Regulation: R17 **Subject code: 1P6CC**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Year II Semester Regular Examinations, October 2020

HEAT TRANSFER

(Mechanical Engineering)

Maximum Marks: 70 Date:31.10.2020 **Duration: 2 Hours**

Part-A

All the following questions carry equal marks **(10x1M=10 Marks)**

1 What is Radiation?
2 What is the formula for Newton's law of cooling?
3 What is fin effectiveness?
4 What is the mode of heat transfer from fin to air?
5 What is forced convection?
6 What is turbulent flow?
7 Expand LMTD.
8 What is heat exchanger?
9 What is boiling?
10 Define Emissive Power.

Part-B

Answer **ANY FIVE QUESTIONS** **(12MX 5=60Marks)**

11 A Stainless steel plate is of 2 cm thick is maintained at a temperature of 550^0C at one face and 50^0C on the other. The thermal conductivity of stainless steel at 300^0C is19.1 W/m K. Calculate the heat transferred through the material per unit area.

12 Derive general heat conduction equation in Cartesian coordinates?

13 What is critical thickness of insulation? Derive expression for critical thickness of insulation for a sphere.

14 A tube 2 cm. O.D maintained at uniform temperature of Ti is covered with insulation (k=0.20 W/m K) to reduce heat loss to the ambient air Tα with h=15W/m^2K. Find i) the critical thickness r_c of insulation (ii)the ratio of heat loss from the tube with insulation to that without insulation, if the thickness of insulation is equal to r_c.

15 a) Differentiate between Newtonian and Non Newtonian fluids. Give examples. (6M)
b) What do you mean by laminar and turbulent boundary layers? (6M)

16 A flat plate 1 m wide and 1.5 m long is to be maintained at 90 ^{0}C in air when free stream temperature is 10 ^{0}C. Determine the velocity at which air must flow over the plate so that the rate of energy dissipation from the plate is 3.75 kW.

17 Derive LMTD for parallel flow heat exchangers.

18 Derive NTU of parallel flow heat exchangers.

19 What is shape factor? Obtain the expression for it.

20 What is boiling? Explain different boiling regimes in detail.