

Code No: 5221AM

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech I Semester Examinations, February - 2017

NANOFLUIDS

(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) Define the terms i) Viscosity ii) Density iii) Nanofluid. [5]
- b) Describe the effect of thermal conductivity on volumetric concentration of nanofluids. [5]
- c) Define thermal diffusivity and explain its significance for Nanofluids. [5]
- d) Define heat transfer coefficient and explain its significance for Nanofluids. [5]
- e) Explain the nanofluids to building heating and cooling application. [5]

PART - B

5 × 10 Marks = 50

2. Write a short note on Theoretical equations and new empirical correlations for determining the Viscosity of nanofluids. [10]

OR

3. Discuss about principle of measurement and apparatus of density and also discuss about Andrade's and other theoretical equations. [10]

- 4.a) Give an expression for Hamilton-Crosser equation to determine the thermal conductivity of different nanofluids.

- b) Discuss thermal conductivity as a function of temperature. [5+5]

OR

- 5.a) Give an expression for Buongiorno's thermal equilibrium equation to determine the specific heat of different nanofluids

- b) How does the Brownian motion related to thermal conductivity. [5+5]

6. Write short notes on:

a) Graetz number effect in the entry region

b) Nusselt number

c) Prandtl number. [4+3+3]

OR

- 7.a) Explain the significance of the friction factor and heat transfer coefficient of nanofluids in

i) Laminar flow

ii) Turbulent flow

- b) Explain correlation for friction factors and nusselt number. [6+4]

10. What are the important principles of measurement and apparatus required to determine the nanofluid convective heat transfer coefficient. [10]

OR

9. Explain: a) Heating capacity b) mass flow c) LMTD d) Pumping power of nano fluids. [2+3+2+3]

10. Describe the performance of nanofluids with glycol solution in hydronic coils. [10]

OR

11. Describe the potential applications of nanofluids in various sectors. [10]

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