CBCS SCHEME

USN | | | | | | | | | | |

18NT55

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Microfluidics and Nanofluids

Time: 3 hrs. Max. Marks: 100

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

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.

Module-1

1 a. Define microfluidics. Explain its applications. **(10 Marks)**

b. Explain the benefits of size reduction of microfluidic devices. **(10 Marks)**

OR

2 a. Discuss in detail about Elastomeric microfluidic valve with neat sketch. **(10 Marks)**

b. List and Explain the various factors affecting on the performance of nanofluids. **(10 Marks)**

Module-2

3 a. Explain the following concepts in microfludics:
i) Laminar flow ii) Turbulant flow iii) Peclet number
iv) Pressure-driven flow v) Electro-osmotic flow **(10 Marks)**

b. Define the concept of micropumps. Explain in detail about types of micropumps. **(10 Marks)**

OR

4 a. Define Micromixer and explain its types. **(10 Marks)**

b. Write a short note on Soft lithography and PDMS. **(10 Marks)**

Module-3

5 a. Discuss the impact of Microfluidics on bio-medical research. **(10 Marks)**

b. Explain the following concepts:
i) Surface and interfacial tension ii) Capillary force **(10 Marks)**

OR

6 a. Define Chemotaxis. Explain any 4 techniques. **(10 Marks)**

b. Write a short note on:
i) Microfluidic device fabrication
ii) Organ-on-chip **(10 Marks)**

Module-4

7 a. Define Emulsion. Explain briefly about properties Mechanism and uses of Emulsification **(10 Marks)**

b. What are Micro Emulsion and brief about its types. **(10 Marks)**

OR

8 a. Brief about Surfactant film properties. **(08 Marks)**

b. Write a short note on
i) Hydrophilic-lipophilic balance ii) Ultra low-interfacial tension **(12 Marks)**

Module-5

9 a. Explain the preparation of following non-metallic nanofluids:
i) Aluminium-nitride nanofluids ii) Zinc-oxide nanofluids **(10 Marks)**

b. Explain in brief about the preparation of Gold and Silver nanofluids **(10 Marks)**

OR

10 a. Write s short note on CNT-nanofluids. **(08 Marks)**

b. Mention and Explain any 3 applications of nanofluids used in:
i) Electronic applications ii) Bio-medical applications. **(12 Marks)**

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