CBCS SCHEME

USN | | | | | | | | | |

18EC33

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Electronic Devices

Time: 3 hrs. Max. Marks: 100

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. What are the types of Bonding forceses in solids? Explain. **(06 Marks)**

b. Explain the classification of material based on conductivity and energy band diagram. **(08 Marks)**

c. Find the conductivity of the intrinsic germanium at 300 K. If a donar type impurity is added to the extent of 1 atom/10^7 germanium atom assume $\mu_n = 3800$, $\mu_P = 1800$, $n_i = 2.5\times10^3$, $Q = 1.602\times10^{-19}$. **(06 Marks)**

OR

2 a. What are Direct and Indirect band gap semiconductor? Explain with examples. **(08 Marks)**

b. Explain the concentration of electron-hole pair in Intrinsic semiconductor with energy band diagram. **(06 Marks)**

c. Calculate the Intrinsic carrier concentration in Silicon at room temperature T = 300 K, where B is the material dependent parameter 5.4×10^{31} and E_G as the bandgap energy 1.12 eV, where K is the Boltzman constant = 8.62×10^{-5} eV/K. **(06 Marks)**

Module-2

3 a. With energy band diagram, explain the doping level in extrinsic semiconductor at 0 K and at 50 K. **(09 Marks)**

b. What is the magnitude of HALL voltage in a N-Type germanium bar having an majority carrier concentration $N_D = 10^{17}$ cm^3. Assume B = 0.2 Wb/m^2, d = 2 mm, E = 10 V/cm. **(05 Marks)**

c. Explain the effect of temperature on semiconductor. **(06 Marks)**

OR

4 a. Explain the qualitative description of current flow at P-N junction under equilibrium and biased condition. **(08 Marks)**

b. Explain zener breakdown and avalanche breakdown under reverse biased P-N junction. **(06 Marks)**

c. Discuss the piece-wise linear approximations of junction diode under ideal condition. **(06 Marks)**

Module-3

5 a. Explain the optical generation of carrier in a P-N junction. **(08 Marks)**

b. Discuss the configuration of a solar cell in enlarged view of the planar junction. **(06 Marks)**

c. What is injection-electroluminiscence and what are its applications? **(06 Marks)**

OR

6 a. Explain I-V characteristics of n-p junction as a function of emitter current. (08 Marks)

b. Discuss switching operation in common-emitter transistor. (06 Marks)

c. Figure Q6 (c) shows the common emitter amplifier circuit. Calculate I_B and I_C assume $\tau_P = 10\ \mu s$, $\tau_t = 0.1\ \mu s$ (06 Marks)

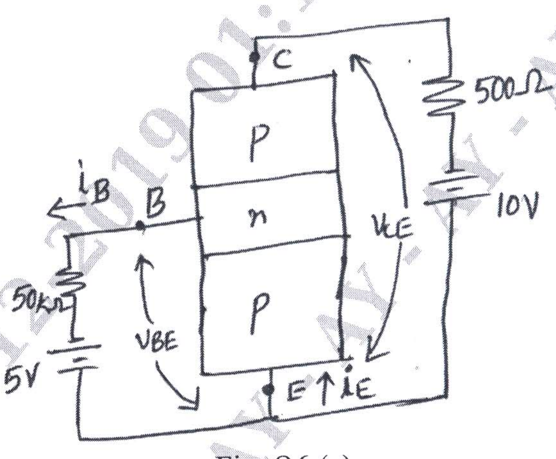

Fig. Q6 (c)

Module-4

7 a. Draw and explain the I-V characteristics of n-channel PNJFET for different biasing voltages. (07 Marks)

b. Draw and explain the small signal equivalent circuit of n-channel PNJFET. (07 Marks)

c. Explain the MOS structure with the aid of parallel-plate capacitor. (06 Marks)

OR

8 a. Explain the effect of frequency on gate voltage of a MOS capacitor with a P-type substrate. (10 Marks)

b. Explain P-channel enhancement and depletion type MOSFET with their circuit symbols. (10 Marks)

Module-5

9 a. With schematic diagram, explain ION-implantation system. (07 Marks)

b. Explain low pressure chemical vapour deposition reactor. (07 Marks)

c. Discuss photolithography. (06 Marks)

OR

10 a. What are the different types of integrated circuits and its advantages? (10 Marks)

b. Explain the process of Integration. (10 Marks)

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