



Roll No:

BTECH

(SEM. VIII) THEORY EXAMINATION 2025-26
MODELING OF FIELD-EFFECT NANODEVICES

TIME: 3 HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

2x7 = 14

(a)	Why are copper interconnects used?	CO-1	K2
(b)	Name the operating regions of a MOSFET.	CO-2	K2
(c)	What is the physical structure of a CNT?	CO-3	K2
(d)	Name types of multigate transistors.	CO-1	K2
(e)	What is the gate voltage effect?	CO-2	K2
(f)	What is a drawback of scaling in radiation environments?	CO-4	K2
(g)	What is leakage current?	CO-5	K2

SECTION B

2. Attempt any *three* of the following:

7 x 3 = 21

(a)	Explain MOSFET scaling and short channel effects.	CO-1	K2
(b)	Explain 1D and 2D MOS electrostatics.	CO-2	K2
(c)	Explain silicon nanowire MOSFETs and their I-V characteristics.	CO-3	K2
(d)	Explain radiation effects in SOI MOSFETs.	CO-4	K2
(e)	Explain impact of device performance on digital circuits.	CO-5	K2

SECTION C

3. Attempt any *one* part of the following:

7 x 1 = 7

(a)	Explain high-k dielectric and copper Interconnects.	CO-1	K2
(b)	Explain multigate transistors.	CO-1	K2

4. Attempt any *one* part of the following:

7 x 1 = 7

(a)	Explain MOSFET current-voltage characteristics and CMOS technology.	CO-2	K2
(b)	Explain scattering and mobility in MOSFETs.	CO-2	K2

5. Attempt any *one* part of the following:

7 x 1 = 7

(a)	Explain carbon nanotube FETs (CNTFETs).	CO-3	K2
(b)	Explain ballistic transport and nano transistor model.	CO-3	K2

6. Attempt any *one* part of the following:

7 x 1 = 7

(a)	Explain single event effects (SEE).	CO-4	K2
(b)	Compare radiation effects in single-gate and multi-gate devices.	CO-4	K2

7. Attempt any *one* part of the following:

7 x 1 = 7

(a)	Explain bandgap voltage reference, Op-Amp, and comparator.	CO-5	K2
(b)	Explain dynamic and static power consumption in digital circuits.	CO-5	K2