# INTERNATIONAL INDIAN SCHOOL - DAMMAM
# PRELIMINARY EXAMINATION – 2016
# CLASS - XII
# PHYSICS

**SET-A**

**Max. Time: 3 hours**
**Max. Marks: 70**

**General Instructions:**

i. All questions are compulsory.
ii. Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each.
iii. There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks. You have to attempt only one of the choices in such questions.
iv. Use of calculator is not permitted. However you may use log tables if necessary.

## SECTION-A

1. Arrange the following networks in the increasing order of the number of computers that may be present in the network .
   Internet, LAN ,WAN.
2. A convex lens of focal length f is kept coaxially in contact with a concave lens of same focal length. What is the power of the combination?
3. Name the experiment which proved the wave nature of electrons.
4. The binding energy per nucleon of two nuclei A and B are 4MeV and 8.2MeV respectively. Which of the two nuclei is more stable?
5. What type of extrinsic semiconductor is formed when germanium is doped with indium?

## SECTION -B

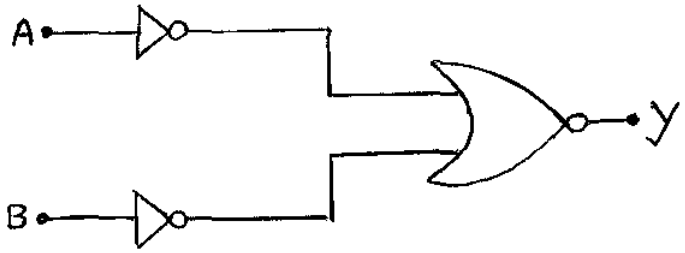
6. An infinitely long positively charged wire has a linear charge density $\lambda$. An electron revolves around the wire as its centre with a constant velocity in a circular plane perpendicular to the wire. Deduce the expression for its kinetic energy.
7. The energy of the electron in the ground state of hydrogen atom is -13.6eV. How much energy is required to take an electron from its ground state to the first excited state?
8. Define the term 'wave front'. Draw a diagram to show the refraction of a plane wave front incident on a convex lens.
9. Prove that an ideal inductor does not dissipate power in an a.c circuit.

   **OR**

   State the principle of a step-up transformer. Why cannot such a device be used to step up d.c. voltage?
10. A particle of mass m and charge q moving with a uniform speed v normal to a uniform magnetic field B describes a circular path of radius r. Derive the time period of its revolution.

## SECTION-C

11. Explain with the help of a circuit diagram the working of diode as a half wave rectifier. What is the frequency of output signal of a half wave rectifier, if the frequency of input signal is 50Hz?
12. Define half life period. Calculate the half life period of a radioactive substance if its activity drops to $\frac{1}{16}$ th of its initial value in 30years.
13. Write the truth table and identify the logic operation.




14. What do you mean by diffraction of light?
    In a single slit diffraction experiment a slit of width 'a' is illuminated by red light of wavelength 650nm. For what value of 'a' will the first secondary maximum fall at an angle of diffraction 30°.
15. In a plot of photoelectric current versus anode potential how does,
    (i) the saturation current vary with anode potential for incident radiations of different frequencies but same intensity.
    (ii) the stopping potential vary for incident radiations of different intensities but same frequency.
    (iii) photoelectric current vary for different intensities but same frequency of incident radiations.
16. Consider a uniform electric field $\mathbf{E} = 3\times10^{3}\hat{\imath}$ N/C. Calculate the flux of this electric field through a square surface of area 10cm$^2$ when,
    (i) its plane is parallel to the y-z plane.
    (ii) its plane is parallel to x-z plane
17. Derive an expression for the force between two long parallel current carrying conductors. Use this expression to define the S.I unit of current.

    **OR**

    State the principle of a moving coil galvanometer. Prove that in a radial magnetic field the deflection of the coil is proportional to the current flowing in the coil.
18. Sketch the magnetic field lines of paramagnetic and diamagnetic materials in an external uniform magnetic field. Distinguish between these materials in terms of magnetic susceptibility.
19. Obtain the mutual inductance of two long co-axial solenoids. How does the mutual inductance of a pair of coils change when the distance between the coils is increased?
20. Find the wavelength of electromagnetic wave of frequency $5\times10^{19}$ Hz in free space. Name this e.m. wave and give its one application.
21. Draw the labelled diagram of a reflecting type telescope and explain its working.
22. Show that in the free oscillations of an LC circuit, the sum of energies stored in the inductor and capacitor is constant in time.

## SECTION-D

23. **When Sunitha a class XII student came to know that her parents are planning to rent out the top floor of their house to a mobile company she protested. She tried hard to convince her parents that this move would be a health hazard. Ultimately her parents agreed.**
**( i ) By objecting to this move of her parents, what value did Sunitha display?**
**( ii ) Calculate the range of e.m. waves which can be transmitted by an antenna of height 20m. Given radius of the earth = 6400km.**

## SECTION-E

24. (a) Obtain an expression for electrostatic energy stored in a parallel plate capacitor.
(b) Two capacitors with capacitances $C_1$ and $C_2$ are charged to potentials $V_1$ and $V_2$ respectively and then connected in parallel. Calculate the common potential difference across the combination.

**OR**

24. (a) Obtain an expression for electric potential at a point on the axis of an electric dipole.
(b) Two charges 5μC and 2μC are separated by a distance of 18cm. Calculate the electrostatic potential energy of this charge system.

25. (a)Explain the phenomenon of total internal reflection.
(b)What are the conditions for this phenomenon to occur?
(c)Describe briefly any two applications of total internal reflection.

**OR**

25. (a)Derive an equation for the refractive index of a prism.
(b)Draw the graph to show the variation of angle of deviation with angle of incidence in case of a prism.
(c)Which colour deviates the least on passing through a prism?

26. (a)State the principle of potentiometer.
(b) Obtain an expression for potential gradient in terms of resistivity of potentiometer wire.
(c)In a potentiometer circuit for comparing emfs , a cell of emf 1.25V gives a balance point at 35cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63cm, what is the emf of the second cell?

**OR**

26. (a)Obtain the relation between resistivity and relaxation time.
(b)A copper wire of resistivity ρ is stretched to three times its length. What will be its new resistivity?
(c) A silver wire has a resistance of 2.1Ω at 27.5 °C and 2.7Ω at 100 °C. Determine the temperature coefficient of resistivity of silver.