

**INTERNATIONAL INDIAN SCHOOL – DAMMAM**  
**PRELIMINARY EXAMINATION-2014**  
**CLASS – XII**

**PHYSICS**

SET A

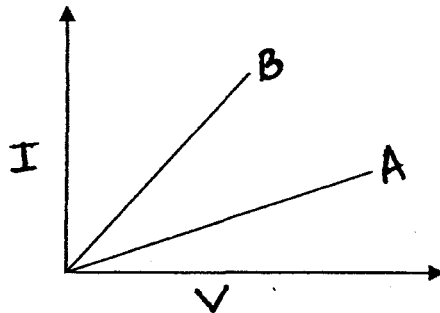
**Max. Time : 3 Hours**

**Max. Marks : 70**

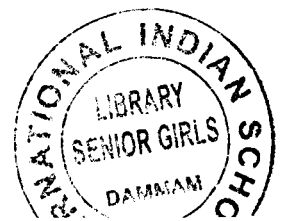
**General Instructions:**

- (i) All questions are compulsory.
- (ii) Questions 1 to 8 carry one mark each, 9 to 18 carry two marks each, 19 to 27 carry three marks each and 28 to 30 carry five marks each.
- (iii) Use log tables if necessary.

1. For a given medium the dielectric constant is unity. What is its permittivity?
2. Which lamp has greater resistance a 60W or a 100W lamp, when connected to the same supply?
3. The V-I graph for parallel and series combination of two metallic resistors are shown in the figure. Which graph represents parallel combination? Justify your answer.



4. Define the term 'transducer' for a communication system.
5. The vertical component of Earth's magnetic field at a place is  $\sqrt{3}$  times the horizontal component. What is the value of angle of dip at this place?
6. A soft iron core is introduced in an inductor. What is the effect on the self inductance of the inductor?
7. What happens to frequency when light passes from one medium to another?
8. Why sky waves are not used in the transmission of TV signals?
9. What is a light emitting diode? Draw its V-I characteristics.

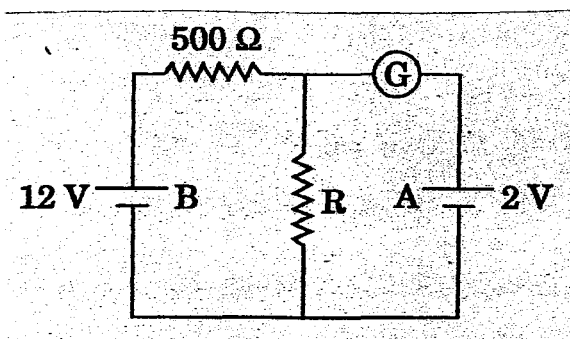


10. An electron and a proton enter perpendicular to a uniform magnetic field with the same speed. Find the ratio of the radii of the circular paths of the particles. Given proton is 1840 times heavier than electron.

OR

How will the magnetic field at the centre of a circular coil carrying current change if the current through the coil is doubled and the radius of the coil is halved?

11. The power factor of an ac circuit is 0.5. What is the phase difference between voltage and current in this circuit? What is the power factor of a series LCR circuit at resonance?
12. Prove law of reflection based on wave theory.
13. A coil of area  $5 \text{ cm}^2$  and 100 turns is placed in a uniform magnetic field of 1.5T. Find the magnetic dipole moment and the maximum torque produced when a current of 0.2A is passed through the coil.
14. Derive an expression for potential at a point due to a point charge.
15. Sketch the graphs showing the variation of stopping potential  $V_0$  with frequency  $\nu$  of incident radiation for two photosensitive metals A and B having threshold frequencies  $\nu_A$  and  $\nu_B$  respectively.  $\nu_B > \nu_A$ .
- (a) What does the slope of the graphs represent ?
- (b) What does the intercept of the graphs on the potential axis represent?
16. An electron and a proton are moving in the same direction and possess same kinetic energy. Find the ratio of de- Broglie wavelengths associated with these particles.
17. How much work must be done to charge a  $24 \mu\text{F}$  capacitor when the potential difference between the plates is 500V?
18. In the circuit shown in the figure the galvanometer G gives zero deflection. If the batteries have negligible internal resistance find the value of the resistor R.



19. Using a neat circuit diagram explain the working of a potentiometer to compare the emf of two primary cells.
20. A galvanometer of resistance  $50\Omega$  gives full scale deflection for a current of  $0.05\text{A}$ . Calculate the length of shunt wire required to convert the galvanometer into an ammeter of range  $0\text{-}5\text{A}$ . The diameter of the shunt wire is  $2\text{mm}$  and its resistivity is  $5 \times 10^{-7}\Omega\text{m}$ .
21. Name the electromagnetic radiation which :
- (a) is used in satellite communication
  - (b) is used for studying crystal structure
  - (c) is similar to the radiation emitted during decay of radioactive nuclei
  - (d) has its wavelength range  $390\text{nm}$  to  $770\text{nm}$
  - (e) is absorbed from sunlight by ozone layer
  - (f) produces intense heating effect.
22. Derive thin lens formula.
23. Calculate the modulation index of an AM wave for which the maximum amplitude is 'a' while the minimum amplitude is 'b'.
24. State and prove Brewster's law.
25. **Geeta has dry hair. A comb run through her dry hair attracts small bits of paper. She observes that Neeta with oily hair combs her hair, the comb could not attract small bits of paper. She consults her teacher for this and gets the answer. She then goes to junior classes and shows this phenomenon as physics experiment to them. All juniors feel very happy and tell her that they will also look for such interesting things in nature and try to find the answers.**
- 1) **What according to you are the values displayed by Geeta?**
  - 2) **Explain why the comb attracts paper bits in case of dry hair and does not attract in case of oily hair.**
26. Define half life of a radioactive substance and establish its relation with decay constant.

**OR**

Define binding energy per nucleon. Draw a graph showing the variation of binding energy per nucleon with mass number. Name the element which has the highest binding energy per nucleon.

27. Derive an expression for the radius of the ground state orbit of hydrogen atom using Bohr postulate. What is the ratio of orbital radii of hydrogen atom for  $n=1$  and  $n=2$ ?

28. Draw a circuit diagram to study the input and output characteristics of npn transistor in CE configuration. Show these characteristics graphically.  
Explain the working of a transistor as a switch.

**OR**

What is a zener diode? Draw its V-I characteristics.  
Using a circuit diagram explain the working of a zener diode as a voltage regulator.

29. Derive prism formula. Draw a graph to show the variation of angle of incidence and angle of deviation.

At what angle should a ray of light be incident on the face of a prism of refracting angle  $60^\circ$  so that it just suffers total internal reflection at the other face. The refractive index of the prism is 1.524.

**OR**

Explain myopia and hypermetropia with the help of ray diagrams. How are they corrected?

A real image of an object is formed at a distance of 20cm from a lens. On putting another lens in contact with it the image is shifted 10cm towards the combination. Determine the power of the second lens.

30. Explain with the help of a diagram the principle, theory and working of an AC generator.

An AC generator consists of a coil of 50 turns and area  $2.5\text{m}^2$  rotating at an angular speed of  $60\text{ rad s}^{-1}$  in a uniform magnetic field 0.3T between the pole pieces of a magnet. The resistance of the circuit is  $500\Omega$ . (a) What is the maximum current drawn from the generator? (b) What is the flux through the coil when the current is maximum?

**OR**

Define the term impedance of series LCR circuit. Derive the mathematic expression for it using phasor diagram.

An inductor  $200\text{mH}$ , a capacitor and a resistor  $10\Omega$  are connected in series with a 100V, 50Hz a.c. source. If the current and voltage are in phase with each other calculate the capacitance of the capacitor.