Q. Code:187487

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

B.E./ B. TECH.DEGREE EXAMINATIONS, MAY 2024

Eighth Semester

EE18024 – NANOELECTRONICS

(Common to ECE and EEE)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Understand the fundamentals of nanoelectronics.	**3**
CO 2	Understand the transport phenomenon at the nanoscale.	**3**
CO 3	Understand the functionality of MOS capacitors.	**3**
CO 4	Analyze the Characteristics of MOSFET.	**4**
CO 5	Model and characterize various MOS devices.	**5**

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Name any two high-k dielectric materials for MOS device.	**1**	**3**
2.	Depict the gate leakage in a MOSFET.	**1**	**4**
3.	Define drift transport in nano transistor.	**2**	**3**
4.	Using hall measurement, how is the type of semiconductor identified?	**2**	**3**
5.	Define work function of a metal.	**3**	**2**
6.	Draw the Energy band diagram of an ideal MOS capacitor with p-type semiconductor at zero bias.	**3**	**3**
7.	Sketch the static I-V characteristics of MOSFET.	**4**	**3**
8.	Define field effect mobility in semiconductor.	**4**	**2**
9.	List the different types of SOI.	**5**	**2**
10.	Name any two multi-gate models of FET.	**5**	**2**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Explain in detail the challenges of Nano MOSFETS in terms of electrical and optical performance.	**(14)**	**1**	**4**
	(OR)			
(b)	Write a short note on the 65 nm Node technology.	**(14)**	**1**	**3**

12. (a)	Using energy band diagram, describe the electron transport mechanism in quantum dot.	**(14)**	**2**	**4**
	(OR)			
(b)	Explain in detail the hall measurement concept. What are the electrical parameters that can be measured? Describe with suitable equations.	**(14)**	**2**	**4**
13. (a)	Explain the effect of oxide and interface trapped charges in a MOS capacitor.	**(14)**	**3**	**4**
	(OR)			
(b)	Analyze the capacitance voltage characteristics of a MOS capacitor at different frequencies.	**(14)**	**3**	**4**
14. (a)	Analyze the concept of channel length modulation and field dependent mobility in MOSFET with suitable diagrams.	**(14)**	**4**	**4**
	(OR)			
(b)	Analyze the effect of short channel effects and subthreshold current in MOSFET with suitable diagrams.	**(14)**	**4**	**4**
15. (a)	Explain the concept of surface potential and charge based model.	**(14)**	**5**	**3**
	(OR)			
(b)	Explain in detail the construction, working and properties of FinFET.	**(14)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Explain the optical confinement phenomenon in different types of quantum devices with the help of band diagram. Name a few applications of the above devices.	**(10)**	**2**	**4**

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