

## JUPITER ACADEMY

NEET PHYSICS SAMPLE PAPER 11TH SYLLABUS - 02  
NEET-UG - PHYSICS

Time Allowed : 60 mins

Maximum Marks : 180

## General Instructions:

- For each correct response, the candidate will get 4 marks.
- For each incorrect response, one mark will be deducted from the total scores.

## PHYSICS (Section-A)

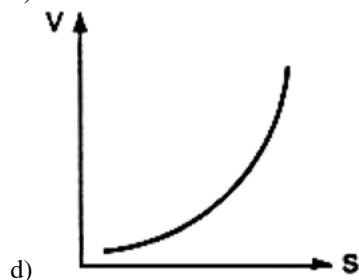
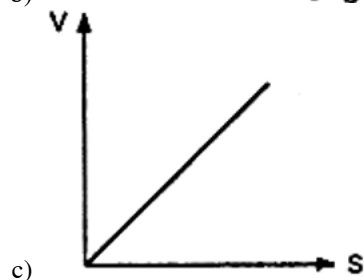
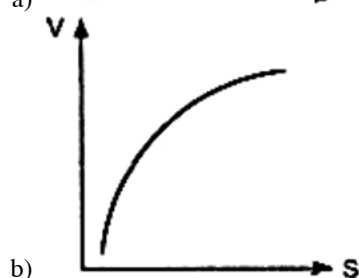
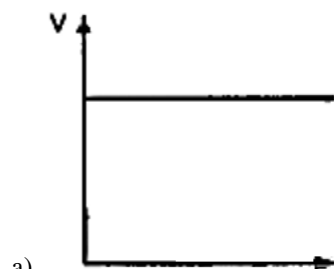
1) If force is proportional to square of velocity, then the dimensions of proportionality constant is: [4]

- a)  $[MLT^0]$                       b)  $[M^0LT^{-1}]$   
c)  $[ML^{-1}T]$                     d)  $[ML^{-1}T^0]$

2) The unit of permittivity of free space  $\epsilon_0$  is: [4]

- a)  $\frac{\text{coulomb}}{(\text{newton metre})}$   
b)  $\frac{\text{newton metre}^2}{\text{coulomb}^2}$   
c)  $\frac{\text{coulomb}^2}{(\text{newton metre})^2}$   
d)  $\frac{\text{coulomb}^2}{(\text{newton metre}^2)}$

3) A body falls from height h. The v - s graph is: [4]



4) A projectile is given an initial velocity of  $\hat{i} + 2\hat{j}$ . The cartesian equation of its path is: ( $g = 10 \text{ m/s}^2$ ) [4]

- a)  $Y = 2x - 25x^2$               b)  $Y = x - 5x^2$   
c)  $4y = 2x - 5x^2$               d)  $Y = 2x - 5x^2$

5) At a height 0.4 m from the ground, the velocity of a projectile in vector form is:  $\vec{v} = (6\hat{i} + 2\hat{j}) \text{ m/s}$ . The angle of projection is: ( $g = 10\text{m/s}^2$ ) [4]

- a)  $45^\circ$   
b)  $60^\circ$   
c)  $30^\circ$   
d)  $\tan^{-1}(\frac{3}{4})$

6) A truck is stationary and has a bob suspended by a light string, in a frame attached to the truck. The truck suddenly moves to the right with an acceleration of a. The pendulum will tilt: [4]

- a) To the left and angle of inclination of the pendulum with the vertical is  $\tan^{-1}(\frac{a}{g})$   
b) To the left and angle of inclination of the pendulum with the vertical is  $\sin^{-1}(\frac{a}{g})$   
c) To the left and angle of inclination of the pendulum with the vertical is  $\sin^{-1}(\frac{g}{a})$   
d) To the left and angle of inclination of the pendulum with the vertical is  $\tan^{-1}(\frac{g}{a})$

7) A bucket full of water weighs 5 kg, it is pulled from a well 20 m deep. There is a small hole in the bucket through which water leaks at a constant rate of 0.2 kg/m. The total work done in pulling the bucket up from the well is: ( $g = 10 \text{ m/s}^2$ ) [4]

- a) 100 J                                      b) 600 J  
c) 500 J                                      d) 400 J

8) A bullet of mass m is fired from a rifle of mass M. If  $\vec{v}$  be the velocity of the bullet, velocity acquired by the rifle is: [4]

- a)  $\vec{V} = -\vec{v}$   
b)  $\vec{V} = +\vec{v}$   
c)  $\vec{V} = -\frac{M}{m}\vec{v}$   
d)  $\vec{V} = -\frac{m}{M}\vec{v}$

9) A solid sphere is rotating in free space. If the radius of the sphere is increased keeping mass same which one of the following will not be affected? [4]

- a) Angular momentum  
b) Rotational kinetic energy  
c) Moment of inertia  
d) Angular velocity

10) A disc of moment of inertia  $I_1$  is rotating freely with angular velocity  $\omega_1$  when a second, non - rotating disc with moment of inertia  $I_2$  is dropped on it gently the two then rotate as a unit. Then the total angular speed is: [4]

- a)  $\frac{I_1\omega_1}{I_2}$   
b)  $\frac{I_2\omega_1}{I_1}$   
c)  $\frac{I_1\omega_1}{I_2+I_1}$

- d)  $\frac{(I_1+I_2)\omega_1}{I_2}$
- 11) Two satellites of the earth,  $S_1$  and  $S_2$  are moving in the same orbit. The mass of  $S_1$  is four times the mass of  $S_2$ . Which one of the following statements is true? [4]
- The kinetic energies of the two satellites are equal.
  - $S_1$  and  $S_2$  are moving with the same speed.
  - The potential energies of the earth and satellite in the two cases are equal.
  - The time period of  $S_1$  is four times that of  $S_2$ .
- 12) A boat carrying a number of large stones is floating in a water tank. What will happen to the water level if the stones are unloaded into water? [4]
- Rise
  - Fall
  - Rise till half the number of stones are unloaded and then begin to fall
  - Remain unchanged
- 13) If  $\lambda_m$  denotes the wavelength at which the radiative emission from a black body at a temperature T K is maximum, then: [4]
- $\lambda_m \propto T^{-1}$
  - $\lambda_m \propto T$
  - $\lambda_m \propto T^{-2}$
  - $\lambda_m \propto T^2$
- 14) Ice at  $-20^\circ\text{C}$  is added to 50 g of water at  $40^\circ\text{C}$ , when the temperature of the mixture reaches  $0^\circ\text{C}$ , it is found that 20 g of ice is still unmelted. The amount of ice added to the water was close to:  
(Specific heat of water =  $4.2 \text{ J/g}^\circ\text{C}$   
Specific heat of Ice =  $2.1 \text{ J/g}^\circ\text{C}$   
Heat of fusion of water at  $0^\circ\text{C}$  =  $334 \text{ J/g}$ ) [4]
- 100g
  - 60g
  - 40g
  - 50g
- 15) 1 gm of an ideal gas expands isothermally, heat flow will be: [4]
- From the gas to the outside atmosphere
  - From outside atmosphere to gas
  - Zero
  - Both from the gas to the outside atmosphere and from outside atmosphere to gas
- 16) At the same temperature, the ratio of energy per gm mole of  $\text{O}_2$  and  $\text{H}_2$  is: [4]
- 2
  - 1.4
  - 3
  - 1
- 17) A body of mass 1 kg is suspended from a weightless spring having force constant 600 N/m. Another body of mass 0.5 kg moving vertically upwards hits the suspended body with a velocity of 3 m/sec and gets embedded in it. The frequency of oscillation and the amplitude of motion are: [4]
- $\frac{10}{\pi}$  HZ, 5 cm
  - $\frac{5}{\pi}$  HZ, 10 cm
  - $\frac{10}{\pi}$  HZ, 10 cm
  - $\frac{5}{\pi}$  HZ, 5 cm
- 18) When beats are produced by two progressive waves of nearly the same frequency, which one of the following is correct?
- The particles vibrate simple harmonically, with the frequency equal to the difference in the component frequencies

- The amplitude of vibrations at any point changes simple harmonically with a frequency equal to the difference in the frequencies of the two waves
  - The frequency of the beats depends on the position, where the observer is
  - The frequency of the beat changes as time progresses
- [4]
- Iv and i
  - I and ii
  - Only ii
  - Iii and iv

19) Match the following:

Column I	Column II
(A) Whenever two waves having the same frequency travel with the same speed along the same direction in a specific medium, then they superpose and create an effect termed as the	(i) beats
(B) Where two waves having similar frequencies move with the same speed along opposite directions in a specific medium, then they superpose to produce	(ii) interference of waves
(C) When two waves having slightly varying frequencies travel with the same speed along the same direction in a specific medium, they superpose to produce	(iii) stationary waves

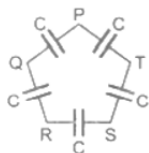
[4]

- None of these
- A - (iii), B - (i), C - (ii)
- A - (ii), B - (iii), C - (i)
- A - (i), B - (ii), C - (iii)

20) Two similar point charges  $q_1$  and  $q_2$  are placed at a distance  $r$ , apart in air. The force between them is  $F_1$ . A dielectric slab of thickness  $t (< r)$  and dielectric constant  $K$  is placed between the charges. Then, the force between the same charges is  $F_2$ . The ratio  $\frac{F_1}{F_2}$  is: [4]

- $\left[ \frac{r}{r-t+t\sqrt{K}} \right]^2$
- 1
- $\left[ \frac{r-t+t\sqrt{K}}{r} \right]^2$
- $\bar{K}$

21) Five capacitors each of capacitance value  $C$  are connected as shown in the figure. The ratio of capacitance between P and R and the capacitance between P and Q is:



[4]

- a) 1 : 1                      b) 5 : 2  
c) 2 : 3                      d) 3 : 1
- 22) The internal resistance of a cell of e.m.f. 2 volts is  $0.1 \Omega$ . It is connected to a resistance of  $3.9 \Omega$ . The voltage across the cell will be (in volts) [4]  
a) 1.95 V                      b) 1.9 V  
c) 2 V                          d) 0.5 V
- 23) A conducting gas is in the form of a long cylinder. Current flows through the gas along the length of the cylinder. The current is distributed uniformly across the cross - section of the gas. Disregard thermal and electrostatic forces among the gas molecules. Due to the magnetic fields set - up inside the gas and the forces which they exert on the moving ions, the gas will tend to [4]  
a) Expand and contract alternately  
b) Increase  
c) Contract  
d) Expand
- 24) A paramagnetic material has  $10^{28}$  atoms/m<sup>3</sup>. Its magnetic susceptibility at temperature 350 K is  $2.8 \times 10^{-4}$ . Its susceptibility at 300 K is: [4]  
a)  $2.672 \times 10^{-4}$               b)  $3.672 \times 10^{-4}$   
c)  $3.726 \times 10^{-4}$               d)  $3.267 \times 10^{-4}$
- 25) If a solution of ferromagnetic material is poured into a U - tube and one arm of this tube is placed between the poles of a strong magnet with the meniscus in line with the field, then the level of the solution will: [4]  
a) Fall                          b) Oscillate slowly  
c) Remain unchanged        d) Rise
- 26) An e.m.f, of 5 volt is produced by a self inductance, when the current changes at a steady rate from 3 A to 2 A in 1 millisecond. The value of self inductance is: [4]  
a) 5 mH                        b) Zero  
c) 5000 H                      d) 5 H
- 27) A coil is placed in a time varying magnetic field. If the number of turns in the coil were to be halved and the radius of wire doubled, the electrical power dissipated due to the current induced in the coil would be: (Assume the coil to be short circuited). [4]  
a) Doubled                      b) Quadrupled  
c) The same                      d) Halved
- 28) A coil having an inductance of one henry and a resistance of 10 ohm is suddenly connected to a battery of emf 50 volt and negligible internal resistance. The initial rate of increase of current in the circuit is: [4]  
a) 0.2 ampere per sec        b) 50 ampere per sec  
c) 25 ampere per sec        d) 5 ampere per sec
- 29) All components of the electromagnetic spectrum in vacuum have the same: [4]  
a) Velocity                      b) Wavelength  
c) Frequency                    d) Energy
- 30) Out of the following:  
i. Pole  
ii. Focus

- iii. Radius of curvature and  
iv. Principal axis for a spherical mirror, the quantities that do not depend on whether the rays are paraxial or not, are:

[4]

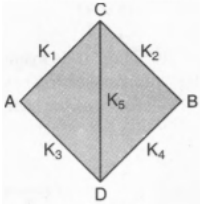
- a) Only (i), (ii) and (iii)  
b) Only (i) and (iv)  
c) Only (i), (iii) and (iv)  
d) All (i), (ii), (iii) and (iv)
- 31) A single slit diffraction pattern is obtained using a beam of red light. If the red light is replaced by the blue light, then the diffraction pattern: [4]  
a) Becomes broader              b) Will disappear  
c) Remains unchanged          d) Becomes narrower
- 32) The de Broglie wavelength  $\lambda$  associated with a proton changes by 25% if its momentum is changed by  $p_0$ . The initial momentum was [4]  
a)  $\frac{p_0}{400}$                           b)  $\frac{p_0}{100}$   
c)  $100 p_0$                       d)  $401 p_0$
- 33) When 1 centimetre thick surface is illuminated with light of wavelength  $\lambda$ , the stopping potential is V. When the same surface is illuminated by the light of wavelength  $2\lambda$ , the stopping potential is  $\frac{V}{3}$ . The threshold wavelength for the metallic surface is: [4]  
a)  $4\lambda$                               b)  $6\lambda$   
c)  $\frac{4\lambda}{3}$                               d)  $\frac{8\lambda}{3}$
- 34) The atomic number of silicon is 14. Its ground - state electron configuration is: [4]  
a)  $1s^2 2s^2 2p^6 3s^1 3p^3$               b)  $1s^2 2s^2 2p^6 3s^2 3p^2$   
c)  $1s^2 2s^2 2p^8 3s^2$                   d)  $1s^2 2s^2 2p^6 3s^4$
- 35) Given the masses of various atomic particles  $m_p = 1.0072$  u,  $m_n = 1.0087$ u,  $m_e = 0.000548$ u,  $m_{\bar{\nu}} = 0$ ,  $m_d = 2.0141$  u, where p = proton, n = neutron, e = electron,  $\bar{\nu}$  = antineutrino and d  $\equiv$  deuteron. Which of the following process is allowed by momentum and energy conservation? [4]  
a)  $N + p \rightarrow d + \gamma$   
b)  $E^+ + e \rightarrow \gamma$   
c)  $P \rightarrow n + e^+ + \bar{\nu}$   
d)  $N + n \rightarrow$  deuterium atom (electron bound to the nucleus)

### PHYSICS (Section-B)

- 36) A ball loses 15.0% of its kinetic energy when it bounces back from a concrete wall. With what speed you must throw it vertically down from a height of 12.4 m to have it bounce back to the same height? (ignore air resistance) [4]  
a) 4.55 m/s                      b) 12.0 m/s  
c) 6.55 m/s                      d) 8.6 m/s
- 37) Two discs have same mass and same thickness. Their materials are of densities  $\rho_1$  and  $\rho_2$ . The ratio of their moments of inertia about central axis will be: [4]  
a)  $\rho_1 : \rho_2$   
b)  $\rho_1 \rho_2 : 1$   
c)  $1 : \rho_1 \rho_2$   
d)  $\rho_2 : \rho_1$
- 38) The weight of an object in the coal mine, sea level, at the top of the mountain are  $W_1$ ,  $W_2$ , and  $W_3$  respectively, then: [4]

- a)  $W_1 < W_2 < W_3$       b)  $W_1 = W_2 = W_3$   
 c)  $W_1 > W_2 > W_3$       d)  $W_1 < W_2 > W_3$

- 39) Five rods of same dimensions are arranged as shown in figure. They have thermal conductivities  $K_1, K_2, K_3, K_4$  and  $K_5$  when points A and B are maintained at different temperatures. No heat flows through the central rod if:



[4]

- a)  $K_1 K_4 = K_2 K_3$   
 b)  $K_1 K_2 = K_3 K_4$   
 c)  $\frac{K_1}{K_4} = \frac{K_2}{K_3}$   
 d)  $K_1 = K_4$  and  $K_2 = K_3$
- 40) The velocity of sound in hydrogen is 1224 m/s. Its velocity in a mixture of hydrogen and oxygen - containing 4 parts by volume of hydrogen and 1 part of oxygen is: [4]
- a) 306 m/s                      b) 612 m/s  
 c) 2448 m/s                     d) 1224 m/s
- 41) Which one of the following statements is true? [4]
- a) Both light and sound waves in air are longitudinal.  
 b) Both light and sound waves in air are transverse.  
 c) Both light and sound waves can travel in a vacuum.  
 d) The sound waves in air are longitudinal while the light waves are transverse.
- 42) An infinitely long straight wire contains a uniformly continuous current of 10A. The radius of the wire is  $4 \times 10^{-2}$  m. The magnetic field at  $2 \times 10^{-2}$  m from the centre of the wire will be: [4]
- a)  $2.5 \times 10^{-5}$  T                b)  $5.0 \times 10^{-5}$  T  
 c) 0                                 d)  $7.5 \times 10^{-5}$  T
- 43) The length of a bar magnet is 10 cm and its pole strength is  $10^{-3}$  Wb. It is placed in a magnetic field of induction  $4\pi \times 10^{-3}$  T in a direction making an angle  $30^\circ$  with the field direction. The value of torque acting on the magnet will be: [4]
- a)  $2\pi \times 10^{-5}$  Nm  
 b)  $2.5 \times 10^4$  Nm  
 c)  $2\pi \times 10^{-7}$  Nm  
 d)  $0.5 \times 10^2$  Nm
- 44) A cylindrical bar magnet is kept along the axis of a circular coil. On rotating the magnet about the axis, the coil will have induced in it:
- i. A current

- ii. No current  
 iii. Only an emf  
 iv. Both an emf and a current

[4]

- a) Iv and i                              b) I and ii  
 c) Iii and iv                            d) Only ii
- 45) The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. This inductor is of inductance: [4]
- a) 1.389 H                              b) 138.88 H  
 c) 13.89 H                              d) 0.138 H
- 46) A ray of light is travelling from glass to air. (Refractive index of glass = 1.5). The angle of incidence is  $50^\circ$ . The deviation of the ray is: [4]
- a)  $80^\circ$   
 b)  $\sin^{-1} \left[ \frac{\sin 50^\circ}{1.5} \right] - 50^\circ$   
 c)  $0^\circ$   
 d)  $50^\circ - \sin^{-1} \left[ \frac{\sin 50^\circ}{1.5} \right]$
- 47) A ray falls on a prism ABC ( $AB = BC$ ) and travels as shown in the figure. The minimum refractive index of the material should be:
- 
- [4]
- a)  $\sqrt{3}$                                       b)  $4/3$   
 c) 1.5                                      d)  $\sqrt{2}$
- 48) A metal surface of threshold frequency  $10^{15}$  Hz is illuminated by a light of frequency  $\nu$ . Most energetic electrons thus emitted enter normally in a magnetic field of intensity 2.5 T. If the magnetic force acting on these electrons is  $10^{-6}$  dyne, the frequency of incident radiation is: [4]
- a)  $2.8 \times 10^{-16}$  Hz                    b)  $8.5 \times 10^{27}$  Hz  
 c)  $8.5 \times 10^{17}$  Hz                    d)  $4.3 \times 10^{17}$  Hz
- 49) The wavelength of the first line of Lyman series of hydrogen atom is equal to that of the second line of Balmer series for a hydrogen like ion. The atomic number Z of hydrogen like ion is: [4]
- a) 1                                        b) 3  
 c) 4                                        d) 2
- 50) The fusion of hydrogen into helium is more likely to take place: [4]
- a) At high temperature and high pressure  
 b) At low temperature and low pressure  
 c) At low temperature and high pressure  
 d) At high temperature and low pressure