

Roll No.....

Total No. of Questions—14]

[Total No. of Printed Pages—4

**KH2RO9**

**8335**

**PHYSICS**

PAPER—A

Maximum Marks—60

Time Allowed—3 Hours

**(Long Answer Type Questions)**

1. State and explain Coulomb's law in vector form. Hence define unit of charge.

*Or*

Derive an expression for potential energy of an electric dipole in a uniform electric field. 5

2. Deduce an expression for the capacitance of a parallel plate capacitor with a dielectric slab.

*Or*

State and prove Gauss's theorem in electrostatics. Deduce Coulomb's law from it. 5

3. Explain the principle of a Potentiometer. How can it be used to determine internal resistance of a cell ?

*Or*

What are Secondary Cells ? Describe lead accumulator. 5

4. Derive an expression for magnetic field due to current flowing in a long straight conductor.

P. T. O.

( 2 )

**Or**

Discuss the principle, construction and working of a Cyclotron. Obtain the expression for the maximum energy acquired by the accelerated charged particle. 5

5. Derive an expression for the average power in LCR circuit connected to a.c. supply. Define Power factor.

**Or**

Give the principle, construction and working of an a.c. generator. 5

**(Short Answer Type Questions)**

6. Derive a relation for work done in moving a charge in an electric field. 3
7. There are  $8.4 \times 10^{22}$  free electrons per cubic cm in copper. Calculate drift velocity of electrons in a copper wire of  $1 \text{ mm}^2$  cross-section. The current in the wire is 0.21 A. 3
8. Explain Thomson's effect and Thomson's coefficient. 3
9. A resistance of  $1980 \Omega$  is connected in series with a voltmeter, after which the scale division becomes 100 times larger. Find the resistance of Voltmeter. 3
10. What are Eddy Currents ? How can they be minimised ? 3
11. A current of 10A in primary coil of a circuit is reduced to zero at a uniform rate in  $10^{-3}$ s. If coefficient of mutual inductance is 3H, What is the induced e.m.f. in the secondary ? 3
12. What is Electromagnetic spectrum ? Give its important uses. 3

S/8335



**(Very Short Answer Type Questions)**

13. The following very short answer type questions of two marks, each may be answered in a few sentences or as required.

- (a) Define Conductance and Conductivity and give their units. 2
- (b) Define Angle of dip and Earth's horizontal component. 2
- (c) What is current sensitivity and voltage sensitivity of a Galvanometer ? 2
- (d) Why sky waves are not used in the transmission of T.V. Signals ? 2

**(Objective Type Questions)**

14. Choose the correct/most appropriate answer and write it in your Answer-book :

(i) How many electrons must be removed from a piece of metal to give it a positive charge of  $1.0 \times 10^{-7}$  C ?

- A.  $6.25 \times 10^{11}$
- B.  $6.25 \times 10^{-11}$
- C.  $62.5 \times 10^{11}$
- D.  $0.625 \times 10^{11}$ . 1

(ii) Ampere hour is the unit of

- A. Charge
- B. Current
- C. Power
- D. Energy. 1

(iii) The vertical component of earth's magnetic field is zero at a place where angle of dip is

A.  $0^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$ .

1

(iv) Which of the following is most suitable for the core of electromagnets ?

A. Air

B. Soft Iron

C. Steel

D. Cu-Ni alloy.

1

(v) For high frequency, capacity offers

A. less resistance

B. more resistance

C. zero resistance

D. None of these.

1

(vi) Which of the following are not electromagnetic waves ?

A. X-rays

B. Gamma rays

C.  $\beta$ -rays

D. Cosmic rays.

1