Total No. of Questions :8] *[Total No. of Printed Pages :2*

Roll No .....

MMTP-301(A)

M.E./M.Tech., III Semester

Examination, December 2013

Computer Aided Design of Thermal System

(Elective - I)

Time : Three Hours

Maximum Marks: 70

Note: Attempt any five questions.All questions carry equal marks. Assume suitable missing data, if any.

1. a) Explain the formulation of design problem of a thermal system.
   b) Discuss the conceptual design step in design of hot rolling process.

2. a) Discuss the importance of material selection in design of thermal system.
   b) In a food processing system, food materials are placed on flat plate and subjected to gas heating at the bottom of plate for a given amount of time. Select a suitable material for the plates.

3. a) What do you understand by mathematical modeling? Compare it with physical modeling.
   b) For a common parallel flow heat exchanger discuss the development of a simple mathematical model.

4. In a design of hot water storage system, it is given that a steady flow of hot water at 75°C and a mass flow rate is of 113.1Kg/h enters a long circular pipe of diameter 2cm, with connective

heat loss at the outer surface of pipe to the ambient at 15°C with a heat transfer co-efficient h of 100W/m²k. The density ρ, specific heat at constant pressure Cp and thermal conductivity k of water are given as 10^3 Kg/m³, 4200J/Kgk and 0.6 W/mk respectively. Develop a simple mathematical model for this process and calculate the water temperature after the flow has traversed 10m of pipe.

5. What do you understand by simulation of thermal process? State its importance. Discuss any simulation software available in design of thermal system.

6. a) What is Numerical simulation? Discuss different methods of Numerical simulation.
   b) Describe calculus method of optimization.

7. a) What is Dynamic programming? State its limitation.
   b) In a water flow problem, the total flow rate is given by two variable x and y.

   Flow rate = $8.5x^2 + 7.1y^2 + 21$ with a constraint that $x + y^{1.5} = 25$. Solve the optimization problem as a constrained problem.

8. Write short notes on any two
   a) System Simulation
   b) Genetic Algorithm
   c) Numerical Modeling

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