Total No. of Questions : 12]

SEAT No. :

P1946

[Total No. of Pages : 3

[5254]-47

B.E. (Mechanical) (Semester - II)

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

(2008 Pattern) (Elective - IV)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) How heat exchanger classified according to construction features? **[6]**

b) State advantages and limitations of plate heat exchanger. **[4]**

c) Explain heat exchanger design methodology. **[6]**

OR

Q2) a) Explain fluidised bed heat exchanger? **[5]**

b) What are baffle plates how they classified? **[5]**

c) Explain methods to determine heat exchanger effectiveness. **[6]**

Q3) a) Explain Shell and tube heat exchanger basic design procedure. **[5]**

b) Printed-Circuit Heat Exchangers? **[3]**

c) In shell and tube feed water heater, cold water at 15°C flowing at the rate of 180kg/h is preheated to 90°C by flue gases from 150°C flowing at the rate of 900 kg/h. The water flows inside the copper tubes (d_i= 25 mm, d_O = 32 mm) having thermal conductivity k_w = 381 W/m.K. The heat transfer coefficients on gas and water sides are 120 and 1200 W/m^2.K, respectively. The fouling factor on gas and water sides is 0.002m^{2}K/W. Determine the flue gas outlet temperature, the overall heat transfer coefficient based on the outside tube diameter, and the true mean

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temperature difference for heat transfer. Consider specific heats C_p for flue gases and water as 1.05 and 4.19 J/g.K respectively, and the total tube outside surface are as $5m^2$. There are no fin inside or outside the tubes, and there is no fouling on gas side. **[8]**

OR

Q4) a) What is TEMA standards? **[5]**

b) Explain Shell and tube heat exchanger in detail. **[5]**

c) Explain Kern Method. **[6]**

Q5) a) Explain plate fin heat exchanger. **[9]**

b) Air enters the core of finned-tube exchanger of the type shown in figure 1 at 1 atm and 30°C. The air flow at a rate of 1500kg/h perpendicular to the tube and exit with a mean temperature of 100°C. The core is 0.5m long with a 0.25 m^2 frontal area. Calculate the total pressure drop between the air inlet and outlet and the average heat transfer coefficient on the air side. **[9]**

OR

Q6) a) Explain tube fin heat exchanger. **[9]**

b) Air at 2 atm and 500K with a velocity of u_∞=20m/s flows across a compact heat exchanger matrix having the configuration shown in figure 2 (surface 11.32- 0737-S-R). Calculate the heat transfer coefficient and the frictional pressure drop. The length of the matrix is 0.8m. **[9]**

SECTION - II

Q7) a) Explain horizontal shell type condensers with diagram. **[8]**

b) Which are the common heat exchanger types used in refrigeration and air conditioning industry. **[8]**

OR

Q8) a) Explain vertical tube side condensers with diagram. **[8]**

b) Explain :

i) Water cooling evaporator **[4]**

ii) Air cooling evaporator **[4]**

Q9) a) What is the principle of operation of cooling tower? **[6]**

b) State and explain different cooling tower material. **[6]**

c) What is hyperbolic cooling tower? **[4]**

OR

Q10)a) Explain Psychometric Analysis of Air Passing through cooling tower. **[8]**

b) Explain Combined Flow Coil Evaporative Cooling Tower. **[4]**

c) Factors to be considered for selecting cooling tower. **[4]**

Q11)a) What is liquid cooling? **[6]**

b) Why we need to cool electrical applications? **[6]**

c) Explain wick structure of heat pipe. **[6]**

OR

Q12)a) What is forced electronic cooling. **[6]**

b) Explain "cooling personal computers". **[6]**

c) What is immersion cooling and explain in brief two closed loop System? **[6]**