SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

Time: 3 Hours | **NEET TOT GT-7** | **Max. Marks: 720 M**

PHYSICS

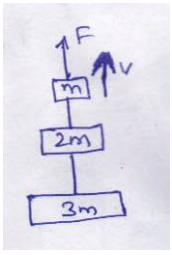
1. A body is thrown at an angle 30^0 to the horizontal with the velocity of 10 m/s. After 2 sec, its velocity will be (in m/s) ($g=10m/s^2$)

1) $10\sqrt{3}$ 2) $5\sqrt{3}$ 3) $7\sqrt{3}$ 4) $2\sqrt{3}$

2. A vehicle is travelling along unbanked curved path. If the friction between the road and tyres suddenly disappears then the vehicle

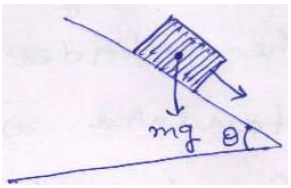
1) moves along tangential direction
2) moves along radially outward direction
3) moves along a direction between tangential and radially outward direction
4) moves along the same curved path

3. Three blocks with masses m, 2m and 3m are connected by strings as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is acceleration due to gravity)



1) 3 mg 2) 6 mg 3) zero 4) 2 mg

4. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 45^0, the box starts to slip and slides 2m down the plank in 2s. The coefficients of static and kinetic friction between the base and the plank will be respectively



1) 1 and 0.65 2) $\sqrt{3}$ and 0.75 3) 1 and 0.858 4) 1 and 0.758

5. A particle moves with a velocity $\vec{V} = 2\hat{i} + 3\hat{j} + \hat{k}\ ms^{-1}$ under the influence of a constant force $\vec{F} = 2\hat{i} + 2\hat{j} - 3\hat{k}\ N$. The instantaneous power applied to the particle is

1) 7W 2) 13W 3) 6W 4) 1W

6. A ball is thrown vertically downwards from a height of 60m with an initial velocity V_0. It collides with the ground, loses 25 percent of its energy in collision and rebounds to the same height. The initial velocity V_0 is

1) $36ms^{-1}$ 2) $60ms^{-1}$ 3) $50ms^{-1}$ 4) $30ms^{-1}$

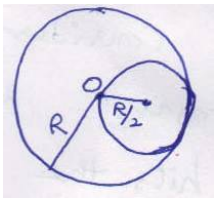
7. Consider a drop of rain water having mass 1g falling from a height of 2km. It hits the ground with a speed of 100m/s. Take 'g' constant with a value 10 m/s^2. The work done by (i) the gravitational force and (ii) the resistive force of air

1) (i) -10J (ii) -5J 2) (i) 10J (ii) 5J 3) (i) 20J (ii) -15J 4) (i) 1J (ii) 5J

8. Torques of equal magnitude are applied to a hollow cylinder and solid sphere, both having the same mass and radius. The cylinder is free to rotate about its standard axis of symmetry and the sphere is free to rotate about an axis passing through its centre. Which of the two will acquire a greater angular speed after a given time?

1) Sphere 2) Hollow Cylinder
3) Both acquire same angular speed in same time
4) Data is insufficient to reach any conclusion

9. A disc of radius R has mass 6m, a hole of radius $\frac{R}{2}$ is made in it as shown. The moment of inertia of the remaining part about an axis passing through entre O of the disc and perpendicular to the plane of disc is



1) $\frac{21}{8}mR^2$ 2) $\frac{9}{2}mR^2$ 3) $\frac{8}{21}mR^2$ 4) $\frac{2}{9}mR^2$

10. Centre of mass of 3 particles 5kg, 10kg & 15kg is at (0,0,0). Where should a particle of mass 20 kg be placed so that the centre of mass of combination will be at (2, 2, 2) ?

1) (1,1,1) 2) (3,3,3) 3) (0,0,0) 4) (5,5,5)

11. An infinite number of point masses each equal to '2m' are placed at x=1, x=2, x=4, x=8m… what is the total gravitation potential at x=0

1) -2Gm 2) -4Gm 3) -6Gm 4) -3Gm

12. The mass of a body is 'm'. It is taken from the earth's surface to the height equal to 3 times the radius of the earth (R). The change in potential energy of body will be.

1) $\frac{2}{3}mgR$ 2) $\frac{1}{3}mgR$ 3) $\frac{3}{4}mgR$ 4) mgR

13. A simple pendulum performs simple harmonic motion about x=0 with an amplitude 'a' and time period 'T'. The speed of pendulum at $x=\frac{3}{4}a$ will be

1) $\frac{\pi a}{2}$ 2) $\frac{7\pi a}{T}$ 3) $\frac{5\pi a}{2T}$ 4) $\frac{\sqrt{7}\pi a}{2T}$

14. Two simple harmonic motions $y_1 = A\sin\omega t$, $y_2 = 2A\cos\omega t$ are superimposed on a particle of mass m. The total mechanical energy of the particle is

1) $\frac{5}{2}m\omega^2A^2$ 2) $\frac{1}{2}m\omega^2A^2$ 3) $3m\omega^2A^2$ 4) $m\omega^2A^2$

15. A wire of length L and radius r is rigidly fixed at one end. On stretching the other end of wire with a force F, the increase in its length is l. If another wire of same material but length 3L and radius 3r is stretched with a force of 3F, the increase in its length will be

1) l 2) $2l$ 3) $\frac{l}{2}$ 4) $3l$

16. Water rises to a height 'h' in capillary tube. If the length of capillary tube above the surface of water is made less than 'h' then

1) water rises upto the tip of capillary tube and stays there without overflowing
2) water rises upto the tip of capillary tube and then starts over flowing like a fountain
3) water rises upto a point a little below the top and says there
4) water does not rise at all

17. Which one of the following is not an assumption of kinetic theory of gases?

1) The volume occupied by the molecules of the gas is negligible
2) The force of attraction between the molecules is negligible
3) The collision between the molecules are elastic
4) All molecules have same speed

18. 2g of steam at 100^0 C can melt how much ice at 0^0C? Latent heat of ice =80 cal/g and latent heat of steam = 540cal/g

1) 1) 8g 2) 16g 3) 32g 4) 4g

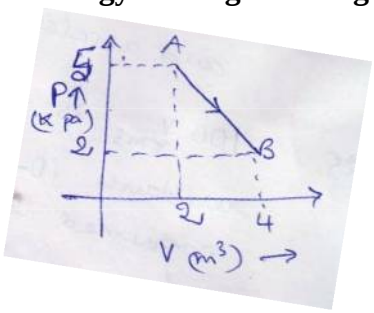
19. Certain quantity of water cools from 70^0C to 65^0C in the first 4 minutes and to 60^0C in next 6 minutes. The temperature of surroundings is

1) 52^0C 2) 42^0C 3) 10^0C 4) 20^0C

20. Efficiency of carnot's engine aperating between reservoirs, maintained at temperatures 627^0C and 27^0C is

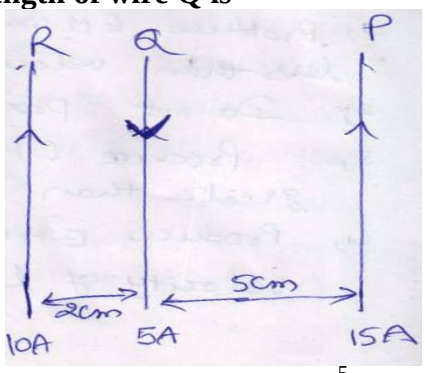
1) 33.3% 2) 67% 3) 50% 4) 75%

21. 2 Moles of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in figure, The change in internal energy of the gas during the transition is



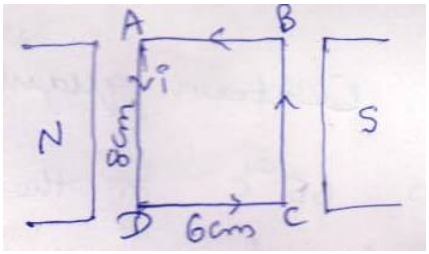
1) -10KJ 2) 10KJ 3) 5KJ 4) -5KJ

22. Three long straight and parallel wires carrying currents are arranged as shown in fig. The force experienced by 10cm length of wire Q is



1) $2x10^{-5}$N towards right 2) $2x10^{-5}$N towards left
3) $2x10^{-4}$N towards right 4) $2x10^{-4}$N towards left

23. A 50 turns coil shown in figure carries a current of 2A in a magnetic field B of $0.1Wb/m^2$. The torque acting on the coil is



1) 48Nm tending to rotate the side AD out of the page
2) $48x10^{-3}$ Nm tending to rotate the side AD into the page
3) 0.48 Nm tending to rotate the side AD into the page
4) $48x10^{-3}$ Nm tending to rotate the side AD out of the page

24. A magnet is dropped down in an infinitely long vertical copper tube.

1) The magnet moves with continuously increasing velocity and ultimately acquires a constant terminal velocity
2) The magnet moves with continuously decreasing velocity and ultimately comes to rest
3) The magnet moves with continuously increasing velocity but constant acceleration
4) The magnet moves with continuously increasing velocity and acceleration

25. An AC generator consists of a coil of 500 turns each of area $500cm^2$ and rotating at an angular speed of 50 rpm in a uniform magnetic field of $2.4x10^{-2}T$. Find the peak value of emf induced

1) 0.314V 2) 31.4V 3) 3.14V 4) 314V

26. The time varying electric and magnetic fields in space

1) produce EM wave which is propagated with a velocity less than velocity of light.
2) do not produce EM wave
3) produce EM wave which propagates with a velocity greater than the velocity of light
4) produce EM wave which propagates with the velocity of light

27. An electron of mass m and charge 'e' initially at rest gets accelerated by a constant electric field 'E'. The rate of change of de-Broglie wavelength of the electron at time 't' ignoring relativistic effect is

1) $\frac{-h}{eEt^2}$ 2) $\frac{-eEt^2}{h}$ 3) $\frac{-mh}{eEt^2}$ 4) $\frac{-h}{eE}$

28. Wave length of the first member of Lymen series is $1216A^0$. Calculate the wavelength of second member of Balmer series.

1) $2824A^0$ 2) $4864A^0$ 3) $3864A^0$ 4) $4684A^0$

29. When an α - particle of mass 'm' moving with velocity 'V' bombards on a heavy nucleus of charge 'Ze' its distance of closest approach from the nucleus depends on 'm' as

1) m 2) $\frac{1}{m}$ 3) $\frac{1}{\sqrt{m}}$ 4) $\frac{1}{m^2}$

30. A train moving at a speed of 20 ms^{-1} towards a stationary object, emits a sound of frequency $620H_Z$. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is (speed of sound in air =$330ms^{-1}$)

1) $700H_Z$ 2) $1840H_Z$ 3) $1740H_Z$ 4) None of these

31. An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 25cm. The next large length of the column resonating with the same tuning fork is

1) 125cm 2) 50cm 3) 75cm 4) 100cm

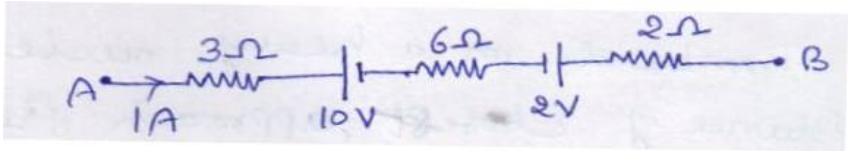
32. Charges of $+4\mu C$ each are placed at two opposite corners of a square of side 1m and $-4\mu C$ each at the remaining two corners. The intensity of electric at the centre of the square is.

1) Zero 2) $18x10^5$ N/C 3) $9x10^5$ N/C 4) $4.5x10^5$ N/C

33. A parallel plate capacitor is charged by a battery. After charging the capacitor, battery is disconnected and distance between the plates is decreased then which of the following statement is correct?

1) Electric field does not remain constant 2) Potential difference is increased
3) The capacitance is decreased 4) The stored energy is decreased

34. The potential difference between A and B in the following figure is



1) 23V 2) 9V 3)19V 4) 3V

35. A potentiometer wire has a length 3m and resistance 5Ω. The resistance that must be connected in series with the wire and an accumulator of e.m.f. 2V, so as to get a potential gradient 2m V per cm on the wire is

1) 0.16Ω 2) 116 Ω 3) 1.16 Ω 4) 11.6 Ω

36. Susceptibility is positive for

1) non – magnetic substances 2) dia and paramagnetic substances
3) ferro and diamagnetic substances 4) para and ferromagnetic substances

37. Number of fissions per second in a reactor of power 2W is (given energy released per fission is 200MeV)

1) $6.2\text{x}10^{10}$ 2) $62\text{x}10^{10}$ 3) $0.62\text{x}10^{10}$ 4) $3.2\text{x}10^{10}$

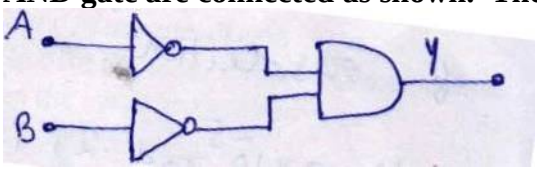
38. Half life of a radioactive substance A is 3 times the half life of another radioactive substance B. Initially the number of nuclei of A and B are N_A and N_B respectively. After two half lives of A, number of nuclei of both are equal. Then the ratio $\frac{N_A}{N_B}$ is

1) $\frac{1}{8}$ 2) $\frac{1}{16}$ 3) $\frac{1}{4}$ 4) $\frac{1}{3}$

39. A potential barrier V volts exists across a P-N junction the thickness of the depletion region is 'd'. An electron with velocity 'v' approaches, P-N junction from N side. The velocity of the electron across the junction is

1) $\sqrt{v^2+\frac{2Ve}{m}}$ 2) $\sqrt{v^2-\frac{2Ve}{m}}$ 3) V 4) $\sqrt{\frac{2Ve}{m}}$

40. Two NOT gates and one AND gate are connected as shown. The system is equivalent to



1) AND 2) NOR 3) OR 4) NAND

41. If the minimum voltage in an AM wave was found to be 4V and maximum voltage 12V. Find percent modulation index.

1) 75% 2) 60% 3) 66.7% 4) 50%

42. Parallel rays of light focused by a thin convex lens. A thin concave lens of same focal length then joined to the convex lens and the result is that.

1) The focal point shifts away from the lens by a small distance
2) The focal point shifts towards the lens by a small distance
3) The focal point of lens does not shift at all
4) The focal point shifts to infinity.

43. A bird in air looks at a fish vertically below it and inside water. X is the height of the bird above the surface of water and Y is the depth of the fish below surface of water. If refractive index of water w.r.t air is μ, the distance of the fish as observed by the bird is

1) X+Y 2) $X+\frac{Y}{\mu}$ 3) μX+Y 4) μX+μY

44. Light of wave length 789nm is used to view an object under a microscope. The aperture of the objective has a diameter of 0.8cm. Find the limiting angle of resolution.

1) $12.03\text{x}10^{-5}$ rad 2) $120.3\text{x}10^{-5}$ rad 3) $12.03\text{x}10^{-7}$ rad 4) $120.3\text{x}10^{-7}$rad

45. A parallel beam of light of wavelength 400nm falls on a narrow slit and the resulting diffraction pattern is observed on screen 0.5m away. It is observed that the first minimum is at a distance of 2mm from the centre of the screen. Find the width of the slit

1) 2cm 2) 2mm 3) $0.2\text{x}10^{-4}$m 4) $2\text{x}10^{-4}$m

PHYSICS

46. K_C for $A+B \Leftrightarrow 3C$ is 20 at 25^0c, if a 2 liter vessel contains 1,2 and 4 mole of A, B and C respectively, the reaction at 25^0c shall

1) Proceed from left to right 2) Proceed from right to left
3) Be at equilibrium 4) Not occur

47. Solubility of AgCl in 0.1M NaCl is (ksp of AgCl = $1.2\text{x}10^{-10}$)

1) 0.05M 2) $1.2\text{x}10^{-6}$M 3) $2\text{x}10^{-5}$ M 4) $1.2\text{x}10^{-9}$ M