SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

Time: 3 Hours | **NEET TOT GT-1** | **Max. Marks: 720 M**

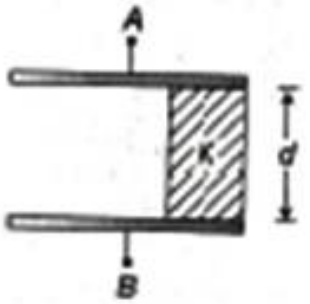
PHYSICS

1. A charged particle of mass m and charge q is released from rest in a uniform electric field E.

The kinetic energy of the particle after time t is

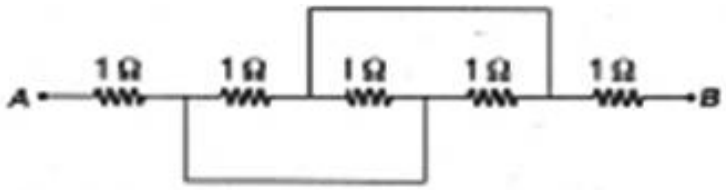
1) $\frac{2E^2t^2}{mq}$ 2) $\frac{E^2t^2m}{2t^2}$ 3) $\frac{E^2q^2t^2}{2m}$ 4) $\frac{Eqm}{2t}$

2. A Parallel plate capacitor with vaccum b/w its plates has capacitance C. A slab of dielectric constant K and having the same thickness as the separation b/w the plates is introduced. So as to fill 1/3 rd of the capacitor as shown in the figure. The new capacitance will be



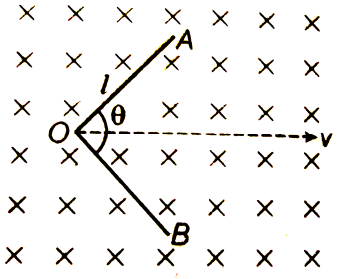
1) $(K+2)\frac{C}{4}$ 2) $(K+2)\frac{C}{3}$ 3) $(K+3)\frac{C}{4}$ 4) $(K+3)\frac{C}{3}$

3. Equivalent resistance b/w the points A and B $(in\,\Omega)$



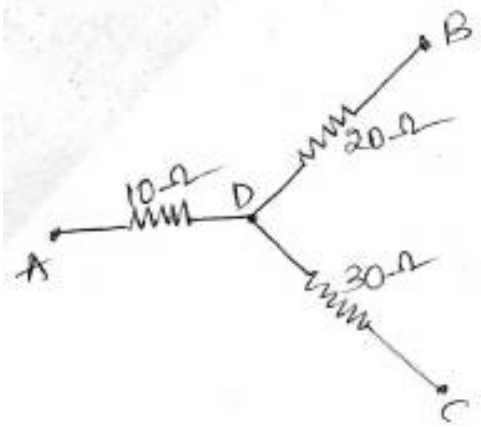
1) $1/5$ 2) $1\frac{1}{4}$ 3) $2\frac{1}{3}$ 4) $3\frac{1}{2}$

4. An $\angle AOB$ made of a conducting wire moves along its bisector through a magnetic field B as suggested by figure. Find the emf induced between the two free ends if the magnetic field is perpendicular to the plane of the paper.



1) $B\ell\sin(\theta/2)$ 2) $Bv\sin(\theta/2)$ 3) $2B\ell v\sin(\theta/2)$ 4) $B\ell v\sin(\theta/4)$

5. In the circuit given here, the points A, B and C are 70V, zero and 10V respectively. Then



1) The point D will be at a potential of 60V
2) The point D will be at a potential of 20V
3) Currents in the paths AD,DB and DC are in the ratio 1:2:3
4) Currents in the paths AD,DB and DC are in the ratio 3:2:1

6. In an ammeter 0.2 % of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

1) $\frac{499}{500}G$ 2) $\frac{1}{500}G$ 3) $\frac{500}{499}G$ 4) $\frac{1}{499}G$

7. The pressure exerted by an electromagnetic wave of intensity I (watt m^{-2}) on a non-reflecting surface is [c is the velocity of light]

1) Ic 2) Ic^2 3) I / c 4) I / c^2

8. A beam of electrons is accelerated through a Potential difference V. It is then passed normally through a uniform magnetic field where it moves in a circle of radius r. It would have moved in a circle of radius 2r if it were initially accelerated through a Potential difference.

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

9. A magnetic needle lying parallel to a magnetic field requires W units of work to turn it through 60^0. The torque required to maintain the needle in this position is

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

10. A thin rod of length 'L' and mass 'M' held vertically with one and fixed on the floor is allowed to fall. The velocity of the other end when it hits the floor is

1) $\sqrt{3gL}$ 2) $\sqrt{5gL}$ 3) $\sqrt{2gL}$ 4) $\sqrt{gL}$

11. In a step-up transformer, the turns ratio of primary and secondary is 1:2 A leclanche cell of emf 1.5 V is connected a cross the primary. The voltage developed across the secondary would be

1) zero 2) 3.0 V 3) 1.5V 4) 0.75V

12. Choose the correct option

1) The radiation in increasing order of frequency are radio waves, micro waves, infrared, visible, ultraviolet, x-rays, gamma rays, cosmic rays.
2) The wave length of colours in increasing order violet, indigo blue, green, yellow, orange and red
3) The speed of light is maximum in vacuum .
4) All options are correct.

13. A beam of light of wavelength λ is incident on a metal having work function ϕ and placed in a magnetic field B. The most energetic electrons emitted perpendicular to the field are bent in circular arcs of radius R. Then

1) $B=\frac{mv}{eR}, Where\ \frac{hc}{\lambda}=\phi+\frac{1}{2}mv^2$ 2) $B=\frac{mR}{ev}, Where\ \frac{hc}{\lambda}=\phi+\frac{1}{2}mv^2$

3) $B=\frac{mv}{eR}, Where\ \frac{hc}{\lambda}=\phi+\frac{1}{2}mv^2$ 4) None

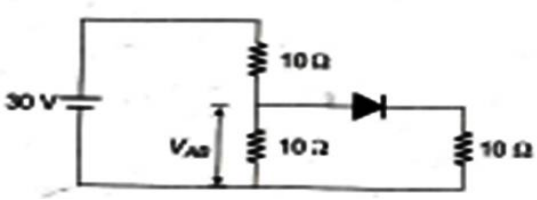
14. If the electron in a hydrogen atom jumps from the third orbit to the second orbit, the emitted radiation has wave length. ('R' is Rydberg's constant).

1) $\frac{36}{5R}$ 2) $\frac{5R}{36}$ 3) $\frac{6}{5R}$ 4) $\frac{5R}{6}$

15. Three-fourths of the active nuclei present in a radioactive sample decay in $\frac{3}{4}s$. The half-life of the sample is

1) 1 sec 2) ½ sec 3) ¾ sec 4) 3/8 sec

16. Find V_{AB}

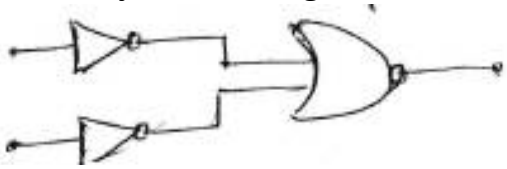


1) 10V 2) 20V 3) 30V 4) None of these

17. A particle of mass m is projected with a velocity v making an angle of 45° with horizontal. The magnitude of the angular momentum of the projectile about the point of projection when the particle is at its maximum height h is

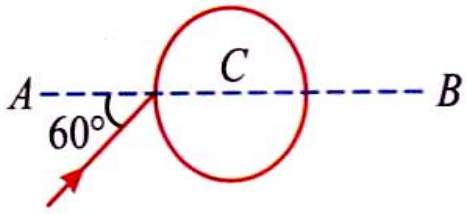
1) $m\sqrt{2gh^2}$ 2) $\frac{mv^3}{\sqrt{2}g}$ 3) $\frac{mv^3}{4\sqrt{2}g}$ 4) zero

18. Which logic gate is represented by the following combination of logic gates



1) OR 2) NAND 3) AND 4) OR

19. A ray of light falls on a transparent sphere with centre at C as shown in figure. The ray emerges from the sphere parallel to line AB. The refractive index of the sphere is



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

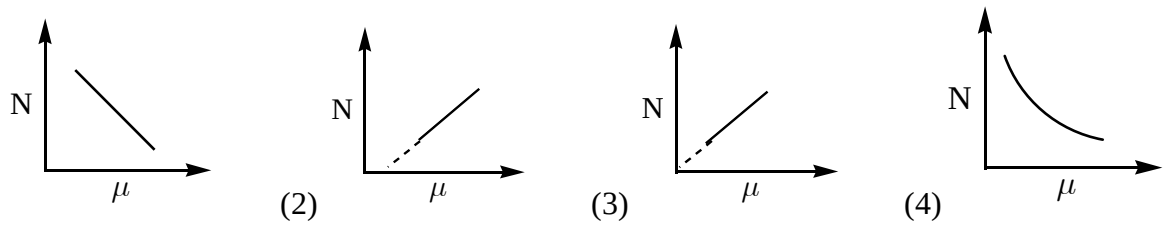
20. The focal length of a biconvex lens is 20 cm and its refractive index is 1.5. If the radii of curvatures of two surfaces of lens are in the ratio 1:2, then the larger radius of curvature is (in cm)

1) 10 2) 15 3) 20 4) 30

21. **In a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is $2V$. If the base resistance is $1k\Omega$ and the current amplification of the transistor is 100, the input signal voltage is.**

1) 0.1V 2) 1.0V 3) 1 mV 4) 10mV

22. **YDSE is completely submerged in a transparent liquid. Which of the following graphs best represent the variation of the total number of fringes N observed on the screen with the index of refraction of the liquid μ**

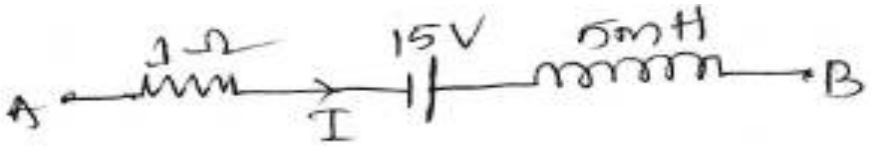


(1) (2) (3) (4)

23. **When the angle of incidence on a material is $60°$, the reflected light is completely polarized. The velocity of the refracted ray inside the material is $\left(in\ ms^{-1}\right)$**

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

24. **If $I=5A$ and decreasing at a rate of $10^3\left(A/\sec\right)$ then V_B-V_A**



1) 5V 2) 10V 3) 15V 4) 20V

25. **Match the Columns**

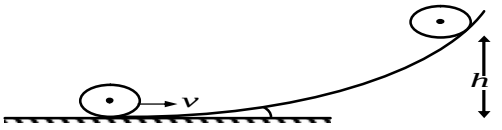
I	**II**
A) Work, torque, energy, heat	**i)** $ML^{-1}T^{-2}$
B) Young's modulus, bulk modulus, Shear modulus, pressure, stress	**ii)** ML^2T^{-2}
C) Angular momentum, Plank's constant	**iii)** MLT^{-1}
D) Momentum, impulse	**iv)** ML^2T^{-1}

	A	**B**	**C**	**D**
1)	i	ii	iii	iv
2)	ii	i	iv	iii
3)	iv	iii	ii	i
4)	iii	iv	ii	i

26. **A particle moves a long a straight line such that its displacement s at any time t is given by $s=t^3-6t^2+3t+4$ metres, t being in second. The velocity when the acceleration is zero is**

1) 3m/s 2) -12m/s 3) 42m/s 4) -9m/s

27. **A disc of mass *M* and radius *R* rolls on a horizontal surface and then rolls up and inclined plane as shown in the figure. If the velocity of the disc is *v*, then height to which the disc will rise will be**



1) $\frac{3v^2}{2g}$ 2) $\frac{3v^2}{4g}$ 3) $\frac{v^2}{4g}$ 4) $\frac{v^2}{2g}$

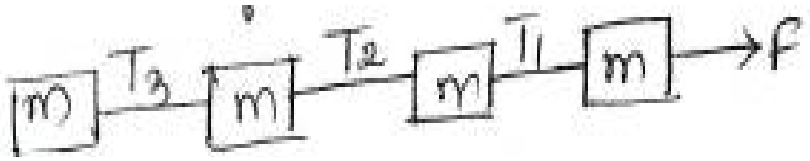
28. An object is projected with a velocity of 10m/s at an angle 45^0 with horizontal. The equation of trajectory followed by the projectile is $y = \alpha x - \beta x^2$, the ratio α / β is

1) 5 2) 10 3) 15 4) 20

29. A ship is travelling due east at a speed of 15km/h. Find the speed of a boat heading 30^0 east of north if it appears always due north from the ship.

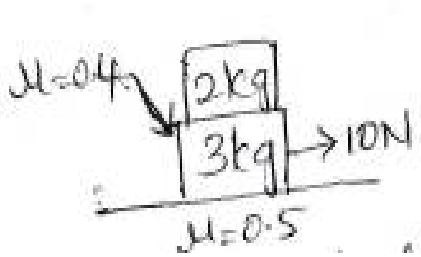
1) $30 km/h$ 2) $\frac{15\sqrt{3}}{2} km/h$ 3) $10\sqrt{3} km/h$ 4) $20 km/h$

30. Four identical blocks each of mass m are linked by threads as shown. If the system moves with constant acceleration under the influence of force F, the tension T_2 is



1) F 2) $F/2$ 3) 2F 4) $F/4$

31. The friction acting on the upper block is



1) 8N 2) 2N 3) 25N 4) zero

32. A mass m moves with a velocity V and collides in elastically will another identical mass. After collision, the 1st mass moves with velocity $\frac{V}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. Find the speed of the 2nd mass after collision.

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

33. A uniform cube of side 'a' and mass 'M' rests on a rough horizontal table. A horizontal force 'F' is applied normal to one of the faces at a point that is directly above the centre of the face at a height $\frac{3a}{4}$ above the base. The minimum value of 'F' for which the cube begins to topple about an edge is

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

34. A point P lies on the axis of a ring of mass M and radius a, at a distance a from its centre c. A small particle starts from P and reaches c under gravitational attraction only. Its speed at c will be

1) $\sqrt{\frac{2GM}{a}}$ 2) $\sqrt{\frac{2GM}{a}\left(1-\frac{1}{\sqrt{2}}\right)}$ 3) $\sqrt{\frac{2GM}{a}\left(\sqrt{2}-1\right)}$ 4) *zero*

35. Two blocks of mass m_1 and m_2 are attached to the lower end of a light vertical spring of force constant k. The upper end of the spring is fixed. When the system is in equilibrium the lower block (m_2) is removed. The other block (m_1) will

1) remain undisturbed

2) move through a distance $\frac{m_2 g}{k}$ and come to rest.

3) undergo vertical SHM with a time period of $2\pi\sqrt{\frac{m_1}{k}}$

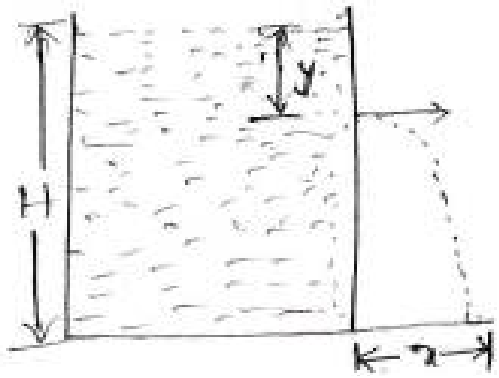
4) undergo vertical SHM with a time period of $2\pi\frac{\sqrt{m_1+m_2}}{k}$

36. The minimum phase difference b/w the two simple harmonic oscillations

$y_1 = \frac{1}{2}\sin\omega t + \left[\frac{\sqrt{3}}{2}\right]\cos\omega t$ **and** $y_2 = \sin\omega t + \cos\omega t$ **is**

1) $\frac{\pi}{6}$ 2) $-\frac{\pi}{6}$ 3) $\frac{\pi}{12}$ 4) $\frac{7\pi}{12}$

37. A tank, which is open at the top, contains a liquid up to a height H. A small hole is made in the side of the tank at a distance y below the liquid surface. The liquid emerging from the hole lands at a distance x from the tank. Choose incorrect option.



1) If y is increased from zero to H, x will first increase and then decrease.

2) x is maximum for $y = \frac{H}{2}$

3) The maximum value of x is H.

4) The maximum value of x will depend on the density of liquid

38. If a metal wire is stretched a little beyond its elastic limit (or yield point), and release it will.

1) lose its elastic property completely 2) not contract

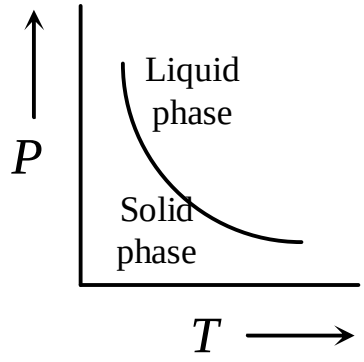
3) contract, but its final length will be greater than its initial length

4) contract only up to its length at the elastic limit

39. The ends of stretched wire of length L are fixed at $x=0$ and $x=L$, In one experiment the displacement of the wire is $y_1 = A\sin\left(\frac{\pi x}{L}\right)\sin\omega t$ and energy is v is $y_2 = A\sin\left(\frac{2\pi x}{L}\right)\sin 2\omega t$ and energy is E_2. Then

1) $E_2 - E_1$ 2) $E_2 = 2E_1$ 3) $E_2 = 4E_1$ 4) $E_2 = 16E_1$

40. The pressure-temperature (*P*-*T*) phase diagram shown below corresponds to the



1) curve of fusion of solids that expand on solidification.
2) curve of sublimation of solids that directly go over to the vapour phase
3) curve of fusion of solids that contract on solidification
4) curve of fusion of solids that do not change in volume upon solidification.

41. A whistle revolves in a circle with an angular speed of $20 rad/s$ using a string of length $50 cm$. If the frequency of sound from the whistle is $385 Hz$. Then what is the minimum frequency heard by an observer, which is far away from the centre in the same plane? $(V = 340 m/s)$

1) $333 Hz$ 2) $374 Hz$ 3) $385 Hz$ 4) $394 Hz$

42. Which of the following gases has maximum *rms* speed at a given temperature

1) hydrogen 2) nitrogen 3) oxygen 4) carbon dioxide

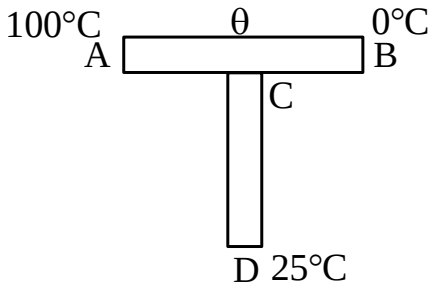
43. A 5g piece of ice at $-20^0 C$ is put into 10g of water at $30^0 C$. Assuming that heat is exchanged only b/w the ice and water. The final temperature of the mixture.

1) $10^0 C$ 2) $20^0 C$ 3) $0^0 C$ 4) $15^0 C$

44. A carnot cycle has the reversible process in the following order.

1) Isothermal expansion, adiabatic expansion, isothermal compression and adiabatic compression.
2) Isothermal compression, adiabatic expansion, isothermal expansion and adiabatic compression.
3) Isothermal expansion, adiabatic compression, isothermal compression and adiabatic expansion.
4) Adiabatic expansion, isothermal expansion, adiabatic compression and isothermal compression.

45. A rod of thermal resistance $5 K/W$ is joined at the middle of a n identical rod AB as shown. The temperature of C and heat current in CD will be



1) $35^0 C, 4W$ 2) $45^0 C, 4W$ 3) $35^0 C, 3W$ 4) $45^0 C, 3W$