GURUDAS COLLEGE

B.Sc. Semester – V

Paper: CC 12 Practical

Time: 1 Hr   Full Marks: 15

Answer any _one question_ from the following

1. (a) Define Hall voltage with appropriate block diagram.
    (b) Write down the theory for the determination of Hall voltage in the laboratory.
    (c) What does Hall coefficient signify?
    (d) What precautions should be taken during this experiment?
    (e) What are the disadvantages of this method?

    (2+2)+5+2+2+2

2. (a) Write down the theory for the determination of Hall voltage in the laboratory.
    (c) Plot the following data and determine the Hall coefficient from each curve.

No. of Obs.	Magnetic Field (Gauss)	Hall Current (mA)	Hall Voltage (mV)	Thickness of the specimen (cm)
1.	750	2	10	
		3	16	
		4	20	
		5	28	
		6	34	
				0.05
2.	1100	2	16	
		3	24	
		4	32	
		5	42	
		6	50	

    5 + 5 + 5

3. (a) Write down the differences between conductors, semiconductors and insulators.
    (b) How do the conductivities of metals and semiconductors depend on temperature?
    (c) Why is the current kept constant for measuring the resistivity of a sample by four probe method?
    (d) Why a four probe is used instead of a two probe in determining the resistivity of the semiconductor sample?
    (e) What are the disadvantages of four probe method?

(f) What precautions should be taken during this experiment?

(g) Why the correction factor $G_7\left(\frac{w}{s}\right)$ is used?

3+2+2+2+2+2+2

4. (a) State the basic theory with suitable diagram to find resistivity and band gap of a semiconductor sample using four probe method.

(b) Given distance between probes (s) = 2.0 mm and thickness of the semiconductor sample (w) = 0.5 mm, calculate the resistivity (ρ) values from the following data for a constant current of amplitude 7.0 mA, using the relation: $G_7\left(\frac{w}{s}\right) = 5.67$.

Serial No.	Temperature (Degree centigrade)	Voltage (mV)
1	30	176
2	35	176
3	40	175
4	45	174
5	50	173
6	55	168
7	60	161
8	65	151
9	70	139
10	75	125
11	80	112
12	85	98

(c) Plot $\ln(\rho)$vs 1/T graph and calculate the magnitude of band gap (E_g).

(3 + 2) + 5 + 5