GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-III Examination December 2009

Subject code: 131101   **Subject Name: Basic Electronics**
Date: 17 /12 / 2009   Time: 11.00 am – 1.30 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)** Define following terms: **04**
      (i) Electron Volt (eV).
      (ii) Mobility of charge carries.
      (iii) Barrier potential.
      (iv) Voltage equivalent of temperature.

    (b) Explain energy band diagram of insulator, semiconductor and conductor.   **05**

    (c) Explain following for npn transistor.   **05**
      (i) Current components.
      (ii) Regions of operation according to biasing condition

Q.2 **(a)** Draw the circuit diagram of full wave bridge rectifier and give its input and output waveforms. Also derive the expression for the d.c. current.   **07**

    (b) Explain Hall effect. Derive expression of Hall voltage and state its applications.   **07**

<p align="center">OR</p>

    (b) A bar of n type silicon has length of 5 cm and circular cross sectional area of 10 mm^2. When it is subjected to a voltage of 1 V along its length, the current flowing through it is 5 mA. Calculate the concentration of free electrons and drift velocity of electrons. Assume mobility of free electrons to be 1300 cm^2/V-s.   **07**

Q.3 **(a)** Compare zener and avalanche break down.   **04**

    (b) What is transition capacitance in p-n junction diode? Give its physical significance.   **05**

    (c) State the use of clipping circuits. Discuss with neat sketch working of a biased parallel clipper.   **05**

<p align="center">OR</p>

Q.3 **(a)** Explain principle of operation of a Photodiode.   **04**

    (b) Discuss piece-wise linear model of a diode.   **05**

    (c) Compare V-I characteristics of Silicon and Germanium p-n junction diode.   **05**

Q.4 **(a)** Draw CE transistor configuration and give its input and output characteristics. Also derive the relation between current gain of CE, CB and CC configurations.   **07**

    (b) Give constructional details of JFET and give its characteristics. Why FET is called voltage controlled device?   **07**

<p align="center">OR</p>

Q.4 **(a)** Explain the operation of Emitter follower amplifier. Why is it named as emitter follower? **07**

(b) Give points of difference between BJT and FET. Also explain FET as voltage variable resistor. **07**

Q.5 **(a)** State the need of biasing. Discuss voltage divider bias circuit and mention its advantages. **07**

(b) What is the difference between voltage amplifier and power amplifier? State important features of power amplifier and classify them based on the position of Q point. **07**

OR

Q.5 **(a)** Discuss h-parameter equivalent circuit for transistor in CE configuration. **07**

(b) State the role of voltage regulators in power supplies? Discuss working of a series voltage regulator. **07**

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