Tamilnadu Board Class 12 Physics Sample Paper 2

HIGHER SECONDARY SECOND YEAR

PHYSICS

MODEL QUESTION PAPER-II

TIME : 2.30 HOURS   **MARKS : 70**

PART-I

I. CHOOSE THE CORRECT ANSWER.   15x1=15

1. If the electric potential is constant in the given region, the electric field will be

   a) a constant   b) Varying with respect to distance

   c) Zero   d) $\frac{1}{r}$ times of its potential

2. Terminal voltage across a secondary cell is equal to its emf, When

   a) at the time of charging   b) at the time of discharing

   c) no current is drawn from the cell   d) none of the above

3. An electric current is passing through East along a long conductor. The direction of magnetic field above the wire

   a) towards East   b) towards West

   c) towards South   d) towards North

4. An inductor with iron core and a bulb are connected to in series a circuit with D.C source. If an iron core is removed from an inductor, then the brightness of the bulb will.

   a) be a same   b) increase

   c) decrease   e) increase a moment then decreases

5. Electromagnetic waves are

   a) transverse   b) produced by accelerated charges

   c) Chargeless   d) all the above

6. Refractive index of a medium is $\sqrt{3}$ At what angle of incidence, the angle between reflected ray and refracted ray will be perpendicular to each other?

   a) $45^0 26'$ b) $60^0 21'$

   c) $32^0 18'$ d) $35^0 16'$

7. In Coolidge tube, the intensity of x-ray depends upon

   a) the filament current   b) potential difference applied

   c) velocity of the striking electrons   d) atomic weight of the target

8. An electron and a proton are projected in a uniform electric field with equal kinetic energies in a direction perpendicular to the field, then

   a) the electron trajectory will be less curved than the proton trajectory

   b) the proton trajectory will be less curved than the trajectory of electron.

   c) both the trajectories will be equally curved

   d) electron and proton will move upward and downward in a straight line path.

9. When a monochromatic light falls on a photosensitive material, the number of photoelectrons emitted per second is 'n' and their maximum kinetic energy is K_{max}. If the intensity of the incident light is doubled, then

   a) both K_{max} and n are doubed

   b) n is doubled but K_{max} remains constant

   c) both K_{max} and n are halved

   d) n remains constant but K_{max} doubled

10. A particle of mass M decays at rest into two particles of mass M and 2m having non - zero velocities. The ratio of de Broglie wavelength of the two particles is

    a) 1 : 2   b) 2 : 1   c) 0   d) 1

11. Rest mass of mesons varies from

    a) $207 \, m_e$ to $250 \, m_e$ b) $250 \, m_e$ to $1000 \, m_e$

    c) $1000 \, m_e$ to $1836 \, m_e$ d) $1836 \, m_e$ to $2180 \, m_e$

12. If the self inductance of an air core inductor increases from 0.1 mH to 20 mH on the introduction of metal core into it. The relative permeability of the core used is

   a) 200   b) 20   c) 2   d) 1

13. The width of depletion region in a PN junction diode

   a) decreases when reverse bias applied

   b) increases when reverse bias applied

   c) increases when forward bias applied

   d) remains the same. irrespective of the bias voltage

14. In a common emitter amplifier, the output resistance is 4000 Ω and the input resistance is 1 k Ω. If the peak value of the signal voltage is 10mV and β =50, then the peak value of the output voltage is

   a) 500 x 10^{-3}V   b) 1.25V   c) 200V   d) 2V

15. A sinusoidal carrier voltage of 100V is amplitude modulated by a sinusoidal voltage of frequency 5KH$_Z$ resulting in maximum modulated carrier amplitude of 180V. The modulation factor is

   a) 1.8   b) 1   c) 0.8   d) 1.6

PART - II

Answer any six questions in which Q.No 19 is compulsory $6 \times 2 = 12$

16) What is rectification?

17) Three point charges 4q,Q and 2q are placed in a straight line of length 10 cm at points $^{a)}$ distance 0.5 cm, 10 cm respectively. If the net force on charge 2q is zero, then calculate the value of Q

18) The V - I graph for a given metallic wire at different temperatures T_1 and T_2 are shown. Which of the temperature T_1 and T_2 is greater? Give explanation.
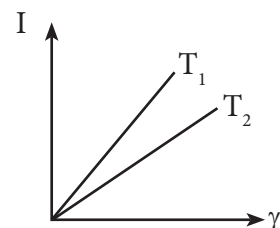
19) To increase the current sensitivity of a moving coil galvanometer by 50% its resistance is increased so that the new resistance becomes twice its initial resistance. Derive By what factor does the voltage sensitivity change.

20) A piece of metal and non metallic stone are dropped simultaneously from the same height (near the surface of the earth) Which one will reach ground earlier? Give reason.

21) What are the condition for total internal reflection?

22) State the principle of Millikan's oil drop experiment.

23) Write a note on variation of mass with velocity.

24) Two radio active materials x_1 and x_2 have decay constants 10λ and λ respectively. If initially they have the same number of nuclei then after what time the ratio of the number of nuclei of x_1 to that of x_2 will be $1/e$?

PART - III

III. Answer any six questions. Q.No : 30 is compulsory   **6 x 3 = 18**

25) Derive an expression for potential due to a point charge.

26) The range of a voltmeter of resistance 300 Ω is 5V Calculate the resistance to be connected to convert it into an ammeter of range 5A?

27) Write a note on Nicol prism.

28) Explain the power losses in transformer.

29) State and explain Bragg's law.

30) A proton is moving at a speed of 0.900 times the velocity of light. Find its kinetic energy in Joules and MeV.

31) What are the properties of neutron?

32) State and prove de Morgan's theorem.

33) Explain Frequency Modulated Transmitter by using block diagram.

PART - IV

Note : Answer all the questions   **5 x 5 = 25**

34) Derive an expression for electric field due to an electric dipole along its equatorial line.

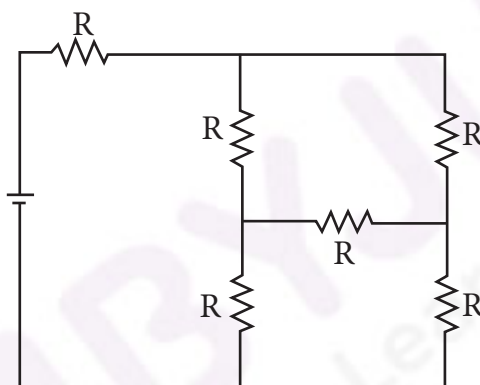(or)

Describe the working of a transistor amplifier.

35) Describe the principle, construction and working of cyclotron.

(or)

What are cosmic rays? Explain how the intensity of the cosmic rays changes with latitude and altitude.

36) (a) Derive an expression for resultant of resistances when connected in series.

(b) Calculate the resultant resistance of the given circuit

(or)

(a) Derive an expression for bandwidth of Interference fringes in Young's double slit experiment.

37) Obtain an expression for the radius of the nth electronic orbit of an atom based on Bohr's theory.

(or)

What is the principle of radar? Describe the transmission and reception of radar by using block diagram.

38) Discuss with theory the method of inducing emf in a coil by changing its orientation with respect to the direction of the magnetic field.

(or)

Explain the action of operational amplifier as (i) inverting amplifier and as (ii) difference amplifier.