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BIEL-001

B.Tech. (BTCSVI / BTECVI / BTELVI)

Term-End Examination

00463

December, 2016

BIEL-001 : BASICS OF ELECTRONICS ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. (a) Define mobility in semiconductors. Does it also depend on doping levels ? *3*

(b) Differentiate among semiconductors, conductors and insulators on the basis of band gap. *3*

(c) Explain in detail the Fermi level and energy distribution of carriers inside the bands. *4*

2. (a) What are intrinsic and extrinsic semiconductors ? Comment on the conductivity of extrinsic semiconductors. *4*

(b) In a certain conductor with cross-sectional area of a = 10^{-7} m^2, there are 10^{23} electrons/m^3 with mobility of 0·4 m^2/V.s. Determine the conductivity and resistance of a conductor of length 15 cm. *6*

3. (a) A germanium diode carries a current of 10 mA when a forward bias of 0·2 V is applied.

(i) Estimate the reverse saturation current (I_s).

(ii) Calculate the bias voltages needed for diode currents of 1 mA and 100 mA. Comment on the range of these two voltages. *6*

(b) Explain Zener breakdown and Avalanche multiplication phenomena in a p-n junction diode. *4*

4. (a) Discuss briefly the biasing of p-n junction. *5*

(b) Define "diffusion capacitance" of a p-n junction diode. Obtain an expression for the same. *5*

5. (a) What are the advantages of the FET over a conventional bipolar junction transistor ? Define pinch-off voltage, transconductance, amplification factor and drain resistance of an FET. *7*

(b) Explain briefly "Base width modulation". *3*

6. (a) Describe the characteristics of UJT with the help of a neat diagram. *6*

(b) Derive the relation between alpha and beta of transistor configuration. *4*

7. Describe briefly the C – V (Current – Voltage) characteristics, basic structures and operating principles of MOSFET. *10*

8. (a) With the help of a circuit diagram, explain the working of a half wave rectifier with capacitor filter. *5*

   (b) Discuss in detail "The Voltage Multiplier". *5*

9. (a) Explain the use of Bleeder resistor. *2*

   (b) Compare full wave bridge and centre tapped rectifiers in terms of their ripple factor and efficiency. *5*

   (c) A bridge rectifier uses four identical diodes of forward resistance of 5 Ω each. It is supplied from a transformer with output voltage of 20 V (rms) and secondary winding resistance of 10 Ω. Calculate the output d.c. voltage at a d.c. load current of 100 mA. *3*

10. Write short notes on any ***two*** of the following : *2×5=10*

    (a) PIN diode

    (b) Series Regulator

    (c) Heterojunction Bipolar Transistor
