R20 Regulation *Subject code:3P6CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, May 2025

HEAT TRANSFER

(ME)

Maximum Marks: 70 Date: 18.06.2025 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	BTL
1	What is mean by conduction heat transfer?	2M	1	L1
2	Define boundary conditions.	2M	1	L1
3	What is the function of insulating materials?	2M	2	L1
4	Give examples for Transient heat transfer.	2M	2	L1
5	What is meant by periodic heat transfer?	2M	3	L1
6	Differentiate between laminar and turbulent flow.	2M	3	L1
7	What is mean by drop wise condensation?	2M	4	L1
8	Define black body.	2M	4	L1
9	Define regenerator and recuperator.	2M	5	L1
10	What are the advantages of NTU method over the LMTD method?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Explain the respective rate equations governing conduction, convection and radiation.	10M	1	L2
	OR			
12	Derive the general conduction equation for Cylindrical co-ordinate system.	10M	1	L2
13	Derive the heat conduction through composite cylinder.	10M	2	L2
	OR			
14	A steel cylinder of diameter 0.25 m and length 0.8 m initially at 35^0 C is placed in a furnace where the temperature is 900^0 C. Determine the temperature at the centre and on the surface of the cylinder after a lapse of 1 hr. (Assume thermal conductivity = 35 W/mk, density = 7800 kg/m^3, specific heat = 0.83 kJ/kg k, heat transfer coefficient = 233 W/m^2 k).	10M	2	L2
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?	10M	3	L2

	OR			
16	Derive the heat dissipation from an infinitely long fin.	10M	3	L2
17	A vertical cylinder 5 cm diameter and 1 m high is maintained at a temperature of 65^0 C in atmosphere of air at 15^0 C. Calculate the rate of heat loss by free convection from the cylinder to air.	10M	4	L2
	OR			
18	In a counter flow double pipe heat exchanger, water is heated from 25^0C to 65^0C by oil with a specific heat of 1.45kJ/kg-K and mass flow rate of 0.9kg/s. the oil is cooled from 230^0C to 160^0C. If overall heat transfer coefficient is 420W/m^2 -K. Calculate the rate of heat transfer, mass flow rate of water and surface area of heat exchanger?	10M	4	L2
19	Define shape factor. Derive the expression for shape factor between two black bodies.	10M	5	L2
	OR			
20	What is Stefan Boltzman Law? Explain the concept of total emissive power of a surface.	10M	5	L2