**AaaaaaaaaAAAAAIEEE Previous Years Papers**

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| http://www.askiitians.com/images/image_40.jpg |
| [AIEEE Paper](http://www.askiitians.com/aieee/AIEEE-Past-Papers) > 2007-Physics**AIEEE 2007 Physics**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **1)**  The displacement of an object attached to a spring and executing simple harmonic motion is given by x = 2 X 10-2 cos πt metres. The time at which the maximum speed first occurs is t 1 )   0.5 s2 )   0.75 s3 )   0.125 s4 )   0.25 s **2)** In an a.c. circuit the voltage applied is E = E0 sin ωt. The resulting current in the circuit is I = I0 sin (ωt - π/2) . The power consumption in the circuit is given by1 )  p = E0I0/√22 )  P = zero3 )  p = E0I0/24 )  P = √2 E0I0  **3)** An electric charge 10-3 μ C is placed at the origin (0, 0) of X - Y co-ordinate system. Two points A and B are situated at ( √2, √2) and (2, 0) respectively. The potential difference between the points A and B will be1 )   9 volt2 )   zero3 )   2 volt4 )   4.5 volt **4)** A battery is used to charge a parallel plate capacitor till the potential difference between the plates becomes equal to the electromotive force of the battery. The ratio of the energy stored in the capacitor and the work done by the battery will be1 )   12 )   23 )   1/44 )   1/2 **5)** An ideal coil of 10 H is connected in series with a resistance of 5 Ω and a battery of 5V. 2 seconds after the connection is made, the current flowing in amperes in the circuit is 1 )   (1 - e) 2 )   e3 )    e-14 )    (1 - e-1) **6)** A long straight wire of radius a carries a steady current i. The current is uniformly distributed across its cross section. The ratio of the magnetic field at a/2 and 2a is 1 )   ¼ 2 )   4 3 )   1 4 )   ½**7)**  A current I flows along the length of an infinitely long, straight, thin walled pipe. Then 1 )   the magnetic field is zero only on the axis of the pipe2 )   the magnetic field is different at different points inside the pipe3 )   the magnetic field at any point inside the pipe is zero4 )   the magnetic field at all points inside the pipe is the same, but not zero  **8)**  If M0 is the mass of an oxygen isotope 8O17 , MP and MN are the masses of a proton and a neutron respectively, the nuclear binding energy of the isotope is1 )   (M0 - 8 MP) C22 )   (M0 - 8 MP - 9 MN) C23 )   (M0 C2 4 )  4 )   (M0 - 17 MN) C2  **9)**In gamma ray emission from a nucleus1 )   both the neutron number and the proton number change2 )   there is no change in the proton number and the neutron number3 )   only the neutron number changes4 )   only the proton number changes  **10)**  If in a p-n junction diode, a square input signal of 10V is applied as shown                                    p-n-junction-diode    Then the output signal across RL will be output-signal-across-RL **11)**  Photon of frequency ν has a momentum associated with it. If c is the velocity of light, the momentum is 1 )   ν/c 2 )   h ν c 3 )   h ν /c2 4 )   h ν /c  **12)**    The velocity of a particle is v = v0 + gt + ft2 . If its position is x = 0 at t = 0, then its displacement after unit time (t = 1) is1 )   v0 + 2g + 3f2 )   v0 + g/2 + f/33 )   v0 + g + f4 )   v0 + g/2 + f  **13)**     For the given uniform square lamina ABCD, whose centre is O,                                    uniform-square-lamina1 )   √2 IAC = IEF2 )   IAD = 3 IEF3 )   IAC = IEF4 )   IAC = √2 IEF**14)**    A point mass oscillates along the x-axis according to the law x = x0 cos (ω t - π/4). If the acceleration of the particle is written as a = A cos (ω t + δ ). , then 1 )   A = x0 , δ = - π/42 )   A = x0 ω2 , δ = π/43 )   A = x0 ω2 , δ = - π/44 )   A = x0 ω2 , δ = 3π/4  **15)**    Charges are placed on the vertices of a square as shown. Let **E** be the electric field and **V** the potential at the centre. If the charges on A and B are interchanged with those on D and C respectively, then                                             charges-on-vertices-of-square1 )   **E** remains unchanged, **V** changes2 )   both Both **E** and **V** change3 )   **E** and **V** remains unchanged4 )   **E** changes, **V** remains unchanged  **16)**    The half-life period of a radio-active element X is same as the mean life time of another radioactive element Y. Initially they have the same number of atoms. Then1 )   X will decay faster than Y2 )   Y will decay faster than X3 )   X and Y have same decay rate initially4 )   X and Y decay at same rate always  **17)**    A Carnot engine, having an efficiency of η = 1/10 as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is1 )   99 J2 )   90 J3 )   1 J4 )   100 J  **18)**    Carbon, silicon and germanium have four valence electrons each. At room temperature which one of the following statements is most appropriate ?1 )  The number of free conduction electrons is significant in C but small in Si and Ge2 )  The number of free conduction electrons is negligible small in all the three3 )  The number of free electrons for conduction is significant in all the three4 )  The number of free electrons for conduction is significant only in Si and Ge but    small in C  **19)**    A charged particle with charge q enters a region of constant, uniform and mutually orthogonal fields **E** and **B** with a velocity **v** perpendicular to both **E** and **B** , and comes out without any change in magnitude or direction of **v** . Then1 )   **v** = **E** X **B**/B22 )   **v** = **B** X **E**/B23 )   **v** = **E** X **B**/E24 )   **v** = **B** X **E**/E2  **20)**    The potential at a point x (measured in μ m) due to some charges situated on the x-axis is given by V(x) = 20/(x2 - 4) Volts. The electric field E at x = 4 μ m is given by1 )   5/3 Volt/μ m and in the -ve x direction2 )   5/3 Volt/μ m and in the +ve x direction3 )   10/9 Volt /μ m and in the -ve x direction4 )   10/9 Volt/μ m and in the +ve x direction**21)**    Which of the following transitions in hydrogen atoms emit photons of highest frequency ? 1 )   n = 2 to n = 6 2 )   n = 6 to n = 2 3 )   n = 2 to n = 1 4 )   n = 1 to n = 2  **22)**    A block of mass 'm' is connected to another block of mass 'M' by a spring (massless) of spring constant 'k'. The blocks are kept on a smooth horizontal plane. Initially the blocks are at rest and the spring is unstretched. Then a constant force 'F' starts acting on the block of mass 'M' to pull it. Find the force on the block of mass 'm'1 ) mF/M2 ) (M + m)F/M3 ) mF/M+m4 ) MF/M+m **23)**    Two lenses of power - 15 D and + 5D are in contact with each other. The focal length of the combination is1 )   - 20 cm2 )   - 10 cm3 )   + 20 cm4 )   + 10 cm  **24)**    One end of a thermally insulated rod is kept at a temperature T1 and the other at T2. The rod is composed of two sections of lengths l1 and l2 and thermal conductivities k1 and k2 respectively. The temperature at the interface of the two sections is                                           thermally-insulated-rod1 )   ( k2 l2 T1 + k1 l1 T2 ) / ( k1 l1 + k2 l2 )2 )   ( k2 l1 T1 + k1 l1 T2 ) / ( k2 l1 + k1 l2 )3 )   ( k1 l2 T1 + k2 l1 T2 ) / ( k1 l2 + k2 l1 )4 )   ( k1 l1 T1 + k2 l2 T2 ) / ( k1 l1 + k2 l2 )  **25)**   A sound absorber attenuates the sound level by 20 dB. The intensity decreases by a factor of1 )   10002 )   100003 )   104 )   100  **26)**    If Cp and Cv denote the specific heats of nitrogen per unit mass at constant pressure and constant volume respectively, then1 )   Cp - Cv = R/282 )   Cp - Cv = R/143 )   Cp - Cv = R4 )   Cp - Cv = 28 R  **27)**    A charged particle moves through a magnetic field perpendicular to its direction. Then1 )   the momentum changes but the kinetic energy is constant2 )   both momentum and kinetic energy of the particle are not constant3 )   both, momentum and kinetic energy of the particle are constant4 )   kinetic energy changes but the momentum is constant      **28)**   Two identical conducting wires AOB and COD are placed at right angles to each other. The wire AOB carries an electric current I1 and COD carries a current I2. The magnetic field on a point lying at a distance 'd' from O, in a direction perpendicular to the plane of the wires AOB and COD, will be given by 1 )   μ0 /2 π (I1 + I2/d)½ 2 )   μ0 /2 π d (   I12 + I22 )½ 3 )   μ0 /2 π d ( I1 + I2 )4 )   μ0 /2 π d (I12 + I22 )  **29)**   The resistance of a wire is 5 ohm at 50°C and 6 ohm at 100°C. The resistance of the wire at 0°C will be1 )   2 ohm2 )   1 ohm3 )   4 ohm4 )   3 ohm  **30)**   A parallel plate condenser with a dielectric of dielectric constant K between the plates has a capacity C and is charged to a potential V volts. The dielectric slab is slowly removed from between the plates and then reinserted. The net work done by the system in this process is 1 )   1/2 (K - 1) C V2 2 )   C V2(K - 1)K 3 )   (K - 1)C V2 4 )   zero  **31)**   If gE and gm are the accelerations due to gravity on the surfaces of the earth and the moon respectively and if Millikan's oil drop experiment could be performed on the two surfaces, one will find the ratio (electronic charge on the moon)/(electronic charge on the earth) to be1 )   12 )   03 )   gE/gm4 )   gm/gE  **32)**   A circular disc of radius R is removed from a bigger circular disc of radius 2R such that the circumferences of the discs coincide. The centre of mass of the new disc is αR from the centre of the bigger disc. The value of α is1 )   1/32 )   1/23 )   1/64 )   1/4  **33)**   A round uniform body of radius R, mass M and moment of inertia 'I' , rolls down (without slipping) an inclined plane making an angle θ with the horizontal. Then its acceleration is1 )   gsin θ/(1 + (I/(MR2)))2 )   gsin θ/( 1 + ((MR2)/I))3 )   gsin θ/(1 - (I/(MR2)))4 )   gsin θ/(1 - ((MR2)/I)) **34)**   Angular momentum of the particle rotating with a central force is constant due to 1 )   Constant Force2 )   Constant linear momentum3 )   Zero Torque4 )   Constant Torque**35)**   A 2 kg block slides on a horizontal floor with a speed of 4 m/s. It strikes a uncompressed spring, and compresses it till the block is motionless. The kinetic friction force is 15 N and spring constant is 10,000. N/m. The spring compresses by 1 )   5.5 cm2 )   2.5 cm3 )   11.0 cm4 )   8.5 cm  **36)**   A particle is projected at 60° to the horizontal with a kinetic energy K. The kinetic energy at the highest point is1 )   K2 )   Zero3 )   K/24 )   K/4  **37)**   In a Young's double slit experiment the intensity at a point where the path difference is λ/6 ( λ being the wavelength of the light used ) is I . If I0 denotes the maximum intensity , I/I0 is equal to1 )   1/√22 )   √3/23 )   1/24 )   3/4  **38)**   Two springs, of force constants k1 and k2 are connected to a mass m as shown. The frequency of oscillation of the mass is f. If both k1 and k2 are made four times their original values, the frequency of oscillation becomes                      two-springs-connected1 )   f/22 )   f/43 )   4f4 )   2f  **39)**   When a system is taken from state i to state f along the path iaf, it is found that Q = 50 cal and W = 20 cal. Along the path ibf Q = 36 cal. W along the path ibf is                                         system1 )   6 cal2 )   16 cal3 )   66 cal4 )   14 cal **40)**   A particle of mass m executes simple harmonic motion with amplitude 'a' and frequency 'ν' . The average kinetic energy during its motion from the position of equilibrium to the end is1 )   π2 m a2ν22 )   (1/4) π2 m a2ν23 )   4 π2 m a2ν24 )   2 π2 m a2ν2 |

# **1) The displacement of an object attached to a spring and executing simple harmonic motion is given by x = 2 X 10-2 cos πt metres. The time at which the maximum speed first occurs is t**

# **0.125 s**

# **0.25 s**

#

# **2) In an a.c. circuit the voltage applied is E = E0 sin ωt. The resulting current in the circuit is I = I0 sin (ωt - π/2is given by**

# **p = E0I0/√2**

# **P = zero**

# **p = E0I0/2**

# **P = √2 E0I0**

#

# **3) An electric charge 10-3 μ C is placed at the origin (0, 0) of X - Y co-ordinate system. Two points A and B are 2, √2) and (2, 0) respectively. The potential difference between the points A and B will be**

# **9 volt**

# **2 volt**

# **4.5 volt**

#

# **4) A battery is used to charge a parallel plate capacitor till the potential difference between the plates becomes equal to the electromotive force of the battery. The ratio of the energy stored in the capacitor and the work done by the battery will be**

# **1**

# **2**

# **1/4**

# **1/2**

#

# **5) An ideal coil of 10 H is connected in series with a resistance of 5 Ω and a battery of 5V. 2 seconds after the connection is made, the current flowing in amperes in the circuit is**

#  **(1 - e)**

#  **(1 - e-1)**

#

# **6) A long straight wire of radius a carries a steady current i. The current is uniformly distributed across its cross section. The ratio of the magnetic field at a/2 and 2a is**

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# **3 ) 1/4**

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#  **1 ) ¼**

#  **2 ) 4**

#  **3 ) 1**

#  **4 ) 1/2**

#  **1 ) ¼**

#  **2 ) 4**

#  **3 ) 1**

#  **4 ) 1/2AIaaaaaaaaaaaaaAAAAAA**

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