

**B.Tech**  
**(SEM III) THEORY EXAMINATION 2018-19**  
**ELECTRONICS DEVICES AND CIRCUITS**

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

1. Attempt all questions in brief. 2 x 7 = 14
- a) What type of semiconductor material is suitable for luminescence effect?
  - b) What do you mean by diffusion of carriers?
  - c) In the linear region operation of MOSFET drain current decreases as the temperature increases. Explain.
  - d) What is meant by threshold voltage?
  - e) What is a transistor? Explain its types.
  - f) What do you mean by optoelectronic devices?
  - g) What is negative feedback and positive feedback?

**SECTION B**

2. Attempt any three of the following: 7 x 3 = 21
- a) Explain the principle of indirect recombination in band gap. Discuss its mechanism.
  - b) What is a photodiode? Explain its construction and operation.
  - c) Explain the operation and characteristics of N-channel MOSFET.
  - d) Explain transistor characteristics in CE configuration. Explain the behaviour of the transistor in active and cutoff mode.
  - e) What is an oscillator? How does it differ from an amplifier?

**SECTION C**

3. Attempt any one part of the following: 7 x 1 = 7
- a) Explain the terms: solar cell, LED.
  - b) Derive the expression for the forward and reverse saturation current for P-N junction diode.
4. Attempt any one part of the following: 7 x 1 = 7
- a) The energy distribution function  $p_E$  is given by the product of two factors ( $p_E = N(E) \cdot f(E)$ ). What is the interpretation to be given to each of these factors?
  - b) B. What is Einstein relation? Develop expressions to establish relations between diffusion coefficient and mobility of carriers or obtain the relation:  $D/\mu = kT/q$ .
5. Attempt any one part of the following: 7 x 1 = 7
- a) Show that  $I_E = I_B + \alpha I_E + I_{CBO}$ . In what way  $I_{CBO}$  depend on temperature?
  - b) Define  $\alpha$  and  $\beta$  of a transistor and derive the relationship between them.

6. Attempt any *one* part of the following: 7 x 1 = 7
- a) Explain the terms: single stage MOS amplifier, MOSFET internal capacitances
  - b) Draw a biasing circuit of MOSFET amplifier and explain it.
7. Attempt any *one* part of the following: 7 x 1 = 7
- A. draw the circuit diagram of LC oscillators? What is the condition of oscillation.
  - B. Explain the four types of feedback topologies with the help of schematic diagram.

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