

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

Time allowed: 3 hours
Maximum Marks: 70

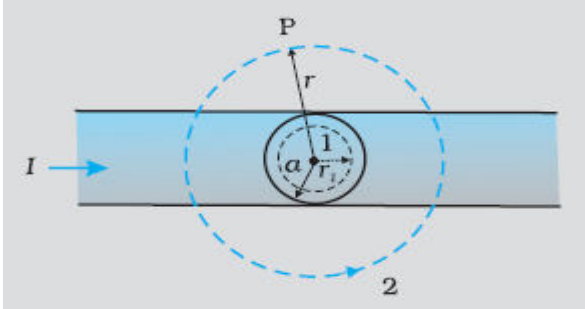
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General Instructions:

- (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 $m_p = 1.67 \times 10^{-27}$ kg $\mu_0 = 4\pi \times 10^{-7}$ T-m/A
 $m_e = 9 \times 10^{-31}$ kg

1. 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
2. Write the function of moderator .Give one example of moderator
3. A person looking at mesh of crossed wires is able to see the vertical wires more distinctly than the horizontal wires. Why? How can it be corrected?
4. Draw the graph of ohm's law at high temperatures.
5. 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° with the field, what would be the ratio of their angular frequencies?
6. Draw the graph for the variation of (a) stopping potential with frequency and (b) photoelectric current Vs anode potential keeping the intensity of incident radiations constant
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. Write two use of infrared waves.
9. Name the part of electromagnetic spectrum to which waves of wavelength (i) 1\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. Figure shows a long straight wire of a circular cross-section (radius a) carrying steady current I . The current I is uniformly distributed across this cross-section. Calculate the magnetic field in the region $r < a$ and $r = a$.



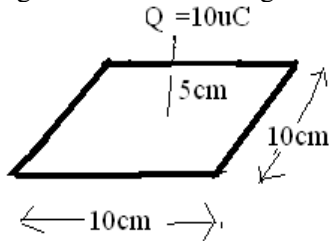
VECTOR CLASSES

The classes with a direction.

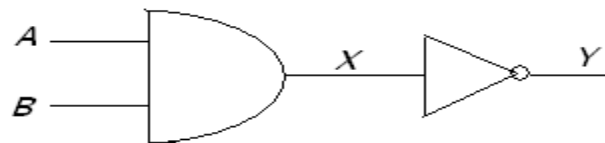
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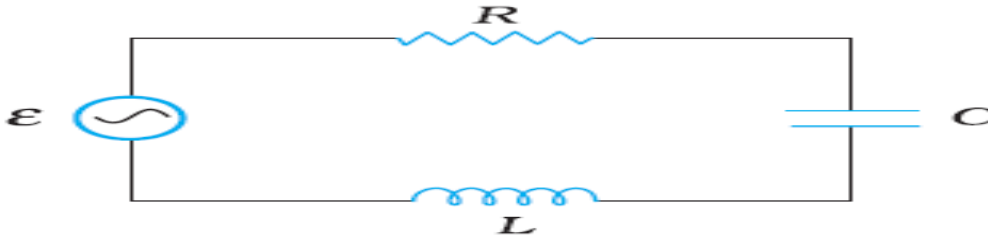
11. Define interference. Write two conditions of sustained interference.
12. A monochromatic light of wavelength λ is incident on an isolated metallic sphere of radius a . The threshold wavelength is λ_0 which is larger than λ . Find the number of photoelectrons emitted before the emission of photoelectrons will stop.
13. Define electric flux. A point charge of $+10\mu\text{C}$ is at a distance 5cm directly above the centre of a square of side 10cm as shown in the figure. What is the magnitude of electric flux through the square?



14. Define Amplitude modulation. Draw the graph between the amplitude and angular frequency for amplitude modulated wave
15. Define mass defect. Draw the binding energy curve indicating maximum binding energy.
OR
Write the equations for the two types of β -decay .Why is it very difficult to detect the neutrino?
16. How a Photodiode works. Draw its voltage – current graph.
17. How a OR gate is realized from the NAND gate. Draw diode circuit of OR gate.
Find the output at Y if (i) $A=1, B=0$ (ii) $A=0, B=1$



18. Obtain the expression for the mutual inductance between two solenoids wound over one another
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) Obtain the quality factor of the circuit and the power factor at the resonating frequency.
- (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.

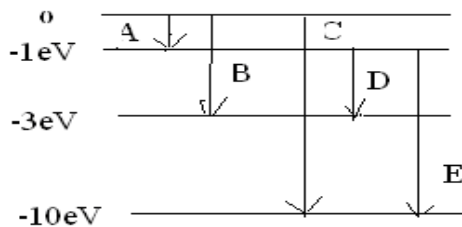
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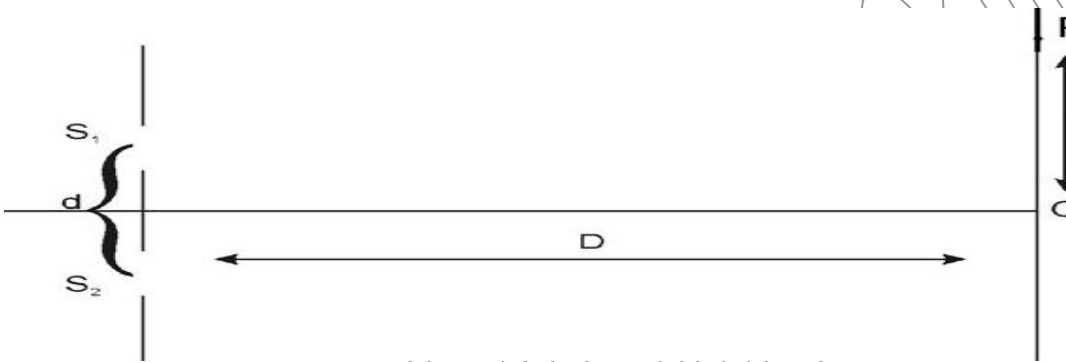
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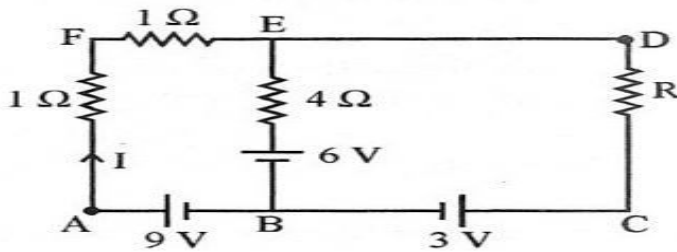
20. The energy levels in an atom of an element are shown in the following diagram. Which one of the level transition will result in the emission of photon of wavelength 620nm? Support your answer with mathematical calculation.



21. The intensity, at the central maxima(O) in a Young's double slit set up is I_0 .If the distance OP equals one third of the fringe width of the pattern, show that the intensity, at point P., would equal $I_0/4$



22. State Kirchoff's second Law. Using Kirchoff's rules determine the value of unknown resistance R in the circuit so that no current flows through 4Ω resistance. Also find the potential difference between A and D



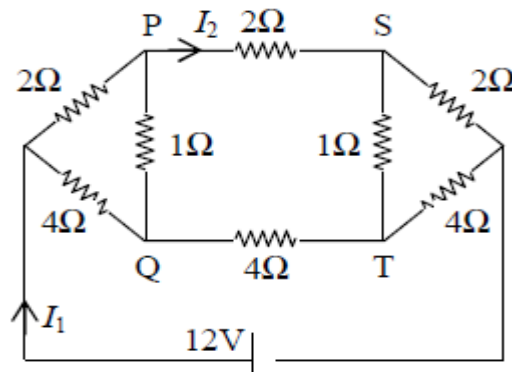
23. Define modulation index. Find the modulation index of an AM wave for which the maximum amplitude is 'a' while the minimum amplitude is 'b'.

24. Draw the circuit diagram of transistor as a device. How it works as a switch

OR

Draw the diagram of transistor as an oscillator. 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. **Yash and friends decided to have a astronomy club in their society. Yash collected the information of buying telescopes. The telescopes were too expensive .They convinced the people of society and collected the money for an astronomical telescope. Yash father insisted on buying refracting telescopes. Yash told his father the advantages of reflecting telescopes. He explained how their resolving and magnifying power is better than others. The whole society appreciated their steps.**
- (a) **What values have yash to form a astronomy club in his society?**
 (b) **Write types of reflecting telescopes.**
 (c) **Draw diagram of any refelecting type of telescope.**

27. (i) Using the relation for refraction at a single spherical refracting surface, derive the lens maker's formula. Write the sign conventions (denser to rarer medium)
 (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

- (a) With the help of a suitable ray diagram, derive the mirror formula for a concave mirror.
 (b) Consider coaxial system of two thin convex lenses of focal length f each separated by a distance d . Draw a ray diagram for image formation corresponding to an object at infinity placed on the principal axis in the following cases. (i) $d < f$ (ii) $d = f$ (iii) $f < d < 2f$ (iv) $d = 2f$
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 in series is required whereas in an ammeter a shunt is used ?

OR

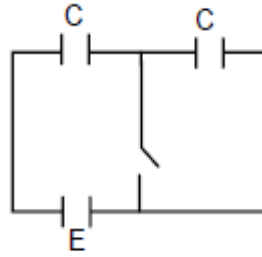
Draw a schematic sketch of a cyclotron. Explain briefly how it works and how it is used to accelerate the charged particles. (i) Show that time period of ions in a cyclotron is independent of both the speed and radius of circular path.
 (ii) What is resonance condition? How is it used to accelerate the charged particles?

29. Define electric potential at any point. Derive the expression for electric potential due to electric dipole at any point. Two non-conducting solid spheres of radii R and $2R$, having uniform volume charge densities σ_1 and σ_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 σ_1 / σ_2 .

OR

Find the expression for the capacitance of a parallel plate capacitor of area 'A' and plate separation 'd' when a dielectric slab of thickness t is introduced between the plates of the capacitor. In which case would the capacitance be more and why?

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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