

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE SEM-III Examination-Dec.-2011**

**Subject code: 131101**

**Date: 20/12/2011**

**Subject Name: Basic Electronics**

**Time: 2.30 pm -5.00 pm**

**Total marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the concept of potential energy barrier. **07**  
(b) State the limitations of Rutherford model and explain Bohr atomic model. **07**

- Q.2** (a) Explain the mobility and conductivity using electron-gas theory. Also derive the expression of current density. **07**  
(b) Describe the Hall effect and also explain how it is help to determine the different properties of semiconducting material. **07**

**OR**

- (b) Explain the generation of holes and electrons in an intrinsic semiconductor. **07**
- Q.3** (a) Explain the formation of barrier potential in open circuited PN junction diode. Also derive the expression for barrier potential. **07**  
(b) A diode having internal resistance  $20\Omega$  is used for half-wave rectification. If the applied voltage  $V=50\sin(\omega t)$  and load resistance  $R_L=800\Omega$ , find: **07**  
1)  $i_m$ ,  $I_{dc}$ ,  $I_{rms}$   
2) d.c. output voltage  
3) efficiency of rectification.

**OR**

- Q.3** (a) Define the rectification and describe the full wave bridge rectifier with the help of neat circuit diagram and waveforms. **07**  
(b) The resistivities of two sides of a step graded germanium diode are  $2\Omega\cdot\text{cm}$  and  $1\Omega\cdot\text{cm}$  for p-side and n-side respectively. Calculate the height of potential energy barrier  $V_o$ . Assume  $\mu_p=1800\text{ cm}^2/\text{v}\cdot\text{sec}$ ,  $\mu_n=2100\text{ cm}^2/\text{v}\cdot\text{sec}$ ,  $q=1.6\times 10^{-19}$   $n_i=2.5\times 10^{13}$  per  $\text{cm}^3$  **07**

- Q.4** (a) Define following terms: **07**  
1) PIV  
2) voltage equivalent of temperature  
3) electric potential  
4) electron volt  
5) Ripple factor  
6) base spreading resistance  
7) pinch off voltage
- (b) Explain the different types of clipping circuits. **07**

**OR**

- Q.4 (a)** Explain the output characteristic of n-p-n transistor in CE configuration. Also indicate different regions. **07**
- (b)** Determine h-parameters for the two port network. Also draw the hybrid model for CE, CB and CC configurations. **07**

- Q.5 (a)** Explain DC load line and Q-point for any transistor configuration. Also state the necessity of biasing and list biasing methods for transistor. **07**
- (b)** List the basic configurations of a low frequency FET amplifier. Explain any one of them with the help of neat circuit diagram and small signal equivalent circuit. **07**

**OR**

- Q.5 (a)** Classify the power amplifiers based on the position of Q-point on the ac load line. Also explain Class-B push-pull amplifier. **07**
- (b)** Explain the principle of operation of JFET. Also compare FET with BJT. **07**

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