



Regulation R17

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 1P6CC

B.Tech VI Semester Supplementary Examinations, January 2023

HEAT TRANSFER (Mechanical Engineering)

Maximum Marks: 70

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)

- 1 What is the convection mode of heat transfer?
- 2 What are the applications of heat transfer?
- 3 What is the function of fin?
- 4 What is critical radius of insulation?
- 5 Differentiate the free and forced convection.
- 6 What are the advantages of dimensional analysis?
- 7 What is fouling factor?
- 8 Why drop wise condensation is preferred to film wise condensation?
- 9 Define Stefan Boltzmann constant?
- 10 List out the applications of heat exchangers?

Part-B

Answer all the questions

(10MX 5=50Marks)

- 11 A Stainless-steel plate is of 2 cm thick is maintained at a temperature of 550°C at one face and 50°C on the other. The thermal conductivity of stainless steel at 300°C is 19.1 W/m K . Calculate the heat transferred through the material per unit area? [10]
- OR
- 12 Derive the general conduction equation for Cartesian co-ordinate system? [10]
- 13 Briefly describe about lumped heat capacity system. Give its examples. [10]
- OR
- 14 A steel cylinder of diameter 0.25 m and length 0.8 m initially at 25°C is placed in a furnace where the temperature is 1000°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 = $233 \text{ W/m}^2 \text{ k}$). [10]
- 15 Derive the heat dissipation from a fin insulated at the tip? [10]
- OR
- 16 Explain the procedure to form dimensionless groups by using Buckingham-pi theorem?

- 17 A vertical cylinder 5 cm diameter and 1 m high is maintained at a temperature of 65°C in atmosphere of air at 15°C . Calculate the rate of heat loss by free convection from the cylinder to air. [10]

OR

- 18 a) Classify heat exchangers. [5]
b) What are shell and tube heat exchangers. [5]
- 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]
- OR
- 20 Define absorptivity, reflectivity and transmissivity? [10]