

**Guess Paper – 2014**  
**Class – XII**  
**Subject – PHYSICS (Theory)**

*Time allowed: 3 hours*

*SET C*

*Maximum Marks: 70*

**General Instructions:**

(i) All questions are compulsory..

(iii) Q.No. 1 to 8 are very short answer type questions, carrying one mark each.

(iv) Q.No numbers 9 to 16 are short answer type questions, carrying two marks each.

(v) Q.No. 17 to 25 are also short answer type questions, carrying three marks each.

(vi) Q.No. 27 to 29 are long answer type questions, carrying five marks each.

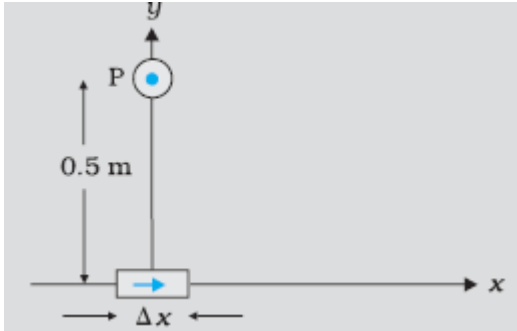
(viii) Q.No. 26 is a value based question of four marks

(ix) You may use the following values of physical constants wherever necessary

$c=3 \times 10^8$  m/s  $h=6.6 \times 10^{-34}$  Js  $e=1.6 \times 10^{-19}$  C  $N_A = 6.023 \times 10^{23}$  /mole  $m_n = 1.67 \times 10^{-27}$  kg  $\mu_0 = 4\pi \times 10^{-7}$  T-m/A  
 $m_e = 9 \times 10^{-31}$  kg

1. The de Broglie wavelengths, associated with a proton and a neutron, are found to be equal. Which of the two has a higher value for kinetic energy?
2. Three concentric metallic spherical shells of radii R, 2R, 3R, are given charges Q1, Q2, Q3, respectively. find the surface charges given to the shells, Q1 : Q2 : Q3
3. Write the function of coolant .Give one example of coolant.
4. A partially plane polarized beam of light is passed through a Polaroid. Show graphically the variation of the transmitted light intensity with angle of rotation of the Polaroid.
5. Draw resistivity-temperature graph for alloys.
6. Two identical charged particles moving with same speed enter a region of uniform magnetic field. If one of these enters normal to the field direction and the other enters along a direction at  $60^\circ$  with the field, what would be the ratio of their angular frequencies?
7. A deuteron and an alpha particle, both initially at rest, are (suitably) accelerated so as to have the same kinetic energy .What is the ratio of their de-Broglie wavelength?
8. Name the characteristics of electromagnetic waves that (i) increases (ii) remains constant in the electromagnetic spectrum as one moves from radiowave region towards ultraviolet region
9. Name the part of the electromagnetic spectrum to which waves of wavelength (i)  $1\text{\AA}$  and (ii)  $10^{-2}$  belong. Using the relation  $\lambda T = (0.29 \text{ cm}) \text{K}$ , obtain in the characteristic Kelvin temperature corresponding to these two wavelengths.(i) X-rays, (ii) Microwaves

10. An element  $\delta l = \delta x i$  is placed at the origin and carries a large current  $I = 10$  A. What is the magnetic field on the y-axis at a distance of 0.5 m.  $\delta x = 1$  cm.



VECTOR CLASSES

The classes with a direction.

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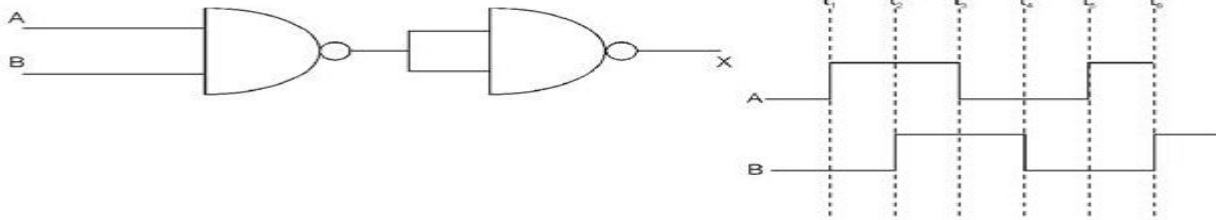
**SET C**

11. State Brewster's Law. Derive the expression.
12. A monochromatic light of wavelength  $\lambda$  is incident on an isolated metallic sphere of radius  $a$ . The threshold wavelength is  $\lambda_0$  which is larger than  $\lambda$ . Find the number of photoelectrons emitted before the emission of photoelectrons will stop.
13. An electric flux of  $-6 \times 10^3 \text{ Nm}^2/\text{C}$  passes normally through a spherical Gaussian surface of radius 10cm, due to a point charge placed at the centre. (i) What is the charge enclosed by the Gaussian surface?  
(ii) If the radius of the surface is doubled, how much flux would pass through the surface?
14. How the detection of Amplitude modulated wave is done. What is the function of rectifier in detection?
15. Calculate the binding energy per nucleon of  ${}_{20}\text{Ca}^{40}$  nucleus. Given:  $m({}_{20}\text{Ca}^{40}) = 39.962589\text{u}$   
Mass of a neutron =  $1.008665\text{u}$  and mass of a proton =  $1.007825\text{u}$ .  $1\text{u} = 931\text{MeV}$

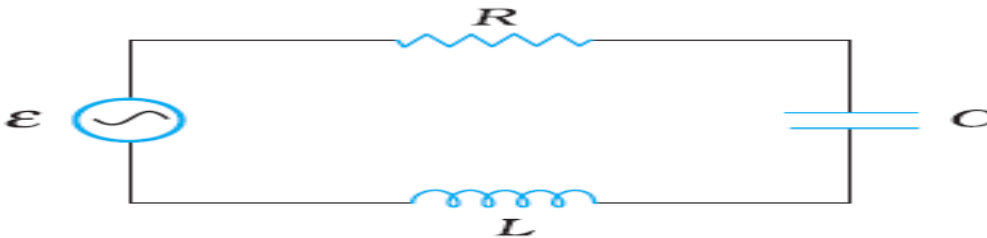
OR

Write the equations of gamma -decay. Explain it by an example

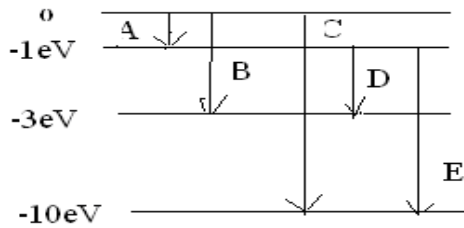
16. How a solar cell works. On what factors solar cell fabrication depends.
17. Draw the output wave from at X, using the given inputs A, B for the logic circuit shown below. Also identify the equivalent gate.



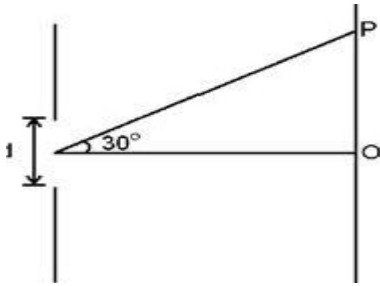
18. Obtain the expression for the magnetic field inside the solenoid using ampere's circuital law.
19. A variable frequency 230V alternating voltage source is connected across a series combination  $L=5H$   $C=80\mu F$  and  $R=40\Omega$ .



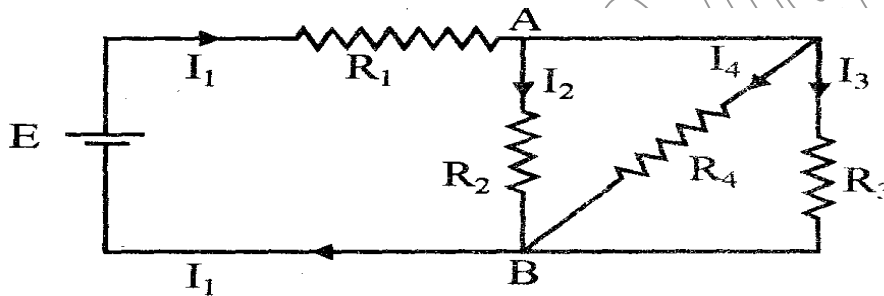
- (a) Find the quality factor of the circuit. What it indicates
- (b) Determine the rms potential drops across the three elements of the circuit. Show that the potential drop across the LC Combination is zero at the resonating frequency.
20. The energy levels in an atom of an element are shown in the following diagram. Find the maximum wavelength of level transition. Which transition has maximum energy.



21. A slit of width  $d$  is illuminated by white light. For what value of  $d$  is the first minimum, for red light of wavelength  $=650$  nm, located at point P? For what value of the wavelength of light will the first diffraction maxima also fall at P



22. State Kirchoff's second Law. In the circuit shown  $R_1 = 4\Omega$ ,  $R_2 = R_3 = 15\Omega$ ,  $R_4 = 30\Omega$  and  $E = 10V$ . Calculate the equivalent resistance of the circuit and the current in each resistor

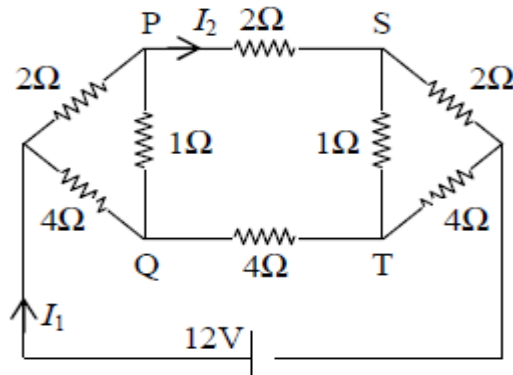


23. What is satellite wave propagation? If the sum of the heights of transmitting and receiving antennae in line of sight of communication is fixed at  $h$ , show that the range is maximum when the two antennae have a height  $h/2$  each

24. Draw the circuit diagram of common base npn transistor. How it works as a switch  
OR

Draw the diagram of a half wave rectifier. Write its working

25. For the resistance network in the figure below find the (a) current  $I_1$  (b) current  $I_2$  (c) Potential difference in P and Q



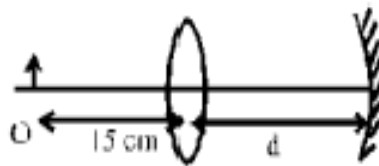
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26. **Bhavika lives in a society in Dwarka. She with her friends of NGO contacted the RWA of the society to organize a eye camp. She gathered old and young people suffering from different eye defects. Most of them get cured their eyes. All people of the society appreciated her steps**
- (i) **List three values Bhavika displayed in her act .**  
 (ii) **Name two general eye defects and their causes**

27. (i) Define magnification of a mirror. Derive the expression for the mirror formula  
 (ii) A 35mm slide with a 24mm X 36mm picture is projected on screen placed 12 m from the slide .The image of the slide picture on the screen measure 1.0mX 1.5m. Determine the location of projection lens and its focal length

OR

- (i) Using the relation for refraction at a single spherical refracting surface, derive the lens maker's formula.(ii) Calculate the distance  $d$ , so that a real image of an object at  $O$ , 15cm in front of a convex lens of focal length 10cm be formed at the same point  $O$ . The radius of curvature of the mirror is 20cm. Will the image be inverted or erect?



28. (a) With the help of a diagram, explain the construction and working of a moving coil galvanometer.  
 (b) Write two characteristics and role of suspension wire in moving coil galvanometer.  
 (c) Why is it that while using a moving coil galvanometer as a voltmeter a high resistance in series is required whereas in an ammeter a shunt is used ?

OR

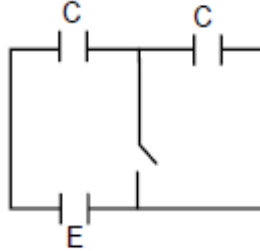
Derive the expression for the magnetic field due to current carrying circular loop of radius  $R$ , at a point, which is at a distance  $X$  from its center along the axis of loop. Consider two parallel co-axial circular coils of same radius  $R$  and number of turns  $N$ , carrying same current  $I$  in same direction, separated by a distance  $R$  Show that the field on the axis around the mid-point between the coils in uniform over a distance that is small as compared to  $R$  is given by  $B = (0.72\mu_0NI) / R$

29. Define electric field intensity at any point. Derive the expression for electric field intensity due to electric dipole at any point axial line of the electric dipole. Two non-conducting solid spheres of radii  $R$  and  $2R$ , having uniform volume charge densities  $\sigma_1$  and  $\sigma_2$  respectively, touch each other. The net electric field at a distance  $2R$  from the centre of the smaller sphere, along the line joining the centre of the spheres is zero. Find the ratio  $\sigma_1/\sigma_2$ .

OR

Two capacitors with capacity  $C_1$  and  $C_2$  are charged to potential  $V_1$  and  $V_2$  respectively and then connected in parallel. Calculate the common potential across the combination, the charge on each capacitor, the electrostatic energy stored in the system and the change in the electrostatic energy from its initial value.

In given diagram a switch is open for long time and then closed (a) find the charge flown through the battery when the switch is closed. (b) Find the work done by the battery (c) find the change in energy stored in the capacitors



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