

20/05/26

FE Sem-II (NEP-2020) May 2026

Time: 1 ½ hr

Max Marks: 45

Note : 1) Question no 1 is compulsory

2) Attempt any two questions from the remaining.

3) Assume suitable data, if required and state it clearly.

Q.1. Answer any five from the following

(5x3) 15

- State three features of JFET.
- Explain the importance of surface to volume ratio in Nano materials.
- In Common base connection, $I_E = 1 \text{ mA}$, $I_C = 0.95 \text{ mA}$, Calculate the value of I_B .
- Explain why Varactor diode is called Voltage Variable Capacitor.
- Write Diode Equation and explain the situation in forward and reverse bias .
- Write the principle of Hall effect and explain the Hall coefficient.

(3 x 5) 15

- Q. 2 a) Define Fermi Level. Show that Fermi Level Lies in the middle of the Forbidden energy gap of an intrinsic semiconductor.
- b) Draw energy level diagram explaining the variation of Fermi level of n-type semiconductor with temperature.
- c) Explain working of Solar Cell. Write its applications.

(3 x 5) 15

- Q.3.a) Explain the p-n junction forward bias with energy level diagram.
- b) Draw and explain I-V characteristics of Zener diode. What is Avalanche breakdown.
- c) Find resistivity of intrinsic germanium at 300 K. Given density of carriers is $2.5 \times 10^{19}/\text{m}^3$. Mobility of electron is $0.39 \text{ m}^2/\text{volt-sec}$ and mobility of holes is $0.19 \text{ m}^2/\text{v-sec}$, charge of electron is $1.6 \times 10^{-19} \text{ C}$.

(3 x 5) 15

- Q .4 a) Explain the working of NPN transistor in CB mode with neat diagram.
- b) Define base current amplification factor (β) and emitter current amplification factor (α) and thus derive the relation between the two.
- c) Explain the working principle of LED and write five advantages and five applications of it.

(3 x 5) 15

- Q. 5 a) State the principle of electron beam lithography and explain its working.
- b) Explain construction and working principle of photodiode.
- c) Compare between FET and BJT.
