Q.P. Code: 16ME320 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year II Semester Supplementary Examinations February-2022

HEAT TRANSFER

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	List the basic laws which govern the heat transfer.		**6M**
	b	Name and explain the mechanism of heat transfer.		**6M**
		OR		
2	a	Distinguish between conduction, convection and radiation modes of heat transfer		**6M**
	b	Calculate the rate of heat transfer per unit area through a copper plate 45 mm thick, whose one face is maintained at 350 ^{o}C and the other face at 50 ^{o}C. Take thermal conductivity of copper as 370 W/m ^{o}C.		**6M**

UNIT-II

3		A reactor's wall, 320 mm thick, is made up of an inner layer of fire brick (k= 0.84W/m ^{0}C) covered with a layer of insulation (k = 0.16 W/m ^{0}C). The reactor operates at a temperature of 1325 ^{0}C and the ambient temperature is 25 ^{0}C. Determine the thickness of fire brick and insulation which gives minimum heat loss.		**12M**
		OR		
4		A spherical shaped vessel of 1.4 m diameter is 90 mm thick. Find the rate of heat leakage, if the temperature difference between the inner and outer surface is 220 ^{0}C. Thermal conductivity of the material of the sphere is 0.083W/m ^{0}C		**12M**

UNIT-III

5	a	What is convective heat transfer? Distinguish between free and forced convection		**6M**
	b	Derive the expression for Reynolds number and how flows are determined by Reynolds number?		**6M**
		OR		
6		Assuming that a man can be represented by a cylinder 350 mm in diameter and 1.65 m high with a surface temperature of 28 ^{0}C. Calculate the heat he would lose while standing in a 30 km/h wind at 12 ^{0}C.		**12M**

UNIT-IV

7	a	Explain briefly the condensation mechanism on the vertical plate		**8M**
	b	Explain briefly the various regimes of saturated pool boiling with diagram		**4M**

OR

8 A vertical tube of 60 mm outside diameter and 1.2 m long is exposed to steam at atmospheric pressure. The outer surface of the tube is maintained at a temperature of 50 ^{0}C by circulated cold water through the tube. Calculate the following **12 M**

i). The rate of heat transfer to the coolant, and

ii). The rate of condensation of steam

UNIT-V

9 State the following law: **12M**

i) Wien's displacement law ii) Stefan Boltzmann law iii. Krichhoff's law.

OR

10 Calculate the following for an industrial furnace in the form of a black body and emitting radiation at 2500 ^{o}C. **12M**

i) Monochromatic emissive power at 1.2 μm length

ii) Wavelength at which the emissive is maximum

iii) Maximum emissive power

*** END ***