SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

Time: 3 Hours | **NEET TOT GT-4** | **Max. Marks: 720 M**

PHYSICS

1. **An experiment measures quantities x, y, z and then t is calculated from the data as $t = \frac{xy^2}{z^3}$. If percentage errors in x, y and z are respectively $1\%, 3\%, 2\%$, then percentage error in t is**

1) 10% 2) 4% 3) 7% 4) 13%

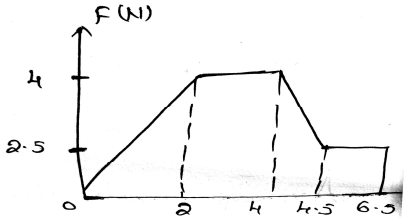
2. **A particle is dropped from height *H*. At a point its kinetic energy is *x* times of its potential energy. Find the speed of the particle at that point (Reference of P.E is ground)**

1) $\left[2gxH\right]^{1/2}$ 2) $\left[\frac{2g(x+1)H}{x}\right]^{1/2}$ 3) $\left[\frac{2gH}{(x+1)}\right]^{1/2}$ 4) $\left[\frac{2gxH}{(x+1)}\right]^{1/2}$

3. **A man moves on his motor bike with 54 Km/h and then takes a U-turn and continues to move with same velocity. The time of U-turn is 10 S. Find the magnitude of average acceleration during U-turn**

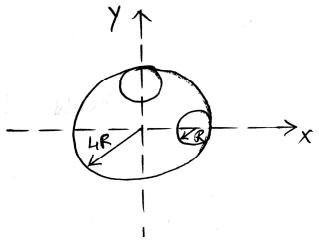
1) 0 2) $3ms^{-2}$ 3) $1.5\sqrt{2}ms^{-2}$ J 4) none

4. **A body of 2 kg has an intial Speed $5ms^{-1}$. A force acts on it for some time in the direction of motion. The force time graph is shown in figure. The final speed of the body is**



1) $9.25ms^{-1}$ 2) $5ms^{-1}$ 3) $14.3ms^{-1}$ 4) $4.25ms^{-1}$

5. **From the Circular disc of radius 4R two small disc of radius R are cut off. The Centre of mass of the new structure will be**



1) $i\frac{R}{5} + j\frac{R}{5}$ 2) $-i\frac{R}{5} + j\frac{R}{5}$ 3) $\frac{-3R}{14}\left(\hat{i} + \hat{j}\right)$ 4) *none*

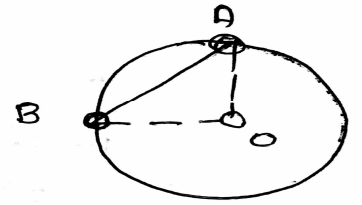
6. **Two Radioactive substances X and Y emit α and β particles respectively. Their disintegration constants are in the ratio 2 : 3. To have equal rate of disintegration of getting emission of α and β particles., the ratio of number of atoms of X to that of Y at any time instant is**

1) 2 : 3 2) 3 : 2 3) e : 1 4) (e – 1) : 1

7. **A uniform rope of mass m and length L is hanged freely from stationary ceiling. If the cross sectional area of rope is A and Young's modulus Y, then net elongation in the rope due to its own weight**

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

8. Beads A and B each of mass m are connected by a light in extensible cord. They are constrained (restricted) to move on a frictionless vertical plane as shown. The beads are released from rest at the position shown. The tension in the cord just after the release is



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

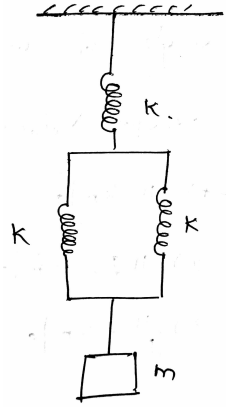
9. A uniform thin bar of mass 6 m and length 12 L is bent to make a regular hexagon. Its moment of inertia about an axis passing through the centre of mass and perpendicular to the plane of the hexagon is

1) $20mL^2$ 2) $6mL^2$ 3) $\frac{12}{5}mL^2$ 4) $30mL^2$

10. The force $7\hat{i}+3\hat{j}-5\hat{k}$ acts on a particle whose Position Vector is $\hat{i}-\hat{j}+\hat{k}$. What is the torque For the given force about the origin?

1) $2\hat{i}+12\hat{j}+10\hat{k}$ 2) $2\hat{i}+10\hat{j}+12\hat{k}$ 3) $2\hat{i}+10\hat{j}+10\hat{k}$ 4) $10\hat{i}+2\hat{j}+\hat{k}$

11. What will be time period of the displaced body of mass m?

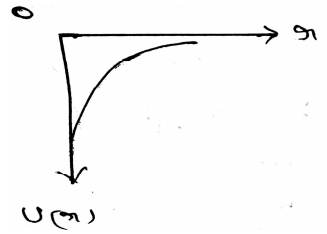


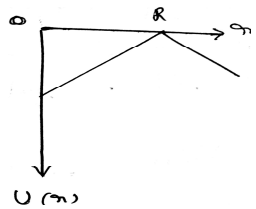
1) $2\pi\sqrt{\frac{m}{2k}}$ 2) $2\pi\sqrt{\frac{3m}{k}}$ 3) $2\pi\sqrt{\frac{3m}{2k}}$ 4) $\pi\sqrt{\frac{3m}{k}}$

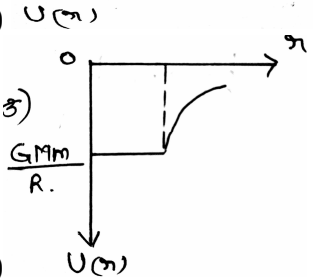
12. For a Satellite escape Velocity is 11 km/s. If the Satellite is launched at an angle of 60^0 with the vertical, then escape velocity will be

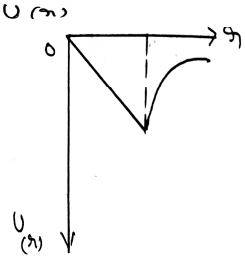
1) $11km/s$ 2) $5.5\sqrt{3}km/s$ 3) $11/\sqrt{3}km/s$ 4) $5.5km/s$

13. A shell of mass M and radius R has a point mass m placed at a distance 'r' from its centre. The gravitational potential energy $U(r)$ $verses\,'r'$ will be

1) 

2) 

3) 

4) 

14. Weight of a body is measured by a beam balance. Using standard brass weights. If the air buoyancy is neglected fractional error arises in the measurement is (given density of brass, air and the object are $8gm/cc, 0.0012gm/cc$ **and** $3.4gm/cc$ **respectively)**

1) 2×10^{-1} 2) 2×10^{-2} 3) 2×10^{-3} 4) 2×10^{-4}

15. Two identical long solid cylinders are used to conduct heat from temp T_1 to T_2. Originally the cylinders are connected in series and the rate of heat transfer is H. If the cylinders are connected in parallel then the rate of heat transfer would be

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

16. The radiation emitted by a star A is 10000 times that of the sun. If the surface temperatures of the sun and star A are 6000 k and 2000 k respectively, the ratio of the radii of the star A and the sun is

1) 300 : 1 2) 600 : 1 3) 900 : 1 4)1200 : 1

17. One kilogram of ice at 0^0C is mixed with one kilogram of water at 80^oC. The final temperature of the mixture is

(take specific heat of water = $4200Jkg^{-1}k^{-1}$**) (latent heat of ice = 336 kJ/kg)**

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

18. In an adiabatic process where in pressure is increased by $\frac{2}{3}\%$ if $\frac{C_p}{C_v}=\frac{3}{2}$, then the volume decreases by about

1) $\frac{4}{9}\%$ 2) $\frac{2}{3}\%$ 3) 4% 4) $\frac{9}{4}\%$

19. An ideal refrigerator has a freezer at a temperature of -13^0c. The co-efficient of performance of the engine is 5. The temperature of the air (to which heat is rejected) will be

1) 325^oc 2) $325k$ 3) 39^oc 4) 320^oc

20. Four molecules of a gas have speeds 1, 2, 3 and 4 kms^{-1} respectively. The value of rms speed of the molecules is (in kms^{-1})

1) $\sqrt{\frac{15}{2}}$ 2) $2\sqrt{15}$ 3) $\frac{\sqrt{15}}{2}$ 4) none

21. A glass tube 1.5 m long and open at both ends, is immersed vertically in a water tank completely. A tuning fork of 660Hz is vibrated and kept at the upper end of the tube and the tube is gradually raised out of water. The total number of resonances heard before the tube comes out of water , taking velocity of sound in air 330 m/sec is

1) 12 2) 6 3) 8 4) 4

22. A table is revolving on its axis at 5 revolutions per second. A sound of frequency 1000Hz is fixed on the table at 70 cm from the axis. The minimum frequency heard by a listener standing at a distance from the table will be (speed of sound = 352 m/s)

1) *1000 Hz* 2) *1066 Hz* 3) *941 Hz* 4) *352 Hz*

23. Two Convex lenses of powers 4D and 6D are separated by a distance of $\frac{1}{6}m$. The power of the optical system so formed is

1) -6 D 2) +6 D 3) 10 D 4) 2 D

24. In a compound microscope , the focal lengths of two lenses are 1.5 cm and 6.25 cm an object is placed at 2 cm from objective and the final image is formed at 25 cm from eye lens. The distance between the two lenses is

1) 6.00 cm 2) 7.75 cm 3) 9.25 cm 4) 11.00 cm

25. The minimum deviation produced by a hollow prism filled with a certain liquid is found to be 30^0. The light ray is also found to be refracted at angle of 30^0. The refractive index of the liquid is

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

26. If a transparent medium of refractive index $\mu = 1.5$ and thickness $t = 2.5\times10^{-5} m$ is inserted in front of one of the slits of Young's Double slit experiment, how much will be the shift in the interference pattern. The distance between the slits is 0.5 mm and that between slits and screen is 100 cm.

1) 5 cm 2) 2.5 cm 3) 0.25 cm 4) 0.1 cm

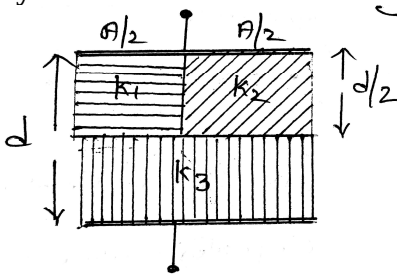
27. Conditions of diffraction is (a= size of the object / aperture , $\lambda =$ wave length of light)

1) $\frac{a}{\lambda} = 1$ 2) $\frac{a}{\lambda} >> 1$ 3) $\frac{a}{\lambda} << 1$ 4) none of these

28. An infinite number of charges , each of charge $1\mu c$ are placed on the x-axis with co-ordinates x=1,2,4,8,….∞. If a charge of 1C is kept at the origin, then what is the net force acting on 1C charge

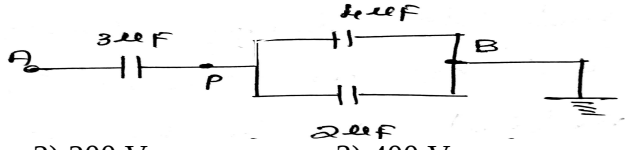
1) 9000 N 2) 12000 N 3) 24000 N 4) 36000 N

29. A parallel plate capacitor of area A, plate separation d and capacitance C is filled with three different di-electric materials having di-electric constants k_1, k_2 and k_3 as shown. If a single di-electric material is to be used to have the same capacitance C in this capacitor, then its di-electric constant k is given by



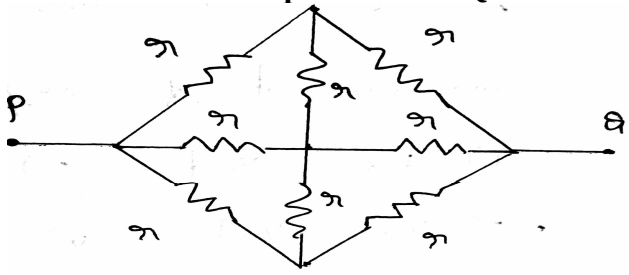
1) $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{2k_3}$ 2) $\frac{1}{k} = \frac{1}{k_1 + k_2} + \frac{1}{2k_3}$ 3) $k = \frac{k_1 k_2}{k_1 + k_2} + 2k_3$ 4) $k = k_1 + k_2 + 2k_3$

30. In the figure a potential of +1200 V is given to point A and point B is earthed, What is the potential at the point P?



1) 100 V 2) 200 V 3) 400 V 4) 600 V

31. The equivalent resistance between the points P and Q in the network given here is equal to (given r = $\frac{3}{2}\Omega$)

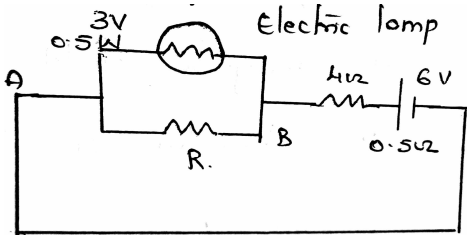


1) $\frac{1}{2}\Omega$ 2) 1Ω 3) $\frac{3}{2}\Omega$ 4) 2Ω

32. A Voltmeter having a resistance of 998 ohm is connected to a cell of emf 2 volt and internal resistance 2 ohms. The error in the measurement of emf will be

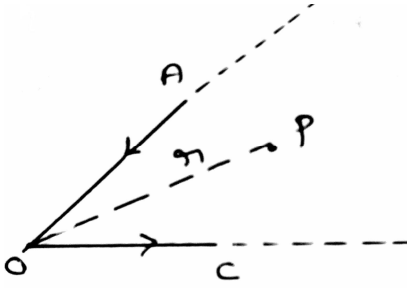
1) $4\times10^{-1}volt$ 2) $2\times10^{-3}volt$ 3) $4\times10^{-3}volt$ 4) $2\times10^{-1}volt$

33. What should be the value of resistance R in the circuit shown in figure so that the electric bulb consumes the rated power?



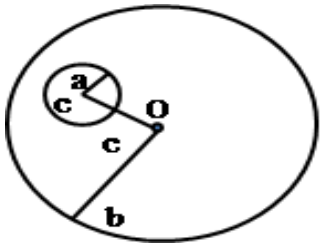
1) 4.5Ω 2) 6Ω 3) 12Ω 4) none

34. Two wires AO and OC carry equal currents i as shown in figure. One end of both the wire extends to infinity. Angle AOC is α. The magnitude of magnetic field at a point P on the bisector of these two wires at a distance r from point O is



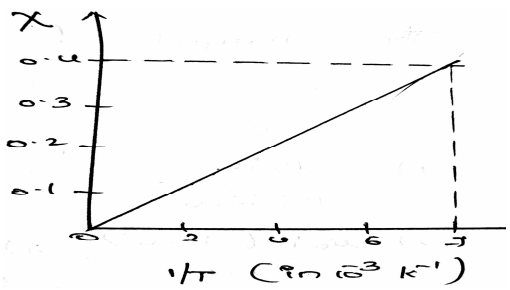
1) $\frac{\mu_o}{2\pi}\frac{i}{r}\cot\left(\frac{\alpha}{2}\right)$ 2) $\frac{\mu_o}{4\pi}\frac{i}{r}\cot\left(\frac{\alpha}{2}\right)$ 3) $\frac{\mu_o}{2\pi}\frac{i}{r}\frac{\left(1+\cos\frac{\alpha}{2}\right)}{\sin\frac{\alpha}{2}}$ 4) $\frac{\mu_o}{4\pi}\frac{i}{r}\left(\frac{\alpha}{2}\right)$

35. A long straight metal rod has a very long hole of radius 'a' drilled parallel to the rod axis as shown in figure. If the rod carries a current I, find the magnetic field on axis of hole. Given c is the centre of the hole and OC = c



1) $\frac{\mu_0 ic}{\pi\left(b^2-a^2\right)}$ 2) $\frac{\mu_0 ic}{2\pi\left(b^2-a^2\right)}$ 3) $\frac{\mu_0 i\left(b^2-a^2\right)}{2\pi c}$ 4) $\frac{\mu_0 ic}{2\pi b^2}$

36. The $\chi-(1/T)$ graph for an alloy of paramagnetic nature is shown in figure. The Curie Constant is, then



1) 57 k 2) $2.8\times10^{-3}k$ 3) 570 k 4) $17.5\times10^{-3}k$

37. An air core solenoid has 1000 turns and is one meter long. Its cross-sectional area is 10 cm^2. Its self-inductance is

1) 0.1256 mH 2) 12.56 mH 3) 1.256 mH 4) 125.6 mH

38. A Virtual Current of its 4A and 50 Hz flows in an AC circuit containing a coil. The power consumed in the coil is 240 W. If the Virtual Voltage across the coil is 100 Vits inductance will be

1) $\frac{1}{3\pi}H$ 2) $\frac{1}{5\pi}H$ 3) $\frac{1}{7\pi}H$ 4) $\frac{1}{9\pi}H$

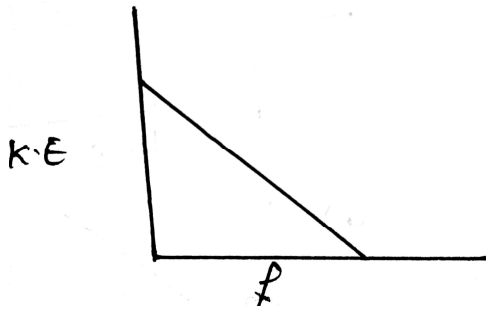
39. The power factor of a good choke coil is

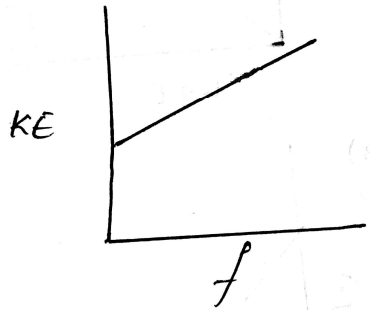
1) Nearly zero 2) Exactly zero 3) Nearly one 4) Exactly one

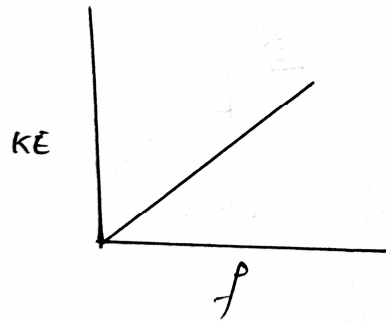
40. In an electromagnetic wave, the average energy density associated with magnetic field is

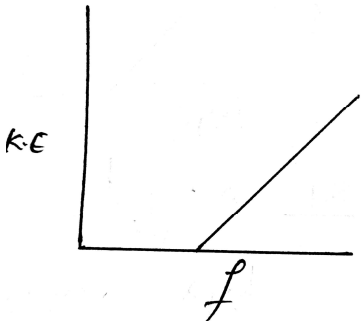
1) $\frac{Li_0^2}{2}$ 2) $\frac{B^2}{2\mu_0}$ 3) $\frac{\mu_0 B^2}{2}$ 4) $\frac{\mu_0}{2B^2}$

41. According to Einstein`s Photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

1) 

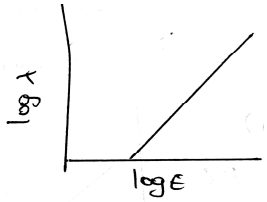
2) 

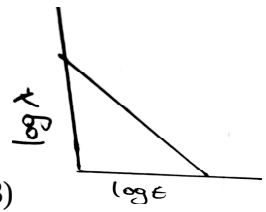
3) 

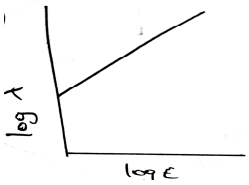
4) 

42. The $\log\lambda - \log E$ graph between the energy E of an electron and its de-Brogile wavelength λ will be

1) 

2) 

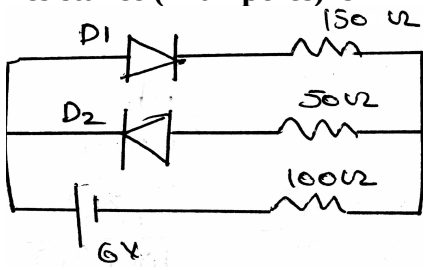
3) 

4) 

43. Oribital acceleration of electron is

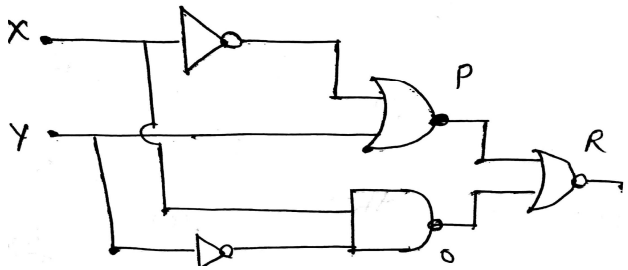
1) $\frac{n^2h^2}{4\pi^2m^2r^3}$ 2) $\frac{n^2h^2}{2n^2r^3}$ 3) $\frac{4n^2h^2}{\pi^2m^2r^3}$ 4) $\frac{4n^2h^2}{4\pi^2m^2r^3}$

44. The circuit shown in following figure contains two diode D_1 and D_2 each with a forward resistance of 50 ohm and with infinite backward resistance. If the battery voltage is 6 V, the current through the 100 ohm resistance (in amperes) is



1) zero 2) 0.020 3) 0.03 4) 0.036

45. Figure gives a system of logic gates. From the study of truth table it can be found that to produce a high out put (1) at R, we must have



1) $x=0; y=1$ 2) $x=1; y=1$ 3) $x=1; y=0$ 4) $x=0; y=0$

CHEMISTRY

46. The strength of bond formed by overlapping of atomic orbitals is in order

1) $s-s<s-p<p-p$ 2) $s-s<p-p<s-p$

3) $s-p<s-s<p-p$ 4) $p-p<s-s<s-p$

47. The molecule which possess both sp^3 and sp^3d^2 hybridisation is

1) solid PCl_5 2) gaseous PCl_5 3) PCl_4 4) PCl_6

48. Which of the following orders is correct for the bond dissociation energy of O_2, O_2^+, O_2^- and O_2^{2-} ?

1) $O_2^+ > O_2 > O_2^- > O_2^{2-}$ 2) $O_2^+ > O_2 < O_2^- < O_2^{2-}$

3) $O_2^+ < O_2 < O_2^- < O_2^{2-}$ 4) $O_2^+ > O_2 > O_2^- < O_2^{2-}$

49. Ethers are more volatile than alcohols having same molecular formula. This is due to

1) Intermolecular H-bonding in ethers 2) Intermolecular H-bonding in alcohols

3) Dipolar character of ethers 4) Resonance structure in alcohols

50. A co-ordination complex compound of cobalt has the molecular formulae containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution and on reacting with excess of $AgNO_3$, AgCl precipitate. The ionic formula for thiscomplex would be

1) $\left[Co(NH_3)_5(NO_2)\right]Cl_2$ 2) $\left[Co(NH_3)_5 Cl\right]\left[Cl(NO_2)\right]$

3) $\left[Co(NH_3)_4(NO_2)Cl_2\right]Cl$ 4) $\left[Co(NH_3)_5\right]\left[(NO_2)_2 Cl_2\right]$

51. Amongst $TiF_6^{2-}, CoF_6^{3-} Cu_2Cl_2$ and $NiCl_4^{2-}$ (atomic number Ti=22,Co=27,Cu=29,Ni=28). The colourless species are

1) $CoF_6^{3-} and NiCl_4^{2-}$ 2) $TiF_6^{2-} and CoF_6^{3-}$

3) $Cu_2Cl_2 and NiCl_4^{2-}$ 4) $TiF_6^{2-} and Cu_2Cl_2$