paper code : U359-153(T1)

# October 2019/INSEM (T1)
# T. Y. B. TECH. (PROGRAM) (SEMESTER -I)
## COURSE NAME: Heat Transfer CODE: MEUA31173
## (PATTERN 2017)

Time: [**1Hour**] [Max.Marks: **30**]

**SOLUTION – AND MARKING SCHEME**

Q.1) a) [6]

Ans-

Figure- ----------1 mark

Overall Heat transfer coff. = U = 1..186 W/ $m^2$.K---------- 2 mark

Overall heat transfer = 39.28 Watt /$m^2$----------3 mark

b) Ans- [6]

Figure----------1 mark

Heat loss per meter length of pipe- 544.17 Watt.---------- 2 mark

Temperature at the interface. Q= HA(T1-T2), T2 = 199.25°C- 3 mark

c) i) State Fourier's Law of Heat Conduction with its mathematical equation. ----------2 mark [4]

ii) Define Thermal Conductivity. ----------2 mark

**OR**

Q.2) a) Ans- [6]

Heat transfer without insulation – Q = HA($\Delta$T) =

Q = 23.37 Watt---------- 1 mark

Heat transfer with insulation = Q = 27.02 Watt ---------- 1 mark

Percentage rise in heat dissipation = 15.64 %---------- 2 mark

Percentage increase in current carrying capacity = 7.33%--2 marks

b) Ans- [6]

Fig----------1 mark

Resistance conduction = 0.053 °K/Watt ---------- 1 mark

Resistance convection = 0.187 °K/Watt ---------- 1 mark

Temperature T1 = 301 °C ---------- 1 mark

Temperature T2 = 241.70°C ---------- 2 mark

c) Explanation. [4]
i) Thermal Diffusivity---------- 2 mark
ii) Thermal Contact Resistance---------- 2 mark

Q.3) a) Fig---------- 1 mark [6]
Heat loss from the rod---------- 2 mark
M = 2.053 ---------- 2 mark
Length of fin = 1.28 m ---------- 1 mark

b) M = 25.82----------1 mark [4]
Q = 3.66 Watt----------1 mark
Tip Temperature – 65.8 °C ----------1 mark
Fin efficiency- 66 % ----------1 mark

c) Diagram- ----------1mark [4]
Step by step derivation ---------- 3 marks

**OR**

Q.4) a) Ans- [6]
M = 15.37---------- 2 marks
Heat transfer form fin Q = 15.046 * $10^3$ Watt----------1 mark
Heat transfer for unfinned portion = 2114 Watt----------1 mark
Overall effectiveness of the fins.= 7 ----------2 mark

b) For air [4]

2k / ht ≥ 5
281.25 ≥ 5 Fin can be used on air side,----------2 mark

For water
4.01 ≤ 5
Fins are less effective for water side ,
purpose will not served----------2 mark

c) Def- Fin Efficiency,----------2 mark [4]
Fin Effectiveness----------2 mark

27/2