USN ☐☐☐☐☐☐☐☐☐☐

**15NT64**

## Sixth Semester B.E. Degree Examination, June/July 2018
## Micro Fluidics and Nano Fluids

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

1   a. Explain briefly about PDMS microvolve architecture using schematic diagram.   (10 Marks)
    b. Explain briefly about benefits of size reduction.   (06 Marks)

**OR**

2   a. Discuss in detail about elastomeric micro-fluidic 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 micropumps? Explain in detail about two types of micropumps.   (08 Marks)
    b. What are micromixers? Discuss its types and explain briefly about T-type micromixers.
       (08 Marks)

**OR**

4   a. Discuss briefly about active micromixers and passive micromixers its types   (08 Marks)
    b. Write a short note on soft lithography and PDMS.   (08 Marks)

### Module-3

5   a. Discuss the impact of microfluidics on biomedical research.   (06 Marks)
    b. Define chemotaxis. Explain in detail about any four techniques.   (10 Marks)

**OR**

6   a. Explain the following microfluidics concepts :   i) Laminar versus turbulent flow
       ii) Surface and interfacial tension    iii) Capillary forces   (08 Marks)
    b. Write a short note on organ-on a chip and biomimetric blood vessel.   (08 Marks)

### Module-4

7   a. Explain briefly about surfactant film properties   (08 Marks)
    b. Write a short note on ultra-low interfacial tension and spontaneous curvature.   (08 Marks)

**OR**

8   a. Explain briefly about nanoemulsions and how it is formed. Compare between macro, micro
       and nano emulsion.   (10 Marks)
    b. Write a short notes on each of the following : i) Packing parameter and microemulsion
       structures ii) Hydrophilic–lipophilic balance iii) Phase inversion temperature.   (06 Marks)

### Module-5

9   a. Explain the preparation of the following non-metalic nano fluids.
       i) Aluminum oxide nanofluids      ii) Silicon dioxide nanofluids.   (08 Marks)
    b. Explain the preparation of the following non-metalic nanofluids.
       i)  Titanium dioxide nanofluids      ii) Copper oxide nanofluids.   (08 Marks)

**OR**

10  a. Mention the applications of nanofluids and explain each of them.   (08 Marks)
    b. Mention the biomedical applications of nanofluids and explain each of them.   (08 Marks)

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