

**FINAL NEET(UG)-2024 (EXAMINATION)**

**(Held On Sunday 5<sup>th</sup> MAY, 2024)**

**PHYSICS**

**TEST PAPER WITH ANSWER**

**Physics : Section-A (Q. No. 1 to 35)**

1. A bob is whirled in a horizontal plane by means of a string with an initial speed of  $\omega$  rpm. The tension in the string is  $T$ . If speed becomes  $2\omega$  while keeping the same radius, the tension in the string becomes :

- (1)  $T$  (2)  $4T$   
 (3)  $\frac{T}{4}$  (4)  $\sqrt{2}T$

Ans. (2)

2. A particle moving with uniform speed in a circular path maintains :

- (1) constant velocity  
 (2) constant acceleration.  
 (3) constant velocity but varying acceleration  
 (4) varying velocity and varying acceleration

Ans. (4)

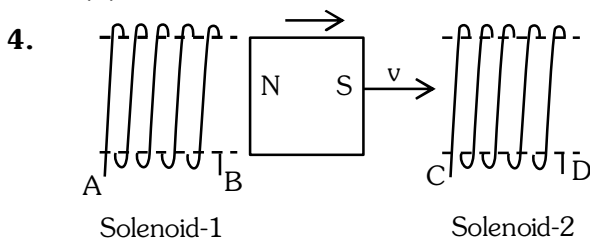
3. A logic circuit provides the output  $Y$  as per the following truth table :

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output  $Y$  is

- (1)  $A \cdot B + \bar{A}$  (2)  $A \cdot \bar{B} + \bar{A}$   
 (3)  $\bar{B}$  (4)  $B$

Ans. (3)



In the above diagrams, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions :

- (1) AB and DC (2) BA and CD  
 (3) AB and CD (4) BA and DC

Ans. (1)

5. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason**.

**Assertion (A)** :- The potential ( $V$ ) at any axial point, at  $2$  m distance ( $r$ ) from the centre of the dipole of dipole moment vector  $\vec{P}$  of magnitude,  $4 \times 10^{-6}$  C m, is  $\pm 9 \times 10^3$  V.

(Take  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$  SI Units)

**Reason (R)** :-  $V = \pm \frac{2P}{4\pi\epsilon_0 r^2}$ , where  $r$  is the

distance of any axial point, situated at  $2$  m from the centre of the dipole.

In the light of the above statements, choose the correct answer from the options given below :

- (1) Both A and R are true and R is the correct explanation of A.  
 (2) Both A and R are true and R is NOT the correct explanation of A.  
 (3) A is true but R is false.  
 (4) A is false but R is true.

Ans. (3)

6. Match **List-I** with **List-II**

**List-I**  
**(Material)**

- A. Diamagnetic  
 B. Ferromagnetic  
 C. Paramagnetic  
 D. Non-Magnetic

**List-II**  
**(Susceptibility ( $\chi$ ))**

- I.  $\chi = 0$   
 II.  $0 > \chi \geq -1$   
 III.  $\chi \gg 1$   
 IV.  $0 < \chi < \epsilon$  (a small positive number)

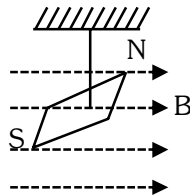
Choose the correct answer from the options given below:

- (1) A-II, B-III, C-IV, D-I  
 (2) A-II, B-I, C-III, D-IV  
 (3) A-III, B-II, C-I, D-IV  
 (4) A-IV, B-III, C-II, D-I

Ans. (1)



7. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is  $9.8 \times 10^{-6} \text{ kg m}^2$ . If the magnitude of magnetic moment of the needle is  $x \times 10^{-5} \text{ Am}^2$ ; then the value of 'x' is :



- (1)  $5 \pi^2$  (2)  $128 \pi^2$   
 (3)  $50 \pi^2$  (4)  $1280 \pi^2$

Ans. (4)

8. In a ideal transformer, the turns ratio  $\frac{N_p}{N_s} = \frac{1}{2}$ . The ratio  $V_s : V_p$  is equal to (the symbols carry their usual meaning) :

- (1) 1 : 2 (2) 2 : 1  
 (3) 1 : 1 (4) 1 : 4

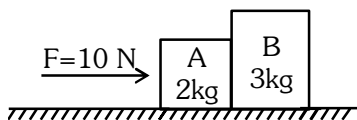
Ans. (2)

9. In a vernier calipers, (N+1) divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is :

- (1)  $\frac{1}{10N}$  (2)  $\frac{1}{100(N+1)}$   
 (3) 100N (4) 10(N+1)

Ans. (2)

10. A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3 kg, respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is :



- (1) zero (2) 4 N  
 (3) 6 N (4) 10 N

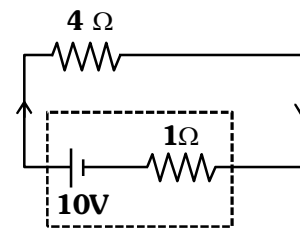
Ans. (3)

11. If  $x = 5 \sin\left(\pi t + \frac{\pi}{3}\right)$  m represents the motion of a particle executing simple harmonic motion, the amplitude and time period of motion respectively, are :

- (1) 5 cm, 2 s (2) 5 m, 2 s  
 (3) 5 cm, 1 s (4) 5 m, 1 s

Ans. (2)

12. The terminal voltage of the battery, whose emf is 10V and internal resistance  $1\Omega$ , when connected through an external resistance of  $4\Omega$  as shown in the figure.



- (1) 4V (2) 6V  
 (3) 8V (4) 10V

Ans. (3)

13. Given below are two statements :

**Statement I :** Atoms are electrically neutral as they contain equal number of positive and negative charges.

**Statement II :** Atoms of each element are stable and emit their characteristic spectrum.

In the light of the above statements, choose the *most appropriate* answer from the options given below :

- (1) Both Statement I and Statement II are correct.  
 (2) Both Statement I and Statement II are incorrect.  
 (3) Statement I is correct but Statement II is incorrect.  
 (4) Statement I is incorrect but Statement II is correct.

Ans. (3)

14. If  $c$  is the velocity of light in free space, the correct statements about photon among the following are :

A. The energy of a photon is  $E = hv$   
 B. The velocity of a photon is  $c$ .  
 C. The momentum of a photon,  $p = \frac{hv}{c}$   
 D. In a photon-electron collision, both total energy and total momentum are conserved.  
 E. Photon possesses positive charge.  
 Choose the correct answer from the options given below :

- (1) A and B only                      (2) A, B, C and D only  
 (3) A, C and D only                (4) A, B, D and E only

Ans. (2)

15. Match List I with List II.

List I (Spectral Lines of Hydrogen for transitions from)	List II (Wavelengths (nm))
A. $n_2 = 3$ to $n_1 = 2$	I. 410.2
B. $n_2 = 4$ to $n_1 = 2$	II. 434.1
C. $n_2 = 5$ to $n_1 = 2$	III. 656.3
D. $n_2 = 6$ to $n_1 = 2$	IV. 486.1

Choose the correct answer from the options given below :

(1) A-II, B-I, C-IV, D-III  
 (2) A-III, B-IV, C-II, D-I  
 (3) A-IV, B-III, C-I, D-II  
 (4) A-I, B-II, C-III, D-IV

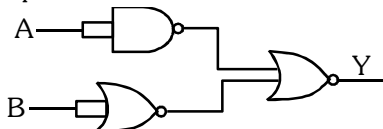
Ans. (2)

16. A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as  $4\pi \times 10^{-7}$  SI units) :

- (1) 44 mT                                (2) 4.4 T  
 (3) 4.4 mT                              (4) 44 T

Ans. (3)

17. The output (Y) of the given logic gate is similar to the output of an/a :



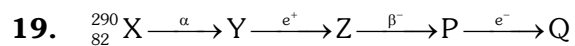
- (1) NAND gate                        (2) NOR gate  
 (3) OR gate                            (4) AND gate

Ans. (4)

18. A wire of length ' $l$ ' and resistance  $100\Omega$  is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

- (1)  $26\Omega$                                 (2)  $52\Omega$   
 (3)  $55\Omega$                                 (4)  $60\Omega$

Ans. (2)



In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are :

- (1) 280, 81                                (2) 286, 80  
 (3) 288, 82                                (4) 286, 81

Ans. (4)

20. The maximum elongation of a steel wire of 1m length if the elastic limit of steel and its Young's modulus, respectively, are  $8 \times 10^8 \text{ N m}^{-2}$  and  $2 \times 10^{11} \text{ N m}^{-2}$  is :

- (1) 4 mm                                    (2) 0.4 mm  
 (3) 40 mm                                (4) 8 mm

Ans. (1)

21. If the monochromatic source in Young's double slit experiment is replaced by white light, then

- (1) interference pattern will disappear.  
 (2) there will be a central dark fringe surrounded by a few coloured fringes.  
 (3) there will be a central bright white fringe surrounded by a few coloured fringes.  
 (4) all bright fringes will be of equal width.

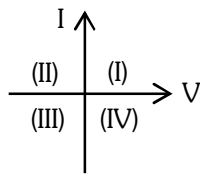
Ans. (3)

22. At any instant of time  $t$ , the displacement of any particle is given by  $2t - 1$  (SI unit) under the influence of force of 5N. The value of instantaneous power is (in SI unit) :

- (1) 10                                        (2) 5  
 (3) 7                                        (4) 6

Ans. (1)

23. Consider the following statements A and B and identify the correct answer :



A. For a solar-cell, the I-V characteristics lies in the IV quadrant of the given graph.

B. In a reverse biased *pn* junction diode, the current measured in ( $\mu A$ ), is due to majority charge carriers.

- (1) A is correct but B is incorrect.
- (2) A is incorrect but B is correct.
- (3) Both A and B are correct.
- (4) Both A and B are incorrect.

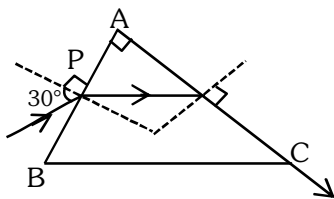
Ans. (1)

24. Two bodies A and B of same mass undergo completely inelastic one dimensional collision. The body A moves with velocity  $v_1$  while body B is at rest before collision. The velocity of the system after collision is  $v_2$ . The ratio  $v_1 : v_2$  is :

- (1) 1 : 2
- (2) 2 : 1
- (3) 4 : 1
- (4) 1 : 4

Ans. (2)

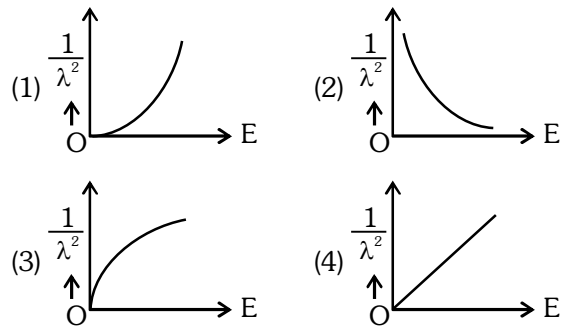
25. A light ray enters through a right angled prism at point P with the angle of incidence  $30^\circ$  as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is :



- (1)  $\frac{\sqrt{5}}{4}$
- (2)  $\frac{\sqrt{5}}{2}$
- (3)  $\frac{\sqrt{3}}{4}$
- (4)  $\frac{\sqrt{3}}{2}$

Ans. (2)

26. The graph which shows the variation of  $\left(\frac{1}{\lambda^2}\right)$  and its kinetic energy, E is (where  $\lambda$  is de Broglie wavelength of a free particle) :



Ans. (4)

27. The quantities which have the same dimensions as those of solid angle are :

- (1) strain and angle
- (2) stress and angle
- (3) strain and arc
- (4) angular speed and stress

Ans. (1)

28. An unpolarised light beam strikes a glass surface at Brewster's angle Then

- (1) the reflected light will be partially polarised.
- (2) the refracted light will be completely polarised.
- (3) both the reflected and refracted light will be completely polarised.
- (4) the reflected light will be completely polarised but the refracted light will be partially polarised.

Ans. (4)

29. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is  $2400 \text{ g cm}^2$ . The length of the 400 g rod is nearly :

- (1) 8.5 cm
- (2) 17.5 cm
- (3) 20.7 cm
- (4) 72.0 cm

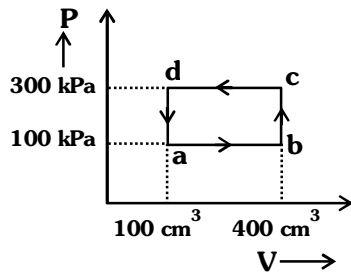
Ans. (1)

30. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is  $0.07 \text{ Nm}^{-1}$ , then the excess force required to take it away from the surface is :

- (1) 19.8 mN
- (2) 198 N
- (3) 1.98 mN
- (4) 99 N

Ans. (1)

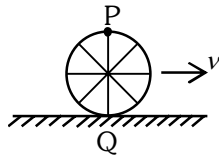
31. A thermodynamic system is taken through the cycle abcd. The work done by the gas along the path bc is :



- (1) zero      (2) 30 J      (3) -90 J      (4) -60 J

Ans. (1)

32. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is  $v$  in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively) ?



- (1) Point P moves slower than point Q.  
 (2) Point P moves faster than point Q.  
 (3) Both the points P and Q move with equal speed.  
 (4) Point P has zero speed.

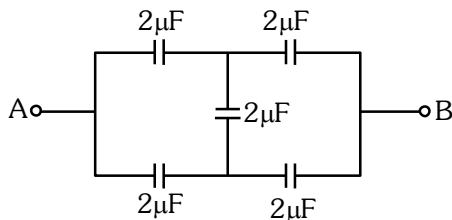
Ans. (2)

33. The mass of a planet is  $\frac{1}{10}$ th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is :

- (1)  $19.6 \text{ m s}^{-2}$       (2)  $9.8 \text{ m s}^{-2}$   
 (3)  $4.9 \text{ m s}^{-2}$       (4)  $3.92 \text{ m s}^{-2}$

Ans. (4)

34. In the following circuit, the equivalent capacitance between terminal A and terminal B is :

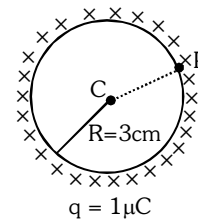


- (1)  $2 \mu\text{F}$       (2)  $1 \mu\text{F}$       (3)  $0.5 \mu\text{F}$       (4)  $4 \mu\text{F}$

Ans. (1)

35. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is :

(Take  $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$  SI units)

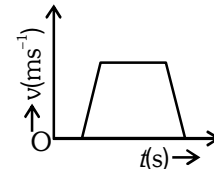


- (1)  $3 \times 10^5$       (2)  $1 \times 10^5$   
 (3)  $0.5 \times 10^5$       (4) zero

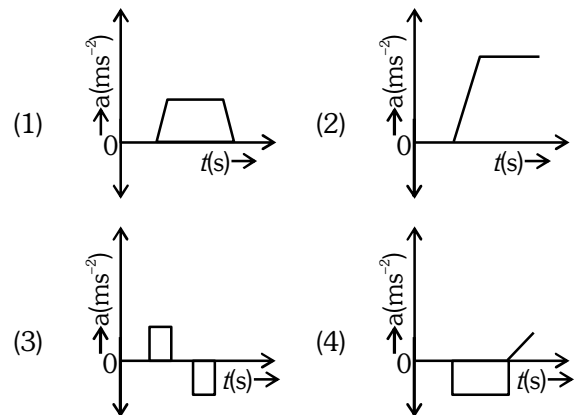
Ans. (4)

**Physics : Section-B (Q. No. 36 to 50)**

36. The velocity ( $v$ ) - time ( $t$ ) plot of the motion of a body is shown below :



The acceleration ( $a$ ) - time ( $t$ ) graph that best suits this motion is :



Ans. (3)

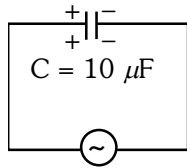
37. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is  $\frac{x}{2}$  times its original time period. Then the value of  $x$  is :

- (1)  $\sqrt{3}$       (2)  $\sqrt{2}$   
 (3)  $2\sqrt{3}$       (4) 4

Ans. (2)



38. A  $10 \mu\text{F}$  capacitor is connected to a  $210 \text{ V}$ ,  $50 \text{ Hz}$  source as shown in figure. The peak current in the circuit is nearly ( $\pi = 3.14$ ) :

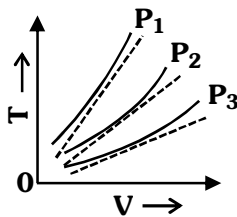


210 V, 50 Hz

- (1) 0.58 A
- (2) 0.93 A
- (3) 1.20 A
- (4) 0.35 A

Ans. (2)

39. The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures  $P_1$ ,  $P_2$  and  $P_3$  compared with those of Charles's law represented as dotted lines.



Then the correct relation is :

- (1)  $P_3 > P_2 > P_1$
- (2)  $P_1 > P_3 > P_2$
- (3)  $P_2 > P_1 > P_3$
- (4)  $P_1 > P_2 > P_3$

Ans. (4)

40. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle  $60^\circ$  with each other. The magnetic moment of this new magnet is : °

- (1) M
- (2)  $\frac{M}{2}$
- (3) 2M
- (4)  $\frac{M}{\sqrt{3}}$

Ans. (2)

41. The minimum energy required to launch a satellite of mass  $m$  from the surface of earth of mass  $M$  and radius  $R$  in a circular orbit at an altitude of  $2R$  from the surface of the earth is :

- (1)  $\frac{5GmM}{6R}$
- (2)  $\frac{2GmM}{3R}$
- (3)  $\frac{GmM}{2R}$
- (4)  $\frac{GmM}{3R}$

Ans. (1)

42. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If I is the current in the circuit, then in the gap between the plates :

- (1) there is no current.
- (2) displacement current of magnitude equal to I flows in the same direction as I.
- (3) displacement current of magnitude equal to I flows in a direction opposite to that of I.
- (4) displacement current of magnitude greater than I flows but can be in any direction.

Ans. (2)

43. The property which is not of an electromagnetic wave travelling in free space is that :

- (1) they are transverse in nature.
- (2) the energy density in electric field is equal to energy density in magnetic field.
- (3) they travel with a speed equal to  $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$
- (4) they originate from charges moving with uniform speed.

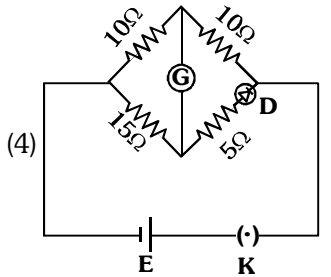
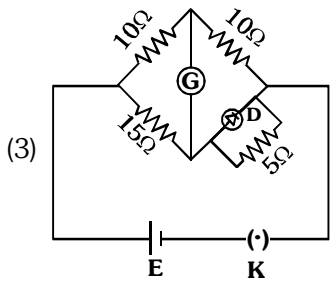
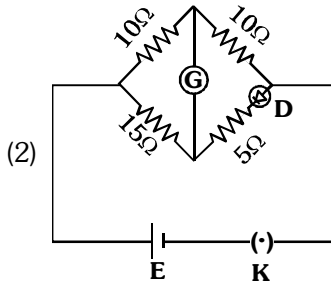
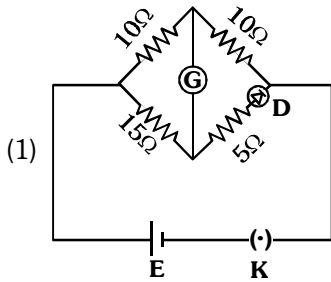
Ans. (4)

44. A metallic bar of Young's modulus,  $0.5 \times 10^{11} \text{ N m}^{-2}$  and coefficient of linear thermal expansion  $10^{-5} \text{ }^\circ\text{C}^{-1}$ , length 1 m and area of cross-section  $10^{-3} \text{ m}^2$  is heated from  $0^\circ\text{C}$  to  $100^\circ\text{C}$  without expansion or bending. The compressive force developed in it is:

- (1)  $5 \times 10^3 \text{ N}$
- (2)  $50 \times 10^3 \text{ N}$
- (3)  $100 \times 10^3 \text{ N}$
- (4)  $2 \times 10^3 \text{ N}$

Ans. (2)

45. Choose the correct circuit which can achieve the bridge balance.



Ans. (1)

46. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to :

- A. hold the sheet there if it is magnetic.
- B. hold the sheet there if it is non-magnetic.
- C. move the sheet away from the pole with uniform velocity if it is conducting.
- D. move the sheet away from the pole with uniform velocity if it is both, non-conducting and non-polar.

Choose the correct statement(s) from the options given below:

- (1) B and D only
- (2) A and C only
- (3) A, C and D only
- (4) C only

Ans. (2)

47. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then

- A. the charge stored in it, increases.
- B. the energy stored in it, decreases.
- C. its capacitance increases.
- D. the ratio of charge to its potential remains the same.
- E. the product of charge and voltage increases.

Choose the most appropriate answer from the options given below :

- (1) A, B and E only
- (2) A, C and E only
- (3) B, D and E only
- (4) A, B and C only

Ans. (2)

48. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is :

- (1) 1 : 1
- (2) 2 : 9
- (3) 1 : 2
- (4) 2 : 3

Ans. (2)

49. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is :

- (1) 34
- (2) 28
- (3) 17
- (4) 32

Ans. (2)

50. A force defined by  $F = \alpha t^2 + \beta t$  acts on a particle at a given time  $t$ . The factor which is dimensionless, if  $\alpha$  and  $\beta$  are constants, is :

- (1)  $\frac{\beta t}{\alpha}$
- (2)  $\frac{\alpha t}{\beta}$
- (3)  $\alpha \beta t$
- (4)  $\frac{\alpha \beta}{t}$

Ans. (2)