

Total No. of Questions : 6]

SEAT No. :

P1716

[5131]-204

[Total No. of Pages : 2

M.Sc. - I

ELECTRONIC SCIENCE

EL2UT08:Foundation of Semiconductor Devices

(2013 Pattern) (Semister - II) (Credit System)

Time : 2½ Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *Answer any Four questions.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Non-Programmable calculator is allowed*

Q1) Attempt the following:

- a) Explain Hybrid piequivalent circuit in BJT. **[4]**
- b) An abrupt silicon P-n junction consist of ap-type region containing $2 \times 10^{16} \text{cm}^{-3}$ acceptors and n type region containing also 10^{16}cm^{-3} acceptors in addition to 10^{17}cm^{-3} donors. Calculate the thermal equilibrium density of electrons and holes in the p-type region as well as both densities in the n-type region $n_i = 10^{10} \text{cm}^{-3}$. **[3]**
- c) Explain the concept of an excess carrier life time. **[3]**

Q2) Attempt the following :

- a) Define ; Thermal conductivity, mobility, Drift carrier and diffusion current. **[4]**
- b) Describe internal pinch off voltage of JFET. **[3]**
- c) Calculate smallest possible uncertainty in position of an electron moving with velocity 10^6m/s . **[3]**

Q3) Attempt the following:

- a) With label diagram explain MESFET. **[4]**
- b) Explain Hull effect. Give it's application. **[3]**
- c) What is millar indices? Determine the Miller indices of plane which is parallel to x - axis & cuts intercepts of 2 & 1/2 respectively along y & z axis. **[3]**

P.T.O.

Q4) Attempt the following :

- a) Explain the terms in short [4]
 - i) basis
 - ii) Space lattice
 - iii) unit cell
 - iv) Lattice
- b) Define Fermi level and Fermi energy with it's importance. [3]
- c) What is break down in diode? What are it's types? [3]

Q5) Attempt the following :

- a) Explain the Czochralski methods for semiconductor crystal growth. [5]
- b) Obtain expression for electron diffusion current density and hole diffusion current density in semiconductor. Show the graphically the electron and hole concentration is a function of distance. [5]

Q6) Attempt the following:

- a) Explain the basic operation of MOS capacitor with suitable diagram.[5]
- b) Define Fermi energy. Explain Fermi Dirac distribution function in detail.[5]

