R15

Code No: 5221AV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech II Semester Examinations, June/July - 2018

CONVECTIVE HEAT TRANSFER

(Thermal Engineering)

Time: 3hrs Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) What is convection and briefly explain about forced, free convection with example. [5]

b) Sketch fully developed laminar flow in duct of cross sectional areas for velocity field. [5]

c) List the correlations for mixed convection and explain. [5]

d) What is boussinesq approximation? [5]

e) Briefly explain natural convection in porous media. [5]

PART - B

5 × 10 Marks = 50

2. Derive navier stroke equation for a steady, two dimensional flow of an incompressible constant property fluid. [10]

OR

3.a) Define dimensional numbers and give the physical significance of each for convection heat transfer.

b) Express the similarity of momentum and energy equations for flow over flat plate. [5+5]

4. Develop analytical solutions for boundary layer for external turbulent flows. [10]

OR

5. The water is heated in a tank by dipping a plate of 20 cm × 40 cm in size. The temperature of the plate surface is maintained at 100^0 C. Assuming the temperature of the surrounding water is at 30^0 C, Find the heat loss from the plate 20 cm side is in vertical plane. [10]

6. Develop procedure for formula numerical solution for convective laminar boundary layer. [10]

OR

7. Derive expression for free convective heat flow through a vertical channel across a horizontal enclosure. [10]

8. Discuss the effect of boundary forces on turbulent flow for combined convection. [10]

OR

9. Develop the expression for combined convection for laminar boundary layer for flow over an isothermal plate. [10]

10. Explain about Darcy flow model. [10]

OR

11. Discuss about stability of horizontal porous layers. [10]

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