R18 Regulation *Subject code:2P6CB*

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: 18.04.2026 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	Define temperature gradient.	2M	1	L1
2	What are the different modes heat transfer?	2M	1	L1
3	Define heat flux.	2M	2	L1
4	What is critical radius of insulation?	2M	2	L1
5	Define effectiveness of the fin.	2M	3	L1
6	Define thermal capacity.	2M	3	L1
7	What is mean by drop wise condensation?	2M	4	L1
8	What is the function of insulating materials?	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	Derive the general conduction equation for Cylindrical co-ordinate system.	10M	1	L2
	OR			
12	State and explain Fourier's law of conduction and also write its assumptions and features.	10M	1	L2
13	Derive the heat conduction through composite sphere.	10M	2	L2
	OR			
14	Briefly describe about lumped heat capacity system. Give its examples	10M	2	L2
15	Derive the heat dissipation from a fin insulated at the tip.	10M	3	L2
	OR			
16	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
17	A vertical cylinder 2.5 m high and 190 mm in diameter is maintained at 80^0 C in an atmospheric environment of 20^0C. Calculate heat loss by free convection	10M	4	L2

	from the surface of the cylinder. Assume properties of at mean temperature as ρ = 1.16 kg/m^3 , υ = 16.97x10-6 m^2 /s, c_p = 1.007 kJ/kg^{0}C and k = 0.1042 kJ/mh^{0}C			
	OR			
18	Derive the equation for parallel flow heat exchanger using NTU method.	10M	4	L2
19	Derive the expression for shape factor between two black bodies.	10M	5	L2
	OR			
20	a) Define absorptivity, reflectivity and transmissivity. b) Two large parallel plates of emissivities 0.9 and 0.6 are at temperatures 627^0 C and 77^0 C respectively. A radiation shield of aluminium sheet of emissivity 0.4 is placed between two plates. Determine the shield temperature and the heat transfer rate per unit area. With the presence of the shield.	3M 7M	5	L2