



M - 2018

Subject Code : 33 (NS)

0426862

PHYSICS

(Kannada and English Versions)

Time : 3 Hours 15 Minutes]

[Total No. of questions : 37]

[Max. Marks : 70

(English Version)

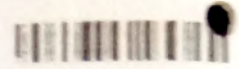
- Instructions :**
1. All Parts are compulsory.
 2. Answer without relevant diagram/figure/circuit wherever necessary will not carry any marks.
 3. Numerical problems solved without writing the relevant formulae carry no marks.

PART - A

I. Answer **all** the following questions :

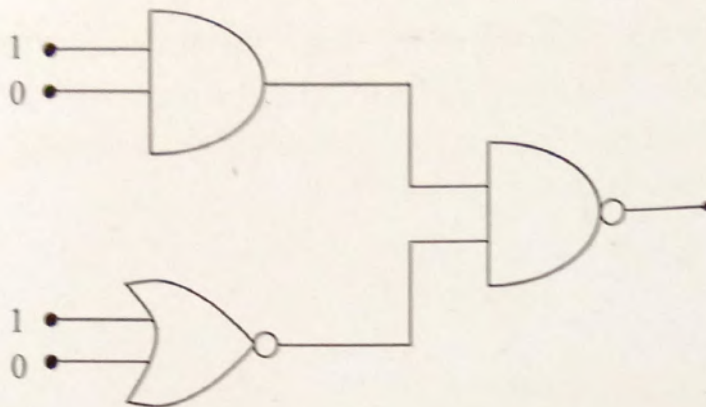
(10 × 1 = 10)

- 1) What is an equipotential surface?
- 2) Define 'drift velocity' of free electrons.
- 3) Give an application of cyclotron.
- 4) State Faraday's law of electro magnetic induction.
- 5) If the peak value of a.c. current is 4.24 A, what is its root mean square value?
- 6) Mention one power loss in transformer.
- 7) Two lenses of power +1.5D and -0.5D are kept in contact on their principal axis. What is the effective power of the combination?
- 8) The decay of proton to neutron is possible only inside the nucleus. Why?



9) What is 'depletion region' in a semi conductor diode?

10)



What is the output of this combination?

PART - B

II. Answer **any five** of the following questions :

(5 × 2 = 10)

- 11) Mention any two factors on which the capacitance of a parallel plate capacitor depends.
- 12) State Kirchoff's laws of electrical network.
- 13) Define magnetic 'declination' and 'dip' at a place.
- 14) Write the expression for magnetic potential energy of a magnetic dipole kept in a uniform magnetic field and explain the terms.
- 15) Give any two applications of X-rays.



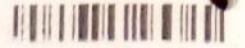
- 16) What is 'myopia'? How to rectify it?
- 17) Draw the diagram representing the schematic arrangement of Geiger-Marsden experimental set up for the alpha particle scattering.
- 18) Write any two characteristics of nuclear forces.

PART – C

III. Answer **any five** of the following questions :

(5 × 3 = 15)

- 19) Give three properties of electric charge.
- 20) State Ampere's circuital law and arrive at the expression for the magnetic field near a straight infinite current carrying wire.
- 21) What is hysteresis? Define the terms 'coercivity' and 'retentivity' of a ferromagnetic material.
- 22) Arrive at Snell's law of refraction, using Huygen's principle for refraction of a plane wave.
- 23) Write Bohr's postulates for the hydrogen atom model.
- 24) Derive the expression for the half-life of a radio active nuclide.
- 25) Write any three distinctions between p-type and n-type semi conductor.
- 26) Draw the block diagram of generalised communication system.



PART – D

IV. Answer **any two** of the following questions :

(2 × 5 = 10)

- 27) Define electric potential due to a point charge and arrive at the expression for the electric potential at a point due to a point charge.
- 28) Obtain the expression for the effective emf and the effective internal resistance of two cells connected in parallel such that the currents are flowing in the same direction.
- 29) Derive the expression for the magnetic field on the axis of a circular current loop, using Biot-Savart's law.

V. Answer **any two** of the following questions :

(2 × 5 = 10)

- 30) Arrive at the expression for the impedance of a series LCR circuit using phasor diagram method and hence write the expression for the current through the circuit.
- 31) Deduce the relation between n , u , v , Q , R for refraction at a spherical surface, where the symbols have their usual meaning.
- 32) What is a rectifier? With suitable circuit describe the action of a full wave rectifier by drawing input and output waveforms.



VI. Answer **any three** of the following questions :

(3 × 5 = 15)

- 33) Three charges each equal to $+4\text{nC}$ are placed at the three corners of a square of side 2cm . Find the electric field at the fourth corner.
- 34) 100 mg mass of nichrome metal is drawn into a wire of area of cross-section 0.05 mm^2 . Calculate the resistance of this wire. Given density of nichrome $8.4 \times 10^3\text{ kgm}^{-3}$ and resistivity of the material as $1.2 \times 10^{-6}\ \Omega\text{m}$.
- 35) A circular coil of radius 10 cm and 25 turns is rotated about its vertical diameter with an angular speed of 40 rad S^{-1} , in a uniform horizontal magnetic field of magnitude $5 \times 10^{-2}\text{T}$. Calculate the emf induced in the coil. Also find the current in the coil if the resistance of the coil is $15\ \Omega$.
- 36) In Young's double slit experiment the slits are separated by 0.28 mm and the screen is placed at a distance of 1.4 m away from the slits. The distance between the central bright fringe and the fifth dark fringe is measured to be 1.35 cm . Calculate the wavelength of the light used. Also find the fringe width if the screen is moved 0.4 m towards the slits, for the same experimental set up.



- 37) Light of frequency 8.41×10^{14} Hz is incident on a metal surface. Electrons with their maximum speed of 7.5×10^5 ms⁻¹ are ejected from the surface. Calculate the threshold frequency for photo emission of electrons. Also find the work function of the metal in electron volt (eV). Given Planck's constant $h = 6.625 \times 10^{-34}$ JS and mass of the electron 9.1×10^{-31} Kg.
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