6 –PHYSICS PUBLIC MODEL QUESTION PAPER

Xll- PHYSICS

PUBLIC MODEL QUESTION PAPER

FULL PORTION – NOV- 2024

ENGLISH MEDIUM

[Totally 6 model question paper including]

SIR CV RAMAN COACHING CENTRE –IDAPPADI- SALEM .

PREPARED BY

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PHYSICS

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Set -1

SIR CV RAMAN COACHING CENTRE
XII – PHYSICS – PUBLIC MODEL EXAM [FULL PORTION]-2024
TOTAL MARK : 70 M TIME : 3 HRS
SECTION – A (15 X 1= 15 M)
CHOOSE THE CORRECT BEST ANSWER

1.Two identical conducting balls having positive charges q_1 and q_2 are separated by a centre to centre distance r. If the are made to touch each other and then separated to the same distance, the force between them will the

a) Less than before b) same as before c) more than before d) zero

2. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of

a) each of them increases b) each of them decreases c) copper increases and germanium decreases d) copper decreases and germanium increases

3. The potential energy of magnetic dipole whose dipole moment is $\vec{p}_m = (-0.5\hat{i} + 0.4\hat{j})\ \text{Am}^2$ kept in uniform magnetic field $\vec{B} = 0.2\,\hat{i}\,\text{T}$

a) – 0.1 J b) 0.1 J c) 0.8 J d) -0.8 J

4. A circular coil with a cross-sectional area of 4 cm^2 has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of 10 cm^2. The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?

(a) 7.54 μH (b) 8.54 μH
(c) 9.54 μH (d) 10.54 μH

5. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium

a) 2.37 b) 2.25 c) 3. 25 d) 7.50

6.Refractive indices for blue colour wavelength in crown glass values are

a) 1.523 b) 1.622 c) 1.533 d) 1.639

7. When light is incident on a soap film of thickness 5×10^{-5} cm, the wavelength of light reflected maximum in the visible region is 5320 Å. Refractive index of the film will be,

a) 1.22 b) 1.33 c) 1.51 d) 1.83

8. M_p denotes the mass of the proton and M_n denotes mass of a neutron. A given nucleus of binding energy B, contains Z protons and N neutrons. The mass M(N,Z) of the nucleus is given by(where c is the speed of light)

(a) $M(N,Z) = NM_n + ZM_p - Bc^2$

(b) $M(N,Z) = NM_n + ZM_p + Bc^2$

(c) $M(N,Z) = NM_n + ZM_p - B/c^2$

(d) $M(N,Z) = NM_n + ZM_p + B/c^2$

9. The barrier potential of a *p-n* junction depends on i) type of semiconductor material ii) amount of doping iii) temperature. Which one of the following is correct?

a) (i) and (ii) only b) (ii) only c) (ii) and (iii) only d) (i) (ii) and (iii)

10. The materials used in Robotics are

a) Aluminium and silver b) Silver and gold c) Copper and gold d) Steel and aluminium

11.Calculate the radius of $_{97}Au^{197}$ nucleus.

a) 3.54 fm b) 2.42 fm c) 6.97 fm d) 8.68 fm

12. Aluminum in Temperature Coefficient of resistivity Values are

a) 3.7×10^{-3} b) 3.9×10^{-3} c) 3.7×10^{-6} d) 3.9×10^{6}

13. Electromagnetic waves travel with speed which is equal to the speed of light in vacuum

$$c = \frac{1}{\sqrt{\epsilon_0 \mu_0}}$$

or free space in values

a) 3×10^{8} m/s b) 3×10^{-8} m/s c) 3×10^{18} m/s d) -3×10^{18} m/s

14. A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm away from the mirror. The length of the image is

a) 2.5 cm b) 5 cm c) 10cm d) 15 cm

15 if a light of wavelength 330 nm is incident on a metal with work function 3.55 eV, the electrons are emitted. Then the wavelength of the wave associated with the emitted electron is (Take h = 6.6 × 10–34 Js)

a) < 2. 75.x 10^{-9} m b) ≥ 2. 75 x 10^{-9} m c) ≤ 2 .75x 10^{-12} m d) < 2.5x 10^{-10} m

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16.Define 'electrostatic potential"
17. What is Peltier effect?
18. What is magnetic susceptibility?
19. State Lenz's law
20. What are electromagnetic waves?
21. State Malus' law
22. Define stopping potential
23. What are logic gates?
24. Compute the binding energy per nucleon of $_2He^4$ nucleus.

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25. Derive an expression for the torque experienced by a dipole due to a uniform electric field.

26. State and explain Kirchhoff 's rules

27. Compare the properties of soft and hard ferromagnetic materials

28. Obtain an expression for motional emf from Lorentz force

29. A magnetron in a microwave oven emits electromagnetic waves (em waves) with frequency f = 2450 MHz. What magnetic field strength is required for electrons to move in circular paths with this frequency?

30. What is optical path? Obtain the equation for optical path.

31. Obtain the equation for resolving power of microscope.

32. Discuss the beta decay process with Examples

33. Verify the given Boolean equation $A + AB = A + B$ using truth table

SECTION – D (5 X 5 = 25 M)

Answer all questions

34 a) Derive an expression for electrostatic potential due to an electric dipole.

(or)

b)Describe the Fizeau's method to determine the speed of light.

35 a) Describe the microscopic model of current and obtain microscopic form of Ohm's law.

(0r)

b)Explain the Young's double slit experimental setup and obtain the equation for path difference

36 a) Discuss the working of cyclotron in detail.

(or)_

b)Obtain Einstein's photoelectric equation with necessary explanation

37 a) Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$)

(or)

b)Discuss the Millikan's oil drop experiment to determine the charge of an electron

38 a) Explain the types of absorption Spectrum

(or)

b) Give circuit symbol, logical operation, truth table, and Boolean expression of i) AND gate ii) OR gate iii) NOT gate iv) NAND gate v) NOR gate and vi) EX-OR gate.

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Set- 2

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TOTAL MARK : 70 M TIME : 3 HRS
SECTION – A (15 X 1= 15 M)
CHOOSE THE CORRECT BEST ANSWER

1. Two points A and B are maintained at a potential of 7 V and -4 V respectively.

The work done in moving 50 electrons from A to from B is

(a) 8.80×10^{-17} J
(b) -8.80×10^{-17} J
(c) 4.40×10^{-17} J
(d) 5.80×10^{-17} J

2. The energy equivalent of one kilowatt-hour (kWh) is 1kWh
a) 3.6×10^{6} J b) 4.6×10^{6} J c) 5.6×10^{6} J d) 3.6×10^{-6} J

3. A toaster operating at 240 V has a resistance of 120 Ω. Its power is
a) 400 W b) 2 W c) 480 W d) 240 W

4. A bar magnet of length *l* and magnetic moment p_m is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be

(a) p_m (b) $\frac{3}{\pi}p_m$
(c) $\frac{2}{\pi}p_m$ (d) $\frac{1}{2}p_m$

5. $\frac{20}{\pi^2}$H inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is

(a) 50 μF (b) 0.5 μF
(c) 500 μF (d) 5 μF

6. Calculate the number of electrons in one coulomb of negative charg

a) 6.25×10^{18} electrons b) 6.25×10^{18} proton

c) 6.25×10^{18} neutron d) -6.25×10^{18} electrons

7. In an electromagnetic wave travelling in free space the rms value of the electric field is 3 V/ m. The peak value of the magnetic field is

(a) 1.414×10^{-8} T (b) 1.0×10^{-8} T
(c) 2.828×10^{-8} T (d) 2.0×10^{-8} T

8. In an electron microscope, the electrons are accelerated by a voltage of

224kV. If the voltage is changed to 14 kV, then the de Broglie wavelength associated with the electrons would

a) increase by 2 times b) decrease by 2 times c) decrease by 4 times d) increase by 4 times

9. The radius of the orbit in Bohr atom model is

a) $r_n = a_0 \frac{n^2}{Z}$ b) $a_0 = \frac{\varepsilon_0 h^2}{\pi m e^2}$ c) $v_n = \frac{h}{2\pi m a_0}\frac{Z}{n}$ d) All

10. The mass of a $^{7}_{3}Li$ nucleus is 0.042 u less than the sum of the masses of all its nucleons. The average binding energy per nucleon of $^{7}_{3}Li$ nucleus is nearly

(a) 46 MeV (b) 5.6 MeV (c) 3.9MeV (d)23 MeV

11. If the input to the NOT gate is A = 1011, its output is

a) 0100 b) 1000 c) 1100 d) 0011

12. Its value for half wave rectifier is

a) 51 % b) 41% c) 90% d) 82%

13. Photons of wavelength λ are incident on a metal. The most energetic electrons ejected from the metal are bent into a circular arc of radius *R* by a perpendicular magnetic field having magnitude *B*. The work function of the metal is

a) $\frac{hc}{\lambda} - m_e + \frac{e^2B^2R^2}{2m_e}$

b) $\frac{hc}{\lambda} + 2m_e\left[\frac{eBR}{2m_e}\right]^2$

c) $\frac{hc}{\lambda} - m_e c^2 - \frac{e^2B^2R^2}{2m_e}$

d) $\frac{hc}{\lambda} - 2m_e\left[\frac{eBR}{2m_e}\right]^2$

14. Law of refraction also called as Snell's law in ratio form is,

a) $\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$. b) $n_{21} = \frac{n_2}{n_1}$ c) $n = \frac{c}{v}$ d) $R = d\left(\frac{1}{\sqrt{n^2-1}}\right)$

15. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w then the refractive index of water is,

(a) $\frac{V_w}{V_a}$ (b) $\frac{V_a}{V_w}$

(c) $\frac{\lambda_w}{\lambda_a}$ (d) $\frac{V_a\lambda_a}{V_w\lambda_w}$

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16. What is action of points ?
17. Distinguish between drift velocity and mobility.
18. State Fleming's left hand rule.
19. Applications eddy currents any Two points
20. Why does sky appear blue?
21. State Brewster's law.
22. What is Bremsstralung?
23. What are black holes?
24. Using the relation $\vec{B} = \mu_o(\vec{H} + \vec{M})$, show that $\chi_m = \mu_r - 1$.

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25. Give the properties of dia / para / ferromagnetic materials.
26. Obtain Gauss law from Coulomb's law
27. State and explain Kirchhoff 's rules.
28. Discuss the Hertz experiment.
29. State Snell's law/law of refraction.
30. How many photons per second emanate from a 50 *mW* laser of 640 *nm*?
31. What is meant by biasing? Mention its types
32. Give the results of Rutherford alpha scattering experiment.
33. Two resistors when connected in series and parallel, their equivalent resistances

are 15 Ω and 56/15 Ω respectively. Find the values of the resistances.

SECTION – D (5 X 5 = 25 M)

Answer all questions

34 a) Derive an expression for the torque experienced by a dipole due to a uniform electric field.

(or)

Obtain the condition for bridge balance in Wheatstone's bridge.

35 Discuss the working of cyclotron in detail.

(or)

Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$)

36 Write down Maxwell equations in integral form

(or)

Obtain lens maker's formula and mention its significance.

37. Obtain the equation for resultant intensity due to interference of light.

(or)

Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.

38 Explain the J.J. Thomson experiment to determine the specific charge of electron

(or)

State and prove De Morgan's first and second theorem

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Set – 3 :

SIR CV RAMAN COACHING CENTRE

Xll – PHYSICS – PUBLIC MODEL EXAM [FULL PORTION]-2024

TOTAL MARK : 70 M TIME : 3 HRS

SECTION – A (15 X 1= 15 M)

CHOOSE THE CORRECT BEST ANSWER

1. SI unit of electrical power is
   a) Volt b) Energy c) Watt d) volt /m
2. Joule's law of heating is
   a) $H = I^2Rt.$ b) $P = I^2R = \frac{V^2}{R}$ c) $\vec{J} = \sigma\vec{E}$ d) none of the above
3. The SI unit of magnetic moment is
   a) Am b) A/m c) A/m^2 d) All
4. Direction of magnetic moment is form
   a) S to N b) N to S c) E to W d) W to E
5. Magnetic field …….. quantity
   a) Vector b) scalar c) tensor d) none of the above
6. Inductor is a device used to stores energy …….. field
   a) Magnetic b) Electric c) electromagnetic d) All
7. There are two ways of spreading light: to be the candle or the mirror that reflects it.
   a) Eith Wharton b) James Albert c) albert Einstein d) Charles dwarin
8. In fact, it was applied in telephone switching circuits by Shannon in
   a) 1938 b) 1958 c) 1978 d) 1999
9. The particle which gives mass to protons and neutrons are
   a) Higgs particle b) Einstein particle c) Nanoparticle d) Bulk particle
10. The barrier potential of a *p-n* junction depends on i) type of semiconductor material ii) amount of doping iii) temperature. Which one of the following is correct?

a) (i) and (ii) only b) (ii) only c) (ii) and (iii) only d) (i) (ii) and (iii)

11. The transverse nature of light is shown in, (a) interference (b) diffraction (c)

scattering (d) polarisation

12. Stars twinkle due to, (a) reflection (b) total internal reflection (c) refraction (d) polarisation

13. Which charge configuration produces a uniform electric field? (a) point charge

(b) uniformly charged infinite line (c) uniformly charged infinite plane (d) uniformly charged spherical shell

14. A toaster operating at 240 V has a resistance of 120 Ω. Its power is

a) 400 W b) 2 W c) 480 W d) 240 W

15. In the year ……., Robert Van de Graff designed a machine which produces a large amount of electrostatic potential difference

a) 1987 b) 1768 c) 1930 d) 1929

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16. Define 'electric field'.

17. State Kirchhoff 's current rule.

18. State Ampere's circuital law

19. State Lenz's law.

20. Define one cuire

21. What are logic gates?

22. Differentiate between Fresnel and Fraunhofer diffraction.

23. What are electromagnetic waves?

24. Calculate the cut-off wavelength and cutoff frequency of x-rays from an x – ray tube of accelerating potential 20,000 V.

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25. List the uses of polaroids

26. List out the laws of photoelectric effect.

27. Write the properties of cathode rays

28. What is meant by biasing? Mention its Types

29. What is displacement current?

30. What are the differences between Coulomb force and gravitational force

31. What is seebeck effect

32. Define stopping potential

33. The ratio of maximum and minimum intensities in an interference pattern is 36 : 1. What is the ratio of the amplitudes of the two interfering waves?

SECTION – D (5 X 5 = 25 M)

Answer all questions

34 a) Explain about compound microscope and obtain the equation for the magnification

(or)

Describe the Fizeau's method to determine the speed of light

35 a) Describe the working of nuclear reactor with a block diagram

(or)

Obtain the expression for electric field due to an infinitely long charged wire.

36 a) Calculate the magnetic field at a point on the axial line of a bar magnet.

(or)

Mention the various energy losses in a transformer.

37 a) Explain the types of emission spectrum.

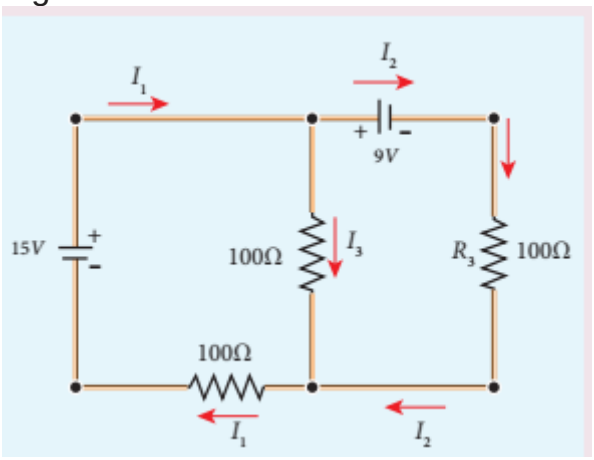
(or)

State and prove De Morgan's first and second theorem.

38 a) Obtain Einstein's photoelectric equation with necessary explanation

(or)

Calculate the currents in the following circuit.



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Set – 4

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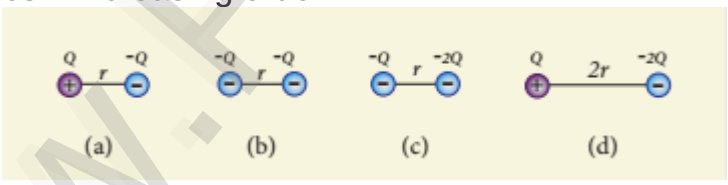
Xll – PHYSICS – PUBLIC MODEL EXAM [FULL PORTION]-2024
TOTAL MARK : 70 M TIME : 3 HRS
SECTION – A (15 X 1= 15 M)

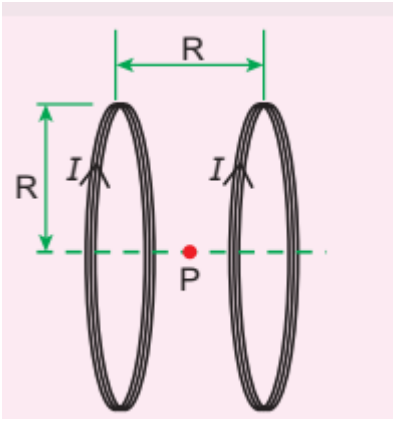
CHOOSE THE CORRECT BEST ANSWER

1. Rank the electrostatic potentialenergies for the given system of chargesin increasing order.



(a) $1 = 4 < 2 < 3$ (b) $2 = 4 < 3 < 1$
(c) $2 = 3 < 1 < 4$ (d) $3 < 1 < 2 < 4$

2. identical coils, each with *N* turns and radius *R* are placed coaxially at a distance *R* as shown in the figure. If *I* is the current passing through the loops in the same direction, then the magnetic field at a point P at a distance of *R*/2 from the centre of each coil is



(a) $\frac{8N\mu_{\circ}I}{\sqrt{5}R}$ (b) $\frac{8N\mu_{\circ}I}{5^{3/2}R}$

(c) $\frac{8N\mu_{\circ}I}{5R}$ (d) $\frac{4N\mu_{\circ}I}{\sqrt{5}R}$

3. The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

a) 800 °C b) 700 °C

c) 850 °C d) 820 °C

4. An e.m. wave is propagating in a medium with a velocity $\vec{v} = v\hat{i}$. The instantaneous oscillating electric field of this e.m. wave is along +*y*-axis, then the direction of oscillating magnetic field of the e.m. wave will be along

(a) –*y* direction (b) –*x* direction (c) +*z* direction (d) –*z* direction

5. In an unbiased *p*-*n* junction, the majority charge carriers (that is, holes) in the *p*-region diffuse into *n*-region because of

a) the potential difference across the *p*-*n* junction

b) the higher hole concentration in *p*-region than that in n-region

c) the attraction of free electrons of *n*-region

d) All of the above

6. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 kV, then the de Broglie wavelength associated with the electrons would

a) increase by 2 times b) decrease by 2 times

c) decrease by 4 times d) increase by 4 times

7. A radioactive nucleus (initial mass number A and atomic number Z) emits two α-particles and 2 positrons. The ratio of number of neutrons to that of

proton in the final nucleus will be

(a) $\frac{A-Z-4}{Z-2}$ (b) $\frac{A-Z-2}{Z-6}$

(c) $\frac{A-Z-4}{Z-6}$ (d) $\frac{A-Z-12}{Z-4}$

8. The electric and magnetic fields of an electromagnetic wave are

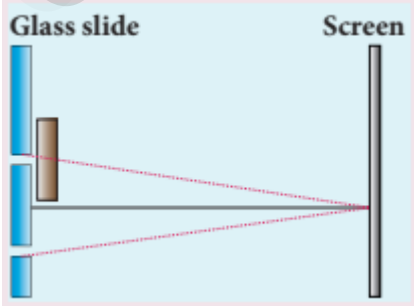
(a) in phase and perpendicular to each other
(b) out of phase and not perpendicular to each other
(c) in phase and not perpendicular to each other
(d) out of phase and perpendicular to each other

9. In an electrical circuit, *R, L, C* and AC voltage source are all connected in series. When *L* is removed from the circuit, the phase difference between the voltage and current in the circuit is $\pi/3$. Instead, if C is removed from the circuit, the phase difference is again $\pi/3$. The power factor of the circuit is

(a) $1/2$ (b) $1/\sqrt{2}$

(c) 1 (d) $\sqrt{3}/2$

10. One of the of Young's double slits is covered with a glass plate as shown in figure. The position of central maximum will,



a) get shifted downwards (b) get shifted upwards
(c) will remain the same (d) data insufficient to conclude

11. A ray of light travelling in a transparent medium of refractive index n falls, on a surface separating the medium from air at an angle of incidents of 45°. The ray can undergo total internal reflection for the following *n*

(a) $n = 1.25$	(b) $n = 1.33$
(c) $n = 1.4$	(d) $n = 1.5$

12 . In a large building, there are 15 bulb of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1k W are connected. The voltage of electric mains is 220 V. The maximum capacity of the main fuse of the building will be

(a) 14 A	(b) 8 A
(c) 10 A	(d) 12 A

13.The unnatural magnetic material is
a) Fe b) Co c) Bi d) Ni

14. The refractive indices for wavelength in violet colour nano meter range ?
a) 486.1 b) 1.663 c) 396.9 d) 1.515

15.The hard rubber in resistivity range for ?

a) $10^{10} - 10^{14}$ b) 1.6×10^{-8} c) 2.5×10^{5} d) $10^{13} - 10^{16}$

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16. Write a short note on ‘electrostatic shielding

17. What do you mean by doping?

18. What are phasors?

19. What is Thomson effect?

20. Calculate the power of the lens of the spectacles needed to rectify the defect of nearsightedness for a person who could see clearly up to a distance of 1.8 m

21. Why do stars twinkle?

22What is meant by excitation energy

23Give two uses each of (i) IR radiation, and (ii) UV radiation.

24. Calculate the magnetic field at the centre of a square loop which carries a current of 1.5 A, length of each side being 50 cm.

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25 Obtain the equation for resolving power of microscope

26. How will you induce an emf by changing the area enclosed by the coil?

27. Derive the equation for effective focal length for lenses in contact.

28. Derive an expression for de Broglie wavelength of electrons.

29. The angle of minimum deviation for an equilateral prism is 37_0. Find the refractive index of the material of the prism

30. Discuss the Hertz experiment

31 Write a note on photodiode

32 Explain in detail Coulomb's law and its various aspects

33 Calculate the amount of energy released when 1kg of $^{235}_{92}U$ under goes fission reaction .

SECTION – D (5 X 5 = 25 M)

Answer all questions

34 Derive an expression for electrostatic potential due to an electric dipole.

(or)

Discuss the working of cyclotron in detail.

35 Derive the energy expression for an electron is the hydrogen atom using Bohr atom model.

(or)

Explain the Young's double slit experimental setup and obtain the equation for path difference.

36 Explain the construction and working of transformer

(or)

State and explain Kirchhoff 's rules.

37 Obtain the equation for radius of illumination (or) Snell's window.

(or)

Obtain Einstein's photoelectric equation with necessary explanation

38 Discuss the Millikan's oil drop experiment to determine the charge of an electron.

(Or)

State and prove De Morgan's first and second theorem.

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Set – 5

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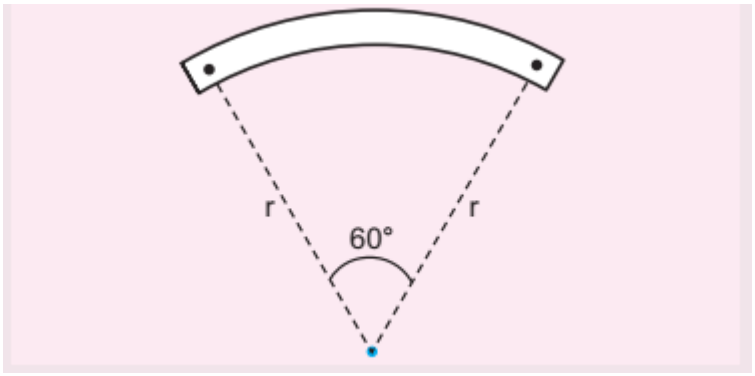
TOTAL MARK : 70 M TIME : 3 HRS
SECTION – A (15 X 1= 15 M)
CHOOSE THE CORRECT BEST ANSWER

1.An electric dipole is placed at an alignment angle of 30_o with an electric field of $2 \times 10_5$ N C_{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is
(a) 4 mC (b) 8 mC (c) 5 mC (d) 7 mC

2. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1k W are connected. The voltage of electric mains is 220 V. The maximum capacity of the main fuse of the building will be.

(a) 14 A	(b) 8 A
(c) 10 A	(d) 12 A

3. A bar magnet of length *l* and magnetic moment p_m is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be



(a) p_m (b) $\frac{3}{\pi}p_m$

(c) $\frac{2}{\pi}p_m$ (d) $\frac{1}{2}p_m$

4. The instantaneous values of alternating current and voltage in a circuit are

$$i = \frac{1}{\sqrt{2}}\sin(100\pi t) \text{ A and}$$

$$v = \frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right) \text{ V.}$$

The average power in watts consumed in the circuits

(a) $\frac{1}{4}$ (b) $\frac{\sqrt{3}}{4}$

(c) $\frac{1}{2}$ (d) $\frac{1}{8}$

5. If the amplitude of the magnetic field is 3×10^{-6} T, then amplitude of the electric field for a electromagnetic waves is

(a) 100 V m^{-1} (b) 300 V m^{-1}

(c) 600 V m^{-1} (d) 900 V m^{-1}

6 For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is

(a) 30° (b) 45°

(c) 60° (d) 90°

7 .First diffraction minimum due to asingle slit of width 1.0×10^{-5} cm is at30°. Then wavelength of light used is

(a) 400 Å (b) 500 Å
(c) 600 Å (d) 700 Å

8. When a metallic surface is illuminatedwith radiation of wavelength λ, the stopping potential is *V*. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is *V/4* The threshold wavelength for the metallic surface is

a) 4λ b) 5λ
c) $\frac{5}{2}\lambda$ d) 3λ

9. The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies a

(a) $A^{2/3}$ (b) $A^{4/3}$
(c) $A^{1/3}$ (d) $A^{5/3}$

10. The barrier potential of a *p-n* junction depends on i) type of semiconductor material ii) amount of doping iii) temperature. Which one of the following is correct?
a) (i) and (ii) only b) (ii) only c) (ii) and (iii) only d) (i) (ii) and (iii)

11.The wavelength λ_e of an electron and λ_p of a photon of same energy *E* are related by

a) $\lambda_p \propto \lambda_e$ b) $\lambda_p \propto \sqrt{\lambda_e}$
c) $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$ d) $\lambda_p \propto \lambda_e^2$

12. The magnetic susceptibility in diamond values is
a) 2.3×10^{-5} b) -3.2×10^{-5} c) -2.2×10^{-5} d) All

12. $\frac{20}{\pi^2}$H inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is

(a) 50 μF (b) 0.5 μF
(c) 500 μF (d) 5 μF

13. The critical angle of flint glass is
a) 1.890 b) 2.890 c) – 1.890 d) – 2.890
14. Which year of Rutherford atom model

a) 1911 b) 1928 c) 1888 d) 1924

15. A single teaspoon of nuclear matter would weigh about ……..

a) Trillion tons b) millions tons c) both d) none of the above

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16. Define energy density of capacitor

17 .Define temperature coefficient of resistance

18 State tangent law

19. Advantages and disadvantages of AC over DC

20. What are electromagnetic waves?

21. Why do clouds appear white?

22. Two light sources with amplitudes 5 units and 3 units respectively interfere with each other. Calculate the ratio of maximum and minimum intensities

23 What is presbyopia?

24. Calculate the maximum kinetic energy and maximum velocity of the photoelectrons emitted when the stopping potential is 81*V* for the photoelectric emission experiment

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25 What is corona discharge?

26 Explain the equivalent resistance of a series

27 Difference between electric field and magnetic field

28 How is a galvanometer converted into (i) an ammeter and (ii) a voltmeter?

29 Applications X rays

30 write short note on positive Thomson effect suitable examples

31 What is Rayleigh's scattering

32 Discuss about pile of plates

33 Calculate the momentum and the de Broglie wavelength in the following cases: i) an electron with kinetic energy 2 eV. ii) a bullet of 50 g fired from rifle with a speed of 200 m/s iii) a 4000 kg car moving along the highways at 50 m/s

SECTION – D (5 X 5 = 25 M)

Answer all questions

34 Explain in detail Coulomb's law and its various aspects

(or)

Explain the determination of unknown resistance using meter bridge.

35 Discuss the working of cyclotron in detail.

(or)

Obtain an expression for average power of AC over a cycle. Discuss its special cases.

36 Write down Maxwell equations in integral form

(or)

Obtain lens maker's formula and mention its significance

37 Obtain the equation for resolving power of microscope

(or)

Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons

38 Derive the energy expression for an eletron is the hydrogen atom using Bohr atom model

(or)

Draw the circuit diagram of a half wave rectifier and explain its working.

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PHYSICS

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Set – 6

SIR CV RAMAN COACHING CENTRE

Xll – PHYSICS – PUBLIC MODEL EXAM [FULL PORTION]-2024

TOTAL MARK : 70 M TIME : 3 HRS

SECTION – A (15 X 1= 15 M)

CHOOSE THE CORRECT BEST ANSWER

1. Two identical conducting balls having positive charges q_1 and q_2 are separated by a centre to centre distance r. If they are made to touch each other and then separated to the same distance, the force between them will be

a) Less than before b) same as before c) more than before d) zero

2.The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

a) 800 °C b) 700 °C

c) 850 °C d) 820 °C

3.A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly

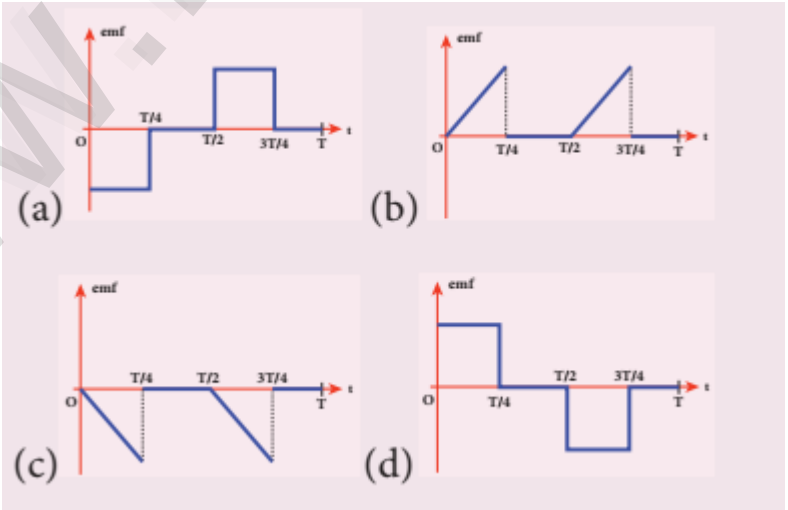
(a) 1.0 A m² (b) 1.2 A m²

(c) 0.5 A m² (d) 0.8 A m²

.

4. 

The current *i* flowing in a coil varies i flowing with time as shown figure .the variation of induced emf of with time would be



5.Fraunhofer lines are an example of _____ spectrum.
(a) line emission (b) line absorption (c) band emission (d) band absorption

6. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w, then the refractive index of water is

(a) $\frac{V_w}{V_a}$ (b) $\frac{V_a}{V_w}$
(c) $\frac{\lambda_w}{\lambda_a}$ (d) $\frac{V_a\lambda_a}{V_w\lambda_w}$

7 First diffraction minimum due to a single slit of width 1.0×10^{-5} cm is at 30^{o}. Then wavelength of light used is

(a) 400 Å (b) 500 Å
(c) 600 Å (d) 700 Å

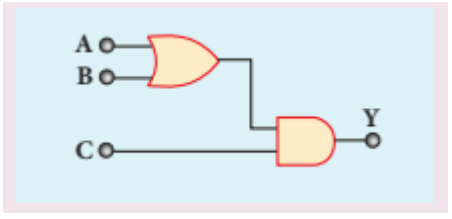
8. The work functions for metals *A*, *B* and *C* are 1.92 eV, 2.0 eV and 5.0 eV respectively. The metal/metals which will emit photoelectrons for a radiation of wavelength 4100Å is/are

a) *A* only b) both *A* and *B* c) all these metals d) none

9. M_p denotes the mass of the proton and M_n denotes mass of a neutron. A given nucleus of binding energy B, contains Z protons and N neutrons. The mass M(N,Z) of the nucleus is given by(where c is the speed of light)

(a) $M(N,Z) = NM_n + ZM_p - Bc^2$
(b) $M(N,Z) = NM_n + ZM_p + Bc^2$
(c) $M(N,Z) = NM_n + ZM_p - B/c^2$
(d) $M(N,Z) = NM_n + ZM_p + B/c^2$

10. The output of the following circuit is 1 when the input ABC is



a) 101 b) 100 c) 110 d) 010

11. The materials used in Robotics are

a) Aluminium and silver b) Silver and gold c) Copper and gold d) Steel and aluminum

12. The Gold in magnetic susceptibility is

a) -0.98×10^{-5} b) -2.2×10^{-5} c) 7.06×10^{-5} d) -3.6×10^{-5}

13. The magnetic flux measured in ……..

a)Weber b) volt c) A/m d) V/M

14. In Young's double slit experiment, the equation for bandwidth is

a) $\beta=\frac{\lambda D}{d}$ b) $y_n=\frac{(2n-1)}{2}\frac{\lambda D}{d}$ c) $y_n=n\frac{\lambda D}{d}$ d) All

15. The centre of tap transformer point in voltage

a) 120 v b) - 120 V c) both a and b d) only 120 V

SECTION – B (6 X 2= 12 M)

Answer any six questions compulsory Q.no .24

16What is an equipotential surface?

17 Why current is a scalar?

18state Curie-Weiss law

19 Give any one definition of power factor.

20what is critical angle

21 Why is oil immersed objective preferred in a microscope

22 State de Broglie hypothesis

23 Compute the binding energy per nucleon of helium nucleus

24 In a transistor connected in the common base configuration $\alpha=0.95$, $I_E=1\,mA$.. Calculate the values of I_C and I_B .

SECTION – C (6 X 3 = 18 M)

Answer any six questions compulsory Q.no .33

25 Give the relation between electric field and electric potential

26 what are superconductor

27 Give the properties of dia / para / ferromagnetic materials.

28 Give the principle of AC generator

29 Discuss the Hertz experiment.

30 If the focal length is 150 cm for a lens, what is the power of the lens?

31 What is bandwidth of interference pattern?

32 Write down the draw backs of Bohr atom model

33. Write down the equation for a sinusoidal voltage of 50 Hz and its peak value is 20 V. Draw the corresponding voltage versus time graph

Section – D (5 x 5 = 25 m)

Answer all questions

34 Derive an expression for electrostatic potential due to a point charge

(or)

Obtain the condition for bridge balance in Wheatstone's bridge

35 Explain the principle and working of a moving coil galvanometer.

(or)

Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

36 Write down Maxwell equations in integral form.

(or)

Describe the Fizeau's method to determine the speed of light

37 Obtain the equation for resolving power of optical instruments

(or)

Briefly explain the principle and working of electron microscope

38 Explain the J.J. Thomson experiment to determine the specific charge of electron

(or)

Explain the ampitude modulation with necessary diagrams.

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