

Note: 1. Numerical problems solved without writing formula carry no marks

2. Answer without relevant diagram / circuit whenever necessary will not carry any marks

PART A

I Answer the following**10 x 1 = 10**

1. Write the condition for dispersion with out deviation in terms of refractive index and angle of prisms
2. How resolving power of telescope can be increased?
3. What is SI unit of specific rotation?
4. Write the expression for refractive index of the medium in terms of speed of light.
5. Write coulombs law in vector form.
6. When does emf of the battery is equal to terminal potential difference.
7. Graphically represent the variation of capacitive reactance with frequency.
8. What is Raman effect?
9. Write the composition of proton in terms of quark.
10. Write collector, base and emitter in the increasing order of doping concentration.

PART B

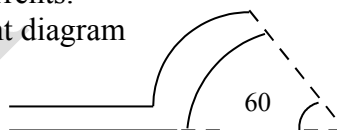
II Answer any 10 of the following**10x2= 20**

11. Draw experimental set up to obtain pure spectrum.
12. Mention the shape of wave fronts for a point source and source at infinity.
13. State Rayleigh's criterion for just resolution.
14. Explain the formation of colors in thin films briefly.
15. Effective capacitance of two capacitors in series and parallel are $2 \mu F$ and $9 \mu F$ respectively. Find the individual capacitances.
16. Draw wheat stones network representing branch currents.
17. Find the magnetic field at the point O in the adjacent diagram

Given, $R_1 = 0.6m$

$R_2 = 0.4 m$

$I = 2 A$



18. Write the relation b/w rms, average and peak voltages.
19. Mention any two uses of laser.
20. Write a note on Fraunhofer lines.
21. Write the symbol and truth table of NAND gate.
22. Give one example each for gel and emulsion.

PART C

III. Answer any one of the following.**1 x 5 = 5**

23. Derive the refraction formula for spherical surface.
24. What are polaroids? Give examples, mention its uses.

IV Answer any two of the following .**2x 5 = 10**

25. Write a note on super conductors.
26. Obtain an expression for impedance in series LCR circuit. Define impedance.
27. I. Explain the terms a) Threshold frequency b) work function c) stopping potential. II. Explain the principle of electron microscope.

V Answer any two of the following.**2x 5 = 10**

28. State Bohr's postulates and obtain the expression for velocity of electron in Bohr orbit.
29. Explain mass defect, binding energy and specific binding energy and mention any two similarities b/w atomic nucleus and liquid drop.
30. What is amplifier? Describe npn transistor CE amplifier.

VI Answer any three of the following.**3x 5 = 15**

31. A fish inside water sees the out side world as if it is contained in a cone, which makes a circle at the surface of water. Calculate the area of the circle if the fish is at a depth of 2 m and RI of water is 1.33.
32. A pendulum bob of mass 80 mg carrying a charge of 20 n C is at rest in a horizontal electric field of 20000 V/ m. Find the tension in the thread and the angle it makes with horizontal.
33. A circular coil of 10 turns and diameter 0.314 m is placed parallel to magnetic meridian. Calculate resultant magnetic field on the axis at a point 0.1 m from the centre. Current through the coil is 1 A and $B_H = 3.6 \times 10^{-5}$ Tesla.
34. Determine the mass of Telium- 99 having activity of 5 .275 Ci. Given half life 6 hrs.

VII Answer any one of the following.**1x 5 = 5**

35. Describe an experiment to determine specific resistance of the wire using meter bridge.
36. Describe an experiment to determine the capacitance of a given capacitor by blotting charging and discharging graph.

VIII Answer any one of the following.**1x 5 = 5**

37. In an experiment with air wedge to find the wavelength of sodium light, following readings are taken. Calculate the wavelength of light.

Fringe number	Reading of TM in cm	Fringe number	Reading of TM in cm
N	5.351	N+20	5.770
N+5	5.456	N+25	5.876
N+10	5.561	N+30	5.981
N+15	5.665	N+35	6.088

Length of the air wedge = 20 cm

diameter of the wire = 0. 3 mm

- 38 In an experiment with potentiometer following readings were obtained to calculate the internal resistance of the cell. Find the internal resistance.

Balancing length when key k_2 is open = 63 cm

Trial number	R in ohm	l_2
1	2	20
2	3	25.8
3	4	30.2
4	5	35.3

E = 2V**PART D****IX Answer any one of the following****1x (4 + 4 + 2) = 10**

39. a) Calculate the percentage change in the fringe width when the distance b/w double slit and screen is increased by 20% and while the slit separation is decreased by 30% in a Young's double slit experiment.
- b) Obtain an expression for effective capacitive when three capacitors are connected in series
- c) What are liquid crystals? Mention the types.
40. a) A galvano meter coil has a resistance 100 ohm requires a potential difference of 300 mV for full scale deflection. How do you convert this into an ammeter to read 3 A and volt meter to read 5 V.
- b) What is diffraction? Mention the types, distinguish b/w them.
- c) mention any two uses of light emitting diode.