GEC – SAMPLE QUESTIONS

1. Why is Si preferred over Germanium for power-electronic applications ?
2. Name one property which distinguishes a semiconductor from a conductor.
3. " A Semiconductor is an insulator at 0^0 Kelvin " – justify the statement.
4. What is meant by effective mass in a solid.Derive expression for effective mass .
5. Define Fermi Level
6. Sketch variation of electron and holes in a semiconductor with position of Fermi level .
7. Show that the Fermi Level is invariant across a junction at equilibrium.
8. Show band-diagram of a p-n junction under forward and reverse biased condition
9. Find expression for contact potential in a p-n junction.
10. An abrupt Si p-n junction has $N_a=10^{18}cm^{-3}$ on one side and $N_d = 5x10^{15}\ cm^{-3}$ on the other side.Calculate the Fermi Level positions at 300K in the p and n-regions. Hence find the contact potential.Draw an equilibrium band diagram for the junction and determine the contact potential V_0 from the diagram.
11. Write a short note on varactor diode.
12. How is the structure of a Zener diode different from an ordinary p=n junction diode .
13. Why is a transistor so called ?
14. Explain with a labelled diagram the different current components in a transistor.
15. Define the terms emitter injection ratio and base transport factor.
16. Define α and β and find relationship between them.
17. Explain early effect in transistors and how it affects the input and output characteristics.
18. What are the factors affecting shift of Q point ?
19. What is the need for biasing ?
20. Why is the hybrid model only valid for small signals?
21. Develop the h parameter model of transistor.
22. Explain physically how self-bias achieves stability.
23. From h-parameter model of a transistor find expression for (i) Input Impedance,(ii) Current gain (iii) voltage gain (iv) output impedance without taking the source resistance into account.
24. Draw block diagram of different stages in an OPAMP .
25. State characteristics of an ideal OPAMP
26. What is the need for level shifter in an OPAMP.?
27. What is the difference between real and virtual ground in an OPAMP
28. Find expression for voltage gain of a) Integrator ,b) differentiator, c) adder and d) differential amplifier using OPAMP.