

Studentpad

NEET 2021-22

Time : 90 Min

Phy : Full Portion Paper

Marks : 180

01) If L , C and R denote the inductance, capacitance and resistance respectively, the dimensional formula for C^2LR is

- 1) $[M^{-1}L^{-2}T^6I^2]$
- 2) $[M^0L^0T^2I^0]$
- 3) $[ML^{-2}T^{-1}I^0]$
- 4) $[M^0L^0T^3I^0]$

02) Electron volt is a unit of

- 1) energy.
- 2) momentum.
- 3) charge.
- 4) potential difference.

03) The vectors from origin to the points A and B are $\vec{A} = 3\hat{i} - 6\hat{j} + 2\hat{k}$ and $\vec{B} = 2\hat{i} + \hat{j} - 2\hat{k}$ respectively. The area of the triangle OAB be

- 1) $\frac{5}{3}\sqrt{17}$ sq. unit
- 2) $\frac{5}{2}\sqrt{17}$ sq. unit
- 3) $\frac{3}{5}\sqrt{17}$ sq. unit
- 4) $\frac{2}{5}\sqrt{17}$ sq. unit

04) A particle starting from rest travels a distance x in first 2 seconds and a distance y in next two seconds, then

- 1) $y = \frac{x}{2}$
- 2) $y = x$
- 3) $y = 3x$
- 4) $y = 4x$

05) Two bodies are projected with the same velocity. If one is projected at an angle of 30° and the other at an angle of 60° to the horizontal, the ratio of the maximum heights reached is

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

06) If force on a rocket having exhaust velocity of 300 m/s is 210 N, then rate of combustion of the fuel is

- 1) 0.07 kg/s
- 2) 0.7 kg/s
- 3) 1.4 kg/s
- 4) 1.7 kg/s

07) When a horse pulls a wagon, the force that causes the horse to move forward is the force

- 1) the ground exerts on it.
- 2) it exerts on the wagon.
- 3) the wagon exerts on it.
- 4) it exerts on the ground.

08) A 500 kg horse pulls a cart of mass 1500 kg along a level road with an acceleration of 1 ms^{-2} . If the coefficient of sliding friction is 0.2, then the force exerted by the horse in forward direction is

- 1) 6000 N
- 2) 5000 N
- 3) 4000 N
- 4) 3000 N

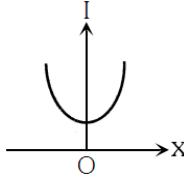
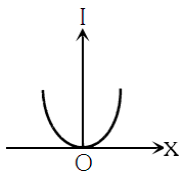
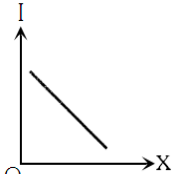
09) Masses of two substances are 1 g and 9 g respectively. If their kinetic energies are same, then the ratio of their momentum will be

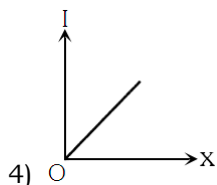
- 1) 1 : 3
- 2) 3 : 1
- 3) 1 : 9
- 4) 9 : 1

10) The displacement x of a particle moving in one dimension under the action of a constant force is related to the time t by the equation $t = \sqrt{x} + 3$, where x is in meters and t is in seconds. The work done by the force in the first 6 seconds is

- 1) 9 J
- 2) 6 J
- 3) 3 J
- 4) 0 J

11) By the theorem of parallel axes, $I = I_{cm} + Mx^2$, the graph between I and x will be

- 1) 
- 2) 
- 3) 



12) What remains constant when the earth revolves around the sun?

- 1) Linear momentum
- 2) Angular momentum
- 3) Angular kinetic energy
- 4) Linear kinetic energy

13) Statement 1: Two different planets have same escape velocity.

Statement 2: Value of escape velocity is a universal constant.

- 1) Both statement 1 and statement 2 are true and the statement 2 is the correct explanation of the statement 1.
- 2) Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of the statement 1.
- 3) Statement 1 is true but statement 2 is false.
- 4) The statement 1 and statement 2 both are false.

14) If acceleration due to gravity on the surface of a planet is two times that on surface of earth and its radius is double that of earth. Then escape velocity from the surface of that planet in comparison to earth will be

- 1) $4 v_e$
- 2) $3 v_e$
- 3) $2 v_e$
- 4) None of these.

15) The increase in length on stretching a wire is 0.05%. If its Poisson's ratio is 0.4, then its diameter

- 1) decrease by 0.4%
- 2) increase by 0.02%
- 3) reduce by 0.1%
- 4) reduce by 0.02%

16) The height to which a cylindrical vessel be filled with a homogeneous liquid, to make the average force with which the liquid presses the side of the vessel equal to the force exerted by the liquid on the bottom of the vessel, is equal to

- 1) radius of the vessel.
- 2) half of the radius of the vessel.
- 3) three-fourth of the radius of the vessel.
- 4) one-fourth of the radius of the vessel.

17) Water rises in a capillary tube to a certain height such that the upward force due to surface tension is balanced by 75×10^{-4} N force due to the weight of the liquid. If the surface tension of water is $6 \times 10^{-2} \text{ Nm}^{-1}$, the inner circumference of the capillary must be

- 1) $0.50 \times 10^{-2} \text{ m}$
- 2) $1.25 \times 10^{-2} \text{ m}$

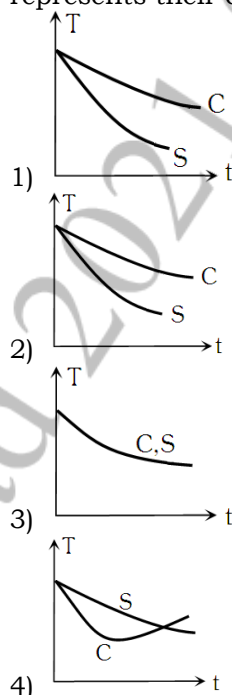
3) $6.5 \times 10^{-2} \text{ m}$

4) $12.5 \times 10^{-2} \text{ m}$

18) A block of mass 100 gm slides on a rough horizontal surface. If the speed of the block decreases from 10 m/s to 5 m/s, the thermal energy developed in the process is

- 1) 37.5 J
- 2) 3.75 J
- 3) 0.75 J
- 4) 0.375 J

19) A hollow copper sphere S and a hollow copper cube C, both of negligible thin walls of same area, are filled with water at 90°C and allowed to cool in the same environment. The graph that correctly represents their cooling is

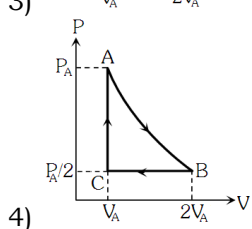
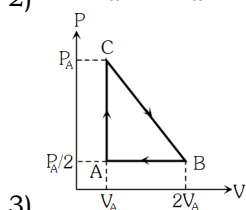
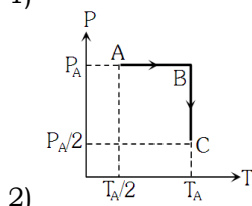
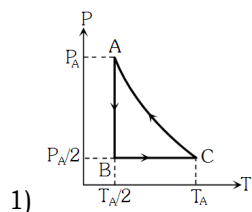


20) An ideal heat engine working between temperature T_1 and T_2 has an efficiency η , the new efficiency if both the source and sink temperature are doubled, will be

- 1) 3η
- 2) 2η
- 3) η
- 4) $\frac{\eta}{2}$

21) Three moles of an ideal gas $\left(C_p = \frac{7}{2}R\right)$ at

pressure P_A and temperature T_A is isothermally expanded to twice its initial volume. It is then compressed at constant pressure to its original volume. Finally the gas is compressed at constant volume to its original pressure P_A . The correct P-V and P-T diagrams indicating the process are



22) Work done by 0.1 mole of a gas at 27°C to double its volume at constant pressure is ($R = 2 \text{ cal mol}^{-1} \text{ }^\circ\text{C}^{-1}$)

- 1) 600 cal
- 2) 60 cal
- 3) 546 cal
- 4) 54 cal

23) That gas cannot be liquified,

- 1) the molecules of which are having potential energy.
- 2) which obeys Vander Waal's equation.
- 3) which obeys gas equation at every temperature and pressure.
- 4) which is a inert gas.

24) A gas mixture consists of molecules of type 1, 2 and 3, with molar masses $m_1 > m_2 > m_3$. V_{rms} and \bar{K} are the r. m. s. speed and average kinetic energy of the gases. Which of the following is true?

- 1) $(V_{\text{rms}})_1 > (V_{\text{rms}})_2 > (V_{\text{rms}})_3$ and $(\bar{K})_1 < (\bar{K})_2 < (\bar{K})_3$
- 2) $(V_{\text{rms}})_1 > (V_{\text{rms}})_2 > (V_{\text{rms}})_3$ and $(\bar{K})_1 < (\bar{K})_2 > (\bar{K})_3$
- 3) $(V_{\text{rms}})_1 = (V_{\text{rms}})_2 = (V_{\text{rms}})_3$ and $(\bar{K})_1 = (\bar{K})_2 > (\bar{K})_3$
- 4) $(V_{\text{rms}})_1 < (V_{\text{rms}})_2 < (V_{\text{rms}})_3$ and $(\bar{K})_1 = (\bar{K})_2 = (\bar{K})_3$

25) A hollow sphere is filled with water through a small hole in it. It is then hung by a long thread and made to oscillate. As the water slowly flows out of the hole at the bottom, the period of oscillation will

- 1) first increase and then decrease to original value.
- 2) first decrease and then increase to original value.

- 3) continuously increase.
- 4) continuously decrease.

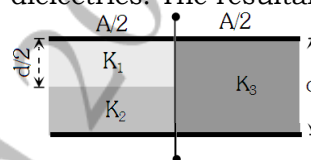
26) A stretched wire of length 110 cm is divided into three segments whose frequencies are in ratio 1 : 2 : 3. Their lengths must be

- 1) 20 cm ; 30 cm ; 60 cm
- 2) 30 cm ; 60 cm ; 20 cm
- 3) 60 cm ; 20 cm ; 30 cm
- 4) 60 cm ; 30 cm ; 20 cm

27) A non-conducting ring of radius 0.5 m carries a total charge of $1.11 \times 10^{-10} \text{ C}$ distributed non-uniformly on its circumference producing an electric field \vec{E} everywhere in space. The value of the line integral $\int_{l=\infty}^{l=0} -\vec{E} \cdot d\vec{l}$ ($l=0$ being centre of the ring) in volt is

- 1) Zero
- 2) - 2
- 3) - 1
- 4) + 2

28) In the figure a capacitor is filled with dielectrics. The resultant capacitance is



- 1) $\frac{2\epsilon_0 A}{d} [k_1 + k_2 + k_3]$
- 2) $\frac{2\epsilon_0 A}{d} \left[\frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} \right]$
- 3) $\frac{\epsilon_0 A}{d} \left[\frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} \right]$
- 4) None of these

29) A cube of side l is placed in a uniform field E , where $E = E\hat{i}$. The net electric flux through the cube is

- 1) $6l^2E$
- 2) $4l^2E$
- 3) l^2E
- 4) Zero

30) A potentiometer having the potential gradient of 2 mV/cm is used to measure the difference of potential across a resistance of 10 ohm. If a length of 50 cm of the potentiometer wire is required to get the null point, the current passing through the 10 ohm resistor is (in mA)

- 1) 10
- 2) 5
- 3) 2
- 4) 1

31) The resistance of a wire of uniform diameter d and length L is R . The resistance of another wire of the same material but diameter $2d$ and length

4L will be

- 1) $R/4$
- 2) $R/2$
- 3) R
- 4) $2R$

32) A long solenoid is formed by winding 20 turns/cm. The current necessary to produce a magnetic field of 20 millitesla inside the solenoid will be approximately

$$\left(\frac{\mu_0}{4\pi} = 10^{-7} \text{ tesla-meter / ampere} \right)$$

- 1) 1.0 A
- 2) 2.0 A
- 3) 4.0 A
- 4) 8.0 A

33) A magnet of length 0.1 m and pole strength 10^{-4} A.m. is kept in a magnetic field of 30 Wb / m^2 at an angle 30° . The couple acting on it is $\text{---} \times 10^{-4} \text{ Nm}$.

- 1) 1.5
- 2) 3.0
- 3) 6.0
- 4) 7.5

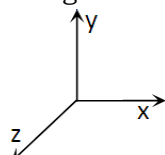
34) A copper disc of radius 0.1 m is rotated about its center with 10 revolutions per second in a uniform magnetic field of 0.1 Tesla with its plane perpendicular to the field. The e.m.f. induced across the radius of disc is

- 1) $2\pi \times 10^{-2} \text{ V}$
- 2) $\pi \times 10^{-2} \text{ V}$
- 3) $\frac{2\pi}{10} \text{ V}$
- 4) $\frac{\pi}{10} \text{ V}$

35) Reactance of a capacitor of capacitance $C \mu\text{F}$ for ac frequency $\frac{400}{\pi} \text{ Hz}$ is 25Ω . The value of C is

- 1) $25 \mu\text{F}$
- 2) $50 \mu\text{F}$
- 3) $75 \mu\text{F}$
- 4) $100 \mu\text{F}$

36) Light wave is travelling along y-direction. If the corresponding \vec{E} vector at any time is along the x-axis, the direction of \vec{B} vector at that time is along



- 1) x-axis
- 2) y-axis
- 3) - z axis
- 4) + z-axis

37) Heat radiations propagate with the speed of

- 1) sound waves.
- 2) light waves.
- 3) β -rays.
- 4) α -rays.

38) The radius of curvature for a convex lens is 40 cm, for each surface. Its refractive index is 1.5. The focal length will be

- 1) 20 cm
- 2) 30 cm
- 3) 40 cm
- 4) 80 cm

39) When light is incident on a doubly refracting crystal, two refracted rays-ordinary ray (O-ray) and extra ordinary ray (E-ray) are produced, then

- 1) E-ray is polarised in the plane of incidence and O-ray perpendicular to the plane of incidence.
- 2) E-ray is polarised perpendicular to the plane of incidence and O-ray in the plane of incidence.
- 3) Both O-ray and E-ray are polarised in the plane of incidence.
- 4) Both O-ray and E-ray are polarised perpendicular to the plane of incidence.

40) The K_α X-rays arising from a cobalt ($z = 27$) target have a wavelength of 179 pm. The K_α

X-rays arising from a nickel target ($z = 28$) is

- 1) = 179 pm
- 2) $> 179 \text{ pm}$
- 3) $< 179 \text{ pm}$
- 4) None of these

41) **Statement 1:** A tube light emits white light.

Statement 2: Emission of light in a tube takes place at a very high temperature.

- 1) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
- 2) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1
- 3) The Statement 1 is true, but the Statement 2 is false
- 4) The Statement 1 is false but the Statement 2 is true

42) In the nuclear reaction: $X(n, \alpha) {}_3\text{Li}^7$, the term X will be 3

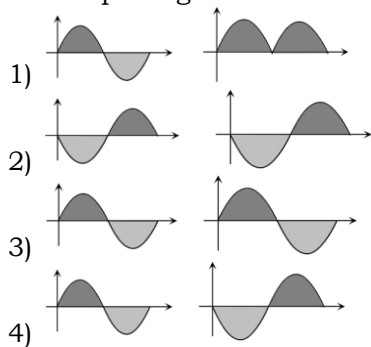
- 1) ${}_2\text{He}^4$
- 2) ${}_5\text{B}^{11}$
- 3) ${}_5\text{B}^9$
- 4) ${}_5\text{B}^{10}$

43) **Statement 1:** Separation of isotopes is possible because of the difference in electron numbers of isotope.

Statement 2: Isotopes of an element can be separated by using a mass spectrometer.

- 1) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
2) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1
3) Both Statement 1 and Statement 2 are false
4) The Statement 1 is false but the Statement 2 is true

44) Which of the following figures correctly gives the phase relation between the input signal and the output signal of triode amplifier?



- 45) For a given plate-voltage, the plate current in a triode is maximum when the potential of
- 1) the grid is positive and plate is positive.
 - 2) the grid is positive and plate is negative.
 - 3) the grid is zero and plate is positive.
 - 4) the grid is negative and plate is positive.