VTU B.E/B.TECH QUESTION PAPER SET

CBCS
SEMESTER VI

MICRO FLUIDICS AND NANO FLUIDS

Use bookmarks to easily navigate between question papers

CBCS SCHEME

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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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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15NT64

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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 briefly about PDMS micro valve architectures using schematic diagram. **(10 Marks)**

b. Explain in details about advantages of PDMS devices. **(06 Marks)**

OR

2 a. Explain in detail about application areas of microfluids systems. **(08 Marks)**

b. Explain briefly about benefits of size reduction. **(08 Marks)**

Module-2

3 a. Explain the following basic principles of micro fluidics:
i) Laminar flow
ii) Peclet Number
iii) Pressure driven flow
iv) Electro osmotic flow. **(08 Marks)**

b. What are Micro pumps? Explain in detail about two types of micropumps. **(08 Marks)**

OR

4 a. What are Micro mixers? Discuss briefly about active micromixers and passive micromixers. **(10 Marks)**

b. Write a short note on:
i) Lithography
ii) PDMS. **(06 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. What is emulsion? Explain the properties, mechanism and user of Emulsification. **(08 Marks)**

b. What are Microemulsions? Explain briefly about its History and its types. **(08 Marks)**

OR

8 a. Describe how stability of nano emulsions can be controlled from destabilizations. **(08 Marks)**

b. Describe the applications of Nano emulsion. **(08 Marks)**

Module-5

9 a. Explain the preparation of the following non-metallic nanofluids:
   i) Aluminium nitride nanofluids.
   ii) Zinc oxide nanofluids. (08 Marks)

b. Explain briefly the preparation of the following metallic nanofluids:
   i) Gold and silver nanofluid
   ii) Copper nanofluid. (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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15NT64

Sixth Semester B.E. Degree Examination, Aug./Sept. 2020
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 briefly about benefits of size reduction. **(06 Marks)**

b. Write a short note on multi layer Fabrication with a neat diagram. **(10 Marks)**

OR

2 a. Explain the factors affecting the nanofluids. **(10 Marks)**

b. Discuss about the theoretical models for the thermal conductivity of nanofluids. **(06 Marks)**

Module-2

3 a. What are micropumps? Explain in detail about two types of micropumps. **(08 Marks)**

b. Write a short note on : (i) Soft thiography and PDMS (ii) Detection method in microfluids. **(08 Marks)**

OR

4 a. What are micromixers? Discuss briefly about Active mixers and passive mixers. **(08 Marks)**

b. Explain : (i) Laminar flow (ii) Peclet number (iii) Pressure driven flow (iv) Electro osmotic flow. **(08 Marks)**

Module-3

5 a. Define chemotaxis. Explain in detail about any four techniques. **(10 Marks)**

b. Discuss the impact of microfluidcis 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. Discuss the applications of nano emulsions. **(08 Marks)**

b. What are micro emulsions? Explain briefly about its history and its type. **(08 Marks)**

OR

8 a. What are Emulsions? Explain the properties, mechanism and uses of emulsification. **(08 Marks)**

b. Explain briefly about surfactant film properties. **(08 Marks)**

Module-5

9 a. Explain the preparation of the following non-metallic nano-fluids:
(i) Aluminium oxide nanofluids.
(ii) Silicon dioxide nanofluids. **(08 Marks)**

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

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