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BIEL-001

B.Tech. (BTCSVI / BTECVI / BTELVI)

Term-End Examination

December, 2015

BIEL-001 : BASICS OF ELECTRONICS ENGINEERING

Time : 3 hours

Maximum Marks : 70

Note : *Answer five questions in all. Question number 1 is compulsory.*

1. State whether the following statements are *true* or *false* : *10×1=10*
- (a) The highest level of energy occupied by an electron is called its Fermi-level.
 - (b) In case of semiconductors or insulators, the property of conduction is dependent on temperature.
 - (c) At reverse bias the number of minority carriers crossing the junction of a diode depends primarily on the concentration of doping impurities.
 - (d) A zener diode is used mainly in breakdown region.
 - (e) The silicon transistors are more widely used than germanium transistors because they have smaller leakage currents.

- (f) In CB configuration, the output $V - I$ characteristics of a transistor is drawn by taking V_{CB} versus I_B for constant I_E .
- (g) The rectifier circuit that produces the least ripples is the full wave rectifier.
- (h) The output voltage of a 7805 IC voltage regulator is 12 V.
- (i) Except the transformer, the main parts of a regulated power supply are rectifier, filter and regulator.
- (j) A transistor when connected in CE mode has a high input resistance and a low output resistance.
2. (a) Explain the existence of various electron energy bands in solids. Based on these bands distinguish between insulators, conductors and semiconductors. 7
- (b) Explain drift and diffusion of charge carriers in semiconductors. Derive an expression for the electron current due to drift and diffusion. 8
3. (a) Draw the characteristics of a silicon p-n junction diode with proper voltage and current levels and show the forward and reverse bias region. Give the diode current equation for both the regions. 7

(b) Describe with the help of a diagram, the principle and working of a zener diode. Why is zener diode used in voltage regulator circuit ?

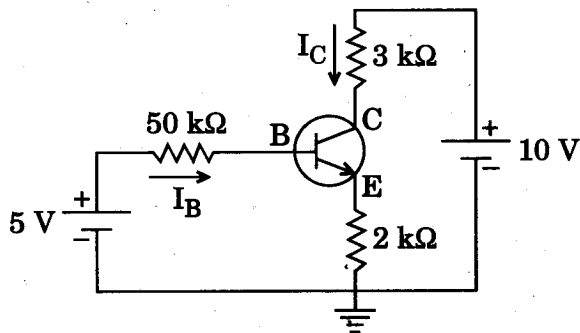
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4. (a) Explain base width modulation (early effect) with the aid of plots of potential and minority carrier concentration throughout the base region.

7

(b) In the circuit diagram shown below, $\beta = 100$, $V_{BE} = 0.8 \text{ V}$, and $V_{CE} = 0.2 \text{ V}$. Determine whether or not silicon transistor is in saturation and find I_B and I_C .

8



5. (a) Compare the characteristics of a transistor amplifier in the three possible configurations.

7

(b) Why are the transistor amplifiers always operated above knee voltage region ? State various methods of improving stability.

8

6. (a) Sketch the cross-section view of an enhancement mode MOSFET. Explain its operation and characteristics. 7
- (b) Distinguish between JFET and MOSFET from construction and drain characteristic point of view. 8
7. (a) With a neat circuit diagram, explain the working principle of a regulated power supply. 7
- (b) Draw the circuit diagram of a centre tap full wave rectifier and explain its working. 8
8. Write short notes on any *three* of the following : $3 \times 5 = 15$
- (a) LDR
- (b) CMOS and its application
- (c) Channel Length Modulation
- (d) Biasing of BJT
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