(Following Paper ID and Numbers to be filled in your Answer books)

Paper ID: | | | | | | |

Roll No: | | | | | | | | | | |

B.Tech

EXAMINATION, 2015-16

Subject: Fundamental of Electronic Devices **Code: NEC302**

[Time: 3 Hours] **[Total Marks: 100]**

SECTION-A

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2 x 10=20)

(a) What is short diode?

(b) Why direct bandgap semiconductors are preferred for LED operation?

(c) What is law of mass action?

(d) What is the property of heavily doped semiconductors used in Tunnel diode?

(e) Comment over the maximum value of Voc of photodiode.

(f) What is injection electroluminescence?

(g) Comment over the assumption of 'ZERO electric field' in neutral region of diode.

(h) Why minority carriers generation is limited within one diffusion (outside depletion region) for increasing reverse saturation current.

(i) Mention the application of negative conductance devices.

(j) Differentiate florescence and phosphorescence.

SECTION-B

Note: Attempt any 5 questions from this section. (10 x 5=50)

Q.2 Discuss in detail the electron occupancy probability with respect to temperature. Derive the equilibrium concentration of holes.

Q.3 Prove that the charge transport mechanism in valance band is mainly due to holes. What is effective mass concept.

Q.4

Correlate the external optical excitation (g_{op}) rate with steady state excess carrier concentration. In a Si sample 10^{13} EHP/cm^3 are created optically per microseconds with $n_0=10^{14}cm^{-3}$ and $\tau_n=\tau_p=2\mu s$. Calculate percentage change in majority and minority carrier concentrations from its equilibrium values ($n_i=1.5x10^{10}cm^{-3}$). Also calculate the respective quasi Fermi levels with respect to intrinsic energy level.

Q.5 **Explain the operation of DIAC.**

Q.6 What is spontaneous and stimulated emission. Describe the operation of semiconductor diode producing the stimulated emissions.

Q.7 How the random motion of particle results in diffusion process. Derive the equation of continuity.

Q.8 Describe the constructional features and operation of MESFET.

Q.9 Derive the capacitance of PN junction in forward and reverse bias case.

SECTION-C

Note: Attempt any 2 questions from this section. (15 x 2=30)

Q.10 What is the application of negative conductance device? What is TED mechanism? Describe the domain formation in GUNN diode.

Q.11 Derive the expression of current flowing through a homojunction diode under various bias conditions. What is minority carrier extraction?

Q.12 Describe in detail the various physical features of Bipolar junction transistor. Describe the amplification and base current controls process.