R20 Regulation *Subject code: 3P6CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, April 2026

HEAT TRANSFER

(ME)

Maximum Marks: 70 Date: 16.04.2026 Duration: 3 hours

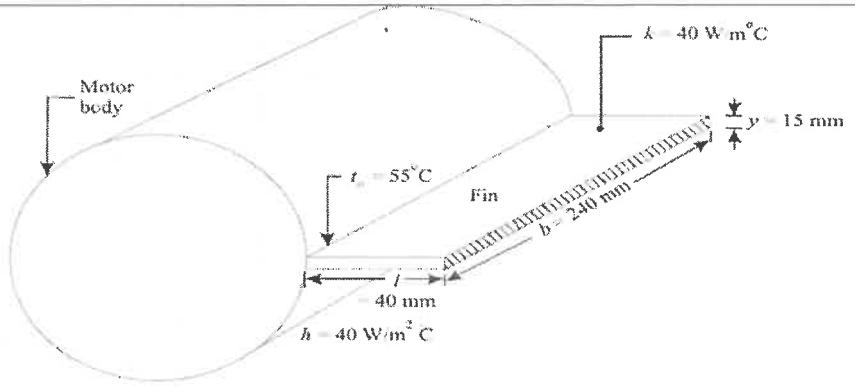
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

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	Give examples for initial'& boundary conditions?	2M	1	L1
3	What is the function of insulating materials?	2M	2	L1
4	State Newtons law of cooling.	2M	2	L1
5	What are Biot and Fourier numbers?	2M	3	L1
6	What is meant by lumped heat analysis?	2M	3	L1
7	What are the types of condensation processes?	2M	4	L1
8	What is the range of effectiveness of a heat exchanger?	2M	4	L1
9	What are the various radiation properties?	2M	5	L1
10	What is radiation shape factor?	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 expression for temperature distribution under one dimensional steady state heat conduction for a cylinder.	10M	2	L2
	OR			
14	Derive the heat conduction through composite sphere.	10M	2	L2
15	A motor body is 360 mm in outside diameter and 240 mm long. Its surface temperature should not exceed 55^0C when dissipating 340 W. Longitudinal fins of 15 mm thickness and 40 mm height are proposed. The convective coefficient is 40 W/m^{20}C. Determine the number of fins required. Atmospheric temperature is 30^0C. Thermal conductivity=40 W/m^0C	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	Derive the equation for parallel flow heat exchanger using NTU method.	10M	4	L2
19	Define shape factor. Derive the expression for shape factor between two black bodies.	10M	5	L2
	OR			
20	a) Explain the different stages of boiling with neat sketch. b) A wire of 1.2 mm diameter and 200 mm length is submerged horizontally in water at a 7 bar. The wire carries a current of 135 A with an applied voltage of 2.18 V. If the surface of the wire is maintained at 300^0C, calculate: i. The heat flux ii. The boiling heat transfer coefficient	5M 5M	5	L2