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BIELE-013

01090

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

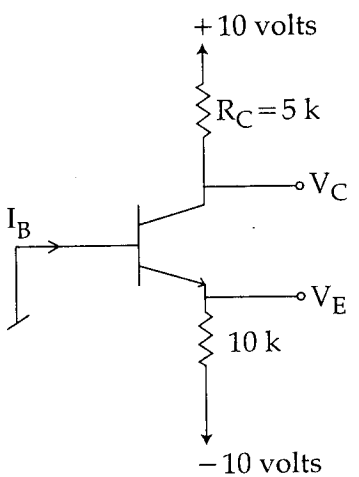
June, 2013

BIELE-013 : DEVICE MODELLING FOR CIRCUIT SIMULATION

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. All question carry **equal** marks.*

1. In the circuit the emitter voltage is measured as −0.7 volt, $\beta = 50$. Find I_E, I_B, I_C, and V_C **10**



2. (a) What do you mean by base width modulation and base stretching in BJT ? 5

(b) Define the four modes of BJT operation with suitable characteristic graphs. 5

3. Calculate the threshold voltage of an N-MOS transistor with subtrate ground. The subtrate doping density $N_A = 2 \times 10^{15}/cm^3$, polysilicon gate doping density of $N_D = 1 \times 10^{20}/cm^3$, Gate - oxide thickness of $t_{ox} = 1000A°$ and oxide interface fixed charge density $N_{ox} = 1 \times 10^{10}/cm^3$. Assume N_o threshold adjust implantation impurities are added $[n_i = 1.45 \times 10^{10}/cm^3]$. **5+5=10**

4. Discuss the principle of Heterojunction devices with suitable examples. **10**

5. What do you understand by SPICE and how will you do D.C. circuit analysis ? **10**

6. Suggest the model statement in SPICE for following : **10**

(a) BJT

(b) FET

(c) MOSFET

(d) Diode

(e) OP - Amp

7. Write short note on following : 5+5

(a) JFET

(b) MESFET

8. Explain short Channel effect and Narrow width effect in MOSFET. 10

9. Discuss small signal model of diode in detail with suitable mathematical explanation. 10

10. Explain BSIM models briefly. Discuss the various non - linear effects of MOSFETs. 10