

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III EXAMINATION – SUMMER 2016**

**Subject Code:131101****Date:02/06/2016****Subject Name:Basic Electronics****Time:10:30 AM to 01:00 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 in detail the phenomenon of Hall effect with mathematical derivations. **07**  
Enlist the various applications of Hall effect?
- (b) Explain the energy band diagram for insulator, semiconductor, and metal. Also, define electron volt. **07**
- Q.2** (a) Briefly discuss the term mobility in connection to charged carriers and derive equation for point form of Ohm's law. **07**
- (b) Explain the significance of continuity equation and also derive the equation. **07**
- OR**
- (b) A diode with an internal resistance of 10 ohm is used as a rectifier to supply power to a 500 ohm load from a 220 V (rms) source of supply. Calculate (a) the peak load current (b) the dc load current (c) the rms load current (d) the dc diode voltage (e) the total input power to the circuit and (f) percentage regulation from no load to the given load. **07**
- Q.3** (a) Describe the diode's static and dynamic resistances. Also, draw diode V-I characteristic. **07**
- (b) Explain working of the double-diode clipper circuit that restrict the output voltage at two individual levels with the help of necessary waveforms. **07**
- OR**
- Q.3** (a) Define and discuss following terms in connection to diode: **07**  
1. Transition capacitance, 2. Diffusion capacitance.
- (b) Describe in detail working operation of full-wave rectifier with suitable waveforms. Also, derive the equation for DC output voltage. **07**
- Q.4** (a) Explain in detail the base-width modulation or 'early effect' for common-base configured transistor and draw its output and input characteristics. **07**
- (b) Introduced the h-parameters and draw h-parameter based equivalent circuit for CE, CB and CC configured transistor. **07**
- OR**
- Q.4** (a) In relation to transistor biasing, describe the compensation techniques. **07**
- (b) Obtain the expression for small-signal voltage gain in relation to emitter follower circuit in terms of h-parameters. **07**
- Q.5** (a) Explain the working operation of n-channel JFET and draw its basic structure. **07**
- (b) Explain briefly the construction and working of p channel Enhancement MOSFET. Also, draw its characteristic and transfer curve. **07**
- OR**
- Q.5** (a) Draw class B push-pull amplifiers system and derive maximum conversion efficiency ( $\eta$ ). **07**
- (b) Define and prove the Miller's theorem and its dual alternative. **07**

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