

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (OLD) EXAMINATION – WINTER 2018****Subject Code:131101****Date:01/12/2018****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) Draw the circuit diagram of full wave bridge rectifier and draw its input and output waveforms. Also state the equation for D.C. load current. **07**  
(b) Define electron volt. Also explain the energy band diagram for insulator, semiconductor, and metal. **07**
- Q.2** (a) Describe the diode's static and dynamic resistances. Also draw diode V-I characteristics. **07**  
(b) Explain i) Zener diode and ii) Photodiode. **07**
- OR**
- (b) A metal piece of circular cross-section has a resistance per unit length equal to  $3.6 \times 10^{-4} \Omega/\text{cm}$ . The cross-sectional area is  $1 \text{ mm}^2$  and the concentration of free electrons is  $9 \times 10^{26} / \text{m}^3$ . If the current density is  $3 \times 10^6 \text{ A/m}^2$ , calculate the following : **07**  
(a) Current (b) Mobility (c) Conductivity (d) Velocity of free electrons.
- Q.3** (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) Explain NPN transistor with symbol, structure and operation. **07**
- OR**
- Q.3** (a) Explain working of Tunnel diode. Draw its I-V characteristic and symbol. List out applications of Tunnel diode. **07**  
(b) Explain Phototransistor. **07**
- Q.4** (a) Explain voltage divider biasing for BJT with derivations and diagram. **07**  
(b) Write short note on Clippers. **07**
- OR**
- Q.4** (a) Derive the expression for small-signal voltage gain in relation to emitter follower circuit in terms of h-parameters. **07**  
(b) Explain class B push-pull Power Amplifier. **07**
- Q.5** (a) Compare class A, class B, class C and class AB amplifiers. **07**  
(b) Draw a neat sketch to illustrate the structure of an N-channel E-MOSFET. Explain its operation. **07**
- OR**
- Q.5** (a) Compare FET with BJT in terms of advantages, disadvantages, construction and Operation **07**  
(b) An n-channel JFET has  $I_{DSS} = 8 \text{ mA}$  and  $V_P = -4 \text{ Volts}$ . **07**  
(a) If  $I_D = 3 \text{ mA}$  calculate the value of  $V_{GS}$ .  
(b) Calculate  $V_{DS(\text{sat})}$  for  $I_D = 3 \text{ mA}$ .

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