Printed Pages:2 **Sub Code: KOE095**

Paper Id: 236034 **Roll No.** | | | | | | | | | | |

B.TECH
(SEM VIII) THEORY EXAMINATION 2022-23
MODELING OF FIELD-EFFECT NANO DEVICES

Time: 3 Hours ***Total Marks: 100***

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. Define modeling.
b. What is meant by high K dielectric?
c. Give few applications of CMOS Technology.
d. What is the use of MOS transistor?
e. Why graphene has zero band gap?
f. Define Molecular transistors.
g. Define multi-gate device.
h. What are the effects of total ionizing dose?
i. What is an RF used for?
j. Enlist the advantages of operational amplifier.

SECTION B

2. Attempt any *three* of the following: **10x3=30**

a. Explain MOSFET scaling and short channel effects in detail.
b. Draw and explain MOSFET current voltage characteristics. Discuss Double gate MOS system.
c. Explain Physical structure and band structure of carbon nanotube.
d. Discuss Radiation effects in SOI MOSFETs.
e. Explain SRAM design with diagram.

SECTION C

3. Attempt any *one* part of the following: **10x1=10**

a. Discuss double gate and triple gate transistors.
b. Discuss the concept of gate stack and quantum effects in detail.

4. Attempt any *one* part of the following: **10x1=10**

a. Explain 1D and 2d MOS electrostatics in detail.
b. Define CMOS Technology. What is the effect of semiconductor thickness?

5. Attempt any *one* part of the following: 10x1=10

a. What do you understand by single electron charging? Discuss in detail.

b. Discuss general model for ballistic nano transistors.

6. Attempt any *one* part of the following: 10x1=10

a. Explain single-gate SOI in detail.

b. Discuss single event effect and scaling effects.

7. Attempt any *one* part of the following: 10x1=10

a. Write short notes on
   (i) intrinsic gain
   (ii) flicker noise
   (iii) self heating

b. Explain Successive approximation DAC.