(b) Can we use Si and Ge for fabrication of LED. Justify your answer. Explain how does LEDs emit different colours. (7)

6. (a) Explain Ebers Moll Model of BJT. What is its significance. (8)

(b) What is monolithic IC. Why is layer of SiO2 is formed over the entire surface in a monolithic IC. (7)

7. (a) Explain in detail the various processes involved in the integrated circuit fabrication. (10)

(b) What do you mean by mobility of a carrier? How does it depend on temperature and doping concentration? (5)



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# 305301

**December, 2019**

**B.Tech (ECE/EIC) -3rd SEMESTER**

**Electronics Devices (EC-301)**

Time : 3 Hours] [Max. Marks : 75

*Instructions :*

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Assume necessary relevant data if missing.*

## PART - A

1. (a) What do you mean by sheet resistance? What is its importance? How can it be increased? (1.5)

(b) Differentiate between drift and diffusion current. Why does the diffusion current increase exponentially with increasing forward bias? (1.5)

(c) Why reverse saturation current is more in CE configuration as compared to CB configuration? (1.5)

(d) At room temperature, why the conductivity of Silicon is lower than that of germanium? (1.5)

(e) How does the current vary with gate voltage in saturation region of FET? (1.5)

(f) Compare small signal model of deletion type and enhancement type MOSFET. (1.5)

(g) What are the conditions under which a zener diode can be used as a voltage regulator? (1.5)

(h) Differentiate between photodiode and solar cell. (1.5)

(i) What is the physical significance of 'k' in a E-k diagram of a semiconductor? (1.5)

(j) What do you mean by Chemical Vapor deposition (CVD)? What are advantages of CVD layer? (1.5)

## PART - B

**2.** (a) Find the conductivity of intrinsic germanium at 300°K. If the donor impurity added to the extent of 1 impurity atom in a $10^7$ germanium atoms, find the conductivity. Given that intrinsic concentration at 300°K is $2.5*10^{13}/cm^3$ and $\mu_n$ and $\mu_p$ in germanium are 3800 and 1800 $cm^2/Vs$ respectively. (8)



(b) Define Fermi level for metals. Show that for intrinsic semiconductor, Fermi level is midway between the conduction band and valance band. Show the location of Fermi level for N type and P type semiconductor. (7)

**3.** (a) Differentiate between V-I characteristics of PN junction diode and Zener diode. Explain how a zener diode can be used as a voltage regulator. (8)

(b) Explain how potential barrier exist in a PN junction diode? What are various factors which affect the width of potential barrier. Explain each. (7)

**4.** (a) Draw input and output characteristics curve of CE configuration of BJT. Indicate Active, cut off, saturation and breakdown regions. Explain the shape of curves qualitatively. (8)

(b) How does a schottky diode differ from a conventional PN junction diode. Why is it called a hot carrier diode. Give its working and plot characteristics. (7)

**5.** (a) Explain and draw output and transfer curve characteristics of enhancement type MOSFET. What you infer from these characteristics. Explain. (8)