

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:

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

OR

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|-----------|----|--|----------|
| | 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 |
