MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: IV (New)	Term	: II	Academic Year	: 2011-12
Course No.	: APE 243	Title	: Heat and Mass Transfer		
Credits	: 2 (1+1)				
Day & Date	: Wednesday, 25.04.2012	Time	: 14.00 to 16.00	Total Marks	: 40

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A"**.
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Enlist various modes of heat transfer and explain convection.

b) State and explain Fourier's Law.

Q.2 Explain electrical analogy.

Q.3 Derive the expression for one dimensional steady state conduction through composite sphere.

Q.4 The following data related to the parallel flow heat exchanger by which the air is heated by hot exhaust gases. The heat transfer per hour is 155450 kJ/h. Inside heat transfer coefficient is 120 W/m^2 ^0C and outside heat transfer coefficient 195 W/m^2 ^0C. Inlet and outlet temperature of hot fluid is 450^0C and 250^0C. The inlet and outlet temperature of cold fluid is 60 and 120^0C. Inside and outside dia of tube is 50 and 60 cm. Calculate the length of the tube required for necessary heat transfer. Neglect the tube resistance.

Q.5 Explain absorptivity, reflectivity and transmissivity of radiation.

Q.6 A cold room has one of the walls 2 x 2.5 m^2 made of bricks 12 cm thick insulated externally by cork slabbing 8 cm thick. Cork is protected externally by 2.5 cm wood. Estimate the heat infiltration through the wall in 24 hours. If interior of the cold room is maintained at temperature of 0^0C and outside temperature is 25^0C, what will be the interface temperature if thermal conductivity for bricks, cork and wood are 0.93, 0.044 and 0.175 W/m K, respectively.

Q.7 Enlist types of convection and explain forced convection.

Q.8 a) State and explain Planck's Law.

b) State and explain Kirchoff's Law.

Q.9 The effective temperature of body having area 0.15 m^2 is 530^0C. Calculate:
1) The total rate of energy emission
2) The intensity of normal radiation
3) The wavelength of maximum monochromatic emissive power

Q.10 Write short notes on (Any Two)
1) Fouling factor   2) Newton's law of cooling   3) Fick's Law

(P.T.O.)

Q.11 Define the following terms.

1) Emissive power   2) Heat exchanger

3) Heat transfer   4) Critical thickness of insulation

Q.12 Fill in the blanks.

1) _____ is the ratio of kinematic viscocity to thermal diffusivity.

2) _____ is the ratio of inertia force to viscous force.

3) _____ is the ratio of internal resistance to surface resistance.

4) The body in which no incident radiation is transmitted through the body is called _____.

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