

Code: 5G564

III B.Tech. II Semester Supplementary Examinations October 2020

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)

UNIT-I

1. a) Explain the working principle of gas turbine along with p-v and T-s diagrams. 7M
- b) The following data is refers to a closed cycle gas turbine plant
- | | |
|------------------------------------|----------------------------------------|
| Atmospheric Air temperature 27°C | Maximum temperature of the cycle 823°C |
| Pressure at compressor inlet 1 bar | Pressure ratio 4 |
| Compressor efficiency 80% | Turbine efficiency 85% |
| Heating value of fuel 41,800 kJ/Kg | Turbine efficiency 80% |
| Heater loss 10% of heating value | |
- Find. i. Work ratio ii. Turbine work iii. Compressor work iv. Heat supplied
- Assume the working substance is air, regard as simple gas with
- $C_p = 1 \text{ KJ/Kg } ^\circ\text{K}$ & $\gamma = 1.4$ 7M

OR

2. a) What is Ramjet? Explain the working of a Ramjet with a neat sketch. 7M
- b) A turbo-jet engine flying at a speed of 960 km/hr consumes air at the rate of 54.5 kg/s. Calculate
- Exit velocity of jet when the enthalpy change for the nozzle is 200 KJ/kg and velocity coefficient is 0.97.
 - Fuel flow rate in kg/s when air-fuel ratio is 75:1.
 - Thermal efficiency of the plant when the combustion efficiency is 93% and Calorific value of the fuel is 45000 KJ/kg. 7M

UNIT-II

3. A refrigerator working on Bell-Coleman cycle operates between pressure limits 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10°C. Air coming out of compressor is cooled at 30°C before entering the expansion cylinder. Expansion & compression follow the law $PV^{1.25} = \text{Constant}$. Determine the theoretical COP of the system. Take $\gamma = 1.4$ & $C_p = 1 \text{ kJ/kg K}$ for air. 14M

OR

4. a) Explain the simple vapour compression cycle with the help of T -s and p- h charts. 7M
- b) Discuss the use of sub cooled cycle in vapour compression refrigeration system. 7M

UNIT-III

5. With the help of a neat sketch explain the working of LiBr-water absorption refrigeration system 14M

OR

6. Discuss the merits and demerits of vapour absorption refrigeration system compared to vapour compression refrigeration system 14M

UNIT-IV

7. a) Explain the working of Winter Air conditioning with help of neat sketch 7M
- b) What are various factors requirement for human comfort 7M

OR

8. Explain the construction of psychrometric chart 14M

UNIT-V

9. Draw the 'Water to water Heat Pump' circuit and explain its working. 14M

OR

10. a) With the aid of simple sketch, explain the working of a centrifugal dust collector 7M
- b) Explain working of any one type of humidifier with a neat diagram? 7M

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III B.Tech. II Semester Supplementary Examinations October 2020

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)

UNIT-I

1. a) Discuss the selection of bearing parameters in the design of Journal bearings. 4M
- b) Design a journal bearing for a centrifugal pump from the following data :
Load on the journal = 20 000 N; Speed of the journal = 900 r.p.m.; Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.017 kg / m-s; Ambient temperature of oil=15.5°C ; Maximum bearing pressure for the pump = 1.5 N / mm². Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient = 1232 W/m²/°C. 10M

OR

2. a) Explain with reference to a neat plot the importance of the bearing characteristic curve 6M
- b) Enumerate the design procedure for sliding contact bearing? 8M

UNIT-II

3. a) Discuss the considerations in the design of Piston head. 4M
- b) A four stroke diesel engine has the following specifications :
Brake power=5 kW, Speed = 1200 rpm, Indicated mean effective pressure=0.35N/mm², Mechanical efficiency = 80 %.
Determine: i.bore and length of the cylinder ii. Thickness of the cylinder head and 3.Size of studs for the cylinder head. 10M

OR

4. a) Explain briefly about the whipping stress induced in the connecting rod. 4M
- b) Discuss briefly about the design procedure of a Connecting rod with a neat sketch. 10M

UNIT-III

5. Describe the procedure for the design of piston 14M

OR

6. Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm². The diameter of the piston is 100 mm ; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6 : 1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm² and 15 N/mm². The density of material of the rod may be taken as 8000 kg/m³ and the allowable stress in the bolts as 60 N/mm² and in cap as 80 N/mm². The rod is to be of I-section for which you can choose your own proportions. Use Rankine formula for which the numerator constant may be taken as 320 N/mm² and the denominator constant 1 / 7500 14M

UNIT-IV

7. a) Briefly explain the concept of surge in springs? 7M
- b) Design a helical compression spring for a maximum load of 1000 N for a deflection of 25mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm². 7M

OR

8. a) Distinguish between flat belt and V- belt drives? 7M
- b) A belt 100 mm wide and 10 mm thick is transmitting power at 1000 metres/min. The net driving tension is 1.8 times the tension on the slack side. If the safe permissible stress on the belt section is 1.6 MPa, calculate the maximum power that can be transmitted at this speed. Assume density of the leather as 1000 kg/m³.
Calculate the absolute maximum power that can be transmitted by this belt and the speed at which this can be transmitted. 7M

UNIT-V

9. a) What are the advantages of the Power screws? 4M
- b) A double-threaded power screw, with ISO metric trapezoidal threads, is used to raise a load of 300 kN. The nominal diameter is 100 mm and the pitch is 12 mm. The coefficient of friction at screw threads is 0.15. Neglecting collar friction, Calculate : (i) torque required to raise the load (ii) torque required to lower the load and (iii) efficiency of the screw. 10M

OR

10. a) Find an expression for h^2 for rectangular section. 4M
- b) Determine:
(i) position of neutral axis and (ii) maximum and minimum stresses when a curved beam of circular section of diameter 100 mm is subjected to pure bending moment of +11.5 kNm. The radius of curvature is 100 mm. 10M

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III B.Tech. II Semester Supplementary Examinations October 2020

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)

UNIT-I

1. Define Management and explain in detail, the evolution of management thought. 14M

OR

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

UNIT-II

3. a) What are the objectives of plant Layout? What are the factors affecting plant location? 8M

- b) Compare two types of production systems with advantages and limitations. 6M

OR

4. Explain in detail, the components of Project Management. 14M

UNIT-III

5. Define method study. What are the objectives and steps involved in it? 14M

OR

6. Explain the concept and different methods of performance rating. 14M

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. a) Define merit rating. What are the objectives of merit rating? 7M

- b) How is merit rating difference from job evaluation? 7M

OR

10. a) Differentiate between marketing and selling. 6M

- b) Explain product life cycle. 8M

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III B.Tech. II Semester Supplementary Examinations October 2020

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)

UNIT-I

1. a) Define
Tolerance, Allowance, Precision and Accuracy. 4M
- b) Differentiate between unilateral and bilateral system of limits and fits 10M

OR

2. A hole and mating shaft are to have a nominal assembly of size 50mm. The assembly is to have a maximum clearance of 0.15mm and a minimum clearance of 0.05mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the limits for both hole and shaft by using
 - i) Hole basis system
 - ii) Shaft basis system. 14M

UNIT-II

3. a) Distinguish between 'line standards' and 'end standards'. 6M
- b) Explain by means of a simple sketch the use of a sine bar as a sine center for testing the taper. 8M

OR

4. a) What are the measuring techniques employed for optical projector? 7M
- b) Discuss about the instruments used for flatness measurement. 7M

UNIT-III

5. List out the various mechanical comparators? Explain any one in detail with neat sketch. 14M

OR

6. a) Explain numerical assessment of surface roughness. What are the disadvantages to use CLA as compared RMS in the measurement of Surface roughness? 8M
- b) Explain why identical surface-roughness values do not necessarily represent the same type of surface. 6M

UNIT-IV

7. Describe briefly the method of measurement of tooth thickness by constant chord method. 14M

OR

8. Discuss briefly co-ordinate measuring machine. State the advantages and possible sources of errors in CMM. 14M

UNIT-V

9. Discuss with neatly drawn sketches the following tests on Lathe
 - a) Spindle center run out
 - b) Spindle taper bore run out.
 - c) Chuck run out.
 - d) Cross slide alignment. 14M

OR

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