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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 ρ_E is given by the product of two factors [ρ_E =N(E). 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 $I_E = I_B + \alpha I_C + I_{CBO}$ In what way I_{CBO} depend on temperature?
b) Define α and β of a transistor and derive the relationship between them.

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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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