

## Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

### Fifth Semester B.E. Degree Examination MICRO FLUIDICS AND NANO FLUIDS

TIME: 03 Hours

Max. Marks: 100

- Note: 1. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.  
2.  
3.

Module – 1			
<b>Q.1</b>	<b>(a)</b>	Explain briefly about Benefits of Size reduction.	10
	<b>(b)</b>	Explain briefly about PDMS Microvalve architectures using schematic diagram.	10
	<b>(c)</b>		
<b>OR</b>			
<b>Q.2</b>	<b>(a)</b>	Explain the factors affecting Nanofluids.	10
	<b>(b)</b>	Discuss in Detail about Elastomeric Microfluidic Valve with a neat diagram.	10
	<b>(c)</b>		
<b>Module – 2</b>			
<b>Q.3</b>	<b>(a)</b>	Explain the following Basic principles of Micro fluidics.	10
	<b>(b)</b>	What are Micropumps? Explain in detail about two types of Micropumps.	10
	<b>(c)</b>		
<b>OR</b>			
<b>Q.4</b>	<b>(a)</b>	Explain any two detection Methods in Microfluidics.	10
	<b>(b)</b>	What are Micromixers? Discuss briefly about Active Micromixers and Passive Micromixers its types.	10
	<b>(c)</b>		
<b>Module – 3</b>			
<b>Q.5</b>	<b>(a)</b>	Discuss the Impact of Microfluidics on biomedical Research.	10

	(b)	Define Chemotaxis. Explain in detail about any four techniques.	10
	(c)		
<b>OR</b>			
<b>Q.6</b>	(a)	Write a short note on Organ –on-a-chip and Biomimetic blood vessel	10
	(b)	Write a short note on rapidly assaying biofluids with microfluids.	10
	(c)		
<b>Module – 4</b>			
<b>Q.7</b>	(a)	What is Emulsion? Explain the properties, Mechanism and uses of Emulsification.	10
	(b)	What are Microemulsions? Explain briefly about its History and its Types.	10
	(c)		
<b>OR</b>			
<b>Q.8</b>	(a)	Explain briefly about Surfactant film properties.	10
	(b)	Write a short note on Ultra – low interfacial tension and spontaneous curvature.	10
	(c)		
<b>Module – 5</b>			
<b>Q.9</b>	(a)	Explain the preparation of the following Non-metallic nanofluids: i. Aluminium nitride nanofluids ii. Zinc oxide nanofluids	10
	(b)	Explain the preparation of the following Non-metallic nanofluids. i. Aluminium oxidenanofluids ii. Silicon dioxidenanofluids	10
	(c)		
<b>OR</b>			
<b>Q.10</b>	(a)	Mention the Biomedical Applications of Nanofluids and explain each of them	10
	(b)	Explain the Application of the following nanofluids. i. Nanofluid Detergent ii. Nanofluids with Carbon nanotubes	10
	(c)		

<b>Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome</b>				
<b>Question</b>		<b>Bloom's Taxonomy Level attached</b>	<b>Course Outcome</b>	<b>Programme Outcome</b>
<b>Q.1</b>	(a)	L2, L5	1	1
	(b)	L1, L5	1	1
	(c)			
<b>Q.2</b>	(a)	L2, L5	1	1
	(b)	L2, L5	1	1
	(c)			
<b>Q.3</b>	(a)	L2, L5	2	2
	(b)	L2, L5	2	2
	(c)			
<b>Q.4</b>	(a)	L2, L5	1	2
	(b)	L2, L5	1	2
	(c)			
<b>Q.5</b>	(a)	L2, L5	2	3
	(b)	L2, L5	2	3
	(c)			
<b>Q.6</b>	(a)	L2, L5	2	3
	(b)	L2, L5	2	3
	(c)			
<b>Q.7</b>	(a)	L2, L5	1	4
	(b)	L2, L5	1	4
	(c)			

<b>Q.8</b>	(a)	L2, L5	1	4
	(b)	L2, L5	1	4
	(c)			
<b>Q.9</b>	(a)	L2, L6	2	4
	(b)	L2, L6	2	4
	(c)			
<b>Q.10</b>	(a)	L2, L5	2	4
	(b)	L2, L5	2	4
	(c)			
<b>Bloom's Taxonomy Levels</b>	<b>Lower order thinking skills</b>			
	Remembering( knowledge): $L_1$	Understanding Comprehension): $L_2$	Applying (Application): $L_3$	
	<b>Higher order thinking skills</b>			
	Analyzing (Analysis): $L_4$	Valuating (Evaluation): $L_5$	Creating (Synthesis): $L_6$	

CO

1. To study basic principles of micro and nano fluids
2. To understand the synthesis advantages and importance of micro and Nano fluids

PO

1. Engineering Knowledge.
2. Problem Analysis.
3. Design / development of solutions (partly).
4. Interpretation of data.



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Module – 1			
<b>Q.1</b>	<b>(a)</b>	Write a short note on Benefits of Automation and Integration.	10
	<b>(b)</b>	Explain in brief about the manufacturing of PDMS micro fluidic device	10
	<b>(c)</b>		
<b>OR</b>			
<b>Q.2</b>	<b>(a)</b>	Explain in detail about advantages of PDMS devices.	10
	<b>(b)</b>	Explain in detail about application areas of Micro fluidic systems.	10
	<b>(c)</b>		
<b>Module – 2</b>			
<b>Q.3</b>	<b>(a)</b>	What are Micromixers? Discuss its types and explain Briefly about T- Type Micromixers.	10
	<b>(b)</b>	Explain any two detection Methods in Microfluidics.	10
	<b>(c)</b>		
<b>OR</b>			
<b>Q.4</b>	<b>(a)</b>	Write a short note on Soft Lithography and PDMS.	10
	<b>(b)</b>	What are Micropumps? Explain in detail about two types of Micropumps.	10
	<b>(c)</b>		
<b>Module – 3</b>			
<b>Q.5</b>	<b>(a)</b>	Define Chemotaxis. Explain in detail about any four techniques.	10

	(b)	Explain the following Microfluidic Concepts. i. Laminar versus turbulent flow ii. Surface and interfacial tension iii. Capillary force	10
	(c)		
<b>OR</b>			
Q.6	(a)	Explain briefly about Microfluidic device Fabrication.	10
	(b)	Write a short note on rapidly assaying biofluids with microfluids.	10
	(c)		
<b>Module – 4</b>			
Q.7	(a)	Write a short note on each of the following: i. Packing parameter and Microemulsion structures ii. Hydrophilic-Lipophilic Balance iii. Phase inversion temperature	10
	(b)	Explain briefly about Nanoemulsions and how it is formed? Compare between macro, micro and nano emulsion	10
	(c)		
<b>OR</b>			
Q.8	(a)	Explain briefly about preparation of nanoemulsions with a suitable sketch	10
	(b)	Discuss the applications of Nanoemulsions.	10
	(c)		
<b>Module – 5</b>			
Q.9	(a)	Explain the preparation of the following Non-metallic nanofluids. i. Titanium dioxide nanofluids ii. Copper oxide nanofluids	10
	(b)	Mention the Applications of Nanofluids and explain each of them	10
	(c)		
<b>OR</b>			
	(a)	Mention the Automotive Applications of Nanofluids and explain each of them	10

<b>Q.10</b>	<b>(b)</b>	Explain about the Electronic Applications and microscale fluidic applications of Nanofluids and explain each of them	10
	<b>(c)</b>		

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