

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**
- OR**
- (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 $1300 \text{ cm}^2/\text{V-s}$. **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**
- OR**
- 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**

OR

- 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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