



M – 2019

Subject Code : 33 (NS)

0413064

PHYSICS

(Kannada and English Versions)

Time : 3 Hours 15 Minutes]

[Total No. of questions : 37]

[Max. Marks : 70

(English Version)

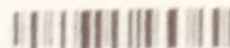
- Instructions :**
1. All Parts are compulsory.
 2. Answer without relevant diagram/figure/circuit wherever necessary will not carry any marks.
 3. Numerical problems solved without writing the relevant formulae carry no marks.

PART – A

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

(10 × 1 = 10)

- 1) State Coulomb's Law.
- 2) Define electrical resistivity of material of a conductor.
- 3) Write the expression for force acting on a moving charge in a magnetic field.
- 4) What is magnetic susceptibility?
- 5) How the self inductance of a coil depends on number of turns in the coil?
- 6) For which position of the object magnification of convex lens is -1. (minus one)?



- 7) For which angle of incidence reflected ray is completely polarised?
- 8) Mention any one type of electron emission.
- 9) Write the expression for energy of an electron in electron orbit of hydrogen atom.
- 10) Write the relation between Half-Life and Mean-Life of radio active element.

PART – B

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

(5 × 2 = 10)

- 11) Write any two basic properties of charge.
- 12) Write the expression for drift velocity in terms of current, explain the terms used.
- 13) Define magnetic 'dip' and 'declination' at a place.
- 14) Write the expression for speed of light in terms of " μ_0 " and " ϵ_0 ", explain the terms used.



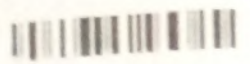
- 15) Write the ray diagram for formation of image in the simple microscope.
- 16) What is diffraction of light?
- 17) Write the expression for de-Broglie wave length of electrons in terms of electric potential and explain the terms used.
- 18) Distinguish between n-type and p-type semi conductors.

PART – C

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

(5 × 3 = 15)

- 19) Derive an expression for potential energy of electric-di-pole placed in a uniform electric field.
- 20) Write the expression for force per unit length between two straight parallel current carrying conductors of infinite length. Hence define SI unit of current 'ampere'.
- 21) Distinguish between 'dia' and 'ferro' magnetic materials.
- 22) Mention the three types energy loss in a transformer.



33 (NS)

- 23) Write three experimental observations of photoelectric effect.
- 24) Write the three postulates of Bohr's atomic model.
- 25) Explain 'Conduction band' 'Valance band' and 'Energy gap', in semi conductors.
- 26) What is modulation? Write the block diagram of the receiver.

PART – D

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

(2 × 5 = 10)

- 27) State Gauss's law. Derive an expression for electric intensity at a point outside the uniformly charged shell.
- 28) Two cells of emf E_1 and E_2 and internal resistance r_1 and r_2 are connected in parallel such that they send current in same direction. Derive an expression for equivalent resistance and equivalent emf of the combination.
- 29) Derive an expression for the intensity of magnetic field at any point on the axis of a circular current loop.



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

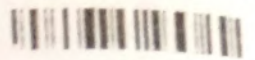
(2 × 5 = 10)

- 30) Derive an expression for the impedance of a series LCR circuit, when an AC voltage is applied to it.
- 31) Derive " Lensmaker's " formula.
- 32) Explain the working of a n-p-n transistor in CE mode as an amplifier.

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

(3 × 5 = 15)

- 33) In a circular parallel plate capacitor radius of each plate is 5 cm and they are separated by a distance of 2 mm. Calculate the capacitance and the energy stored, when it is charged by connecting the battery of 200 V (given $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$).
- 34) Two resistors are connected in series with 5V battery of negligible internal resistance. A current of 2A flows through each resistor. If they are connected in parallel with the same battery a current of $\frac{25}{3}$ A flows through combination. Calculate the value of each resistance.



33 (NS)

- 35) A conductor of length 3m moving in a uniform magnetic field of strength 100 T. It covers a distance of 70 m in 5 sec. Its plane of motion makes an angle of 30° with direction of magnetic field. Calculate the emf induced in it.
- 36) In a Young's double slit experiment wave length of light used is $5000 \text{ \AA}$ and distance between the slits is 2 mm, distance of screen from the slits is 1 m. Find fringe width and also calculate the distance of 7th dark fringe from central bright fringe.
- 37) Half life of U-238 undergoing α - decay is 4.5×10^9 years. What is the activity of one gram of U-238 sample?
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