No. of Printed Pages : 3

BIELE-013

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

00474 **Term-End Examination**

June, 2017

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 may be suitably assumed. Use of scientific calculator is permitted.*

1. (a) What is BSIM ?

(b) What is the use of SPICE code in circuit simulations ?

(c) What is the need of device modelling ?

(d) What is device scaling ?

(e) Draw the I – V characteristic of a MOSFET and mention different regions of operation. *5×2=10*

2. (a) Write the SPICE codes of a full-wave rectifier and simulate for its input-output characteristics. 5

(b) Write the SPICE commands for AC, DC and transient analysis of any circuit. 5

3. (a) Derive the diode current equation of a p-n junction diode and mention the various SPICE codes of it. 5

(b) Draw the small signal equivalent circuit of a p-n junction diode. Write the expressions of junction capacitance and diffusion capacitance. 5

4. (a) Draw and explain the high frequency and noise models of a BJT. 5

(b) How are diode model parameters measured ? 5

5. (a) What is Early effect ? Explain in accordance with the operation of a BJT. 5

(b) How are model parameters extracted of a MOSFET ? Enlist all SPICE model parameters of MOSFET with their values and units. 5

6. (a) Explain temperature and area effects on the BJT model parameters. *5*

(b) Write the SPICE code for BJT parameters. *5*

7. (a) What are the short channel effects of MOSFET ? Explain. *5*

(b) Explain the operation of a MOSFET by deriving the expression of drain current in all modes of operation. *5*

8. (a) Draw and explain the small signal model of MOSFET. *5*

(b) Explain different parasitic capacitances that exist in MOSFET. *5*

9. Explain LEVEL-1 and LEVEL-2 large signal models of MOSFET by writing the corresponding equations and plotting equivalent circuits. *10*

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

(a) HEMT

(b) DIBL Effect

(c) Charge Sharing
