

PART - A

(8x4=32 Marks)

Note : Answer any Eight questions.

1. Explain the differences between Conductors and Semiconductors?
2. What are N-type and P-type semiconductors? Explain.
3. Explain half wave rectifier with a neat diagram?
4. Explain the working of NPN Transistor?
5. A transistor has a current gain of 175. If the base current is 0.1 mA, what is the collector current?
6. Explain Barkhausen's criteria for oscillators?
7. Explain the characteristics of Shockley diode?
8. How SCR is used as a switch? Explain.
9. The maximum transconductance of a certain N-channel JFET is 9.4 mS. If loss is 20 mA, what is the pinch off Voltage?
10. Determine binary equivalent of $(11.75)_{10}$?
11. Find the binary equivalent of $(1B.2)_{16}$?
12. Define AND gate and give its truth table?

PART - B

(4x12=48 Marks)

Note : Answer all the questions.

13. a) Explain Fermi level. Derive Continuity equation in semiconductors?
OR
b) Explain the characteristics of Zener diode? How Zener diode is used as a voltage regulator?
14. a) Discuss input and output characteristics of a BJT in CB configuration? In CB configuration, current gain is 0.97. If the emitter current is 1 mA, determine the value of base current?
OR
b) Draw a circuit diagram for phase shift oscillator and explain its operation?
15. a) Explain the construction and characteristics of a Photo diode? Give some of its applications?
OR
b) Give the characteristic curve of a JUT and explain the use of its negative resistance behavior? How JUT is used as a relaxation oscillator?
16. a) Explain addition and subtraction of signed binary numbers with suitable examples?
OR
b) What are DeMorgan's Theorems? Design all basic gates by a universal gate NOR?

Time: 3 Hours

Max. Marks: 80

PART – A

Note: Answer any eight questions.

(8x4= 32 Marks)

1. Explain Paschen-Back effect.
2. What drawbacks do you observe in Bohr's atomic model?
3. How do you determine inter nuclear distance of an atom?
4. State and explain the de Broglie hypothesis.
5. State Heisenberg's uncertainty principle.
6. What is Compton's effect?
7. What is meant by electric quadrupole moment?
8. Discuss Geiger-Nuttall's law.
9. Define binding energy and packing fraction of nuclei.
10. Define (i) Unit cell (ii) miller indices
11. Write Bragg's law and explain it.
12. How do you define Madelung constant?

PART – B

Note: Answer all the questions.

(4x12= 48 Marks)

13. (a) Explain Raman effect and describe its experimental arrangement.
(OR)
(b) Deduce an expression for the rotational energy levels of a diatomic molecule and explain the energy levels.
14. (a) Explain matter waves and describe Davisson –Germer experiment.
(OR)
(b) Explain time-dependent and time-independent Schrodinger equations.
15. (a) Explain liquid drop model of the nucleus and write its limitations.
(OR)
(b) Describe G.M. counter and explain how does it differ from a proportional counter?
16. (a) Explain Born-Haber cycle and discuss its importance with a neat diagram.
(OR)
(b) Describe Laue's and powder experimental methods of X-ray diffraction.
