Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: 2020-21 TY.B Tech	**School of Technology**	**Department:Mechanical**
Course Code: MET 307	**Course Title: Heat and Mass Transfer**	**Semester :V**
Day : Saturday **Date: 20.02.2021**	**End Semester Examination**	**Time:2 Hrs.** **Max Marks:50**

Instructions: 1) All Questions are compulsory.
2)Figure to the right indicates full harks.
3) Assume suitable datawherevernecessary and state it clearly.
4) Use ofscientific calculators is permitted.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)**–			
a)	State and explain the Fourier's law of heat conduction with suitable example.	8	L1	CO307.1
b)	The inner and outer diameters of hollow sphere are 6cm and 10cm respectively. Inner surface is maintained at 100 ^{0}C while outer surface is at 30 ^{0}C. Calculate the value of the thermal conductivity of the material if the rate of conduction through is 10W. Also calculate temperature at radius of 4 cm.	8	L3	CO307.2
c)	A special thermo box is made up of 20 mm thick stainless-steel plate (K=60 W/mK) insulated with 20 mm thick asbestos layer (K=0.1 W/mK). If the inner wall of the plate is exposed to hot gas at 525^{0}C with a heat transfer coefficient of 100 W/m^{2}K and the outer surface of the asbestos is in contact with cool air at 25^{0}C with a heat transfer coefficient of 25 W/m^{2}K, calculate, i. The heat flux across the layer. ii. The interfacial temperature between layers.	8	L3	CO307.2
Q.2	**Answer the following (any two) –**			
a)	Explain the significance of the following: i. Reynolds number. ii. Nusselt number. iii. Grashoff number. iv. Prandtl number.	8	L2	CO307.3

b)	Draw the flow pattern in natural convection from: i. Heated vertical plate. ii. Cooled vertical plate. iii. Heated horizontal cylinder. iv. Heated vertical cylinder.	8	L3	CO307.3
c)	Find the rate of heat loss from a cubical furnace kept on a concrete floor, if the outside temperature of furnace is 80^0C and surrounding air is at 20^0C. sides of the furnaces are 1m each. Neglect the heat loss due to radiation and convection from the base. At 50^0C the properties of air are ρ =1.013kg/m^3 v = 17.95×10^{-6} m^2/s Cp =1005 J/kg-K K = 0.0283 W/m-K μ = 19.6×10^{-6}N-s/m Pr = 0.698	8	L3	CO307.4

Q.3 Answer the following (any two) –

a)	Write a note on radiation shield and state its applications.	9	L3	CO307.5
b)	Explain Nusselt's theory of film condensation.	9	L2	CO307.5
c)	Explain with neat sketch forced boiling phenomenon.	9	L2	CO307.5

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