

SECOND PUC PREPARATORY EXAMINATION - 2020

Time : 3 Hrs. 15 Mins.

PHYSICS (33)

Max Marks : 70

No. of Pages : 02

Total No. of Ques. : 37

Instructions :

- All parts are compulsory
- Answer without relevant diagram/circuit wherever necessary will not carry any marks.
- Numerical problems solved without writing the relevant formulae carry no marks.

PART - A**I Answer ALL the following questions:**

10x1=10

- Is Gauss's law true for any closed surface ?
- What is the significance of loop rule ?
- What is retentivity ?
- State Faraday's law of electromagnetic induction.
- What is wattless current ?
- Mention one application of IR rays.
- Does the apparent depth of a tank of water change, if viewed obliquely ?
- Why the sun is visible a little before the actual sunrise and a little before the actual sunset ?
- What is meant by oil immersion objective ?
- Give the SI unit of activity.

PART - B**II Answer any FIVE of the following questions:**

5x2=10

- Define electric field intensity. Give the SI unit of electric field intensity.
- How does the capacitance of a parallel plate capacitor depend on
 - dielectric medium and
 - distance between the plates ?
- State and explain Ohm's law ?
- What is cyclotron ? Write the principle.
- What is eddy current ? Mention one application of it.
- Write an equation for displacement current and the terms.
- Write the conditions of TIR.
- Give the logic symbol and truth table and NAND gate.

PART - C**III Answer any FIVE of the following questions:**

5x3=15

- Derive an equation for potential energy of a dipole in an external field.
- Derive an equation for effective capacitance when two capacitors are in series.
- How do you convert galvanometer into a Voltmeter ? Explain.
- Derive an equation for motional emf.
- Describe the Young's double slit experiment to explain Interference fringe.
- State the laws of photoelectric effect.
- Define work function. Write Einstein's photoelectric equation. Explain the terms.
- Classify the solids on the basis of energy bands.

PART - D**IV Answer any TWO of the following questions:**

2x5=10

- Derive an equation for effective internal resistance and effective emf when two cells are connected in parallel.
- Derive an equation for magnetic field at a point on the axis of a current loop.
- Show that bar magnet is equivalent to a current carrying solenoid.

(P.T.O.)

V Answer any TWO of the following questions:

2x5=10

- 30) Derive any equation for refractive index of a prism in terms of angle of prism and angle of minimum deviation.
- 31) Derive an equation for energy of an electron in the n^{th} orbit of hydrogen atom by assuming the equation for radius of an electron.
- 32) What is rectifier ? Explain the working of full wave rectifier with a neat diagram. Draw the input and output waveforms.

VI Answer any THREE of the following questions:

3x5=15

- 33) Four point charges $2 \mu\text{C}$, $-5 \mu\text{C}$, $2 \mu\text{C}$ and $-5 \mu\text{C}$ are located at the corners of a square ABCD of side 10 cm. What is the force on a charge of $1 \mu\text{C}$ placed at the centre of the square?
- 34) The four arms of a wheatstone bridge ABCD have the following resistances. $AB = 100 \Omega$, $BC = 10 \Omega$, $CD = 5 \Omega$ and $DA = 60 \Omega$, A galvanometer of 15Ω resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 V is maintained across AC.
- 35) A 100 capacitor in series with a 40Ω resistance is connected to a 110 V, 60 Hz supply. What is the maximum current in the circuit ?
- 36) A beam of light consisting of two wavelengths 650 nm and 520 nm, is used to obtain interference fringes in a Young's double slit experiment. Find the distance of the third bright fringe on the screen from the central maximum for wavelength 650 nm. Given $d = 0.3 \text{ mm}$, $D = 1.5 \text{ m}$
- 37) The half life of $\frac{90}{38} \text{ Sr}$ is 28 years. What is the disintegration rate of 15 mg of this isotope ?
