

CBCS SCHEME

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15NT64

Sixth Semester B.E. Degree Examination, June/July 2019 Microfluidics and Nanofluids

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the factors affecting nanofluids. (10 Marks)
b. Explain briefly about benefits of size reduction. (06 Marks)

OR

- 2 a. Discuss in detail about elastomeric microfluidic valve with a neat diagram. (08 Marks)
b. Explain briefly about two experimental methods with required equations. (08 Marks)

Module-2

- 3 a. What are micromixers? Discuss its types and explain briefly about T-type micromixers. (08 Marks)
b. Explain the following basic principles of microfluidics:
i) Laminar flow ii) Peclet number
iii) Pressure driven flow iv) Electro-Osmotic flow (08 Marks)

OR

- 4 a. What are Micropumps? Explain in detail about two types of Micropumps. (08 Marks)
b. Explain in detail about any two detection methods in Microfluidics. (08 Marks)

Module-3

- 5 a. Define Chemotaxis. Explain in detail about any four techniques. (10 Marks)
b. Discuss the impact of Microfluidics on Biomedical Research. (06 Marks)

OR

- 6 a. Explain briefly about Microfluidic device fabrication. (08 Marks)
b. Write a short note on Organ-on-a-chip and biomimetic blood vessel. (08 Marks)

Module-4

- 7 a. Explain briefly about nanoemulsions and how it is formed. Compare between macro, micro and nano emulsion. (10 Marks)
b. Discuss the applications of nanoemulsions. (06 Marks)

OR

- 8 a. Describe how stability of nanoemulsions can be controlled from destabilization. (08 Marks)
b. Explain two important properties of nanoemulsions. (08 Marks)

Module-5

- 9 a. Explain the preparation of the following non-metallic nanofluids:
i) Titanium dioxide nanofluid ii) Copper oxide nanofluid (08 Marks)
b. Mention the applications of nanofluids and explain each of them. (08 Marks)

OR

- 10 a. Explain briefly the preparation of the following metallic nanofluids:
i) Gold and silver nanofluid ii) Copper nanofluid (08 Marks)
b. Mention the biomedical applications of nanofluids and explain each of them. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.