

Subject Code : 33 (NS)

PHYSICS

(Kannada and English Versions)

Time : 3 Hours 15 Minutes]

[Total No. of questions : 37]

[Max. Marks : 70

(Kannada Version)

- ಸೂಚನೆಗಳು: a) ಎಲ್ಲಾ ಭಾಗಗಳು ಕಡ್ಡಾಯವಾಗಿರುತ್ತವೆ.
 b) ಅವಶ್ಯವಿರುವ ಕಡೆ ಉತ್ತರಗಳಲ್ಲಿ ಸಂಬಂಧಿತ ಚಿತ್ರ/ರೇಖಾಚಿತ್ರ/ಮಂಡಲ ಬರೆಯದಿದ್ದಲ್ಲಿ ಯಾವುದೇ ಅಂಕಗಳನ್ನು ಕೊಡಲಾಗುವುದಿಲ್ಲ.
 c) ಸಾಂಖ್ಯಿಕ ಲೆಕ್ಕಗಳನ್ನು ಸಂಬಂಧಿತ ಸೂತ್ರದ ಸಹಾಯವಿಲ್ಲದೆ ಬಿಡಿಸಿದ್ದಲ್ಲಿ, ಯಾವುದೇ ಅಂಕಗಳನ್ನು ಕೊಡಲಾಗುವುದಿಲ್ಲ.

ಭಾಗ - A

I. ಈ ಕೆಳಗಿನ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ:

(10×1=10)

- 1) ಕೂಲಂಬ್‌ನ ನಿಯಮದ ಹೇಳಿಕೆ ನೀಡಿರಿ.
- 2) ವೀಟ್‌ಸ್ಟೋನ್‌ನ ಸಮತೋಲಿತ ಜಾಲದ ನಿಬಂಧನೆ ಏನು ?
- 3) ಒಂದು ವಿದ್ಯುದಾವೇಶ ಕಣವು ವಿದ್ಯುತ್ ಕ್ಷೇತ್ರದ ದಿಕ್ಕಿನಲ್ಲಿ ವಿದ್ಯುತ್ ಕ್ಷೇತ್ರವನ್ನು ಪ್ರವೇಶಿಸುತ್ತದೆ. ಅದರ ಪಥದ ಸ್ವಭಾವವನ್ನು ಬರೆಯಿರಿ.
- 4) ಕ್ಯೂರಿಯ ನಿಯಮದ ಹೇಳಿಕೆ ನೀಡಿರಿ.
- 5) ಸ್ವಯಂ ಪ್ರೇರಕತೆ (Self induction) ಎಂದರೇನು ?
- 6) ಸಮೀಪದೃಷ್ಟಿ ದೋಷವನ್ನು ನಿವಾರಣೆ ಮಾಡಲು ಬಳಸುವ ಮಸೂರ ಯಾವುದು ?
- 7) ವಿದ್ಯುತ್ಕಾಂತೀಯ ರೋಹಿತದ ದೃಗ್ಗೋಚರ ಬೆಳಕಿನಲ್ಲಿ ಹೈಡ್ರೋಜನ್ ಪರಮಾಣುವಿನ ರೋಹಿತ ಸರಣಿಯನ್ನು ಹೆಸರಿಸಿ.
- 8) ವಿಕಿರಣ ಪಟುತ್ವದ S.I. ಮೂಲಮಾನವನ್ನು ತಿಳಿಸಿ.
- 9) NAND ದ್ವಾರದಲ್ಲಿ $A = 1$, $B = 0$ ಆಗಮಗಳು (Inputs) ಇದ್ದಾಗ ನಿರ್ಗಮ (Output) ಹೇಗಿರುತ್ತದೆ ?
- 10) 'ಮಾಡ್ಯುಲೇಷನ್' (Modulation) ಎಂದರೇನು ?

P.T.O.



(English Version)

Instructions : a) *All Parts are compulsory.*

b) *Answer without relevant diagram/figure/circuit wherever necessary will **not carry** any marks.*

c) *Numerical problems solved without writing the relevant formulae **carry no** marks.*

PART – A

I. Answer **all** the following : (10×1=10)

- 1) State Coulomb's law.
- 2) What is the condition for the balanced state of Wheatstone's network ?
- 3) A charged particle enters an electric field in the direction of electric field. What is the nature of the path traced by it ?
- 4) State Curie's law.
- 5) What is self induction ?
- 6) What is the nature of the lens used to rectify Myopia ?
- 7) Name the spectral series of hydrogen atom in the visible region of electromagnetic spectrum.
- 8) Write the S.I. unit of radio activity.
- 9) Inputs of NAND gates are $A = 1$, $B = 0$. What is the output ?
- 10) What is modulation ?

PART – B

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

- 11) Write two properties of electric field lines.
- 12) Mention two limitations of Ohm's law.
- 13) Distinguish between diamagnetism and ferromagnetism on the basis of relative permeability and susceptibility.
- 14) What are eddy currents ? Give one use of eddy currents.



- 15) What is displacement current ? Write the expression for displacement current.
- 16) Write the two conditions for total internal reflection to takesplace.
- 17) What are intrinsic semiconductors ? Name the element used as a dopant to obtain P-type semiconductor.
- 18) Draw the block diagram of 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 to a point charge.
- 20) State Ampere's circuital law. Using it, derive the expression for magnetic field at a point due to a long current carrying conductor.
- 21) Define :
 - a) Magnetic declination
 - b) Magnetic dip.
 Mention the S.I. unit of magnetisation.
- 22) Derive the expression for energy stored in a current carrying coil.
- 23) What is the principle behind the working of a transformer ? Mention any two sources of energy loss in transformer.
- 24) Explain Young's double slit-experiment.
- 25) State Bohr's postulates.
- 26) Define input resistance, output resistance and current amplification factor of a transistor.

PART – D

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

- 27) State Gauss's law in electrostatics. Derive the expression for electric field at a point due to a infinitely long charged straight conductor using Gauss's law.
- 28) Assuming the expression for drift velocity, derive the expression for conductivity of a material $\sigma = \frac{ne^2\tau}{m}$, where symbols have usual meaning. Define the term mobility.
- 29) Derive the expression for the force between two parallel conductors carrying current and hence define 'Ampere'.



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

(2×5=10)

- 30) Derive Lens Maker's formula.
- 31) Explain Hallwach's and Lenard's observations on photoelectric effect.
Define :
 - a) Work function
 - b) Threshold frequency
 - c) Stopping potential.
- 32) What is rectification ? With relevant circuit diagram and wave forms, 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) ABCD is a square of side 2 m. Charges of 5nC, + 10nC and - 5nC are placed at corners A, B and C respectively. What is the workdone in transferring a charge of 5 μC from D to the point of intersection of the diagonals ?
- 34) Two identical cells either in series or in parallel combination, gives the same current of 0.5A through external resistance of 4Ω . Find emf and internal resistance of each cell.
- 35) A resistor of 100Ω , a pure inductance coil of L = 0.5 H and capacitor are in series in a circuit containing an a.c. source of 200 V, 50 Hz. In the circuit, current is ahead of the voltage by 30°. Find the value of the capacitance.
- 36) A beam of light consisting of two wavelengths 4200Å and 5600Å is used to obtain interference fringes in Young's double slit experiment. The distance between the slits is 0.3 mm and the distance between the slits and the screen is 1.5 m. Compute the least distance of the point from the central maximum, where the bright fringes due to both the wavelengths coincide.
- 37) Calculate the half life and mean life of Radium - 226 of activity 1Ci : Given the mass of Radium - 226 is 1 gram and 226 gram of radium consists of 6.023×10^{23} atoms.