

ANDHRA EDUCATION SOCIETY SCHOOLS

NEW DELHI

SUMMATIVE ASSESSMENT-I (2016-17)

CLASS - XII

SUBJECT - PHYSICS

RATISHWAR

Time : 3:00 Hrs.

Max Marks : 70

*General Instructions:*

*All questions are compulsory:-*

1. Q. no. 1-5 are very short answer questions each carrying **one** mark.
2. Q. no. 6-10 are short answer questions each carrying **two** marks.
3. Q. no. 11-22 are short answer questions each carrying **three** marks.
4. Q. no. 23 value based carrying **four** marks.
5. Q. no. 24-26 are long answer questions each carrying **five** marks.

- 
1. What is the electric flux through a cube of side 1cm which encloses an electric dipole?
  2. A concave lens of refractive index 1.5 is immersed in a medium of refractive index of 1.65. What is the nature of the lens?
  3. Why are microwaves considered suitable for radar systems used in aircraft navigation?
  4. In a meter bridge, two unknown resistances R and S. When connected in the two gaps, give a null point at 40cm from one end. What is the ratio of R and S?
  5. A transmitting antenna at the top of a tower has a height of 36 m and the height of the receiving antenna is 49 m. what is the maximum distance between them, for satisfactory communication in the LOS mode? (Radius of earth = 6400 km)
  6. Explain the terms (i) Attenuation and demodulation used in communication system.
  7. A nucleus with mass number  $A = 240$  and  $BE/A = 7.6$  Mev breaks into two fragments each of  $A = 120$  with  $BE/A = 8.5$  Mev calculate the released energy.

OR

Calculate the energy in fusion reaction :

$H + H \rightarrow He + n$  Where BE of H = 2.23 Mev and of He = 7.73 Mev.

PTO

8. Plot a graph showing variation of de broglie wave length vs where  $v$  is the accelerating potential for two particles A and B carrying same charge but of masses  $m_1, m_2$  ( $m_1 > m_2$ ) which one of the two represents a particle of smaller mass and why?
9. Two cells of emfs 1.5v and 2.0 v having internal resistances of  $0.2 \Omega$  and  $0.3 \Omega$  respectively are connected in parallel. Calculate the emf and internal resistance of the equivalent cell.
10. State Brewster's law. The value of Brewster angle for a transparent medium is different for light of different colours. Give reason.
11. Write three characteristic features in photo electric effect which cannot be explained on the basis of wave theory of light, but can be explained only using Einstein's equation.
12. Two parallel plate capacitors X and Y have the same area of plates and same separation between them X has air between the plates while Y contains a dielectric medium of  $E_r = 4$



- (i) calculate capacitance of each capacitor if equivalent capacitance of the combination is  $4 \mu\text{F}$ .
- (ii) calculate the potential difference between the plates of X and Y.
- (iii) Estimate the ratio of electrostatic energy stored in X and Y.
13. How are em waves produced by oscillating charges? Draw a sketch of linearly polarized em waves propagating in the Z-direction. Indicate the directions of the oscillating electric and magnetic fields.
14. (a) Calculate the distance of an object of height  $h$  from a concave mirror of radius of curvature 20cm so as to obtain a real image of magnification 2. Find the location of image also
- (b) using mirror formula, explain why does a convex mirror always produce a virtual image?
15. (a) Explain any two factors which justify the need of modulating a low frequency signal.
- (b) Write two advantages of frequency modulation over amplitude modulation.
16. Draw a schematic ray diagram of reflecting telescope showing how rays coming from a distant object are received at the eye piece. Write its two important advantages over a refracting telescope.

17. (a) Define torque acting on a dipole of dipole moment  $p$  placed in a uniform electric field  $E$ . Derive an expression.
- (b) What happens if the field is non uniform
18. Define the term cut off "frequency" in photo electric emission. The threshold frequency of a metal is  $f$ . when the light of maximum frequency  $2f$  is incident on the metal plate the maximum velocity of photo electrons is  $y_1$ . When the frequency of the incident radiation is increased to  $5f$ , the maximum velocity of photo electrons is  $y_2$ . Find the ratio  $y_1:y_2$ .

OR

Use kirchoff's rules to obtain condition for the balance condition in wheat stone's bridge.

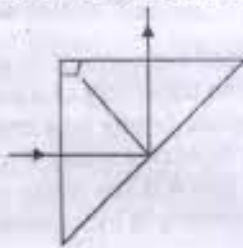
19. In the study of Geiger Marsden experiment on scattering of  $\alpha$ -particles by a thin foil of gold, draw the trajectory of a particles in the coulomb field of target nucleus. Explain briefly how one gets the information on the size of the nucleus from this study. From the relation  $R = R_0 A^{1/3}$  where  $R_0$  is constant and  $A$  is the mass number of the nucleus show that nuclear matter density is independent of  $A$ .
20. (a) State Bohr postulate of hydrogen atom that gives the relationship for the frequency of emitted photon in a transition.
- (b) An electron jumps from fourth to first orbit in an atom. How many maximum number of spectral lines can be emitted by the atom? To which series these lines correspond?
21. Derive an expression for potential at a point due to an electric dipole
22. Derive an expression for energy stored in a capacitor and find the formula for energy density of a parallel plate capacitor.
23. Sushil is in the habit of charging his mobile and then leaving the charger connected through the mains with the switch on. When his sister Asha pointed it out to him, he replied there was no harm as the mobile had been disconnected. Asha then explained to him and convinced him, how the energy was being wasted as the charger was continuously consuming energy.
- Answer the following questions:
- (a) What values did Asha display in convincing her brother?
- (b) What measures, in your view, should be adopted to minimize the wastage of electric energy in your households?
- (c) Imagine an electric appliance of 2 W, left connected to the mains for 20 hours. Estimate the amount of electrical energy wasted.
24. (i) In young's double slit experiment, deduce the condition for (a) constructive and destructive interference at a point on the screen. Draw a graph showing the variation of intensity in the interference

pattern against position on the screen

- (ii) Compare the interference pattern observed in young's double slit experiment with single slit diffraction pattern pointing out three distinguishing features.

OR

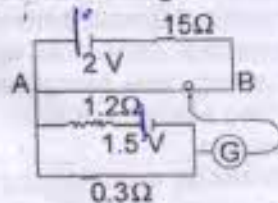
- (i) Plot a graph to show variation of the angle of deviation  $\delta$  as a function of angle of incidence for light passing through a prism. Derive an expression for refractive index of the prism in terms of angle of minimum deviation and angle of prism.
- (ii) What is dispersion of light? What is its cause?
- (iii) A ray of light incident normally on one face of a right isosceles prism is totally reflected as shown in fig. what must be the minimum value of refractive index of glass? Give relevant calculations.



25. (i) Define the term drift velocity
- (ii) on the basis of electron drift, derive an expression for resistivity of a conductor in terms of number density of free electrons and relaxation time. On what factors does resistivity of a conductor depend?
- (iii) Why alloys like constantan and manganin are used for making standard resistors?

OR

- (i) State the principle of working of a potentiometer.
- (ii) In the following potentiometer circuit AB is a uniform wire of length 1m and resistance of  $10\ \Omega$  calculate the potential gradient along the wire and balance length  $AO = 1$ .



- 0 26. (a) Using Gauss' law, derive an expression for the field due to an infinitely long straight uniformly charged wire. (b) Deduce coulomb's law from Gauss' theorem. OR (a) Define dipole moment & give its SI unit (b) Derive an expression for electric field intensity at any point on the axis of a uniformly charged ring.