Code: 5G565

III B.Tech. II Semester Supplementary Examinations January 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	CO	Blooms Level

UNIT–I

1. a) Explain wedge film and squeeze film journal bearings. — 6M CO1 L2

   b) List the design procedure for a Journal bearing. — 8M CO1 L1

OR

2. A full Journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm^2.The speed of the journal is 900 rpm and the ratio of the journal diameter to the diametral clearance is 1000.The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75^{0}C may be taken as 0.011kg/m-s. The room temperature is 35^{0}C.Determine the amount of artificial cooling required and the mass of the lubricating oil required if the difference between the outlet and inlet temperature of the oil is 10^{0}C.The specific heat of the oil as 1850 J/kg/^{0}C — 14M CO1 L5

UNIT–II

3. a) Explain the different types of antifriction bearings. — 6M CO2 L2

   b) Determine the dynamic load carrying capacity of a deep groove ball bearing with the least bore size, and which is required to resist a radial load of 4 kN and an axial load of 3 kN. The shaft rotates at 1400 rpm. The bearing is required to be in operation for 12000 hours with 90% reliability. — 8M CO2 L5

OR

4. a) A bearing is required to carry 4500 N stationery radial load. The shaft rotates at 1000 rpm and the life desired is 30000 hrs. The running conditions are steady, no shock loading. Select a suitable bearing. — 7M CO2 L5

   b) A single row deep groove ball bearing No.6002 is subjected to an axial thrust of 1000 N and a radial load of 2200 N. Determine the expected life that 50 % of the bearings will complete under this condition. — 7M CO2 L1

UNIT–III

5. a) Explain about the stress due to whipping action on connecting rod ends. — 4M CO3 L2

   b) Estimate the design of a Cast Iron piston for a single acting four stroke engine for the following data :
   Cylinder bore = 100 mm, stroke = 125 mm, Maximum gas pressure=5N/mm^2, Indicated Mean effective pressure=0.75N/mm^2, Mechanical efficiency=80%, Fuel consumption = 0.15 kg per brake power per hour, Higher calorific value of fuel =42X10^3 kj/kg, speed=2000 rpm. Any other data required for the design may be assumed. — 10M CO3 L5

OR

6. Describe the design procedure of a Connecting rod with a neat sketch. — 14M CO3 L1

UNIT–IV

7. Estimate the design of a helical spring for a spring loaded safety valve for the following conditions:

Diameter of valve seat = 65 mm

Operating pressure = 0.7 N/mm^2

Max. pressure when the valve blows off freely = 0.75 N/mm^2

Max. lift of the valve when the pressure rises from 0.7 to 0.75 N/mm^2=3.5 mm

Max. allowable stress = 550 MPa

Modulus of rigidity = 84 kN/mm^2

Spring index = 6   14M   CO4   L6

OR

8. a) Explain the selection criterion for the belt drives.   4M   CO4   L2

   b) A V-belt is driven on a flat pulley and a V-pulley. The drive transmits 20 kW from a 250 mm diameter V-pulley operating at 1800 rpm to a 900 mm diameter flat pulley. The centre distance is 1m,the angle of groove is 40^0 and μ = 0.2, if density of belting is 1110 kg/m^3 and allowable stress is 2.1 MPa for belt material, determine the number of belts required if C-size V-belts having 230mm^2 cross-section area are used.   10M   CO4   L5

UNIT–V

9. A gear drive is required to transmit a maximum power of 22.5 kW. The velocity ratio is 1:2 and rpm of this pinion is 200.The approximate centre distance between the shafts may be taken as 600 mm. The teeth has 20^0 stub involute profiles. The static stress for the gear material (which is Cast Iron) may be taken as 60 MPa and face width is 10 times the module. Determine the module, face width and no. of teeth on each gear. Check the design for dynamic and wear loads. The deformation or dynamic factor in the Buckingham equation may be taken as 80 and the material combination factor for the wear as 1.4.   14M   CO5   L5

OR

10. A helical cast steel gear with 30^0 helix angle has to transmit 35 kW at 1500rpm. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20^0 full depth involute teeth. The static stress for Cast steel may be taken as 56 MPa. The width of face may be taken as 3 times the normal pitch. Determine the end thrust on the gear?   14M   CO5   L5

END

III B.Tech. II Semester Supplementary Examinations January 2022
Industrial Management
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Explain the functions of management   7M

   b) Explain Maslow's need Hierarchy theory.   7M

OR

2. Discuss in detail, the basic concepts related to an organization.   14M

UNIT–II

3. Explain the factors of selecting a plant location with specific reference to rural and urban sites.   14M

OR

4. Compare and contrast CPM and PERT and explain their importance in project management.   14M

UNIT–III

5. a) Define Method study. Explain about the steps in Method study.   7M

   b) Distinguish between micro-motion and memo-motion studies.   7M

OR

6. a) List and explain about various types of allowances.   4M

   b) The time study showed the average time for a quality control test for an item is 12.55 min. The performance rating is 100, and allowances are 60 minutes per 8 hour shift.
   (i) Calculate the labour standard for the operation.
   (ii) If this quality control test is alone repeatedly, how many tests per 8 hour shift could be completed on the average?
   (iii) If the quality control test technician's labour rate is Rs. 10 per hour, what is the standard labour cost per test?   10M

UNIT–IV

7. Explain in detail, the objectives and functions of Inventory Management. 14M

OR

8. Define and explain in detail, the concept of TQM.   14M

UNIT–V

9. Define Job Evaluation. Explain about the methods of Job Evaluation.   14M

OR

10. With a neat sketch explain about the product life cycle.   14M

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III B.Tech. II Semester Supplementary Examinations January 2022

Metrology and Surface Engineering
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. Distinguish between hole basis system and shaft basis system? A hole and the mating shaft have nominal size of 50mm. The assembly is to have a maximum clearance of 0.15mm and minimum clearance of 0.05mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the size of hole and shaft is (**a**) The hole based system, (**b**) The shaft based system.   14M

OR

2. Explain Taylor's Principle of Gauge Design with suitable example?   14M

UNIT–II

3. a) Explain the method of measuring angles using following
   i. Spirit level
   ii. Sine bar.   8M

   b) Explain why it is not preferred to use a signbar for measuring angles larger then 45^0?   6M

OR

4. How we are measuring angles using universal bevel vernier protractor With a neat sketch.   14M

UNIT–III

5. What do you mean by waviness and roughness? Describe the methods for numerical assessment of surface texture.   4M

OR

6. Explain working, construction of any one mechanical comparator and what are it's limitations?   4M

UNIT–IV

7. Define best wire size. Explain the measurement of effective diameter of screw thread using three wire method.   14M

OR

8. Explain the measurement of gear tooth thickness using gear tooth vernier caliper. and how do you determine the pitch error of a spur gear   14M

UNIT–V

9. Explain the following alignment tests on Lathe
   i. True running of head stock centre
   ii. True running of locating cylinder of main spindle   14M

OR

10. List out various diffusion coating process and explain them in detail.   14M

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Code: 5G561

III B.Tech. II Semester Supplementary Examinations January 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	CO	Blooms Level
		UNIT–I			
1.	a)	Describe the terms linearity, repeatability and calibration.	7M	CO1	BL1
	b)	List the different sources of errors in measurements and measuring instruments? Explain them brief.	7M	CO1	BL1
		OR			
2.	a)	Draw the generalized scheme of a typical measurement system and explain about various components of it.	7M	CO1	BL2
	b)	Explain about LVDT with a neat sketch.	7M	CO2	BL2
		UNIT–II			
3.	a)	Describe the working principle of Mcleod pressure gauge with neat sketch.	7M	CO3	BL1
	b)	Compare and contrast the advantages and limitations of resistance thermometers and thermistors.	7M	CO3	BL2
		OR			
4.	a)	Explain the working principle of ultrasonic flow meter.	7M	CO3	BL2
	b)	Why rotameter is called variable area flow meter? Describe its construction and working with a neat sketch.	7M	CO3	BL1
		UNIT–III			
5.	a)	What do you understand by a strain rosette? How is it used?	7M	CO4	BL1
	b)	Explain construction and working of hydraulic load cell.	7M	CO4	BL2
		OR			
6.	a)	Describe the tension measurement using strain gauge with neat sketch.	7M	CO4	BL1
	b)	Explain the construction, principle of working and advantages of Strain gauge accelerometer.	7M	CO4	BL2
		UNIT–IV			
7.	a)	Define gauge factor. Explain the factors which affect the gauge factor.	7M	CO5	BL1&BL2
	b)	What are the load cells? Explain the working principle of strain gauge load cell with a neat diagram.	7M	CO5	BL1
		OR			
8.	a)	Distinguish between bonded and unbounded strain gauges	7M	CO5	BL4
	b)	Explain the method of calibration of strain gauges.	7M	CO5	BL2
		UNIT–V			
9.	a)	Draw a block diagram of a typical closed loop system and explain its features.	7M	CO6	BL2
	b)	Define transfer function? List the steps to determine transfer function.	7M	CO6	BL1
		OR			

10. a) The open loop transfer function of a unity feedback control system is given by

$$G(s) = \frac{20}{s(s+2)}$$

Find the state error to the input function $r(t) = 1 + t + t^2$ 7M   CO6   BL1

   b) Represent the mathematical models for thermal systems with an example.   7M   CO6   BL3

END

III B.Tech. II Semester Supplementary Examinations January 2022
Applied Thermodynamics-III
(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) Sketch the Brayton cycle on p-V and T-s plots and derive a relation for its thermal efficiency in terms of pressure ratio. — 8M CO1 L2

   b) Discuss the effect of reheating, regeneration and intercooling on the performance of a gas turbine cycle. — 6M CO1 L2

OR

2. Differentiate turbojet and turbojet engines with suitable diagrams. — 14M CO1 L2

UNIT–II

3. a) Explain with neat sketch a Boot-strap cycle of air refrigeration system. — 10M CO1 L2

   b) List the merits and demerits of an air refrigeration system. — 4M CO1 L2

OR

4. Ammonia refrigeration system operates in a simple saturation vapour compression cycle to produce ice. The average temperature of condenser and evaporator are at 35^0C and -10^oC respectively. The plant produces 12 tons of ice everyday using available water at 30^oC. The ice produced is at -5^oC. Determine the following

   i) Cooling capacity of the plant in kW

   ii) Mass flow rate of refrigerant

   iii) Temperature of ammonia vapour at the discharge of the compressor

   iv) The compressor cylinder diameter and stroke, if its volumetric efficiency is 70% speed = 1500 rpm and L/D = 1.15.

   v) Theoretical power requirement of the compressor

   vi) Theoretical COP — 14M CO1 L3

UNIT–III

5. a) Explain the working of a simple ammonia-water absorption refrigeration system with the help of a neat sketch. — 10M CO2 L2

   b) Enumerate the required properties of an ideal refrigerant. — 4M CO2 L2

OR

6. a) Draw a neat diagram of Electrolux refrigerator and explain its working principle. 8M CO2 L2

   b) List the advantages of vapour absorption refrigeration system over vapour compression refrigeration system. 6M CO2 L2

UNIT–IV

7. The sling psychrometer in a laboratory test recorded the following readings :

   Dry bulb temperature = 35°C, Wet bulb temperature = 25°C.

   Calculate the following :

   (i) Specific humidity

   (ii) Relative humidity

   (iii) Vapour density in air

   (iv) Dew point temperature

   (v) Enthalpy of mixture per kg of dry air.

   Take atmospheric pressure = 1.0132 bar. 14M CO3 L3

OR

8. It is required to design an air-conditioning system for an industrial process for the following hot and wet summer conditions :

   Outdoor conditions ...... 32°C DBT and 65% R.H.

   Required air inlet conditions ...... 25°C DBT and 60% R.H.

   Amount of free air circulated ...... 250 m^3/min.

   Coil dew temperature ...... 13°C.

   The required condition is achieved by first cooling and dehumidifying and then by heating. Calculate the following :

   (i) The cooling capacity of the cooling coil and its by-pass factor.

   (ii) Heating capacity of the heating coil in kW and surface temperature of the heating coil if the by-pass factor is 0.3.

   (iii) The mass of water vapour removed per hour. 14M CO3 L3

UNIT–V

9. Explain the summer Air conditioning system and the winter air conditioning system with neat sketches. 14M CO4 L2

OR

10. Enumerate various methods of air conditioning duct design and explain in detail. 14M CO4 L2

END

III B.Tech. II Semester Supplementary Examinations January 2022

CAD/CAM
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Describe the product cycle followed in a CAD/CAM system   7M

   b) What are the designs related tasks performed by modern computer? Explain with block diagram   7M

OR

2. a) What database structure is implemented for a graphics modeling?   7M

   b) What is a geometric transformation? Explain any three geometric 2-D transformations   7M

UNIT–II

3. The coordinates of a triangle are P(50, 20), Q(110, 20) and R(80, 60). Determine the coordinates of the vertices for the new reflected triangle, if it is to be reflected about
   (i) X – axis
   (ii) Line y = x   14M

OR

4. a) What is the need for concatenation of transformations? Explain what care should be taken in such cases.   8M

   b) Describe briefly the following methods of surface modeling with a few application examples:
   i. Revsurf
   ii. Tabcyl
   iii. Bicubic surface
   iv. Bezier surface   6M

UNIT–III

5. a) What do you understand by the term Numerical Control? Explain briefly the functions that are expected to be served by NC in machine tools.   7M

   b) Discuss the advantages and limitations of open loop and closed loop controls.   7M

OR

6. a) Explain the APT statements:
   i) GOTO and GO/TO ii) GODLTA and GOBACK and iii) INTOL and OUTTOL.   7M

   b) With a neat sketch explain the Structure of CNC machine tools   7M

UNIT–IV

7. a) Discuss the importance of materials handling system in FMS.   7M

   b) Discuss the principle of variant process planning.   7M

OR

8. a) Discuss how group technology is used in designing manufacturing cells.   7M

   b) Sketch the layout of a typical FMS and explain the important subsystems.   7M

UNIT–V

9. a) Discuss the important benefits of computer-aided quality control.   7M

   b) Describe the features of a flexible inspection system.   7M

OR

10. a) Explain the method of part inspection using a CMM.   7M

    b) What are the different material handling systems used in industry? Discuss in details.   7M

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