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**B TECH**  
**(SEM –V) THEORY EXAMINATION 2021-22**  
**ADVANCE SEMICONDUCTOR DEVICES**

**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. Make the energy band diagram of a metal and semiconductor junction at equilibrium.
- b. How a junction barrier is developed across an unbiased junction?
- c. Define minority carrier life time.
- d. Explain the basic principle of operation of Light-Emitting Diode (LED).
- e. What are the different types of degenerate Semiconductors?
- f. Differentiate between MESFETs and MODFETs.
- g. n?

**SECTION B**

**2. Attempt any three of the following:****7 x 3 = 21**

- a. Explain n-type and p-type semiconductor with example. Define and derive the expression for minority carrier life time.
- b. Discuss diffusion length, carrier life time and recombination.
- c. Explain the working principle and ON/OFF operation of MESFET with characteristics.
- d. Derive an expression for a saturated drain current of a n-channel MESFET.
- e. Explain the phenomenon of Charge-Coupled Device (CCD) with application?

**SECTION C**

**3. Attempt any one part of the following:****7 x 1 = 7**

- (a) Briefly explain Metal-Semiconductor Contacts, Metal-Insulator-Semiconductor Capacitors.
- (b) Describe the working operation of Single Electron Transistor and JFETs.

**4. Attempt any one part of the following:****7 x 1 = 7**

- (a) Derive an expression for hole and electron diffusion current.
- (b) Derive an expression for a saturated drain current of an n-channel MESFET.

**5. Attempt any one part of the following:****7 x 1 = 7**

- (a) Explain the working of TUNNEL diode and IMPATT diodes.
- (b) Explain the Device Design and Performance of BARITT Diode and TUNNETT Diode.

**6. Attempt any one part of the following:****7 x 1 = 7**

- (a) Explain Transferred-Electron and Real-Space-Transfer Devices thyristors.
- (b) Explain the operating principle of Laser. Draw Laser Operating Characteristics.

**7. Attempt any one part of the following:****7 x 1 = 7**

- (a) Explain the working principle of Photoconductor, Photodiodes, and Avalanche Photodiode.
- (b) Explain the Solar Cell Sensors, Thermal Sensors and Mechanical Sensors.