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SET-A

GF-10-200

Roll. No. ADAN Name .....

**NEW GREEN FIELDS SCHOOL  
HALF YEARLY EXAMINATION, 2015-16**

**PHYSICS**

Time : 3 hrs.

Class – XII

M.M. : 100

**General Instructions—**

- (1) All questions are compulsory. There are 26 questions in all.
- (2) Question paper has five sections A, B, C, D & E.
- (3) Section A has 5 questions of 1 mark each. Section B has 5 questions of 2 marks each. Section C has 12 questions of 3 marks each. Section D has 1 question of 4 marks. Section E has 3 questions of 5 marks each.
- (4) There is no overall choice. However internal choice is there in one question of 2 marks, one of 3 marks and in all 3 of 5 marks.

Use following values :

$$c = 3 \times 10^8 \text{ m/s}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$\epsilon_0 = 8.854 \times 10^{-12}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ Tm/A}$$

$$\frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$$

$$M_e = 9.1 \times 10^{-31} \text{ kg}$$

$$M_n = 1.675 \times 10^{-27} \text{ kg}$$

$$M_p = 1.673 \times 10^{-27} \text{ kg}$$

$$\text{Avogadro number} = 6.023 \times 10^{23} \text{ per gm mole}$$

$$K_B = 1.38 \times 10^{-23} \text{ J/K}$$

$$h = 6.63 \times 10^{-34} \text{ J.S.}$$

**SECTION—A**

- 1 Why is that sun glasses (goggles) which have curved surfaces do not have any power ?
- 2 How is specific resistance of a wire related to its diameter ?
- 3 Why no force acts on a stationary charges in a magnetic field ?

[P.T.O.]

- 4 A light metal disc on the top of an electromagnet is thrown up as current is switched on. Why? Give reason.
- 5 An object is placed 15 cm from a convex mirrors of curvature 90 cm. Calculate position of image.

## SECTION—B

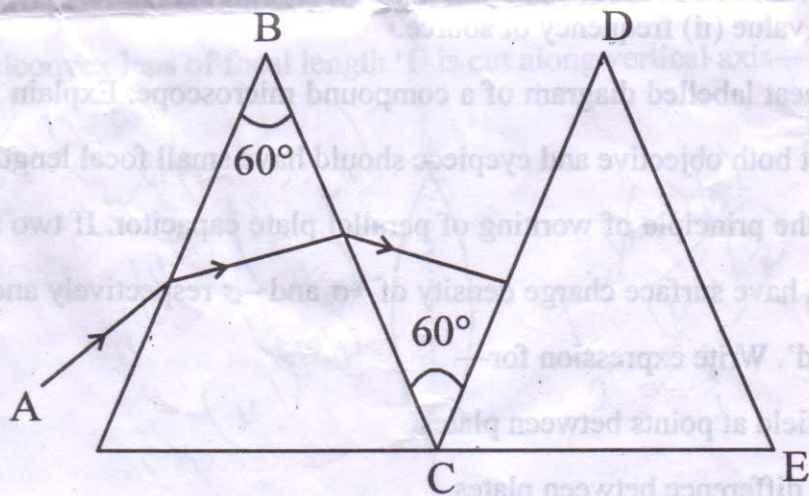
- 6 Prove induced charge does not depend on rate of change of magnetic flux. Define magnetic flux.
- 7 An electric dipole is held in a uniform electric field—
- (a) Show that net force acting on it is zero.
- (b) The dipole is aligned parallel to field. Find work done in rotating it through an angle of  $180^\circ$ .
- 8 'n' identical cells of emf 'E' each and internal resistance 'r' are connected in series to resistor 'R'.
- (a) Deduce an expression for internal resistance 'r' of one cell in terms of current 'I' flowing in circuit.
- (b) How does internal resistance of cell vary with temperature?

OR

- (a) Why does electric current cause heating of the wire?
- (b) Resistance of a conductor is reduced to half its initial value. What will be effect on heat produced by it?
- 9 Long distance radio broadcasts use short wave bands. Why? The small ozone layer on top of the stratosphere is crucial for human survival. Why?
- 10 <sup>what</sup> Why is apparant position of an object below a rectangular block of glass 6 cm thickness? A layer of water 4 cm thick is placed on top of glass  $\mu_{ga} = 3/2$  and  $\mu_{wa} = 4/3$

SECTION—C

- 11 In single slit diffraction pattern, how is the width of central bright maximum changes when—
- (a) Slit width is decreased.
  - (b) Distance between slit and screen is increased.
  - (c) Light of smaller wavelength is used. Justify your answer.
- 12 What is ratio of speed of X-rays to Y-rays in vacuum ? What does an electromagnetic wave consists of ? On what factors its velocity in vacuum depend ?
- 13 A ray of light is incident on a prism ABC of refractive index  $\sqrt{3}$  as shown in figure—
- (a) Find angle of incidence for which deviation of ray by prism ABC is minimum. *Sm*
  - (b) By what angle second prism should be rotated so that final ray suffers minimum deviation—



*Q = CV*  
*v = c/n*  
*v = c/\mu*

- 14 State ampere's circuital law. Use it to deduce expression of magnetic field at a point well inside a solenoid carrying current.
- 15 Show that energy stored in an inductor 'L' when current I as established in it is  $\frac{1}{2} LI^2$ .  
 State a rule to detect direction of induced current in a conductor.



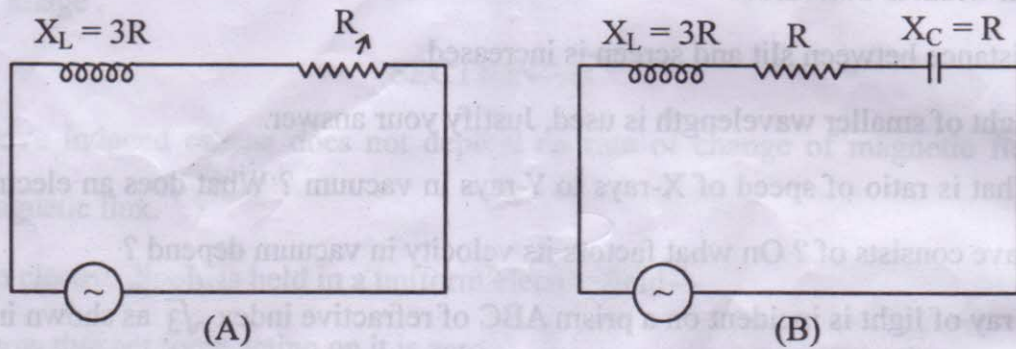
*Sm = (\mu - 1)k*

*A x Sm / r*

*Sm = \int E \cdot dl*  
*= \int \frac{1}{\mu} \cdot dl*  
*= \frac{1}{\mu} \cdot l*  
*Sm = \frac{1}{\mu} \cdot l*

OR

Given below are 2 electrical circuits A & B, calculate ratio of power factor of circuit B to power factor of circuit 'A'.



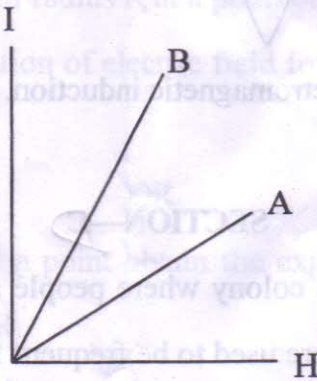
- 16 (a) Why a.c. voltage use is preferred over d.c. ? Voltage use give two reasons.  
 (b) Distinguish between effective value and peak value of alternating current. An alternating current is given by  $I = 10 \sin (314 t)$ . Write corresponding values of (i) effective value (ii) frequency of source.
- 17 Draw a neat labelled diagram of a compound microscope. Explain briefly its working why must both objective and eyepiece should have small focal length ?
- 18 Explain the principle of working of parallel plate capacitor. If two similar plates each of area A have surface charge density of  $+\sigma$  and  $-\sigma$  respectively and distance between them is 'd'. Write expression for—
- (a) Electric field at points between plates.  
 (b) Potential difference between plates.  
 (c) Capacitance of capacitor so formed.
- 19 (a) Why materials used for permanent magnet should have high coercivity ?  
 (b) Figure shows variation of intensity of magnetisation versus applied magnetic field intensity H for two materials A and B—

$\frac{1}{\mu_0} \frac{d\phi}{dI}$

$\frac{1}{\mu_0} \frac{d\phi}{dI}$

(5)

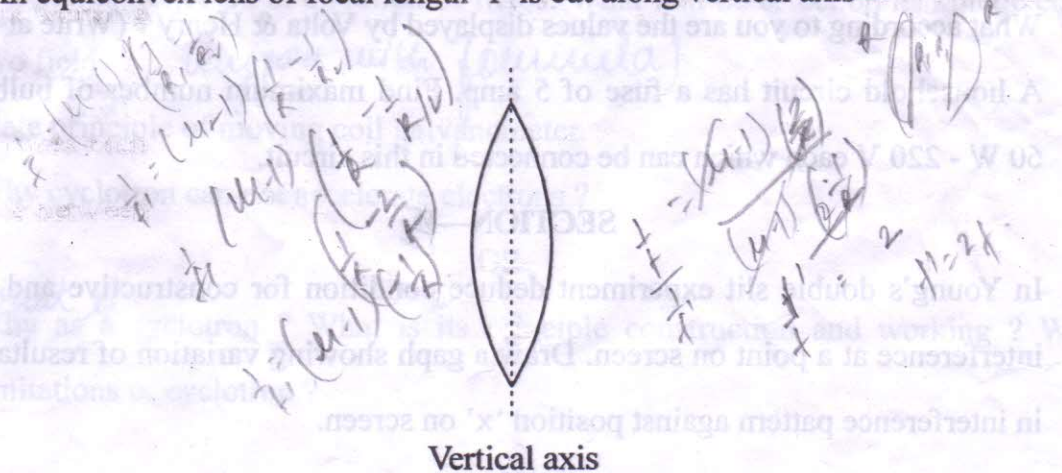
- (i) Identify material A and B. *paramagnetic* *ferromagnetic*
- (ii) Why does material 'B' has larger susceptibility than 'A' for a given field at constant temperature ?



20 Define drift velocity. Derive an expression for drift velocity of free electrons in a conductor in terms of relaxation time.

21 (a) Write two essential conditions for total internal reflection.

(b) An equiconvex lens of focal length 'f' is cut along vertical axis—

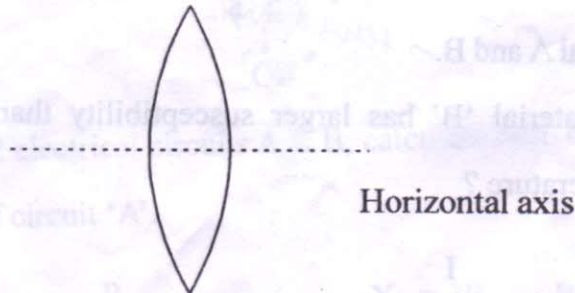


Vertical axis

What is new focal length ? If lens is cut along horizontal axis, what is new focal length.

*f = R/2*  
*f = R/2*  
*f = R/2*

*f = 2f*  
*f = 2f*  
*f = 2f*



- 22 State Faraday's laws of electromagnetic induction. What was contribution of Lenz's for this phenomena.

### SECTION - C

- 23 Volta and Henry lived in a colony where people stole power from transmission lines with the help of hooks. There used to be frequent fire accidents due to short circuiting. Volta & Henry made a group of responsible citizens and visited house to house of colony, making people aware of risks related to short circuiting. They explained the people the importance of paying electricity bills. They succeeded in changing mindset of people.

- What according to you are the values displayed by Volta & Henry ? (Write at least four).
- A household circuit has a fuse of 5 amp. Find maximum number of bulbs of rating 60 W - 220 V each which can be connected in this circuit.

### SECTION - D

- 24 In Young's double slit experiment deduce condition for constructive and destructive interference at a point on screen. Draw a graph showing variation of resultant intensity in interference pattern against position 'x' on screen.

OR

- How is a wave different from a ray ? Draw geometric shape of wavefront when—
  - Light diverges from a point source.
  - Light emerging out from a convex lens when point source is placed at focus.

$D \approx \frac{V}{\lambda}$   
 $\lambda = \frac{V}{f}$   
 $\theta \approx \frac{\lambda}{D}$

(b) State Huygen's principle with the help of suitable diagram prove Snell's law of refraction using Huygen's principle.

25 Use Gauss's law to deduce expression of electric field due to uniformly charged conducting spherical shell of radius  $R$  at a point outside the shell and inside the shell.

Plot a graph showing variation of electric field for  $r < R$  and  $r > R$  where  $r$  is distance from centre of shell.

OR

(a) Define electric potential at a point obtain the expression for electric potential due to point charge  $Q$  at distance  $R$ .

(b) Why is it risky to perform electrostatic experiment on humid day ?

(c) A charge  $Q$  is placed at centre of cube of side ' $l$ '. What is electric flux passing through two opposite faces of cube.

26 (a) Uniform electric & magnetic fields are produced pointing in same direction. An electron is projected in direction of fields. What will be effect on its kinetic energy by two fields ? *(Support with formula)*

(b) State principle of moving coil galvanometer.

(c) Why cyclotron can not accelerate electrons ?

OR

*What is*  
Why as a cyclotron ? What is its principle construction and working ? What are limitations of cyclotron ?