



Regulation R18

Subject code:2P6CB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, January 2023

HEAT TRANSFER (Mechanical Engineering)

Maximum Marks: 70

17/01/23

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]