R-20

Code: 20A351T

III B.Tech. I Semester Supplementary Examinations June 2023

Applied Thermodynamics
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
   2. In Part-A, each question carries **Two marks.**
   3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

1. Answer *all* the following short answer questions   (5 X 2 = 10M)   CO   BL

		CO	BL
a)	Write the primary requirements of steam generators	1	L1
b)	List the organs of steam condensing plant.	2	L2
c)	How are steam turbine classified?	3	L2
d)	Write the effects of operating variables on thermal efficiency	4	L1
e)	How are air conditioning systems classified?	5	L3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks   CO   BL

UNIT–I

2. Explain with the help of neat diagrams (i) Cochran boiler and (ii) Locomotive boiler.   12M   1   L4

OR

3. In a steam turbine steam at 20 bar, 360 ºC is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes, find per kg of steam the network and the cycle efficiency.   12M   1   L2

UNIT–II

4. A surface condenser deals with 13000 kg of steam per hour. The leakage air in the system amounts to 1 kg per 2700 kg of steam. The vacuum in the air pump suction is 705 mm of mercury (barometer 760 mm of Hg) and temperature is 34.6 ºC. Determine the discharging capacity of the wet air pump which removes both air and condensate in m³ per minute, taking the volumetric efficiency as 90 %. If the air pump is single acting and runs a 60rpm and piston stroke is 1.25 times the diameter of the pump, find the dimensions of the wet air pump.   12M   2   L4

OR

5. In a steam nozzle, the steam expands from 4 bar to 1 bar. The initial velocity is 60 m/s and the initial temperature is 200 ⁰C. Determine the exit velocity if the nozzle efficiency is 92%   12M   2   L2

UNIT–III

6. Explain with neat sketch for the following; (i) throttle valve and (ii) nozzle valve.   12M   3   L2

OR

7. The following particulars relate to a two-row velocity compounded impulse wheel: steam velocity at the nozzle outlet = 650 m/s, Mean blade velocity = 125 m/s, Nozzle outlet angle =16 ⁰, Outlet angle, first row of moving blades = 18⁰, Outlet angle, fixed guide blades=22⁰, Outlet angle, second row of moving blades = 36⁰, steam flow = 2.5 kg/s. The ratio of the relative velocity at outlet to that at inlet is 0.84 for all blades. Determine the following: i) The axial thrust on the blades, (ii) the power developed, (iii) the efficiency of the wheel   12M   3   L4

UNIT–IV

8. In a constant pressure open cycle gas turbine air enters at 1 bar at 20 ⁰C and leaves the compressor at 5 bar. Using the following data: Temperature of gases entering the turbine = 680⁰C, pressure loss in the combustion chamber = 0.1 bar ₍compressor₎ = 85%, ₍turbine₎=80%, ₍combustion₎ = 85 %, = 1.4, cp = 1.024 kJ/kg K for air and gas, find (i) the quality of air circulation if the plant develops 1065 kW, (ii) heat supplied per kg of air circulation and (iii) the thermal efficiency of the cycle. Mass if the fuel may be neglected.   12M   4   L5

OR

9. A turbo jet engine consumes air at the rate ofr 60.2 kg/s when flying at a speed of 1000 km/h. Calculate: (i) Exit velocity of the jet when the enthalpy change for the nozzle is 230 kJ/kg and velocity co-efficient is 0.96. (ii) Fuel flow rate in kg/s when air fuel ratio os 70:1, (iii) Thrust specific fuel consumption , (iv) Thermal efficiency of the plant when the combustion efficiency is 92% and calorific value of the fuel used is 42000 kJ/kg, (v) Overall efficiency, (vi) Propulsive power and (vii) Propulsive efficiency.   12M   4   L2

UNIT–V

10. Describe a simple vapour compression cycle giving clearly its flow diagram.   12M   5   L2

OR

11. Enumerate the main parts of the equipments in the conditioning cycle with neat diagram   12M   5   L3

*** End ***

R-20

Code: 20A353T

III B.Tech. I Semester Supplementary Examinations June 2023

Design of Machine Elements - II

(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
      2. In Part-A, each question carries **Two marks.**
      3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

1. Answer **all** the following short answer questions   (5 X 2 = 10M)

		CO	BL
a)	What are the commonly used materials for flat belts?	CO1	L2
b)	What are the commonly used materials for sliding contact bearings?	CO2	L2
c)	Define static load carrying capacity of ball bearing.	CO3	L1
d)	How the number of teeth affect the design of gear?	CO4	L2
e)	What is the function of crank in I.C Engine?	CO5	L2

PART-B
Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL

UNIT–I

2. a) V-Belt drive consists of three V- belts in parallel on grooved pulleys of the same size. The angle of the groove is 30° and the coefficient friction is 0.12. The cross sectional area of each belt is 800 mm² and the permissible safe stress in the belt material is 3MPa. Calculate the power that can be transmitted between two pulleys 400 mm in diameter rotating at 960 rpm.   **10M CO1 L4**

  b) How V-belt is specified?   **2M CO1 L2**

OR

3. a) What is the function of a spring?   **2M CO1 L2**

  b) A spring loaded safety valve for a boiler is required to blow-off at a pressure of 1.5 N/mm², the diameter of the valve is 60 mm. Design a suitable compression spring for the safety valve, assuming spring index to be 6 and 25 mm initial compression. The maximum lift of the valve is 15 mm, the shear stress in the spring material is to be limited to 450 MPa. Take G= 0.84×10^5 MPa.   **10M CO1 L4**

UNIT–II

4. a) Write down Mckee's equation for coefficient of friction/   **2M CO2 L2**

  b) Design a journal bearing for a centrifugal pump to the following specifications. Diameter of Journal: 75 mm, Speed of journal : 1140 rpm. Load on each journal : 11500 N.   **10M CO2 L6**

OR

5. a) What are the commonly used bearing materials?   **2M CO2 L2**

  b) A 75 mm journal bearing 100 mm long is subjected to 2.5 kN at 600 rpm. If the room temperature is at 24°C, what viscosity of oil should be used to limit the bearing temperature at 55°C? Take d/c=1000.   **10M CO2 L6**

UNIT–III			

6. a) Define static load carrying capacity of a rolling contact bearing. | 2M | CO3 | L2

 b) Selecta single row deep groove ball bearing for a radial load of 4000N and an axial load of 5000N, operating at a speed of 1600 rpm for an average life of 5 years at 10 hours per day. Assume uniform and steady load | 10M | CO3 | L6

OR

7. a) A ball bearing is operating on a work cycle consists of three parts.

    i) A radial load of 3000N at 1440 rpm for ¼ cycle

    ii) A radial load of 5000N at 720 rpm for ½ cycle

    iii) A radial load of 2500N at 1440 rpm for the remaining cycle.

  The expected life of the bearing is 10,000 hrs. Calculate the dynamic load carrying capacity of the bearing. | 10M | CO3 | L6

 b) Define dynamic load carrying capacity of rolling contact bearing. | 2M | CO3 |

UNIT–IV			

8. a) Why dedendum value is more than the addendum value? | 2M | CO4 | L2

 b) Design a spur gear pair to transmit a 1.5 kW at 1440 rpm from an electric motor to an air-compressor running at 720 rpm. Take the working life as 10,000 hrs. | 10M | CO4 | L6

OR

9. a) State the applications of gear drives. | 2M | CO4 | L1

 b) A pair of helical gears with 23^0 helix angle is to transmit 2.5 kW at 1000 rpm of the pinion. The velocity ratio is 4:1. The pinion is to be forged steel and the driven gear is be cast steel. The gears are made of 20^0 full depth involute form and the pinion is to have 24 teeth. Design gear drive. | 10M | CO4 | L6

UNIT–V			

10. a) What are the commonly used piston materials? | 2M | CO5 | L2

 b) Design a cast iron piston for a single acting four stroke diesel engine for the following data:

  Cylinder bore: 100 mm, stroke length: 120 mm, Max. Gas pressure : 6MPa, BMEP : 0.7MPa, Fuel consumption : 0.24 kg/kW/hr. Distance of the bearing from the center of the crank pin is 350mm, Design stress for crankshaft and crank pin=35 n/mm^2, Design tensile stress for crankshaft and key: 65N/mm^2. | 10M | CO5 | L6

OR

11. a) What are the manufacturing methods for the crank shaft? | 2M | CO5 | L2

 b) Design an overhang crank shaft for a steam engine to the following specifications. Diameter of the piston: 400 mm, stroke of the piston: 600 mm, Max. steam pressure : 10N/mm^2, the speed of the engine: 100 rpm, | 10M | CO5 | L6

*** End ***

Code: 20A55FT

R-20

III B.Tech. I Semester Supplementary Examinations June 2023

Data Structures using Python
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
      2. In Part-A, each question carries **Two marks.**
      3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

1. Answer *all* the following short answer questions   (5 X 2 = 10M)

		CO	BL
a)	Summarize amortized analysis of dynamic arrays in python.	1	L2
b)	Explain the functionality of queue ADT with real-time example.	2	L2
c)	List the properties of recursion.	3	L1
d)	List the properties of binary search tree.	4	L1
e)	Define trie.	4	L1

PART-B
Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.		Explain array based sequences in python with suitable examples.	12M	1	L2
		OR			
3.	a)	Explain the concept of compact array in python.	6M	1	L2
	b)	Discuss Referential Arrays with a suitable example.	6M	1	L2
		UNIT–II			
4.	a)	Implement Queue ADT using single linked list.	6M	2	L2
	b)	Write a program to check whether the parenthesis is balanced or not using stack.	6M	1	L4
		OR			
5.	a)	Define and Explain stack ADT.	4M	1	L2
	b)	Write a program for insertion and deletion a node in the middle of the list for double linked list.	8M	2	L4
		UNIT–III			
6.		Write the program for Quick sort to sort the list of elements shown below in ascending order 23 11 34 77 8 66 50 43	12M	2	L2
		OR			
7.	a)	Write a program to implement exponentiation operation using recursion.	6M	3	L3
	b)	Draw the recursion trace for computing factorial(5).	6M	2	L3
		UNIT–IV			
8.		Implement sorting using Priority Queues.	12M	3	L3
		OR			
9.		Explain the construction of Binary search tree with an example.	12M	4	L3
		UNIT–V			
10.		Explain graph traversals with suitable example.	12M	3	L3
		OR			
11.		Illustrate the algorithm for Knuth-Morris-Pratt with a suitable example.	12M	4	L4

*** End ***

Code: 20A35CT

R-20

III B.Tech. I Semester Supplementary Examinations June 2023
Industrial Management
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
     2. In Part-A, each question carries **Two marks.**
     3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

1. Answer *all* the following short answer questions   (5 X 2 = 10M)   CO   BL

a) List various functions of management.   1   L1

b) State various objectives of plant layout.   2   L1

c) Difference between method study and work measurement   3   L2

d) Explain the importance of project crashing.   4   L2

e) List the functions of HRM.   5   L1

PART-B
Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

                                                                    Marks   CO   BL

UNIT–I

2. a) What do you mean by management? Explain Fayol's principles of management.   6M   1   L1

   b) Illustrate Maslow's Hierarchy of human needs in brief.   6M   1   L4

OR

3. a) What are the advantages and disadvantages of decentralization?   6M   1   L1

   b) Describe merits and demerits of matrix organization.   6M   1   L2

UNIT–II

4. a) Compare rural and urban sites with respect to a plant location.   5M   2   L5

   b) What are the different types of plant layouts? Discuss their merits and
      demerits?   7M   2   L1

OR

5. a) Derive the formula for determining EOQ for inventory model with uniform
      demand   5M   2   L6

   b) What is Inventory control? What are the functions of inventory control? 7M   2   L2

UNIT–III

6. a) Name various types of charts available for recording the data in method
      study. Explain any one in detail   8M   3   L2

   b) A time study was made of an existing job to develop new time standards.
      The worker was observed for 30 minutes during which he made 20 units.
      He was rated at 90% by the analyst. The firm's allowance for rest and
      personal time is 12%.
      (i) What is the normal time for the task?
      (ii) What is standard time for the task?   4M   3   L3

OR

7. a) Explain the procedure involved in conducting work sampling study. 6M 3 L2
    b) What is marketing mix? Discuss the factors which determine the marketing mix. 6M 3 L1

UNIT–IV

8. The characteristics of project schedule are as given below:

Activity	Time (days)	Activity	Time (days)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	5	8-10	5
4-9	6	9-10	7

From the above data (i) construct a PERT network (ii) Compute earliest and latest expected time for each event (iii) Find critical path 12M 4 L3

OR

9. The following table lists the jobs of a network along with their time estimates.

jobs		Duration(days)		
i	j	Optimistic	Most likely	Pessimistic
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	5	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

i) Draw the project network.
ii) Calculate the length and variance of the critical path and
iii) What is the probability that the jobs on the critical path will be completed in 41 days? 12M 4 L3

UNIT–V

10. a) Define the job evaluation. Explain the importance and objectives of job evaluation 8M 5 L2
    b) Standard time for a given job is 15 hours. Calculated rate of wages is Rs.5. If a worker completes the job in 10 hours, calculate the total earnings of the worker by the Rowan plan. 4M 5 L3

OR

11. a) Explain the goals and objectives of strategic management 6M 5 L2
    b) List the advantages and limitations of SWOT analysis 6M 5 L1

*** End ***