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# CBSE 12th Physics 2010 Unsolved Paper Outside Board

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# CBSE 12th Physics 2010 Unsolved Paper Outside Delhi

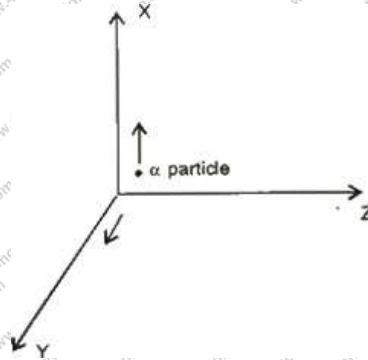
TIME - 3HR. | QUESTIONS - 26

THE MARKS ARE MENTIONED ON EACH QUESTION

## SECTION - A

**Q.1.** Name the physical quantity whose S.I. unit  $JC^{-1}$ . is it a scalar or a vector quantity? *1marks*

**Q.2.** A beam of particles projected along  $+x$  - axis, experiences a force due to a magnetic field along the  $+y$  - axis. What is the direction of the magnetic field? *1 mark*



**Q.3.** Define self-inductance of a coil. Write its S.I. units. *1 mark*

**Q.4.** A converging lens is kept coaxially in contact with a diverging lens - but the lenses being of equal focal length of the combination? *1 mark*

**Q.5.** Define ionization energy. What is its value for a hydrogen atom? *1marks*

**Q.6.** Two conducting wires X and Y of same diameter but different materials are joined in series across a battery. If the number density of electrons X is twice that in Y, find the ratio of drift velocity of electrons in the two wires. *1 marks*

**Q.7.** Name the part of electromagnetic spectrum whose wavelength lies in the range of  $10^{-10}m$ . gives its one use. *1 marks*

**Q.8.** When light travels from a rarer to a denser medium, the speed decreases. Does this decrease in speed imply a decrease in the energy carried by the light wave? justify your answer. *1 marks*

SECTION - B

**Q.9. What is the magnitude of the equatorial and axial field due to a bar magnet of length 5.0 cm at a distance of 50cm from its mid-point? the magnetic moment of the bar magnet is  $0.40 \text{ Am}^2$ . 2 marks**

**Q.10. A spherical conducting shell of inner radius  $r_1$  and outer radius  $r_2$  has a charge 'Q' A charge 'q' is placed at the center of the shell.**

**(a) What is the surface charge density on the (i) inner surface, (ii) outer surface of the shell?**

**(b) Write the expression for the electric field rice at a point  $x > r_2$  from the center of the shell. 2 marks**

**Q.11. Draw a sketch of a plane electromagnetic wave propagating along the z-direction. Depict clearly the directions of electric and magnetic. field varying sinusoid ally with z. 2 marks**

**Q.12. Show that the electric at the surface of a charged conductor is given by  $\vec{E} = \frac{\sigma}{\epsilon_0} \hat{n}$ ,**

**Where  $\sigma$  is the charge density  $\hat{n}$  is a unit vector normal to the surface in the outward direction. 2 marks**

**Q.13. Two identical loops, one of copper and the other of aluminum, are related with the same angular speed in the same magnetic field. Compare (i) the induced emf and (ii) the current produced in the two cols. Justify your answer. 2 marks**

**Q.14. An a-practical and a proton are accelerated from rest by the same potential. Find the ratio of their de Broglie wavelengths. 2 marks**

**Q.15. Write two factors justifying the need of modulating a signal. A carrier wave of peak voltage 12V is used to transmit a message signal. What should be the peak voltage of the modulating signal in order to have a modulation index of 75 %? 2 marks**

**Q.16. Write Einstein's photoelectric equation. State clearly the three salient features observed in photoelectric effect, which can be explained on the above equation. 2 marks**

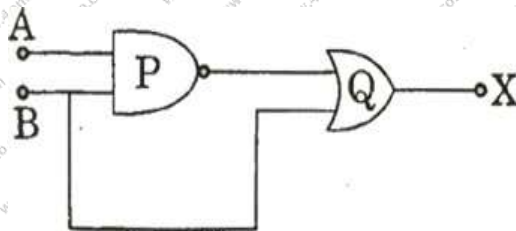
**Q.17. Draw a plot of potential energy of a pair of nucleons as a function of their separation write two important conclusions which you can draw regarding the nature the nature of nuclear forces. 2 marks**



OR

Draw a plot of the binding per nucleon as a function of mass number for a large number of nuclei,  $2 \leq A \leq 240$ . How do you explain the constancy of binding energy per nucleon in the? range  $30 < A < 170$  using the property that nuclear is short-ranged?

Q.18. (i) Identify the logic gates marked P and Q in the given logic circuit. 2 mark

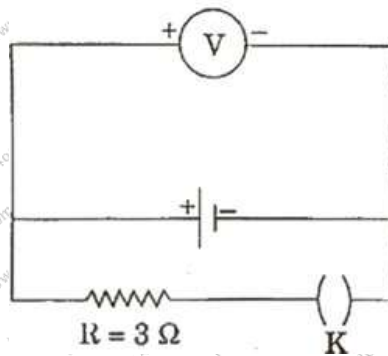


(ii) Write down the output at X for the inputs A=0, B=0 and A=1, B=1. 2 marks

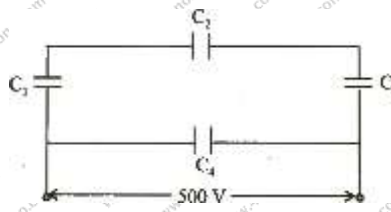
SECTION - C

Q.19. Which mode of propagation is used by short wave broadcast service having frequency range from a few MHz up to 30 MHz? Explain diagrammatically how distance communication can be achieved by this mode. Why is there an upper limit to frequency of? waves used in this mode? 3 marks

Q.20. Write any two factors on which internal resistance of a cell depends. The reading on a high resistance voltmeter, when a cell is connected across it, it 2. 2. V. when the terminals of the cell are also connected to a resistance of 5ohm as shown in the circuit, the voltmeter reading drops to 1. 8V. Find the internal resistance of the cell. 3 marks



**Q.21.** A network of four capacitors each of  $12\mu\text{F}$  capacitance is connected to a  $500\text{ V}$  supply as shown in the figure. Determine (a) equivalent capacitance of the network and (b) charge on each capacitor. *3 marks*



**Q.22. (i)** Draw a neat labelled ray diagram of an astronomical telescope in normal adjustment. Explain briefly working.

**(ii)** An astronomical telescope uses two lenses of power  $10\text{ D}$  and  $1\text{ D}$ . what is its magnifying power in normal adjustment? *3 marks*

**OR**

**(i)** Draw a neat labelled ray diagram of a compound microscope. Explain briefly its working.

**(ii)** Why must both the objective and eye-piece of a compound microscope have short focal lengths?

**Q.23.** In young's double slit experiment, the two slits  $0.15\text{ mm}$  apart are illuminated by chromatic light of wavelength  $450\text{ nm}$ . The screen is  $1.0\text{ m}$  away from the slits.

**(i)** Find the distance of the second (i) bright fringe, (ii) dark from the central maximum.

**(ii)** How will the fringe pattern change if the screen is moved away from the slits? *3 marks*

**Q.24.** State Kirchhoff's rules. Use these rules to write expressions for the currents  $I_1$ ,  $I_2$  and  $I_3$  in the circuit diagram shown. *3 marks*

**Q.25. (a)** Write symbolically the  $\alpha$ -decay process of  ${}_{15}^{32}\text{P}$ .

**(b)** Derive an expression for the average life of a radionuclide. Given its relationship with the half-life. *3 marks*

**Q.26.** How does polarized light get polarized when passed through a polaroid?

Two polaroid's are set in crossed positions. A polaroid is placed between the two making an angle with the pass axis of the first polaroid. Write the expression for the intensity of light transmitted from the second polaroid. In what orientations will the transmitted intensity be (i) minimum and (ii) maximum? *3 marks*



Q.27. An illuminated object and a screen are placed 90cm apart. Determine the focal length and nature of the lens required to produce a clear image on the screen, twice the size of the object. 3 marks

SECTION - D

Q.28. (a) With the help of a diagram, explain the principle and working of a moving coil galvanometer.

(b) What is the importance of a radial magnetic field and how is it produced?

(c) Why is it that while using a moving coil galvanometer as a voltmeter a high resistance series is. 5 marks

OR

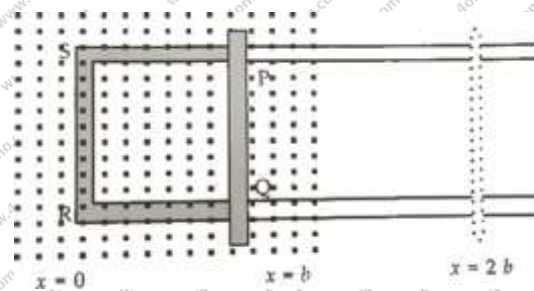
(a) Derive an expression for the force between two long parallel current carrying conductors.

(b) Use this expression to define S.I unit of current.

(c) A long straight wire AB carries a current I. A proton P travels with a speed V, parallel to the wire, at a distance d from it in a direction opposite to the current as shown in the figure. What is the force experienced by the proton and what is its direction?

Q.29. State Faraday's law of electromagnetic induction.

Figure shows a rectangular conductor PQRS in which the conductor PQ is free to move in a uniform magnetic field B perpendicular to the plane of the paper. The field extends from  $x=0$  to  $x=b$  and is zero for  $x>b$ . Assume that only the arm PQ possesses resistance  $r$ , when the arm PQ is pulled outward from  $x=0$  with constant speed  $v$ , absinthe expressions for the flux and the induced emf. Sketch the variations of these quantities with distance  $0 \leq x \leq 2b$ . 5 marks



Or

**Draw a schematic diagram of a step-up transformer. Explain its working principle. Deduce the expression for the secondary to primary voltage in terms of the number of turns in the two coils. In an ideal transformer, how is this ratio related to the currents in the two coils?**

**How is the transformer used in large scale transmission and distribution of electrical energy over long distances?**

**Q.30. (a) Draw the circuit arrangement for studying the input and output characteristics of an n-p-n transistor in CE configuration, with the help of these characteristics define (i) input resistance. (ii) current amplification factor.**

**(b) Describe briefly with the help of a circuit diagram how n-p-n transistor is used to produce self-sustained oscillations. 5 marks.**



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