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BIELE-013

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00655

Term-End Examination

June, 2019

BIELE-013 : DEVICE MODELLING FOR CIRCUIT SIMULATION

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data, if any, may be suitably assumed. Use of scientific calculator is permitted.*

1. (a) What is the need of circuit simulation in device modelling ? 5

(b) Write down the SPICE code for transient AC, DC and noise analysis with the help of suitable example of BJT amplifier. 5

2. (a) How is SPICE different from other Hardware Descriptive Languages ? 5

(b) Write down various modes of operation of BJT. 5

3. Give the high frequency model of a diode and explain how we can measure the parameters of high frequency model. *10*

4. Evaluate the different model parameters of diode with the required derivation and diagram. *10*

5. Draw the high frequency small signal model of BJT and explain how the high frequency model is different from low frequency model. *10*

6. What is charge sharing effect ? Explain with the help of schematic diagram. *10*

7. Explain constant field scaling and write down the after scaling variations in various parameters like channel length, gate oxide thickness, power supply voltage, threshold voltage and doping density of MOSFET. *10*

8. (a) Draw and explain the energy band diagram of heterojunction devices. *5*

   (b) What is built-in voltage ? How does it affect the properties of materials ? *2+3=5*

9. Write down the comparison of level 1 and level 2 model of the MOSFET. *10*

10. Write short notes on any ***two*** of the following : *2×5=10*

(a) BSIM Model

(b) Drain Induced Barrier Lowering (DIBL)

(c) MOS Capacitances

(d) Heterojunction Devices