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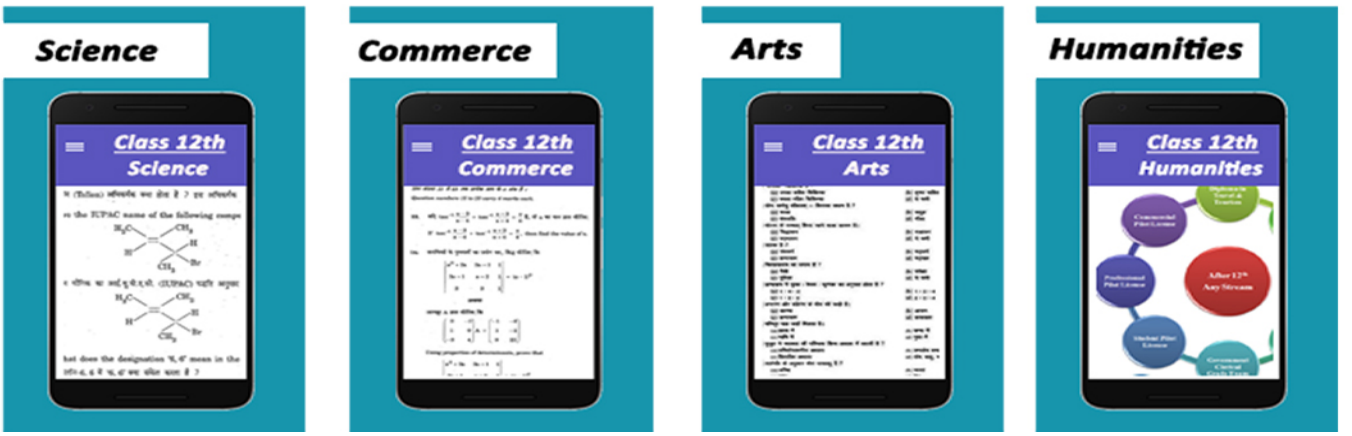

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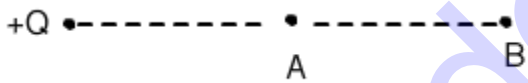
CBSE 12th Physics 2016 Unsolved Paper
Delhi Board

TIME - 3HR. | QUESTIONS - 26
THE MARKS ARE MENTIONED ON EACH QUESTION

SECTION-A

Q.1. A point charge +Q is placed at point O as shown in the figure. Is the potential difference $V_A - V_B$- positive, negative or zero? *1 mark*



Q.2. How does the electric flux due to a point charge enclosed by a spherical gaussian surface get affected when its radius is increased? *1 mark*

Q.3. Write the underlying principle of a moving coil galvanometer. *1 mark*

Q.4. Why are microwaves considered suitable for radar systems used in aircraft navigation? *1 mark*

Q.5. Define 'quality factor' of resonance in series LCR circuit. What is its SI unit? *1 mark*

SECTION - B

Q.6. Explain the terms (i) Attenuation and (ii) Demodulation used in Communications System. *2 marks*

Q.7. Plot a graph showing variation of de-Broglie wavelength λ versus $\frac{1}{V}$ where V is accelerating potential for two particles A and B carrying same charge but masses m_1, m_2.Which one of the two represents a particle of smaller mass and why? *2 marks*

Q.8. A nucleus with mass number A=240 and BE/A = 7.6 MeV breaks into two fragments each of A = 120 with BE/A = 8.5 MeV. Calculate the released Energy. *2 marks*

OR

Calculate the energy in fusion reaction:
$_1^2H + _1^2H \rightarrow _2^3He + n$, **where BE of** $_1^2H = 2.23$ **MeV and of** $_2^3H = 7.73$ **MeV.**

Q.9. Two cells of emfs 1.5V and 2.0V having internal resistances 0.2 Ω and 0.3 Ω respectively are connected in parallel. Calculate the emf and internal resistance of the equivalent cell. *2 marks*

Q.10. State Brewster's law. The values of Brewster angle for a transparent medium is different for light of different colours. Give reason. *2 marks*

SECTION - C

Q.11. A charge is distributed uniformly over a ring of radius 'a', obtain an expression for the electric intensity E at a point on the axis of the ring. Hence show that for point at large distance from the ring, it behaves like a point charge. *3 marks*

Q 12. (a) Write three characteristic feature in photoelectric effect which cannot be explained on the basis of wave theory of light, but can be explained only using Einstein's equation. *3 marks*

Q 13. (a) Write the expression for the magnetic force acting on a charged particle moving with velocity v in the presence of magnetic Field B.

(b) A neutron, an electron and an alpha particle moving with equal velocities, enter a uniform magnetic field going into the plane of the paper as shown. trace their paths in the field and justify your answer. *3 marks*

Q 14. (i) Define mutual inductance.

(ii) A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5s, what is the change of flux linkage with the other coil ? *3 marks*

Q 15. Two parallel plate capacitors X and Y have the same area of plates and same separations between them. X has air between the plates while Y contains a dielectric medium of $e_r = 4$.

(i) Calculate capacitance of each capacitor if equivalent capacitance of the combination is $4\mu_F$.

(ii) Calculate the potential difference between the palate of X and Y.

(iii) Estimate the ratio of electrostatic energy stored in X and Y. *3 marks*

Q 16. Two long straight parallel conductors carry steady current I_1 **and** I_2 **separated by a distance d. If the currents are flowing in the same direction, show how the magnetic field set up in one produces an attractive force on the other. Obtain the expression for this force. Hence define one ampere.** *3 marks*

Q17. How are em waves produced by oscillating charges?

Draw a sketch of linearly polarized em waves propagating in the z-direction. Indicate the directions of the oscillating electric and magnetic fields. *3 marks*

OR

Write maxwell's generalizations of ampere's Circuital law. Show that in the process of charging a capacitor, the current produced within palates of the capacitor is $i = \varepsilon_0 \frac{d\phi_E}{dt}$ where ϕ is the electric flux produced during charging of the capacitor plates.

Q18. (a) Explain any two factors which justify the need of modulating a low frequency signal.

(b) Write two advantages of frequency modulation over amplitude modulation. *3 marks*

Q 19. (i) Write the functions of three segments of a transistor.

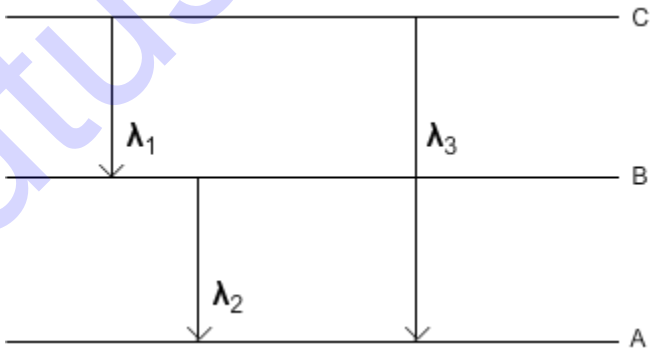
(ii) Draw the circuit diagram for studying the input and output characteristics of n-p-n transistor in common emitter configuration. using the circuit, explain how input, output characteristics are obtained. *3 marks*

Q 20 . (i) Calculate the distance of an objective of height h from a concave mirror of radius a. curvature 20 cm, so as to obtain a real image of magnification 2. Find the location of image also.

(ii) Using mirror formula, explain why does a convex mirror always produce a virtual Image. *3 marks*

Q.21. (i) State Bohr's quantization condition for defining station orbits. How does be Broglie hypothesis explain the stationary orbits?

(ii) Find the relation between the three wavelengths λ_1, λ_2 and λ_3 from the energy level diagram shown:



Q.22. Draw a schematic ray diagram of reflecting telescope showing how rays coming from distant object are received at the eye-piece. Write its two important advantages over a refracting telescope. *3 marks*

SECTION – D

Q.23. Meeta's father was driving her to the school. At the traffic signal she noticed that each traffic light was made of many tiny lights instead of a single of bulb. When Meeta asked this question to her father's he explained the reason for this. Answer the following questions based on above information? *4 marks*

(i) What were the values displayed by Meeta and her father?

(ii) What answer did Meeta's father give?

(iii) What are the tiny lights in traffic signals called and how do these operate?

SECTION- E

Q.24. (i) An a.c. source of voltage $V = V_0 \sin \omega t$ is connected to a series combination of L, C and R. Use the phasor diagram to obtain expression for impedance of the circuit and phase angle between voltage and current. Find the condition when current will be phase with the voltage. What is the circuit in this condition called? *5 marks*

(ii) In a series LR circuit $X_L = R$ and power factor of the circuit is P_1. When capacitor with capacitance C such that $X_L = X_C$ is put in series, the power factor becomes P_2. Calculate P_1/P_2

OR

(i) Write the functions of a transformer. State its principle of working with the help of A diagram. Mention various energy losses in this device.

(ii) The primary coil of an ideal step up transformer has 100 turns and transformation ratio is also 100. The input voltage and power are respectively 220V and 1100W. Calculate.

(a) number of turns in secondary

(b) current in primary

(c) voltage across secondary

(d) current in secondary

(e) power in secondary

Q.25. (i) In young's double slit experiment deduce the condition for (a) constructive, and (b) constructive interference at a point on the screen. Draw a graph showing variation of intensity in the interference pattern against position 'x' on the screen. *5 marks*

(ii) Compare the interference pattern observed in young's double slit experiment with single slit diffraction pattern, pointing out three distinguishing features

OR

(i) Plot a graph to show variation of the angle of deviation as function of angle of incidence for light passing through a prism. Derive an expression for refractive index of the prism in terms of angle of minimum deviation and angle of prism.

(ii) What is dispersion of light? What is its cause?

(iii) A ray of light incident normally on one face of a right isosceles prism is totally reflected as shown in fig. What must be the minimum value of refractive index of glass? give relevant calculations.