

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
- What type of semiconductor material is suitable for luminescence effect?
 - What do you mean by diffusion of carriers?
 - In the linear region operation of MOSFET drain current decreases as the temperature increases. Explain.
 - What is meant by threshold voltage?
 - What is a transistor? Explain its types.
 - What do you mean by optoelectronic devices?
 - What is negative feedback and positive feedback?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21
- Explain the principle of indirect recombination in band gap. Discuss its mechanism
 - What is a photodiode? explain its construction and operation.
 - Explain the operation and characteristics of N- channel MOSFET.
 - Explain transistor characteristics in CE configuration. Explain the behaviour of the transistor in active and cutoff mode.
 - 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
- Explain the terms: solar cell, LED
 - 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
- 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. 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
- Show that $I_E = I_B + \alpha I_E + I_{CBO}$. In what way I_{CBO} depend on temperature?
 - Define α and β 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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