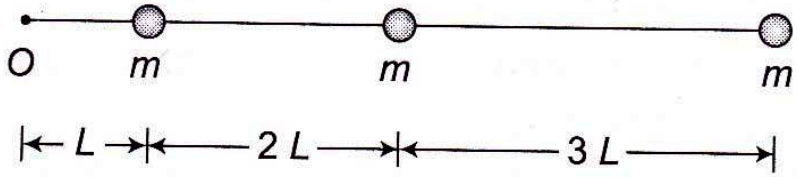
SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

Time: 3 Hours | **NEET TOT GT-10** | **Max. Marks: 720 M**

PHYSICS

1. Three identical particles are joined together by a thread as shown. All the three particles are moving in a horizontal plane. If the velocity of the outermost particle is v_0, then the ratio of tensions in the three sections of the string is



1) 3 : 5 : 6 2) 3 : 4 : 5 3) 6 : 9 : 10 4) 7 : 6 : 11

2. A physical quantity is given by $X = \left[M^a L^b T^c\right]$. The percentage error in measurement of M, L and T are α, β and γ. Then, the maximum % error in the quantity X is

1) $a\alpha + b\beta + c\gamma$ 2) $a\alpha + b\beta - c\gamma$ 3) $\frac{a}{\alpha} + \frac{b}{\beta} - \frac{c}{\gamma}$ 4) none of these

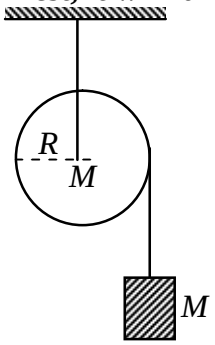
3. An object moving with a speed of 6.25m/s, is deaccelerated at a rate given by $\frac{dv}{dt} = -2.5\sqrt{v}$, where v is the instantaneous speed. The time taken by the object, to come to rest would be

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

4. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is

1) 90^0 2) 45^0 3) 180^0 4) 0^0

5. A mass *M* is supported by a massless string wound round a uniform cylinder of mass *M* and radius *R*. On releasing the mass from rest, it will fall with acceleration :

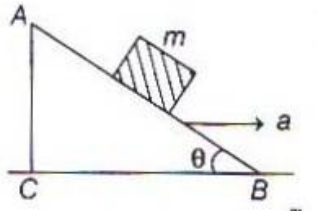


1) g 2) $\frac{1}{2}g$ 3) $\frac{1}{3}g$ 4) $\frac{2}{3}g$

6. A body of mass *m* is dropped from a height *nR* above the surface of the earth (here *R* is the radius of the earth). The speed at which the body hits the surface of the earth is

1) $\sqrt{\frac{2gR}{(n+1)}}$ 2) $\sqrt{\frac{2gR}{(n-1)}}$ 3) $\sqrt{\frac{2gRn}{(n-1)}}$ 4) $\sqrt{\frac{2gRn}{(n+1)}}$

7. A block of mass *m* is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acceleration a towards the right. The relation between a and θ for the block to remain stationary on the wedge is



1) $a = g\cos\theta$ 2) $a = \frac{g}{\sin\theta}$ 3) $a = \frac{g}{\cos ec\theta}$ 4) $a = g\tan\theta$

8. A car of mass 1000kg negotiates a banked curve of radius 90m on a frictionless road. If the banking angle is 45^0, the speed of the car is

1) $20\,ms^{-1}$ 2) $30\,ms^{-1}$ 3) $5\,ms^{-1}$ 4) $10\,ms^{-1}$

9. The magnifying power of a telescope is 9.when it is adjusted for parallel rays the distance between the objective and eye-piece is 20 cm. the focal length of the lenses are

1) 10cm, 10cm 2) 15cm, 5cm 3) 18cm, 2cm 4) 11cm, 9cm

10. The potential energy of a particle in a force field is $U = \frac{A}{r^2} - \frac{B}{r}$, where A and B are positive constants and *r* is the distance of particle from the center of the field. For stable equilibrium, the distance of the particle is

1) B/2A 2) 2A/B 3) A/B 4) B/A

11. A moving neutron collides with a stationary α -particle. The fraction on the kinetic energy lost by the neutron is

1) 16/25 2) 9/25 3) 3/5 4) 2/5

12. A constant torque of 31.4N-m is exerted on a pivoted wheel. If angular acceleration of wheel is $4\pi\ rad/\sec^2$, then the moment of inertia of the wheel is

1) $2.5\,kg-m^2$ 2) $3.5\,kg-m^2$ 3) $4.5\,kg-m^2$ 4) $5.5\,kg-m^2$

13. A circular disc rolls down an inclined plane. The ratio of rotational kinetic energy to total kinetic energy is

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

14. An object of mass m is raised from the surface of the earth to a height equal to the radius of the earth, that is, taken from a distance R to 2R from the centre of the earth. What is the gain in its potential energy ?

1) $\frac{1}{2}mgR$ 2) $\frac{1}{4}mgR$ 3) $\frac{1}{2}mgR^2$ 4) $\frac{1}{6}mgR$

15. A beam of ordinary light is incident on a system of four polaroids which are arranged in succession such that each polaroid is turned through 30^0 with respect to the preceding one. The percentage of the incident intensity that emerges out from the system is approximately

1) 56% 2) 6.25% 3) 28% 4) 21%

16. The average depth of Indian ocean is about 3000m. The fractional compression. $\frac{\Delta v}{V}$ of water at the bottom of the ocean (given that the bulk modulus of the water = $2.2\times10^9\,N/m^2$ and $g = 10\,m/s^2$) is

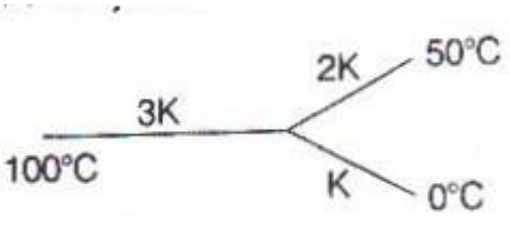
1) 0.82% 2) 0.91% 3) 1.36% 4) 1.24%

17. In drops of liquid, each with surface energy E, join to form a single drop. In this process

1) some energy will be absorbed 2) energy absorbed is $E\left(n-n^{2/3}\right)$

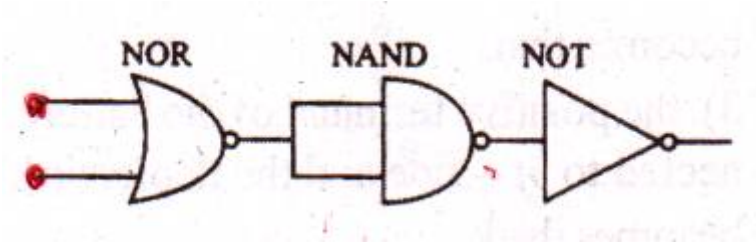
3) energy released will be $E\left(n-n^{2/3}\right)$ 4) energy released will be $E\left(n^{2/3}-1\right)$

18. Three rods of same dimensions have thermal conductivities 3K, 2K and K. They are arranged as shown, with their ends at $100^0C, 50^0C$ and 0^0C. The temperature of their junction is



1) 75^0C 2) $\frac{200}{3}{}^0C$ 3) 40^0C 4) $\frac{100}{3}{}^0C$

19. The circuit



Is equivalent to

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

20. When an ideal monoatomic gas is heated at constant pressure, fraction of heat energy supplied which increases the internal energy of gas, is

1) $\frac{2}{5}$ 2) $\frac{3}{5}$ 3) $\frac{3}{7}$ 4) $\frac{3}{4}$

21. Two mole of oxygen is mixed with eight mole of helium. The effective specific heat of the mixture at constant volume

1) 1.3R 2) 1.4R 3) 1.7R 4) 1.9R

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

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

23. A carnot engine, having an efficiency of $\eta = \frac{1}{10}$ as heat engine is used as a refrigerator. If the work done on the system is 10J, the amount of energy absorbed from the reservoir at lower temperature is

1) 100J 2) 99J 3) 90J 4) 1J

24. A particle is executing SHM along a straight line. Its velocities at distance x_1 and x_2 from the mean position are v_1 and v_2, respectively. Its time period is

1) $2\pi\sqrt{\frac{x_1^2+x_2^2}{v_1^2+v_2^2}}$ 2) $2\pi\sqrt{\frac{x_2^2-x_1^2}{v_1^2-v_2^2}}$ 3) $2\pi\sqrt{\frac{v_1^2+v_2^2}{x_1^2+x_2^2}}$ 4) $2\pi\sqrt{\frac{v_1^2-v_2^2}{x_1^2-x_2^2}}$

25. The equation $y = A\cos^2\left[2\pi nt - 2\pi\frac{x}{\lambda}\right]$ represents a wave with

1) amplitude A/2, frequency 2*n* and wavelength λ
2) amplitude A/2, frequency 2*n* and wavelength $\lambda/2$
3) amplitude A, frequency *n* and wavelength λ
4) amplitude A, frequency 2*n* and wavelength 2λ

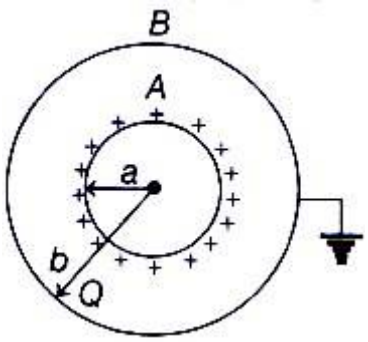
26. Two cars moving in opposite directions approach each other with speed of 22m/s and 16.5m/s respectively. The driver of the first car blows a horn having a frequency 400Hz. The frequency heard by the driver of the second car is [velocity of sound 340m/s]

1) 350 Hz 2) 361 Hz 3) 411 Hz 4) 448 Hz

27. Two positive ions, each carrying a charge q, are separated by a distance d. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be (e being the charge on an electron)

1) $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$ 2) $\sqrt{\frac{4\pi\varepsilon_0 Fe^2}{d^2}}$ 3) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{e^2}}$ 4) $\frac{4\pi\varepsilon_0 Fd^2}{q^2}$

28. What will be the equivalent capacitance of the system as shown in the figure, where two spherical conductors A and B of radii a and b(b>a) are placed concentrically in air with a charge +Q on A and B being earthed ?

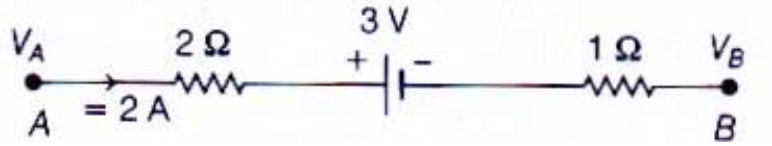


1) $4\pi\varepsilon_0\left(\frac{ab}{b-a}\right)$ 2) $4\pi\varepsilon_0(a+b)$ 3) $4\pi\varepsilon_0 b$ 4) $4\pi\varepsilon_0\left(\frac{b^2}{b-a}\right)$

29. If potential (in volts) in a region is expressed as $V(x,y,z)=6xy-y+2yz$, the electric field (in N/C) at point (1,1,0) is

1) $-(3\hat{i}+5\hat{j}+3\hat{k})$ 2) $-(6\hat{i}+5\hat{j}+2\hat{k})$ 3) $-(2\hat{i}+3\hat{j}+\hat{k})$ 4) $-(6\hat{i}+9\hat{j}+\hat{k})$

30. The potential difference $(V_A - V_B)$ between the points A and B in the given figure is

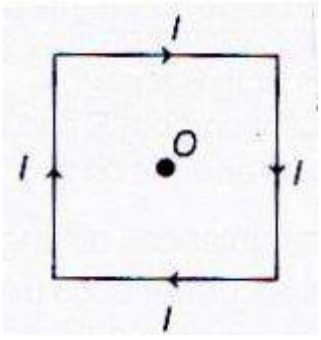


1) -3V 2) +3V 3) +6V 4) +9V

31. Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of the metal wires respectively, the effective conductivity of the combination is

1) $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$ 2) $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$ 3) $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$ 4) $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

32. A square wire of each side *I* carries a current *l*. What is the magnetic field at the mid-point of the square ?

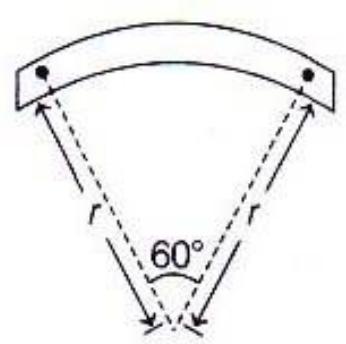


1) $4\sqrt{2}\frac{\mu_0}{4\pi}\frac{I}{l}$ 2) $8\sqrt{2}\frac{\mu_0}{4\pi}\frac{I}{l}$ 3) $16\sqrt{2}\frac{\mu_0}{4\pi}\frac{I}{l}$ 4) $32\sqrt{2}\frac{\mu_0}{4\pi}\frac{I}{l}$

33. An α -particle describes a circular path of radius r in a magnetic field B. What will be the radius of the circular path described by the proton of same energy in the same magnetic field ?

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

34. A bar magnet of length l and magnetic dipole moment M is bent in the form of an arc shown in figure. The new magnetic dipole moment will be



1) M 2) $\frac{3}{\pi}M$ 3) $\frac{2}{\pi}M$ 4) $\frac{M}{2}$

35. A coil having n turns and resistance $R\Omega$ is connected with a galvanometer of resistance $4R\Omega$. This combination is moved in time t second. From a magnetic field (W_1) Wb to (W_2) Wb. The induced current in the circuit is

1) $\frac{W_2 - W_1}{5Rnt}$ 2) $\frac{-n(W_2 - W_1)}{5Rt}$ 3) $\frac{-(W_2 - W_1)}{Rnt}$ 4) $-\frac{n(W_2 - W_1)}{Rt}$

36. The instantaneous values of alternating current and voltages in a circuit are given as

$I = \frac{1}{\sqrt{2}}\sin(100\pi t)$ **ampere**

$e = \frac{1}{\sqrt{2}}\sin(100\pi t + \pi/3) volt$

The average power (in watts) consumed in the circuit is

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

37. In an electromagnetic wave in free space, the root mean square value of the electric field is $E_{rms} = 6V/m$. The peak value of the magnetic field is

1) $1.41\times10^{-8}T$ 2) $2.83\times10^{-8}T$ 3) $0.70\times10^{-8}T$ 4) $4.23\times10^{-8}T$

38. A ray of light is incident at an angle of incidence *i* on one face of a prism of angle A(assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

1) μA 2) $\frac{\mu A}{2}$ 3) A/μ 4) $A/2\mu$

39. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be

1) $\frac{\sqrt{n}}{n+1}$ 2) $\frac{2\sqrt{n}}{n+1}$ 3) $\frac{\sqrt{n}}{(n+1)^2}$ 4) $\frac{2\sqrt{n}}{(n+1)^2}$

40. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T(kelvin) and mass m, is

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

41. Two identical photocathodes receive light of frequencies f_1 and f_2. If the velocities of the photoelectrons (of mass *m*) coming out are respectively v_1 and v_2, then

1) $v_1^2 - v_2^2 = \frac{2h}{m}(f_1 - f_2)$ 2) $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{1/2}$

3) $v_1^2 + v_2^2 = \frac{2h}{m}(f_1 + f_2)$ 4) $v_1 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{1/2}$

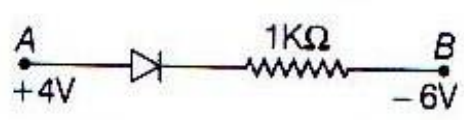
42. An excited hydrogen atom returns to the ground state. The wavelength of emitted photon is λ. The principal quantum number of the excited state will be

1) $\left(\frac{\lambda R}{\lambda R - 1}\right)^{1/2}$ 2) $\left(\frac{\lambda R - 1}{\lambda R}\right)^{1/2}$ 3) $\left[\lambda(\lambda R - 1)\right]^{1/2}$ 4) $\left[\frac{1}{\lambda R(\lambda R - 1)}\right]^{1/2}$

43. Radioactive material A has decay constant 8λ and material B has decay constant λ. Initially, they have same number of nuclei. After what time, the ratio of number of nuclei of material A to that B will be $\frac{1}{e}$?

1) $\frac{1}{\lambda}$ 2) $\frac{1}{7\lambda}$ 3) $\frac{1}{8\lambda}$ 4) $\frac{1}{9\lambda}$

44. Consider the junction diode as ideal. The value of current flowing through AB is



1) $10^{-2}A$ 2) $10^{-1}A$ 3) $10^{-3}A$ 4) $0A$

45. A common emitter amplifier has a voltage gain of 50, an input impedance of 100Ω and an output impedance of 200Ω. The power gain of the amplifier is

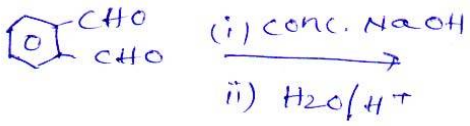
1) 1000 2) 1250 3) 100 4) 500

CHEMISTRY

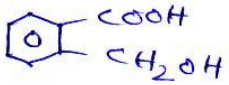
46. Cloud or fog is a colloidal system in which the dispersed phase and the dispersion medium are ___ and _____ respectively.

1) Liquid, gas 2) gas, liquid 3) Liquid, Liquid 4) Solid, gas

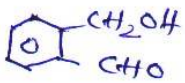
47.



1) 

2) 

3) 

4) 

48. IUPAC name of Acetanilide is :

1) N-phenyl ethanamide 2) N-methyl benzanamide
3) N-phenyl benzene carboxamide 4) N-methyl ethanamide