

M.Sc. F.Y. (Electronics) (CBCS Pattern) Semester - I
PSCELET01 / PSCELET101 - Paper-I : Fundamentals of Semiconductor Devices

P. Pages : 2

Time : Three Hours



GUG/S/23/11154

Max. Marks : 80

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- Notes : 1. All questions are compulsory and carry equal marks.
2. Draw well labeled diagrams wherever necessary.

Either:

1. a) Explain the atomic structure for silicon. Explain the concept of doping. State the types of extrinsic semiconductors. 8
- b) Explain energy level diagram of an atom. Write a short note on Extrinsic Semiconductors. 8

OR

- c) Explain forward and reverse biasing of a p-n junction diode. 8
- d) Draw the equivalent circuit diagrams of a p-n junction diode and explain it. 8

Either:

2. a) State the advantages of using equivalent circuit models for BJT analysis. Explain in detail hybrid Pi model for it. 8
- b) Describe the time delay factors in the frequency limitations of BJT. 8

OR

- c) State the advantages of using equivalent circuit model for BJT device. Explain Ebers - Mall model for BJT device. Draw and explain its equivalent circuit in detail. 8
- d) Describe operation of reverse bias p - n junction diode. Obtain relation for junction capacitance. 8

Either:

3. a) What are the advantages of MOSFETs over JFETs? Explain the small dimension effects with respect to threshold voltage and width. 8
- b) List recent MOSFET structures. Explain anyone in detail. 8

OR

- c) Draw a diagram for MOSFET as two-port network. Explain low frequency and high frequency response from this diagram. 8
- d) Draw the small signal equivalent circuit for JFET and discuss ac response from it. What is charged - coupled devices? Explain. 8

Either:

4. a) What are Optoelectronic devices? Explain any two Optoelectronic devices? **8**
- b) What are Optoelectronic materials? Explain them? **8**

OR

- c) Explain the condition for population inversion in Laser? **8**
- d) List and discuss the advantages and disadvantages of semiconductor lasers. **8**
5. Attempt the following.
- a) What is effect of temperature on Zener and avalanche break down? **4**
- b) What are the differences between CE, CB, and CC configurations? **4**
- c) What are unipolar devices? Explain. **4**
- d) What are the differences between radiative and non-radiative transition? **4**
