =0.2m^2 at 59^{o}C loses heat to a room at temperature 20^{o}C. Given the heat transfer coefficient acting on the hot plate =6.277W/m2K find out the rate of heat transfer. 4M

OR

2. A plane wall is 150 mm thick and its wall area is 4.5 m2. If its conductivity is 9.35W/m0C and surface temperature are steady at 1500C and 450C, determine:
   a) Heat flow across the plane wall.
   b) Temperature gradient in the flow direction. 14M

UNIT–II

3. A steel ball [c=0.46 kJ/kg.oC, k =35 W/moC] 5.0 cm in diameter and initially at a uniform temperature of 450^{o}C is suddenly placed in a controlled environment in which the temperature is maintained at 100^{o}C. The convection heat-transfer coefficient is 10W/m2.^{o}C. Calculate the time required for the ball to attain a temperature of 150^{o}C. 14M

OR

4. Derive an expression for critical thickness of insulation for a cylinder assuming the steady state conditions. 14M

UNIT–III

5. a) Illustrate the development of hydrodynamic boundary layer inside a pipe 6M

   b) List out the dimensionless numbers used in forced convection situation and their mathematical expressions. 8M

OR

6. State and explain the Buckingham's – π Theorem for dimensional analysis 14M

UNIT–IV

7. a) How the condensation and boiling phenomenon heat transfer takes place. 4M

   b) Two large parallel planes with emissivities of 0.3 and 0.5 are maintained at temperatures of 527^{0}C and 127^{0}C respectively. A radiation shield having emissivities of 0.05 on both sides is placed between them. Calculate (i) Heat transfer rate between them without shield. (ii) Heat transfer rate between them with shield. 10M

OR

8. Two very large parallel planes with emissivities 0.3 and 0.8 exchange heat. Find the percentage reduction in heat transfer when a polished-aluminum radiation shield (ϵ=0.04) is placed between them. 14M

UNIT–V

9. Derive an expression for the LMTD method of Counter flow heat exchangers? 14M

OR

10. a) What advantage does the effectiveness-NTU method have over the LMTD method? 7M

    b) Why is a counter flow exchanger more effective than a parallel-flow exchanger? 7M

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