B.E. Electronics Engineering Seven Semester (CBS)

EN7053 - Elective-I : Device Modelling

P. Pages : 2 **GUG/W/18/1791**

Time : Three Hours * 1 4 0 1 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Draw neat sketches wherever necessary.

1. a) Write short note on element values nodes circuit elements element nodes and sources. **8**

b) What are the advantages of PSPICE? **8**

OR

2. a) What are four dependent sources in DC circuit analysis? with typical statements elaborate linear and non linear forms. **8**

b) Write short note on exponential source, pulse source, piecewise linear source and sinusoidal source. **8**

3. a) Derive equation for constant potential for a p-n junction. **8**

b) An abrupt Si junction has Na = $10^{18}/cm^3$ one side and Na = $5x10^{15}/cm^3$ on the other. **8**
i) Calculate the fermi level positions at 300ºk.
ii) Draw equilibrium band diagram for the junction and determine V_o from the diagram.
iii) Calculate V_o from doping concentrations.

OR

4. a) Derive equation for the depletion region width. **8**

b) What do you mean by carrier injection. **8**

5. a) Explain the concept of amplification in BJT in terms of base transport factor emitter injection efficiency and base to collector current amplification factor. **8**

b) What do you mean by normal and inverted mode for a transistor. **8**

OR

6. a) For an active biased pnp transistor draw energy band diagram and compare it with band diagram without bias. Also get equation for $\partial_p(x_n)$. **8**

b) Draw and comment on the different models used for BJT in PSPICE. **8**

7.	a)	With neat sketches discuss the enhancement mode and depletion mode MOS transistor.	**8**
	b)	What is pinch off voltage? Derive equation for V_P.	**8**

OR

8.	a)	What do you mean by threshold voltage?	**8**
	b)	Explain using energy band diagrams the three components of V_T.	**8**
9.	a)	Write short note on MOS models in SPICE.	**8**
	b)	Discuss in detail the MOS layout and schematic for SPICE modeling.	**8**

OR

10.	a)	Explain in detail the ideal voltage transfer characteristics of MOS inverter.	**8**
	b)	Write short note on SSNM.	**8**

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