R18 Regulation *Subject code: 2P6CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, June 2024

HEAT TRANSFER

(ME)

Maximum Marks: 70 Date:24.07.2024 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 5 Units. Answer any one full question from each unit.
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)

		Marks	CO	Blooms Tx
1	What is heat flux?	2	1	L1
2	Define thermal conductivity.	2	1	L1
3	What is the difference between the fin effectiveness and the fin efficiency?	2	2	L1
4	Define Biot number.	2	2	L1
5	What is forced convection?	2	3	L1
6	Define incompressible flow and incompressible fluid.	2	3	L1
7	What is the difference between evaporation and boiling?	2	5	L1
8	Name the different boiling regimes in the order they occur in a vertical tube during flow boiling.	2	5	L1
9	Write about parallel flow heat exchanger?	2	4	L1
10	Define effectiveness of a heat exchanger.	2	4	L1

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11	a) Distinguish between the basic laws of heat transfer with examples? b) An insulated pipe of 50 mm outside diameter is laid in a room at 30 0C. If the surface temperatures is 250 0 C and the convective heat transfer coefficient is 10 W/m2K. Calculate the heat loss per unit length of pipe.	5 5	1	L2
	OR			
12	Derive general conduction equation in Cartesian coordinates.	10	1	L2
13	Derive expression for critical thickness of insulation for a sphere .	10	2	L2
	OR			

14	A tube 2 cm. O.D maintained at uniform temperature of Ti is covered with insulation (k=0.20 W/m K) to reduce heat loss to the ambient air Tα with ha=15W/m2K. Find i) the critical thickness rc of insulation (ii)the ratio of heat loss from the tube with insulation to that without insulation, (a) if the thickness of insulation is equal to rc.	10	2	L2
15	a) Differentiate between Newtonian and Non Newtonian fluids. Give examples b) what do you mean by laminar and turbulent boundary layers.	5 5	3	L2
	OR			
16	A 0.15m outer diameter. steel pipe lies 2m vertically and 8m horizontally in a large room with an ambient temperature of 300C. The pipe surface is at 2500C and has an emissivity o f 0.60. Estimate The total rate of heat loss from the pipe to the atmosphere	10	3	L2
17	Derive the expression for NTU	10	4	L2
	OR			
18	a) Classify heat exchangers b) What are shell and tube heat exchangers	5 5	4	L2
19	a) Differentiate between Opaque body and black body b) Differentiate between Nucleate boiling and film boiling.	5 5	5	L2
	OR			
20	Analyse what do you mean by absorptivity , reflectivity and transmissivity.	10	5	L2