Regulation R18 Subject code: 2P6CB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Supplementary Examinations, February 2024

Heat Transfer

(Mechanical Engineering)

Maximum Marks: 70 Date:20.02.2024 **Duration: 3 Hours**

Note: **1. This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 10 questions. Answer any 5 questions which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A		
All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	What is the convection mode of heat transfer?	CO1	L1
2	What are the applications of heat transfer?	CO1	L1
3	What is the function of fin?	CO2	L1
4	What is critical radius of insulation?	CO2	L1
5	Differentiate the free and forced convection.	CO3	L2
6	What are the advantages of dimensional analysis?	CO3	L1
7	What is film wise condensation?	CO4	L1
8	What is the concept of shape factor?	CO4	L1
9	What is the difference between regenerator and recuperator?	CO5	L1
10	What are the advantages of NTU method over the LMTD method?	CO5	L1
	Part-B		
Answer all the questions (5X10M=50Marks)			
11	A Stainless-steel plate is of 2 cm thick is maintained at a temperature of 550^0C at one face and 50^0C on the other. The thermal conductivity of stainless steel at 300^0C is 19.1 W/m K. Calculate the heat transferred through the material per unit area? [10]	CO1	L4
	OR		
12	Derive the general conduction equation for Cylindrical co-ordinate system? [10]	CO1	L3
13	Briefly describe about lumped heat capacity system. Give its examples. [10]	CO2	L2
	OR		
14	Derive the heat conduction through composite sphere? [10]	CO2	L3
15	The resistance R experienced by a partially submerged body depends upon the velocity V, length of the body l, viscosity of the fluid μ, density of the fluid ρ and gravitational acceleration g. Obtain a dimensionless expression for R by using Buckingham π-method? [10]	CO3	L4
	OR		
16	Derive the heat dissipation from an infinitely long fin? [10]	CO3	L3

17	Determine the heat transfer rate by free convection from a plate 0.3m × 0.3m for which one surface is insulated and the other surface is maintained at 1100C and exposed to atmosphere air at 300C for the following arrangements: a) The plate is vertical b) The plate is horizontal with the heating surface facing up c) The plate is horizontal with the heating surface facing down. [10]	CO4	L4
	OR		
18	Hot oil (cp = 2.09 kJ/kg K) flows through a counter flow heat exchanger at the rate of 0.7kg/s. It enters at 200^0C and leaves at 70^0C. The cold oil (cp = 1.67 kJ/kg K) exits at 150^0C at the rate of 1.2 kg/s. Determine the surface area of the heat exchanger required for the purpose if the overall heat transfer coefficient is 650W/m^2K. [10]	CO4	L4
19	Two perfectly black parallel planes 1.2 by 1.2 m are separated by a distance of 1.2 m. one plane is maintained at 800 K and the other at 500 K. The plates are located in a large room whose walls are at 300K. What is the net heat transfer between the planes? [10]	CO5	L4
	OR		
20	Define absorptivity, reflectivity and transmissivity. [10]	CO5	L2