Hall Ticket Number :										

R-15

Code: 5G563

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

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

OR

2. Find the shaft and hole dimensions with tolerance for a 90H8e9 pair given the following data:

   90 mm lies in the diameter step of 80 to 100mm

   Upper deviation for e shaft = -11 D^0.41

   (IT8 = 25i ; IT9= 40i)

UNIT–II

3. Distinguish between Line standards and End standards. Give examples of these two types of standards.

OR

4. a) Describe the method of using sine bar for measuring taper angle of plug gauges.

   b) Explain why the sine bar is not preferred for generating angles greater than 45^0.

UNIT–III

5. Define the terms "Primary texture" and "Secondary texture". Describe the essential mechanism of Talysurf machine with neat sketch.

OR

6. In the measurements of surface roughness the heights of 10 successive peaks and valleys over a datum line over a specified sampling length were found to be in micrometer

   Peaks: 45, 42, 40, 35, 35 Valleys: 30, 25, 25, 24, 18

   Find CLA and RMS?

UNIT–IV

7. What is CMM? Explain the types of CMM with neat sketches.

OR

8. Explain Parkinson Gear Tester with neat diagram.

UNIT–V

9. What is Surface treatment Process? And write down their characteristics and applications.

OR

10. Name the different alignment tests to be performed on a drilling machine.

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Hall Ticket Number :										

R-15

Code: 5G564

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

Applied Thermodynamics-III

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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

Use of refrigeration table is allowed

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UNIT–I

1. In a gas turbine cycle, having pressure ratio 4.0, air enters the compressor at 1.01 bar and 30°C. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The A:F ratio is 75:1. Air flow rate is 2.5 kg/s. Assuming the values of ratio of specific heats and specific heat at constant pressure for air 1.4 and 1.0 respectively and CV of fuel 42.0 MJ/kg, Calculate the IP and the thermal efficiency of the cycle. 14M

OR

2. Draw a schematic diagram of turbo jet engine and explain its working principle. Briefly discuss the advantages and disadvantages of a turbo jet engine. 14M

UNIT–II

3. A R-22 vapour compression refrigeration system of 3 TR capacity works within a pressure range of 0.25 MPa to 1.5 MPa. The refrigerant vapour enters the compressor at -5°C and leaves the condenser at 35°C. Calculate a) COP, b) swept volume of the compressor, assuming 80% volumetric efficiency, if the compressor runs at 600 rpm. 14M

OR

4. a) Explain why we need air conditioning in an aircraft. With a neat sketch explain the working principle of an aircraft refrigeration system. 10M

   b) Discuss how does the actual air refrigeration cycle deviate from ideal one. 4M

UNIT–III

5. Draw a neat sketch of a vapour absorption refrigeration system working on NH_3 – H_2O as the working fluid and write its working principle. 14M

OR

6. Discuss (with neat sketch) the working principle of a three-fluid refrigeration system. What is the role of the third fluid (inert gas) used. Why this system has not yet been commercialized. 14M

UNIT–IV

7. A sample of moist air at atmospheric pressure of 736 mm of Mercury has DBT 40°C and relative humidity 80%. Find the specific humidity, degree of saturation, dew point temperature, specific enthalpy and specific volume. 14M

OR

8. a) Write a brief note on classification of air conditioner. 7M

   b) Differentiate between RSHF and GSHF. Show these lines on a psychrometric chart. 7M

UNIT–V

9. a) With the aid of simple sketch, explain the working of any one type of air filter. 7M

   b) What is chemical dehumidifying process? Explain the process on a psychrometric chart. What are the dehumidifying materials used for the process. 7M

OR

10. a) Explain the working of any one of the atomizing the water type humidifier. 7M

    b) What is a heat pump? Write the working principle of a heat pump. Discuss some of its application. 7M

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Hall Ticket Number :										

R-15

Code: 5G562

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

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) Elaborate the significance of product cycle in the conventional manufacturing environment. 7M

   b) Emphasize the significance of layers in design of parts. 7M

OR

2. a) Recall various co-ordinate systems used in computer graphics and outline the role of UCS in geometric modeling. 10M

   b) Identify and summarize the significance of a memory device used in Computer. Further, how are these memory devices classified? 4M

UNIT–II

3. Differentiate between C-Rep and B-Rep solid representation schemes with reference to mathematical modeling, storage, applications, and limitations? 14M

OR

4. a) Summarize briefly about wireframe modeling? 7M

   b) Derive the Hermite bi-cubic curve equation in wire frame model? 7M

UNIT–III

5. a) Outline what are NC elements? Explain the features of NC machining center. 7M

   b) List the advantages and disadvantages of Numerical control of machine tools. 7M

OR

6. a) Paraphrase a short notes on Computer assisted part programming 4M

   b) Identify the role of manual part programming in CNC machines and illustrate the significance of G and M Codes in manual part programming? 10M

UNIT–IV

7. a) Briefly explain about OPITZ coding system generally used in GT. 7M

   b) Interpret the limitations of Group Technology? 7M

OR

8. How are materials handling systems classified? Elaborate the applications of AGVS with its advantages? 14M

UNIT–V

9. a) Demonstrate at least one contact and non-contact inspection methods used in. 7M

   b) Emphasize the advantages of CIM over conventional manufacturing. 7M

OR

10. a) Distinguish computer aided inspection and computer aided testing? 7M

    b) Underline the differences between primary and secondary material handling system? 7M

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Hall Ticket Number :										

R-15

Code: 5G565

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

Design of Machine Elements-II

(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) Discuss the types of bearing failure. 6M

   b) Design a journal bearing for a centrifugal pump with the following data:
   Diameter of the journal = 150 mm Load on bearing = 50 kN
   Speed of the journal = 900 rpm. 8M

OR

2. The following data is given for a 360° hydrodynamic bearing:
   Radial load = 3.2 kN Journal speed = 1500 rpm
   Journal diameter = 50 mm Bearing length = 50 mm
   Viscosity of lubricant = 25 cP.
   Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate:
   (i) Coefficient of friction (ii) Power lost in friction iii) Minimum oil film thickness
   iv) Flow requirement in litres/min and v) Temperature rise. 14M

UNIT–II

3. A single row deep grove ball bearing is used to support the lay-shaft of a four-speed automobile gearbox. It is subjected to loads in respective speed ratios as shown in table.
   The lay shaft is fixed to the engine shaft and rotates at 1750rpm. The static and dynamic carrying capacities of the bearing are 11600 and 17600N respectively. The bearing is expected to be use for 4000 hr of operation. Find out the reliability with which the life could be expected.

Gear	Axial load(N)	Radial load(N)	% time engaged
First gear	3250	4000	1%
Second gear	500	2750	3%
Third gear	50	2750	21%
Fourth gear	NIL	NIL	75%

14M

OR

4. a) List the advantages and limitations of Deep groove ball bearing. 4M

   b) A single-row deep groove ball bearing is subjected to a radial force of 8 kN and a thrust force of 4 kN. The shaft rotates at 1200 rpm. The expected life L_{10h} of the bearing is 20000 hours. The minimum acceptable diameter of the shaft is 75 mm. Select a suitable ball bearing for this application. 10M

UNIT–III

5. Determine the dimensions of small end and big end bearings of the connecting rod for a diesel engine with the following data:
   Cylinder bore = 100 mm Maximum gas pressure = 5 MPa
   l/d ratio for piston pin bearing = 2 and (l/d) ratio for crank pin bearing = 1.3.
   Allowable bearing pressure for piston pin bearing = 12 MPa
   Allowable bearing pressure for crank pin bearing = 7.5 Mpa. 14M

OR

6. Design a cast iron piston for a single-cylinder, four stroke engine, with the following data:

Cylinder bore = 105 mm Stroke = 1.4 X cylinder diameter
Maximum gas pressure = 5.2 N/mm^2 Mechanical Efficiency = 80%
Indicative mean effective pressure = 0.78 N/mm^2
Fuel consumption = 0.16 kg per brake power in kW per hour
Higher calorific value of fuel = 46300 kJ/kg Speed = 400 rpm
Temperature at piston centre = 425°C Temperature at piston edge = 225°C
Heat conductivity factor = 46.6 W/m/°C for CI
Heat dissipated through top = 5.5% of heat produced
Permissible tensile stress for piston = 30 MPa for CI
Pressure between rings and piston = 0.04 MPa
Permissible tensile stress in rings = 80 MPa
Permissible pressure on piston barrel = 0.4 MPa
Permissible pressure on piston pin = 18 MPa
Permissible tensile stress in piston pin = 90 MPa. 14M

UNIT–IV

7. a) A safety valve of 60 mm diameter is to blow off at a pressure of 1.2 N/mm^2. It is held on its seat by a close coiled helical spring. The maximum lift of the valve is 10 mm. Design a suitable compression spring of spring index 5 and providing an initial compression of 35 mm. The maximum shear stress in the material of the wire is limited to 500 MPa. The modulus of rigidity for the spring material is 80 kN/mm^2. Calculate: 1. Diameter of the spring wire, 2. Mean coil diameter, 3. Number of active turns, and 4. Pitch of the coil. 12M

b) Explain what you understand by A.M. Wahl's factor and state its importance in the design of helical springs? 2M

OR

8. Prove that the ratio of the driving tensions on the two sides of a pulley is

$$\frac{T_1}{T_2} = e^{\mu\theta}$$

Where, T_1 = Tension in the tight side of the belt, T_2 = Tension in the slack side of the belt, μ = Coefficient of friction between the belt and the pulley, and θ = Angle of contact in radians. 14M

UNIT–V

9. a) What is Pitting and Scoring in gear design. 2M

b) A 15 kW and 1200 r.p.m. motor drives a compressor at 300 r.p.m. through a pair of spur gears having 20° stub teeth. The centre to centre distance between the shafts is 400 mm. The motor pinion is made of forged steel having an allowable static stress as 210 MPa, while the gear is made of cast steel having allowable static stress as 140 MPa. Assuming that the drive operates 8 to 10 hours per day under light shock conditions, find from the standpoint of strength,

1. Module; 2. Face width and 3. Number of teeth and pitch circle diameter of each gear. Check the gears thus designed from the consideration of wear. The surface endurance limit may be taken as 700 MPa. 12M

OR

10. a) Write the advantages of helical gears over spur gear. 2M

b) A pair of helical gears with 30° helix angle is used to transmit 15 kW at 10000 r.p.m. of the pinion. The velocity ratio is 4:1. Both the gears are to be made of hardened steel of static strength 100 N/mm^2. The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module. Find the module and face width from the standpoint of strength and check the gears for wear. 12M

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Hall Ticket Number :										

R-15

Code: 5G561

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

Instrumentation and Control Systems

(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) Sketch and explain with a block diagram generalized measurement system and its elements with an example. 7M

   b) How errors are classified? Explain how errors can be reduced. 7M

OR

2. a) Sketch and explain Linear Variable Differential Transformer with a neat sketch 7M

   b) Sketch and explain Photo electric transducer. 7M

UNIT–II

3. a) Explain the working principle of McLeod pressure gauge. State advantages and disadvantages of McLeod pressure gauge 10M

   b) Explain working principle of thermocouples. 4M

OR

4. a) Explain the working of liquid in glass thermometers by means of neat sketch. List their advantages and disadvantages. 7M

   b) Explain the following vacuum gauges **i**) Thermocouple type thermal conductivity gauge and **ii**) Pirani gauge 7M

UNIT–III

5. a) How does a mechanical load cell work? Explain the principle of measuring shaft torque using strain gauge torsion meter? 7M

   b) Explain the function of a dummy gauge in a strain gauge load cell. 7M

OR

6. a) Explain the construction, principle of working and advantages of Strain gauge accelerometer. 7M

   b) Explain the following i) Hydraulic load cell ii) Strain gauge load cell 7M

UNIT–IV

7. a) Explain the two-arm and four-arm conditions used for strain measurements? 7M

   b) Describe the working principles of strain gauge bridge with sketch. Indicate their arrangements for measurement of torque on a circular shaft. 7M

OR

8. a) Explain one method of temperature compensation using an adjacent arm compensating gauge. 7M

   b) Explain any two methods of compensating temperatures for electrical resistance strain gauge. 7M

UNIT–V

9. a) What is closed loop system? Explain the various elements of it with a block diagram. 10M

   b) Distinguish between open-loop and closed loop control system. 4M

OR

10. a) With the help of block diagram explain how is the water level in a boiler controlled? 8M

    b) What is a servo mechanism? Explain its operation. 6M

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Hall Ticket Number :										

R-15

Code: 5G566

III B.Tech. II Semester Regular & Supplementary Examinations May 2019

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) Distinguish clearly between Management and Organization. CO1 7M

   b) Discuss various functions of Management. CO1 7M

OR

2. a) Describe Functional organization. Also explain about its merits and demerits. CO1 7M

   b) Explain about Taylor's contribution to scientific management. CO1 7M

UNIT–II

3 Explain clearly about various types of Production. CO2 14M

OR

4 The job of a project with respective time estimates are given in table below. Draw the network and determine the length of duration of the project.

Activity		1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
Estimated duration (days)	Optimistic	3	2	6	2	5	3	3	1	4
	Most likely	6	5	12	5	1	6	9	4	19
	Pessimistic	15	14	30	8	17	15	27	7	28

CO2 14M

UNIT–III

5. Illustrate with neat sketches various types of charts associated in conducting Method study. CO3 14M

OR

6. a) List and explain different types of allowances. Explain the steps involved in arriving at standard time, starting with observed time. CO3 7M

   b) An operator manufactures 50 jobs in 6 hours 30 min. If this time includes for setting his machine, calculate the operator's efficiency. What is the standard time if setting time is 35 min and production time per piece = 8 min? CO3 7M

UNIT–IV

7. a) Explain about the following:

   (i) Stores management (ii) Stores records CO4 7M

   b) Discuss about various inventory classification techniques. CO4 7M

OR

8. a) Explain about control chart for variables. CO4 7M

   b) Describe various types of Inspection with suitable example. CO4 7M

UNIT–V

9. Discuss in detail about the functions of Human Resource Management. CO5 14M

OR

10. a) Distinguish between Job evaluation and Merit rating. CO5 7M

    b) Explain briefly about product life cycle. CO5 7M

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