Hall Ticket Number :										

R-15

Code: 5G564

III B.Tech. II Semester Supplementary Examinations December 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)

****

UNIT–I

1. Describe briefly with the help of neat sketches and T-*s* diagrams, various methods employed for improvement of thermal efficiency of an open cycle gas turbine plant. 14M

OR

2. a) Briefly explain the working principle of Pulse Jet engine with a neat sketch 7M

   b) Write the basic differences between Propeller Jet and Turbojet engines. 7M

UNIT–II

3. a) Write the merits and demerits of vapour compression refrigeration system over air refrigeration system. 7M

   b) Discuss briefly with *T-s* and *P-h* charts, the effect of (i) Sub-Cooling and (ii) Super-Heating of refrigerant on performance of VCR system. 7M

OR

4. An ice plant produces 12 tonnes of ice per day at 0^oC using water at room temperature of 30^oC. Calculate the power rating of the compressor-motor if the COP of the plant is 3. Consider overall electro-mechanical efficiency of compressor-motor is 0.9.
   Consider latent of heat of freezing for water is 335 kJ/kg.
   Specific heat of water is 4.184 kJ/kgK 14M

UNIT–III

5. Describe the working of a LiBr-H_2O vapour absorption refrigeration system with a neat sketch 14M

OR

6. The generator, evaporator and ambient temperatures in a vapour absorption refrigeration system are 125^oC, -10^oC and 32^oC respectively. The actual COP is 55% of theoretical COP. If the plant capacity is 120 TOR, calculate the fuel consumption per hour. Consider calorific value of fuel is 42 MJ/kg. 14M

UNIT–IV

7. a) Describe the working of a winter air-conditioning system with a neat sketch. 7M

   b) Explain the following process with the help of psychrometric chart
   i) Sensible heating, ii) Heating and Dehumidification and iii) Cooling and Humidification. 7M

OR

8. a) Describe the working of a summer air-conditioning system with a neat sketch. 7M

   b) Explain the concepts of (i) RSHF and (ii) GSHF 7M

UNIT–V

9. What are the different impurities in atmospheric air? Briefly explain the effect of these impurities on human health. 14M

OR

10. Explain different methods of humidifying the air. Give their relative merits and demerits. 14M

***

Hall Ticket Number :										

Code: 5G562

R-15

III B.Tech. II Semester Supplementary Examinations December 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)

****

UNIT–I

1. a) Explain the basic structure and basic configuration of CAD/CAM software. 7M

   b) With a neat sketch, explain the working principle of Refresh display and DVST. 7M

OR

2. a) What is data base? Explain the popular database models with an example. 7M

   b) Discuss the concept of obtaining a rotation about an arbitrary point in XY plane. 7M

UNIT–II

3. a) What are the various types of curve fitting manipulation techniques? Explain them. 7M

   b) State the differences between C-rep and B-rep techniques of solid modeling. 7M

OR

4. A cubic Bezier curve is defined by the control points as (1, 3), (4, 5), (5, 7) and (8, 4). Find the equation of the curve and calculate the point at u=0.4 and u=0.6. 14M

UNIT–III

5. a) Discuss the different NC words used in part programming techniques. 7M

   b) Explain the basic feedback control system used in CNC machine tools. 7M

OR

6. a) With a block diagram explain main features of CNC machine tools. 7M

   b) Differentiate between manual part programming and computer aided part programming in CNC machines. 7M

UNIT–IV

7. a) How is tool life monitored in FMS? What are the major elements of FMS? 7M

   b) Discuss the principle and advantages of group technology coding. 7M

OR

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

   b) Compare variant and generative process planning methodologies. 7M

UNIT–V

9. a) What are the important sub-modules of a materials requirements planning software? 7M

   b) Explain CIM integration of all activities of industry 7M

OR

10. a) Discuss with neat sketches, the working principle of computer vision systems? 7M

    b) Discuss the major non-contact inspection methods. 7M

***

Hall Ticket Number :										

R-15

Code: 5G565

III B.Tech. II Semester Supplementary Examinations December 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)

****

UNIT–I

1. a) Enumerate the important physical characteristics of a good bearing material. 6M

   b) Describe the design procedure for a journal bearing. 8M

OR

2. Design a journal bearing for a centrifugal pump from the following data: Load on the journal=20000N, Speed of the journal=900rpm, Type of oil is SAE 10, for which the absolute viscosity at 55°C=0.017kg/m-s, Ambient temperature of oil = 15.5^{0}C, Maximum bearing pressure for the pump=1.5N/mm^2.Calculate also mass of the lubricating oil required for artificial cooling, if the rise of temperature of oil be limited to l0°C heat dissipation coefficient=1232W/m^2/°C. 14M

UNIT–II

3. a) What are the advantages of Rolling contact bearings over sliding contact bearings? 6M

   b) Explain the procedure used for designing of a rolling contact bearing. 8M

OR

4. a) Explain dynamic Load Rating for Rolling Contact Bearings under Variable Loads 6M

   b) A single-row deep groove ball bearing (6315) is subjected to a radial force of 8 kN and a thrust force of 3 kN. The values of X and Y factors are 0.56 and 1.5 respectively. The shaft rotates at 1200 rpm. (i) Estimate the life of this bearing, with 90% reliability. (ii) Estimate the reliability for 20 000 h life. 8M

UNIT–III

5. Describe the design procedure for the trunk type piston of an I.C.Engine. 14M

OR

6. Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore=100mm, stroke=125 mm, maximum gas pressure=5 N/mm^2, induced mean effective pressure=0.75 N/mm^2, mechanical efficiency=80%, fuel consumption=0.15 kg per BP per hour, higher calorific value = 42000 kJ/kg, speed=2000 rpm, assume suitable data if required and state the assumptions made. 14M

UNIT–IV

7. Design and draw a valve spring of a petrol engine for the following operating conditions:
   Spring load when the valve is open = 400 N
   Spring load when the valve is closed = 250 N
   Maximum inside diameter of spring = 25 mm
   Length of the spring when the valve is open= 40 mm
   Length of the spring when the valve is closed = 50 mm
   Maximum permissible shear stress = 400 MPa 14M

OR

8. A leather belt 9 mm × 250 mm is used to drive a cast iron pulley 900 mm in diameter at 336 r.p.m. If the active arc on the smaller pulley is 120° and the stress in tight side is 2MPa, find the power capacity of the belt. The density of leather may be taken as 980kg/m^3, and the coefficient of friction of leather on cast iron is 0.35. 14M

UNIT–V

9. a) What are the advantages of Spur gears? 4M

b) The pitch circle diameters of the pinion and gear are 100 mm and 300 mm respectively. The pinion is made of plain carbon steel 40C8 (S_{ut}=600 MPa) while the gear is made of grey Cast Iron FG 300 (S_{ut}=300 MPa). The pinion receives 5 kW power at 500 rpm through its shaft. The service factor and the factor of safety can be taken as 1.5 each. The face width of the gear can be taken as 10 times that of the module. Assume that the velocity factor accounts for the dynamic load. Determine (i) module and (ii) the number of teeth on the pinion and the gear. 10M

OR

10. a) Derive the Lewis equation for the beam strength of a gear tooth. 4M

b) Design a pair of helical gears to transmit power of 15 kW at 3200 rpm with speed reduction 4:1, pinion is made of cast steel 0.4% C–untreated. Gear made of high grade C.I. Helix angle is limited to 26^0 and not less than 20 teeth are to be used on eighter gear. 10M

***