SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

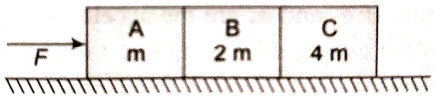
Time: 3 Hours **NEET TOT GT-6** **Max. Marks: 720 M**

PHYSICS

1. A particle is projected up an inclined with initial speed v=20m/s and at an angle $\theta = 30^0$ with the plane. The component of its velocity perpendicular to the plane when it strikes the plane is:

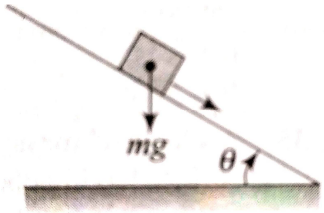
1) $10\sqrt{3}m/s$ 2) $10m/s$ 3) $5\sqrt{3}m/s$ 4) $10\sqrt{5}m/s$

2. A force F is applied on block A as shown in figure. The contact force between the blocks A and B and between the blocks B and C respectively are (Assume frictionless surface)



1) $\frac{F}{7},\frac{2F}{7}$ 2) $\frac{6F}{7},\frac{4F}{7}$ 3) $F,\frac{F}{2}$ 4) $\frac{4F}{7},\frac{6F}{7}$

3. 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 30^0, the box starts to slip and slides 4.0 m down the plank in 4.0 s. The coefficients of static and kinetic friction between the box and the plank will be, respectively



1) 0.4 and 0.3 2) 0.6 and 0.6 3) 0.6 and 0.5 4) 0.5 and 0.6

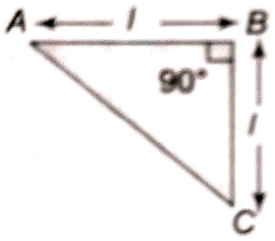
4. Two stones of masses m and 2m are whirled in horizontal circles, the heavier one in a radius $\frac{r}{2}$ and the lighter one radius r. The Tangential speed of lighter stone is n times that of the value of heavier stone when they experience same centripetal forces. The value of n is:

1) 1 2) 2 3) 3 4) 4

5. The force constant of a weightless spring is 16N m^{-1}. A body of mass 1.0 kg suspended from it is pulled down through 5 cm and then released. The maximum kinetic energy of the system (spring + body) will be

1) $2\times10^{-2}J$ 2) $4\times10^{-2}J$ 3) $8\times10^{-2}J$ 4) $16\times10^{-2}J$

6. Figure shows a thin metallic triangular sheet ABC. The mass of the sheet is M .The moment of inertia of the sheet about side AC is:



1) $\frac{Ml^2}{18}$ 2) $\frac{Ml^2}{12}$ 3) $\frac{Ml^2}{6}$ 4) $\frac{Ml^2}{4}$

7. Two bodies have their moments of inertia *I* and 2*I* respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio

1) 1:2 2) $\sqrt{2}:1$ 3) 2:1 4) $1:\sqrt{2}$

8. A Particle is projected vertically upwards and it reaches the maximum height H in time T. The height of the particle at any time t will be.

1) $\frac{1}{2}g(t-T)^2$ 2) $H-\frac{1}{2}g(t-T)^2$ 3) $\left(\frac{1}{3}\right)g(t-T)^2$ 4) $H-g(t-T)$

9. A body of mass m is placed on the earth's surface. It is taken from the earth's surface to a height=3R. The change in gravitational potential energy of the body is

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

10. A 900 kg elevator hangs by a steel cable for which the allowable stress is $1.15\times10^8 N/m^2$ **. What is the minimum diameter required if the elevator accelerates upward at** $1.5m/s^2$ **? Take g=10** m/s^2

1) $\frac{6\times10^{-2}}{\sqrt{5\pi}}m$ 2) $\frac{6\times10^{-2}}{\sqrt{10\pi}}m$ 3) $\frac{3\times10^{-2}}{\sqrt{10\pi}}m$ 4) $\frac{3\times10^{-2}}{\sqrt{5\pi}}m$

11. A metal ball B_1 **(density 3.2 g/cc) is dropped in water, while another metal ball** B_2 **(density 6.0 g/cc) is dropped in a liquid of density 1.6 g/cc. If both the balls have the same diameter and attain the same terminal velocity, the ratio of viscosity of water to that of the liquid is**

1) 2.0 2) 0.5 3) 4.0 4) 5.0

12. A cylinder of radius R made of a material of thermal conductivity K_1 **is the surrounded by a cylindrical shell of inner radius R and outer radius 2R made of material of thermal conductivity** K_2**. The two ends of a combined system are maintained at two different temperatures. There is no loss of heat across the cylindrical surface and the system is in steady state. The effective thermal conductivity of the system is:**

1) K_1+K_2 2) $\frac{K_1+3K_2}{4}$ 3) $\frac{K_1K_2}{K_1+K_2}$ 4) $\frac{3K_1+K_2}{4}$

13. A black body is heated from 27^0C **to** 127^0C**. The ratio of their energies of radiation emitted will be**

1) 81:256 2) 27:64 3) 9:16 4) 3:4

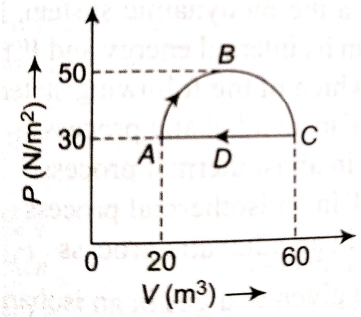
14. If pressure P, velocity V and time T are taken as fundamental physical quantities, the dimensional formula of force is.

1) PV^2T^2 2) $P^{-1}V^2T^2$ 3) PVT^2 4) $P^{-1}VT^2$

15. The molecules of a given mass of a gas have a rms velocity of 200 m/sec at 27^0C **and** $1.0\times10^5 N/m^2$ **pressure. When the temperature is** 127^0C **and pressure is** $0.5\times10^5 N/m^2$**, the rms velocity in m/sec will be**

1) $\frac{100\sqrt{2}}{3}$ 2) $100\sqrt{2}$ 3) $\frac{400}{\sqrt{3}}$ 4) $\frac{100}{\sqrt{3}}$

16. A gas undergoes a cyclic process ABCDA as shown in the figure. The part ABC of process is semicircular. The work done by the gas is:

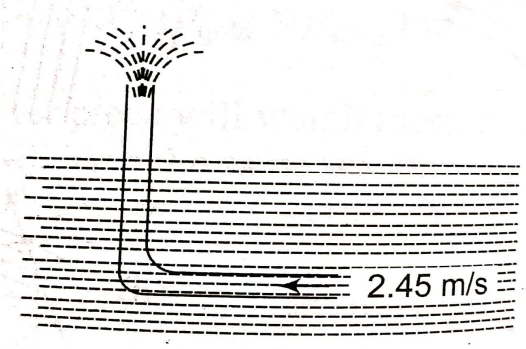


1) 400πJ 2) 2456J 3) $200\pi J$ 4) 1826J

17. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of $\frac{C_p}{C_v}$ for the gas is

1) $\frac{4}{3}$ 2) 2 3) $\frac{5}{3}$ 4) $\frac{3}{2}$

18. An L-shaped tube with a small orifice is held in a water stream as shown in fig. The upper end of the tube is 10.6cm above the surface of water. What will be the height of the jet of water coming from the orifice? (Velocity of water stream is 2.45m/s)

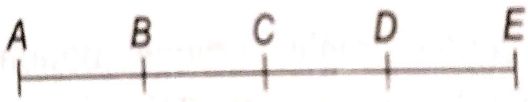


1) Zero 2) 20.8cm 3) 10.6 cm 4) 40.0 cm

19. A metallic block weighs 15N in air. It weighs 12 N when immersed in water and 13N when immersed in another liquid. What is the specific gravity of the liquid?

1) 1/3 2) 2/3 3)12/13 4) 13/15

20. A body performs SHM along the straight line segment ABCDE with C as the midpoint of segment AE (A and E are the extreme position for the SHM). Its kinetic energies at B and D are each one fourth of its maximum value. If length of segment AE is 2R, then the distance between B and D is



1) $\frac{\sqrt{3}}{2}R$ 2) $\frac{R}{\sqrt{2}}$ 3) $\sqrt{3}R$ 4) $\sqrt{2}R$

21. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wave length λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio λ_2/λ_1 is:

1) $\sqrt{\frac{m_1}{m_2}}$ 2) $\sqrt{\frac{m_1+m_2}{m_2}}$ 3) $\sqrt{\frac{m_2}{m_1}}$ 4) $\sqrt{\frac{m_1+m_2}{m_1}}$

22. Two sirens situated one kilometer apart are producing sound of frequency 330Hz. An observer starts moving from one siren to the other with a speed of 2 m/s. If the speed of sound be 330 m/s, what will be the beat frequency heard by the observer?

1) 8 2) 4 3) 6 4) 1

23. An electron of mass m_e initially at rest moves through a certain distance in a uniform electric field in time t_1. A portion of mass m_p also initially at rest takes time t_2 to move through an equal distance in this uniform electronic field. Neglecting the effect of gravity, the ratio of t_2/t_1 is nearly equal to

1) 1 2) $\left(m_p/m_e\right)^{1/2}$ 3) $\left(m_e/m_p\right)^{1/2}$ 4) 1836

24. A conducting sphere of radius 10 cm is charged with 10μC. Another uncharged sphere of radius 20 cm is allowed to touch it for some time. After that if the spheres are separated, then surface density of charges, on the sphere will be in the ratio of

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

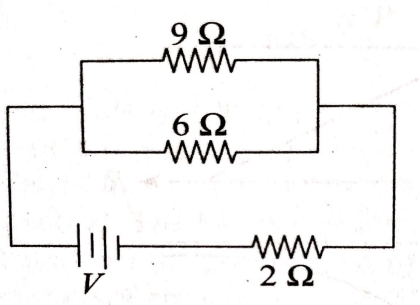
25. Two charges, each equal to 1μC, are placed at the vertices A and B of a triangle ABC. The product of AC and BC is $30\,cm^2$. The sum of the sides AC and BC is 10cm. The potential at C is

1) $3\times10^5 V$ 2) $6\times10^5 V$ 3) $9\times10^5 V$ 4) $18mV$

26. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 10 divisions per milliampere and voltage sensitivity is 2 divisions per millivolt. In order that each divisions reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be

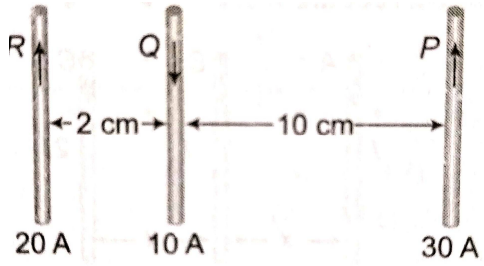
1) 99995 2) 9995 3) 10^3 4) 10^5

27. If power dissipated in the 9Ω resistor in the circuit shown is 36W, the potential difference across the 2Ω resistor is



1) 8 V 2) 10 V 3) 2 V 4) 4 V

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



1) $1.4\times10^{-4} N$ towards right 2) $1.4\times10^{-4} N$ towards left
3) $2.6\times10^{-4} N$ towards right 4) $2.6\times10^{-4} N$ towards left

29. A triangular loop of side *l* carries a current I. It is placed in a magnetic field B such that the plane of the loop is in the direction of B. The torque on the loop is

1) Zero 2) bil 3) $\frac{\sqrt{3}}{2} Il^2B^2$ 4) $\frac{\sqrt{3}}{4} IBl^2$

30. The ratio of the magnetic field at the center of a current carrying coil of the radius a and at a distance 'a' from center of the coil and perpendicular to the axis of coil is

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

31. A conducting circular loop is placed in a uniform magnetic field, B=0.025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mms^{-1}. The induced emf when the radius is 2cm is

1) 2πμV 2) πμV 3) $\frac{\pi}{2}\mu V$ 4) 2μV

32. A circuit has a resistance of 11Ω, an inductive reactance of 25Ω and a capacitative resistance of 18Ω. It is connected to an AC source of 260 V and 50 Hz. The current through the circuit (in amperes) is

1) 11 2) 15 3)18 4) 20

33. A convex lens is in contact with concave lens. The magnitude of the ratio of their focal length is 2/3. Their equivalent focal length is 30 cm. What are their individual focal lengths?

1) -75, 50 2) -10, 15 3) 75, 50 4) -15, 10

34. When light rays are incident on a prism at an angle 45^0, the minimum deviation is obtained. If refractive index of the material of prism is $\sqrt{2}$, then the angle of prism will be

1) 30^0 2) 40^0 3) 50^0 4) 60^0

35. A simple telescope, consisting of an objective of focal length 60 cm and a single eye lens of focal length 5 cm is focused on a distant object is such a way that parallel rays comes out from the eye lens. If the object subtends an angle 2^0 at the objective, the angular width of the image

1) 10^0 2) 24^0 3) 50^0 4) $1/6^0$

36. A double slit experiment is immersed in a liquid of refractive index 1.33. It has slit separation of 1mm and distance between the plane of slits and screen 1.33 m. The slits are illuminated by a parallel beam of light whose wavelength in air is $6300A^0$

1) $6.3\times10^{-4}m$ 2) $8.3\times10^{-4}m$ 3) $6.3\times10^{-2}m$ 4) $6.3\times10^{-5}m$

37. When the angle of incidence on a material is 60^0, the reflected light is completely polarized. The velocity of the reflected ray inside the material is (in ms^{-1})

1) 3×10^8 2) $\left(\frac{3}{\sqrt{2}}\right)\times10^8$ 3) $\sqrt{3}\times10^8$ 4) 0.5×10^8

38. When radiation of wavelength λ is incident on a metallic surface. The stopping potential is 4.8 volts. If the same surface is illuminated with radiation of double the wavelength, then the stopping potential becomes 1.6 volts. Then the threshold wavelength for the surface is

1) 2λ 2) 4λ 3) 6λ 4) 8λ

39. The ratio between total acceleration of the electron in singly ionized helium atom and hydrogen atom (both in ground state) is

1) 1 2) 8 3)4 4)16

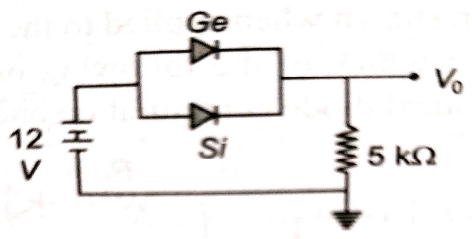
40. At any instant the ratio of the amount of radioactive substances is 2:1. If their half-lives be respectively12 and 16 hours, then after two days, what will be the ratio of the substances?

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

41. An atomic power nuclear reactor can deliver 300 MW. The energy released due to fission of each nucleus of uranium atom U^{238} is 170 MeV. The number of uranium atoms fissioned per hour will be

1) 30×10^{25} 2) 4×10^{22} 3) 10×10^{20} 4) 5×10^{15}

42. Ge and Si diodes conduct at 0.3 V and 0.7 V respectively. In the following figure if Ge diode connections are reversed, the value of V_0 changes by



1) 0.2 V 2) 0.4 V 3) 0.6 V 4) 0.8V

43. A transistor is used as an amplifier in CB mode with a load resistance of 5kΩ the current gain of amplifier is 0.98 and the input resistance is 70Ω, the voltage gain and power gain respectively are

1) 70, 68.6 2)80, 75.6 3) 60, 66.6 4) 90, 96.6

44. If A and B two inputs in AND gate, then AND gate has an output of 1 when the values of A and B are

1) A=0, B=0 2) A=1, B=1 3) A=1, B=0 4) A=0,B=1

45. Out of the following options which one can be used to produce a propagating electromagnetic wave?

1) A charge moving at constant velocity 2) A stationary charge

3) A charge less particle 4) An accelerating charge

CHEMISTRY

46. Specific volume of cylindrical virus particles is $6.02\times10^{-2} cc/g$ **whose radius and length** $7A^0$ **and** $10A^0$**, If** $N_A = 6.02\times10^{23}$ **find molecular weight of virus**

1) $3.08\times10^3 kg/mol$ 2) $15.4\ kg/mol$ 3) $15.4\times10^4\ kg/mol$ 4) $3.08\times10^4\ kg/mol$

47. Which transition is Li^{+2} **would have the same wavelength as the** $2\rightarrow4$ **transition is** He^+ **ion?**

1) $4\rightarrow2$ 2) $2\rightarrow4$ 3) $3\rightarrow6$ 4) $6\rightarrow2$

48. Pressure of a mixture of 4g of O_2 **and 2g of** H_2 **confined in a bulb of 1 litre at** 0^0C **is**

1) 25.184 atm 2) 31.205 atm 3) 45.215 atm 4) 15.210 atm

49. Which of the following exhibits weakest inter molecular forces

1) NH_3 2) HCl 3) He 4) H_2O

50. If x_1, x_2 & x_3 **are enthalpies of H-H, O=O and O-H bonds respectively and** x_4 **is the enthalpy of vaporization of water, estimate the standard enthalpy of combustion of hydrogen?**

1) $x_1+\frac{x_2}{2}-2x_3+x_4$ 2) $x_1+\frac{x_2}{2}-2x_3-x_4$ 3) $x_1+\frac{x_2}{2}-x_3-x_4$ 4) $2x_3-x_1-\frac{x_2}{2}-x_4$

51. Which of the following on the addition will cause deep red colour to disappear.

$$\underset{\text{Pale yellow}}{Fe^{+3}_{(aq)}} + \underset{\text{Colour less}}{SCN^-_{(aq)}} \rightleftharpoons \underset{\text{Deep red}}{\left[Fe(SCN)\right]^{+2}_{(aq)}}$$

a) KSCN **b)** $HgC\ell_2$ **c)** $H_2C_2O_4$

1) a, b & c 2) a & b only 3) b & c only 4) a & c only

52. Which of the following are not state functions?

I) q+w **II) q** **III) w** **IV) H-Ts**

1) II,III&IV 2) I,II&III 3) II&III 4) I&IV

53. 30 CC of $\frac{M}{3}HC\ell$, 20 CC of $\frac{M}{2}HNO_3$ and 40CC of $\frac{M}{4}NaOH$ **solutions are mixed and the volume was made up to** $1\,dm^3$**. Then pH of the resulting solution is :**

1) 1 2) 2 3) 3 4) 8

54. Mercury is the only metal which is liquid at 0^0C**. This is due to**

1) very high ionization energy and weak metallic bond

2) Low ionization energy

3) high atomic weight 4) high vapour pressure

55. Which substance does not speed up decomposition of H_2O_2**?**

1) glycerol 2) Pt 3) gold 4) MnO_2

56. For alkali metals, which one of the following trends is incorrect

1) Hydration enthalpy : $Li^+ > Na^+ > K^+ > Rb^+$ 2) Ionisation energy : $Li > Na > K > Rb$

3) Density : $Li < Na < K < Rb$ 4) Atomic size : $Li < Na < K < Rb$