



M - 2017

Subject Code : 33 (NS)

1694644

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

(10 × 1 = 10)

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

- 1) State Coulomb's law.
- 2) Define mobility of electron.
- 3) What is the significance of Lenz's law?
- 4) Define displacement current.
- 5) Write one application of microwave.
- 6) How the power of a lens is related to its focal length?
- 7) Write the expression for de-Broglie wavelength of a particle.
- 8) What is the conclusion of Davisson - Germer experiment on the nature of electron?
- 9) Write the SI unit of activity.
- 10) What is transducer in communication system?

PART - B

(5 × 2 = 10)

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

- 11) Write any two properties of electric field lines.
- 12) On what factors does the capacitance of a parallel plate capacitors depends?



- 13) State and explain Ohm's law.
- 14) Define the terms :
 - i) Declination
 - ii) Inclination or Dip.
- 15) State and explain Faraday's law of electromagnetic induction.
- 16) Name the type of lens which is used to correct
 - i) Myopia
 - ii) Hypermetropia.
- 17) What is NAND gate? Give its logic symbol.
- 18) Draw the block diagram of a AM receiver.

PART – C

III. Answer **any five** of the following questions : (5 × 3 = 15)

- 19) Derive the relation between electric field and electric potential due a point charge.
- 20) Derive the expression for energy stored in a charged capacitor.
- 21) Explain with circuit diagram how to convert galvanometer into an voltmeter.
- 22) Derive the expression for motional emf induced in a conductor moving in a uniform magnetic field.
- 23) What is transformer? Mention two sources of energy loss in a transformer.
- 24) Mention any three applications of polaroids.
- 25) Write any three experimental observations of photoelectric effect.
- 26) Give any three differences between n-type and p-type semiconductors.

PART - D

IV. Answer **any two** of the following questions : (2 × 5 = 10)

27) Deduce the condition for balance of a Wheatstone's bridge using Kirchhoff's rules.

28) Derive the expression for magnetic field at a point on the axis of a circular current loop.

29) Write any five properties of ferromagnetic materials.

V. Answer **any two** of the following questions : (2 × 5 = 10)

30) Derive Lens Maker's formula for a convex lens.

31) State radioactive decay law. Derive $N = N_0 e^{-\lambda t}$ for a radioactive element.

32) What is rectification? With relevant circuit diagram and waveforms explain the working of p-n junction diode as a full wave rectifier.

VI. Answer **any three** of the following questions : (3 × 5 = 15)

33) Two point charges $q_A = 3\mu\text{C}$ and $q_B = -3\mu\text{C}$ are located 20 cm apart in vacuum.

a) What is the electric field at the mid point O of the line AB joining the two charges?

b) If a negative test charge of magnitude $1.5 \times 10^{-9}\text{C}$ is placed at this point. What is the force experienced by the test charge?



- 34) When two resistors are connected in series with a cell of emf 2 V and negligible internal resistance, a current of $\frac{2}{5}$ A flows in the circuit. When the resistors are connected in parallel the main current is $\frac{5}{3}$ A. Calculate the resistances.
- 35) A source of alternating emf of 220 V – 50 Hz is connected in series with a resistance of 200Ω an inductance of 100 mH and a capacitance of $30 \mu F$. Does the current lead or lag the voltage and by what angle?
- 36) Light of wave length 6000 \AA is used to obtain interference fringes of width 6 mm in a Young's double slit experiment. Calculate the wave length of light required to obtain fringe of width 4 mm when the distance between the screen and slits is reduced to half of its initial value.
- 37) The first member of the Balmer series of hydrogen atom has wavelength of 6563 \AA . Calculate the wavelength and frequency of the second member of the same series. Given : $C = 3 \times 10^8 \text{ ms}^{-1}$.
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