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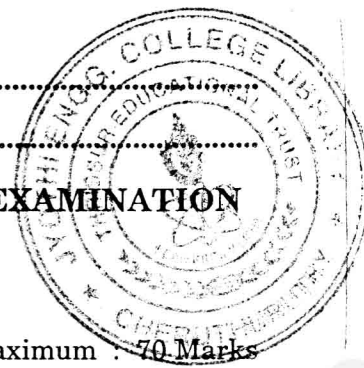
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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
MAY 2012**

EC 09 406/PTEC 09 405—SOLID STATE DEVICES

Time : Three Hours

Maximum : 70 Marks



Part A

Short answer questions.

1. What is the significance of Fermi-Dirac function ?
2. What is avalanche breakdown ?
3. Why is BJT called current controlled device ?
4. What is kirk effect ?
5. What is strong inversion in MOSFET ?

(5 × 2 = 10 marks)

Part B

Answer any four questions.

6. Derive the expression for charge concentrations of semiconductor doped with pentavalent impurity.
7. Derive the expression for drift current in semiconductors.
8. Derive the expression for built in potential of a graded PN junction.
9. With circuit diagram explain and write the expressions for terminal currents of *p-n-p* BJT.
10. Explain the short-channel effects in MOSFET.
11. Explain the concept of threshold voltage in N-MOSFET and P-MOSFET.

(4 × 5 = 20 marks)

Part C

12. (a) Derive the continuity equation.

Or

- (b) Derive the expression for Fermi-level in intrinsic semiconductor.

13. (a) Explain Schottky effect and derive an expression for change in potential barrier due to image charge and applied bias voltage.

Or

- (b) Draw the structure of GaAs isotope diodes and explain its characteristics.

14. (a) Draw the Eber-Moll model for BJT and write the analytical expressions for transistor characteristics.

Or

- (b) Draw the structure of JFET and explain its operation.

15. (a) Explain the working and characteristics of *n*-channel, depletion MOSFET with diagrams.

Or

- (b) Explain the working of floating gate MOSFET with diagram.

(4 × 10 = 40 marks)