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BME-027

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

00960

Term-End Examination

June, 2015

BME-027 : HEAT AND MASS TRANSFER

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **seven** questions. All questions carry equal marks.*

1. (a) State and explain Fourier's law of heat conduction. *5*

(b) Explain the different modes of heat transfer. *5*

2. (a) For heat conduction through a sphere, prove that thermal resistance offered by the wall to heat conduction is $R_k = \frac{x_w}{k A_{gm}}$ with usual notations. *5*

(b) Discuss critical radius of insulation. *5*

3. (a) State and explain the various numerical methods for conduction heat transfer. *5*

(b) Explain the principle of convection heat transfer with examples. *5*

4. (a) What are the different types of fins ? Why are fins attached to heat exchanger ? *5*

(b) A steam pipe (ε = 0·85) of 0·5 m diameter has a surface temperature of 550 K. The pipe is located in a room at 30°C and the convection heat transfer coefficient is 28 W/m^2K. Calculate the combined heat transfer coefficient and rate of heat transfer/unit length of pipe. *5*

5. (a) Give the classification of heat exchangers. Explain plate fin heat exchanger. *5*

(b) Explain the temperature distribution in heat exchangers. *5*

6. (a) Explain Scotch marine boiler. *5*

(b) Give the advantages and disadvantages of fire tube boilers. *5*

7. (a) Using dimensional analysis establish the relationship between the Sherwood number, Reynolds number and Schmidt number. *7*

(b) What is Sherwood number ? *3*

8. (a) What do you mean by equimolar counter diffusion ? 5

(b) How do you extend the unsteady state continuity equation to steady state continuity equation ? 5

9. (a) Define the following terms : 6

(i) Radiosity

(ii) Emission

(iii) Spectral intensity

(b) Explain Wein's displacement law. 4

10. (a) What is mass transfer to packed beds ? 5

(b) Write a short note on Radiation Shields. 5