Q. Code: 902305

Reg. No. | | | | | | | | | | | | | |

B.E./ B. TECH.DEGREE EXAMINATIONS, MAY 2023

Sixth and Eighth Semester

OE18612 – NANOTECHNOLOGY AND PROTOTYPING LABORATORY

(Common to all branches except EEE)

(Regulation 2018)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT
CO 1	Understand various semiconductor process technology and microfabrication methods
CO 2	Synthesis nanostructures using variety of semiconductor technology for a given application.
CO 3	Characterize any specific nanostructure structurally, electrically and by imaging.
CO 4	Trained in cleanroom protocol, utilize vacuum and physical deposition technology.
CO 5	Design and prototype any Nano device.

PART- A (10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Name any two micro-fabrication tools used in semiconductor process technology.	**1**	**2**
2.	List the different types of etching in semiconductor fabrication.	**1**	**3**
3.	Define sol-gel process.	**2**	**2**
4.	Define the principle of ball milling.	**2**	**3**
5.	Identify an imaging technique which uses electron tunneling.	**3**	**3**
6.	Write the major difference between SEM and TEM imaging.	**3**	**3**
7.	State the significance of high vacuum in deposition procedure.	**4**	**3**
8.	What are the fabrication tools used for metal deposition?	**4**	**3**
9.	Name some inert gases used in cleanroom environment.	**5**	**2**
10.	Identify any two nano device which can be fabricated using thin film technology.	**5**	**2**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Explain in detail the process flow diagram of any Nano device.	**(14)**	**1**	**3**
	(OR)			
(b)	Explain in detail the three processes involved in cleaning of silicon wafer for chip fabrication.	**(14)**	**1**	**3**

12. (a)	Explain in detail the MOCVD deposition process with a neat sketch and the necessary equations.	**(14)**	**2**	**4**
	(OR)			
(b)	Compare the processes of thermal evaporation and Sputtering.	**(14)**	**2**	**4**
13. (a)	Explain the principle of Scanning electron microscopy and explain its working with a neat sketch.	**(14)**	**3**	**3**
	(OR)			
(b)	Identify any one characterization involving X-rays as the source for analyzing the material properties.	**(14)**	**3**	**3**
14. (a)	What is evaporation? Mention the types of evaporation and explain principle of operation of any one evaporation technique with suitable schematics.	**(14)**	**4**	**4**
	(OR)			
(b)	Explain in detail the principle of photolithography with any one example and necessary cross sectional diagrams.	**(14)**	**4**	**4**
15. (a)	Discuss in detail the process methods in the fabrication of a MOSFET.	**(14)**	**5**	**4**
	(OR)			
(b)	Discuss in detail the fabrication of a thin film solar cell.	**(14)**	**5**	**4**

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Sketch a neat stick diagram for a CMOS gates computing (a) 4-input NAND gate (b) $Y = \left(\overline{(ABC) + D}\right)$	**(10)**	**1**	**3**

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