

N. B. (1) All questions are compulsory

(2) Note the internal options

(3) Marks assigned to each question are written against the question

Q. 1 (A) Attempt any one [8]

(1) Give physical signification of Boltzman Transport equation. Evaluate Hall Effect by solving Boltzman transport for n-type semiconductor and show

$$R_H = -\frac{3\pi}{8} \frac{1}{en}$$

(1) Explain hot electrons concept and prove that at high electric field applied to semiconductor mean drift velocity increased as $E^{1/2}$ and also discuss derivation from ohm's law.

B) Attempt any one [4]

(1) Write short note on magneto-resistance

(2) Explain in brief Shubnikov de Hass effect

2. (A) Attempt any one [8]

(1) Discuss inter band transition in quantum wells and give its some applications.

(2) Explain direct and indirect transition in semiconductor due to absorption of radiant energy. Obtain the expression and discuss its variation with frequency with help of neat diagram.

(B) Attempt any one [4]

(1) Write note on photoconductivity of semiconductors

(2) Explain in brief free carrier absorption in semiconductors

3. (A) Attempt any one [8]

(1) Discuss the structure, properties of organic semiconductors and state their applications in various fields.

(2) Discuss design, fabrication and electrical characteristic of Si-H field effect transistors. What are its advantages and limitations in semiconductor device technology?

(B) Attempt any one [4]

(1) Explain in brief polymer semiconductors

(2) Write note on electronic properties of amorphous semiconductors

Q. 4 (A) Attempt any one [8]

(1) What is mean by nematic phase of a liquid crystal? How does it differ from the other phases of liquid crystal?

(2) Explain construction, working and applications of photovoltaic cells

(B) Attempt any one [4]

(1) Write note on metallic glasses?

(2) Write note on giant-magneto resistance

Q.5 Attempt any Four [12]

(1) Write note on quantum hall effect

(2) Explain in brief transferred electron effects

(3) Radiative recombination in semiconductor

(4) Write note on free carrier absorption process

(5) Explain electronic density of states

(6) Write note on transport properties of electron in semiconductor

(7) Write short note on magnetites

(8) Explain in brief ceramic materials
