UG/5th Sem/Phys(H)/Pr/19

2019

B.Sc. (Honours)

5th Semester Examination

PHYSICS

Paper - C12P

Full Marks : 20 Time : 3 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *one* question from the following. 15×1=15

1. Determine the magnetic susceptibility of paramagnetic solution by Quincke's tube method (Calibration graph for electromagnet will be supplied)

   (a) Theory/working formula 3

   (b) Data for measuring the rise of solution level (h) as a function of Magnetic Field (B) 5

[Turn Over]

(c) Plot of h-B graph. 3

(d) Calculation of susceptibility. 2

(e) Discussions. 2

2. Determine the magnetic susceptibility using a Gouy balance (Calibration graph for electromagnet will be supplied)

(a) Working formula 2

(b) Data for measuring change in weight (Δm) of the substance as a function of Magnetic Field (B) 6

(c) Plot of $\Delta m - B^2$ graph. 3

(d) Calculation of susceptipility. 2

(e) Discussions 2

3. Study the variation of dielectric constant of a dielectric sample with frequency (Thickness and area of the sample must be supplied)

(a) Theory/working formula. 2

(b) Measure capacitance at different frequencies (at least five) 5

(c) Calculation of dielectric constants at those frequencies. 3

(d) Plot the variation of dielectric constant with frequency. 3

(e) Discussions. 2

4. Study the variation of resistivity of a semiconductor sample using four-probe method and determine its band gap (Thickness of the sample, probe distance and correction factor, if any, must be supplied)

(a) Working formula. 2

(b) Data for current and voltage at different temperatures (T) for a supplied probe current (from room temperature to 150°C when increasing) 5

(c) Calculation of resistivity (ρ) at those temperatures. 2

(d) Plot of ln (ρ) vs 1/T. 2

[Turn Over]

(e) Calculation of ban gap. 2

(f) Discussions 2

5. Determine the Hall coefficient of a semiconductor sample (Thickness of the sample must be supplied. Calibration graph for electromagnet will be supplied.)

(a) Working formula. 2

(b) Data for Hall voltage (V_H) as a function of sample current (I_s) for a particular magnetic field (corresponding I in direct and reverse directions.) No reversal of I_s is required. 7

(c) Plot of I_s vs V_H graph. 2

(d) Calculation of the Hall coefficient. 2

(e) Discussions. 2

6. Trace the magnetic hysteresis loop for an anchor ring with ferromagnetic core and find the energy loss per cycle (All physical constants related to the experiment and I'/d' must be supplied)

(a) Working formula 3

(b) Data for Tracing B-H loop. 7

(c) Drawing of B-H loop. 3

(d) Calculation. 2

7. Trace the P-E hysteresis curve for a ferroelectric specimen (All physical constants related to the experiment must be supplied)

(a) Theory 3

(b) Data for hysteresis loop 5

(c) Drawing P-E hysteresis curve 3

(d) Calculation of the values of spontaneous polarization (P_s) and coercive field (E_c) 2

(e) Discussion 2

8. Determine the coupling coefficient of a given piezoelectric crystal.

(a) Working formula 2

(b) Data 5

(c) Graph 3

[Turn Over]

(d) Calculation 3

(e) Discussion 2

[LNB : 2 Viva-Voce : 3]

Remarks

Experiment	:	15 Marks
LNB	:	02 Marks
Viva-Voce	:	03 Marks

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Instruction to the Examiners

- Experiment will be allotted on the basis of lottery by drawing cards. 2 Marks will be deducted for every subsequent chance after the second chance.

- Each examine should write the theory/working formula and circuit diagram in front of examiners.

- Examiners are requested to put their signature with relevant comment in the cases of circuit implementation, at least one data in tables, any sort of inconveniences. Experimental circuit may be supplied to the students with proper deduction of marks, who will fal to implement the correct circuit.
