USN | | | | | | | | | 18EC33

# Third Semester B.E. Degree Examination, Dec:20 '19-1Jan.2020
## Electronic Devices

Time: 3 hrs. Max. Marks: 100

**Note:** ***,'Inswer FIFE full questions, choosing ONE full question from each module.***



### Module-I

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)**

Find the conductivity of the intrinsic germanium at 300 K. If a donar type impurity is added to the extent of I atom/$10^7$ germanium atom assume =3800, $vi_p$ =1800 , $n_i$ = 2.5 x$10^3$ , Q = 1.602 x$10^{-19}$ **(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 x$10^{31}$ and F:, as the bandgap energy 1.12 eV, where K is the Boltzrnan constant = 8.62 X$10^{-5}$ 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 $N_i$, =10'$^7$ 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 1-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 1B and lc assume **Tp = 1** 0 pts , = 0.1 pi.s **(06 Marks)**

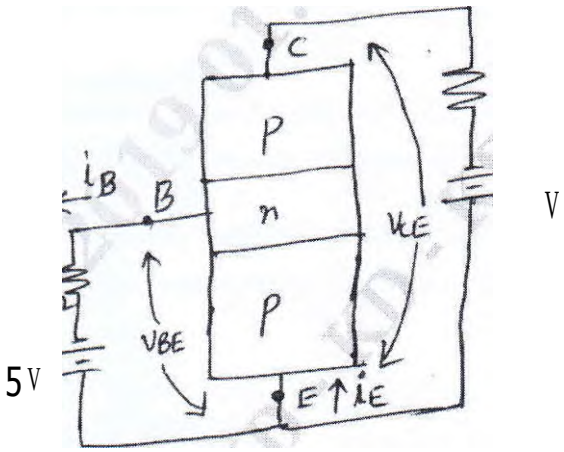


Fig. Qb (c)

## Module-4

7 a. DraW and explain the 1-V characteristics of n-channel PNJFET for different biasing voltages. **(07 Marks)**

h. 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)**