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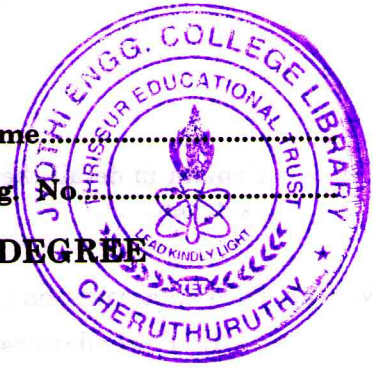
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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2011

EC 04 306—SOLID STATE DEVICES

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Define and explain (1) Mobility ; (2) Diffusion process in semiconductors.

   (b) Explain in detail the conductivity properties of solids.

   (c) Explain the construction and properties of PN junction diodes.

   (d) Explain the features of heterojunctions.

   (e) Give an account on base narrowing.

   (f) Differentiate FET from MOSFET. Explain the difference.

   (g) Explain the working principle of LED with a neat sketch.

   (h) Draw the 2 transistor model of SCR and explain it in detail.

   (8 × 5 = 40 marks)

II. (a) Explain the following in detail :

   (i) Continuity equation.

   (ii) Diffusion length.

   (iii) Quasi fermilevel.

   (3 × 5 = 15 marks)

Or

   (b) (i) Differentiate Direct from Indirect bandgap semiconductors. Explain the difference.

   (7 marks)

   (ii) Explain the significance of energy band diagrams.

   (8 marks)

III. (a) (i) Obtain the expression for current flow through *pn* junction.

   (7 marks)

   (ii) Explain the breakdown mechanism in Zener diodes.

   (8 marks)

Or

   (b) Explain in detail the VI characteristics of switching diode and varactor diodes with neat sketches.

   (15 marks)

IV. (a) Explain the following in detail :

   (i) Base narrowing.

   (7 marks)

   (ii) Kirk effect.

   (8 marks)

Or

Turn over

(b) Explain in detail the construction and characteristics of MOSFET and MESFET with neat sketches.

(15 marks)

V. (a) Give an account on :

  (i) Power devices. (7 marks)

  (ii) Semiconductor lasers. (8 marks)

Or

(b) Explain the physical structure, principle of operation of SCR with neat sketches. (15 marks)

$[4 \times 15 = 60 \text{ marks}]$