USN

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018

Micro and Nano Fluidics

Time: 3 hrs. Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain in detail about Maxwellian distribution function and Boltzmen equation. (10 Marks)
 - b. Write a brief note on:
 - i) Dynamics and post collision properties, and
 - ii) Kinematics of binary collision

(10 Marks)

- 2 a. Explain the concept of electrophoresis in micro scale liquid flow. (10 Marks)
 - b. Explain in detail about electric double layer effect.

(10 Marks)

(10 Marks)

- 3 a. Explain in detail dielectro-phoresis in micro-scale liquid flow.
 - b. Explain concepts of surface and interfacial energies and tensions in micro fluidics. (10 Marks)
- 4 a. Explain in detail about the free energies of adhesion in microfluidics. (10 Marks)
 - b. Derive Young-Laplace equation of capillarity.

(10 Marks)

PART - B

- 5 a. Discuss in detail about one step method to synthesize nanofluidics. State its advantages and limitations. (10 Marks)
 - b. Explain diverse applications of nanofluidies in various fields.

(10 Marks)

- 6 a. Explain about ionic transport in nano tubule channel driven by electric fields. (10 Marks)
 - b. Write a note on electrophoresis of individual nano tubules in microfluidic channels.

(10 Marks)

- 7 a. Discuss about conduction, convection and radiation heat transfer. (10 Marks)
 - b. Explain about gas absorption technique with neat diagram.

(10 Marks)

(10 Marks)

- 8 a. Discuss about nanofluids in medical applications. (10 Marks)
 - b. Discuss about electromagnetic nanofluid applications in solar energy harvesting.

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