MHT CET 2nd and 3rd May 2019

Test Date	02/05/2019
Test Time	9:00 AM - 12:00 PM
Subject	PCM

Section : **Physics**

Q.1 A sotne of mass 1kg is tied to a string 2m long and is rotated at constant speed of 40 ms^{-1} in a vertical circle . The ratio of the tension at the top and the bottom is [Take g = 10ms^{-2}]

Ans

✗ 1. $\dfrac{81}{79}$

✔ 2. $\dfrac{79}{81}$

✗ 3. $\dfrac{19}{12}$

✗ 4. $\dfrac{12}{19}$

Q.2 Two coils have a mutual inductance of 0.01 H. The current in the first coil changes according to equation I = 5 sin 200πt. The maximum value of e.m.f induced in the second coil is

Ans

✔ 1. $10\,\pi$ volt

✗ 2. $0.1\,\pi$ volt

✗ 3. π volt

✗ 4. $0.01\,\pi$ volt

Q.3 The radius of the earth and the radius of orbit around the sun are 6371 km and 149×10^6 km respectively.The order of magnitude of the diameter of the orbit is greater than that of earth by

Ans

✗ 1. 10^3

✗ 2. 10^2

✔ 3. 10^4

✗ 4. 10^5

Q.4 Two open pipes of different lengths and of same diameter in which the air column vibrates with fundamental frequencies 'n_1', and 'n_2' respectively. When both pipes are joined to form a single pipe, its fundamental frequency will be

Ans

✗ 1. $\dfrac{n_1 + n_2}{n_1 n_2}$

✗ 2. $\dfrac{n_1 n_2}{2n_2 + n_1}$

✗ 3. $\dfrac{2n_2 + n_1}{n_1 n_2}$

✔ 4. $\dfrac{n_1 n_2}{n_1 + n_2}$

Q.5 If 'C_p' and C_v are molar specific heats of an ideal gas at constant pressure and volume respectively, If 'λ' is ratio of two specific heats and 'R' is universal gas constant then 'C_p' is equal to

Ans

✔ 1. $\dfrac{R\gamma}{\gamma-1}$

✘ 2. γR

✘ 3. $\dfrac{1+\gamma}{1-\gamma}$

✘ 4. $\dfrac{R}{\gamma-1}$

Q.6 In a series LCR circuit R=300Ω ,L=0.9H,C=2μF , ω =1000rad/s. The impedance of the circuit is

Ans

✔ 1. 500Ω

✘ 2. 1300Ω

✘ 3. 400Ω

✘ 4. 900Ω

Q.7 The quantity which _does not_ vary periodically for a particle performing S.H.M. is

Ans

✘ 1. acceleration

✔ 2. total energy

✘ 3. displacement

✘ 4. velocity

Q.8

Which of the following combinations of 7 identical capacitors each of 2μF gives a resultant capacitance of $^{10}/_{11}$ μF?

Ans

✘ 1. 3 in parallel and 4 in series.

✗ 2. 2 in parallel and 5 in series.

✗ 3. 4 in parallel and 3 in series.

✔ 4. 5 in parallel and 2 in series.

Q.9 Bohr model is applied to a particle of mass 'm' and charge 'q' moving in a plane under the influence of a transverse magnetic field 'B'.
The energy of the charged particle in the nth level will be
(h = Planck's constant)

Ans

✗ 1. $2nhq\,B\,/\,\pi\,m$

✗ 2. $nhq\,B\,/\,2\pi\,m$

✔ 3. $nhq\,B\,/\,4\pi\,m$

✗ 4. $nhq\,B\,/\pi\,m$

Q.1 0 In moving coil galvanometer, strong horse shoe magnet of concave shaped pole pieces is used to

Ans

✗ 1. increase space for roatation of coil.

✗ 2. reduce weight of galvanometer.

✔ 3. produce magnetic field which is parallel to plane of coil at any position.

✗ 4. make magnetic induction weak at the centre.

Q.1 1 Two identical wires of substances 'P' and 'Q' are subjected to equal stretching force along the length. If the elongation of 'Q' is more than that of 'P', then

Ans

✗ 1. both P and Q are equally elastic.

✔ 2. P is more elastic than Q.

✗ 3. P is plastic and Q is elastic.

✗ 4. Q is more elastic than P.

Q.1 2

If W_1, W_2 and W_3 represent the work done in moving a particle from A to B along three different paths1,2 and 3 (as shown in fig) in the gravitational field of the point mass 'm'. Find the correct relation between 'W_1','W_2' and 'W_3'
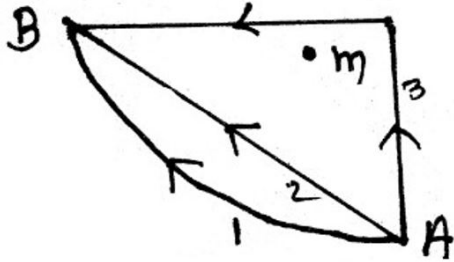
Ans

✗ 1. W1<W3<W2

✗ 2. W1<W2<W3

✔ 3. W1=W2=W3

✗ 4. W1>W3>W2

Q.1 3

Assuming that the junction diode is ideal, the current in the arrangement shown in figure is
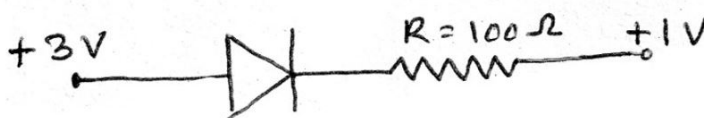
Ans

✗ 1. 30mA

✗ 2. 40mA

✔ 3. 20mA

✗ 4. 10 mA

Q.1 4

The equation of simple harmonic progressive wave is given by
$Y = a \sin 2\pi \ (bt - cx)$
The maximum particle velocity will be twice the wave velocity if

Ans

✗ 1. $c = \pi a$

✗ 2. $c = \dfrac{1}{2\pi a}$

✔ 3. $c = \dfrac{1}{\pi a}$

✗ 4. $c = 2\pi a$

Q.1 5 In fundamental mode,the time required for the sound wave to reach upto the closed end of a pipe filled with air is 't' second .The frequency of vibration of air column is

Ans

✗ 1. $(2t)^{-1}$

✗ 2. $4(t)^{-1}$

✗ 3. $2(t)^{-1}$

✔ 4. $(4t)^{-1}$

Q.1 Two small drops of mercury each of radius 'R' coalesce to form a large single drop. The ratio
6 of the total surface energies before and after the change is

Ans ✗ 1. $2^{2/3}:1$

✗ 2. $\sqrt{2}:1$

✔ 3. $2^{1/3}:1$

✗ 4. $2:1$

Question Type : **MCQ**

Question ID : **469665451**

Option 1 ID : **4696651802**

Option 2 ID : **4696651804**

Option 3 ID : **4696651801**

Option 4 ID : **4696651803**

Status : **Answered**

Chosen Option : **3**

Q.1 If radius of the solid sphere is doubled by keeping its mass constant, the ratio of their
7 moment of inertia about any of its diameter is

Ans ✗ 1. $1:8$

✗ 2. $2:5$

✗ 3. $2:3$

✔ 4. $1:4$

Question Type : **MCQ**

Question ID : **469665496**

Option 1 ID : **4696651981**

Option 2 ID : **4696651983**

Option 3 ID : **4696651984**

Option 4 ID : **4696651982**

Status : **Answered**

Chosen Option : **4**

Q.1 For a metallic wire, the ratio of voltage to corresponding current is
8

Ans ✗ 1. independent of temperature.

✔ 2. increases with rise in temperature.

✗ 3. increases or decreases with rise in temperature depending upon the metal.

✗ 4. decreases with rise in temperature.

Question Type : **MCQ**

Question ID : **469665477**

Option 1 ID : **4696651905**

Option 2 ID : **4696651906**

Option 3 ID : **4696651908**

Option 4 ID : **4696651907**

Q.1 In air, a charged soap bubble of radius 'R' breaks into 27 small soap bubbles of equal radius 'r'.
9 Then the ratio of mechanical force acting per unit area of big soap bubble to that of a small soap bubble is

Ans

✗ 1. $\dfrac{1}{81}$

✗ 2. $\dfrac{3}{1}$

✗ 3. $\dfrac{1}{3}$

✔ 4. $\dfrac{9}{1}$

Question Type : **MCQ**

Question ID : **469665490**

Option 1 ID : **4696651957**

Option 2 ID : **4696651959**

Option 3 ID : **4696651958**

Option 4 ID : **4696651960**

Status : **Answered**

Chosen Option : **3**

Q.2 Two parallel conductors carrying unequal currents in the same direction _____
0

Ans

✗ 1. neither attract nor repel each other.

✗ 2. repel each other.

✔ 3. attract each other.

✗ 4. will have rotational motion.

Question Type : **MCQ**

Question ID : **469665468**

Option 1 ID : **4696651871**

Option 2 ID : **4696651870**

Option 3 ID : **4696651869**

Option 4 ID : **4696651872**

Status : **Answered**

Chosen Option : **3**

Q.2 A layer of atmosphere that reflects medium frequency radio waves which is ineffective during
1 night, is

Ans

✗ 1. F layer

✔ 2. E layer

✗ 3. stratosphere

✗ 4. thermosphere

Question Type : **MCQ**

Question ID : **469665459**

Option 1 ID : **4696651834**

**Q.2
2** A transverse wave is propagating on the string.The linear density of a vibrating string is 10^{-3} kg/m. The equation of the wave is Y = 0.05 sin(x+15t) where x and Y are in metre and time in second.The tension in the string is

Ans ✗ 1. 0.2 N

✗ 2. 0.250 N

✔ 3. 0.225 N

✗ 4. 0.325 N

**Q.2
3** The kinetic energy of a revolving satellite (mass m) at a height equal to thrice the radius of the earth (R) is

Ans ✔ 1. $\dfrac{mgR}{8}$

✗ 2. $\dfrac{mgR}{16}$

✗ 3. $\dfrac{mgR}{2}$

✗ 4. $\dfrac{mgR}{4}$

**Q.2
4** A particle executes the simple hormonic motion with an amplitude ' *A* '. The distance travelled by it in one periodic time is

Ans ✗ 1. $\dfrac{A}{2}$

✗ 2. A

✗ 3. $2A$

✓ 4. $4A$

Question Type : **MCQ**

Question ID : **469665491**

Option 1 ID : **4696651961**

Option 2 ID : **4696651962**

Option 3 ID : **4696651963**

Option 4 ID : **4696651964**

Status : **Answered**

Chosen Option : **4**

**Q.2
5** A galvanometer has resistance of 100Ω and a current of 10mA produces full scale deflection in it. The resistance to be connected to it in series, to get a voltmeter of range 50 volt is

Ans ✗ 1. 3900Ω

✗ 2. 4000Ω

✗ 3. 4600Ω

✓ 4. 4900Ω

Question Type : **MCQ**

Question ID : **469665489**

Option 1 ID : **4696651953**

Option 2 ID : **4696651954**

Option 3 ID : **4696651955**

Option 4 ID : **4696651956**

Status : **Answered**

Chosen Option : **4**

**Q.2
6** The angle made by orbital angular momentum of electron with the direction of the orbital magnetic moment is

Ans ✗ 1. 120°

✗ 2. 60°

✓ 3. 180°

✗ 4. 90°

Question Type : **MCQ**

Question ID : **469665488**

Option 1 ID : **4696651951**

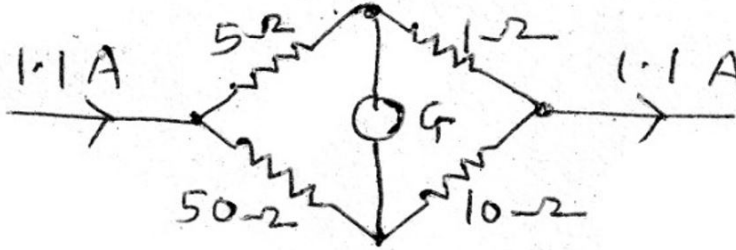Option 2 ID : **4696651949**

Option 3 ID : **4696651952**

Option 4 ID : **4696651950**

Status : **Marked For Review**

Chosen Option : **3**

**Q.2
7**

The current in 1Ω resistor in the following circuit is

Ans

✓ 1. 1A

✗ 2. 0.5A

✗ 3. 1.1A

✗ 4. 0.8A

Q.2
8 The wave length of the first line in Balmer series in the hydrogen spectrum is 'λ'. What is the wavelength of the second line in the same series?

Ans

✓ 1. $\dfrac{20}{27}\lambda$

✗ 2. $\dfrac{3}{16}\lambda$

✗ 3. $\dfrac{5}{36}\lambda$

✗ 4. $\dfrac{3}{4}\lambda$

Q.2
9 Work done in stretching a wire through 1mm is 2J. What amount of work will be done for elongating another wire of same material, with half the length and double the radius of cross section, by 1 mm?

Ans

✗ 1. 2J

✗ 2. 4J

✗ 3. 8J

✔ 4. 16J

**Q.3
0**

The resultant $\vec{R}$ of $\vec{P}$ and $\vec{Q}$ is perpendicular to $\vec{P}$. Also $|\vec{P}| = |\vec{R}|$. The angle between $\bar{P}$ and $\bar{Q}$ is $[\tan 45^o = 1]$

Ans

✗ 1. $\dfrac{5\pi}{4}$

✗ 2. $\dfrac{7\pi}{4}$

✗ 3. $\dfrac{\pi}{4}$

✔ 4. $\dfrac{3\pi}{4}$

**Q.3
1** A telescope has large diameter of the objective.Then its resolving power is

Ans

✗ 1. independent of the diameter of the objective.

✗ 2. low.

✗ 3. zero.

✔ 4. high.

Q.32 A uniform rod of length '6L' and mass '8m' is pivoted at its centre 'C'. Two masses 'm' and '2m' with speed 2v, v as shown strikes the rod and stick to the rod. Initially the rod is at rest. Due to impact, if it rotates with angular velocity 'ω_1' then 'ω' will be.
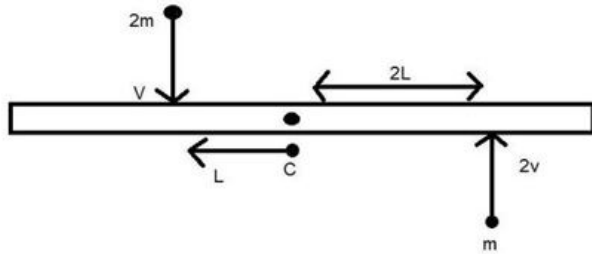
Ans

✔ 1. $\dfrac{v}{5\,L}$

✘ 2. Zero

✘ 3. $\dfrac{8\,v}{6\,L}$

✘ 4. $\dfrac{11\,v}{3\,L}$

Q.33 If $\sqrt{A^2 + B^2}$ represents the magnitude of resultant of two vectors $(\vec{A} + \vec{B})$ and $(\vec{A} - \vec{B})$, then the angle between two vectors is

Ans

✘ 1. $\cos^{-1}\left[-\dfrac{2(A^2 - B^2)}{(A^2 + B^2)}\right]$

✘ 2. $\cos^{-1}\left[-\dfrac{A^2 - B^2}{A^2B^2}\right]$

✔ 3. $\cos^{-1}\left[-\dfrac{(A^2 + B^2)}{2(A^2 - B^2)}\right]$

✘ 4. $\cos^{-1}\left[-\dfrac{(A^2 - B^2)}{A^2 + B^2}\right]$

Q.3 4

A thin metal wire of length 'L' and uniform linear mass density 'ϱ' is bent into a circular coil with 'o' as centre. The moment of inertia of a coil about the axis XX' is
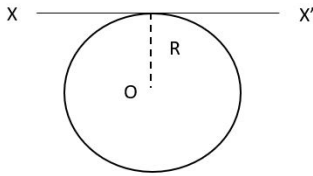
Ans

✔️ 1. $3\varrho L^3/8\pi^2$

❌ 2. $\varrho L^3/4\pi^2$

❌ 3. $3\varrho L^2/4\pi^2$

❌ 4. $\varrho L^3/8\pi^2$

Question Type : **MCQ**

Question ID : **469665471**

Option 1 ID : **4696651881**

Option 2 ID : **4696651884**

Option 3 ID : **4696651883**

Option 4 ID : **4696651882**

Status : **Answered**

Chosen Option : **1**

Q.3 5 The dimensions of torque are same as that of

Ans

✔️ 1. moment of force.

❌ 2. pressure.

❌ 3. acceleration.

❌ 4. impulse.

Question Type : **MCQ**

Question ID : **469665484**

Option 1 ID : **4696651933**

Option 2 ID : **4696651934**

Option 3 ID : **4696651935**

Option 4 ID : **4696651936**

Status : **Answered**

Chosen Option : **1**

Q.3 6 For transistor, the current ratio 'β_{dc}' is defined as the ratio of

Ans

❌ 1. collector current to emitter current

✔️ 2. collector current to base current

❌ 3. base current to collector current

❌ 4. emitter current to collector current

Q.3 7 A clock pendulum having coefficient of linear expansion α = 9×10^{-7}/°C has a period of 0.5 s at 20° C. If the clock is used in a climate where the temperature is 30° C , how much time does the clock lose in each oscillation?(g=constant)

Ans ✗ 1. 2.5×10^{-7}s

✗ 2. 5×10^{-7}s

✗ 3. 1.125×10^{-6}s

✔ 4. 2.25×10^{-6}s

Q.3 8 Two capillary tubes of different diameters are dipped in water .The rise of water is

Ans ✗ 1. zero in both the tubes

✗ 2. same in both the tubes

✗ 3. more in the tube of larger diameter

✔ 4. more in the tube of smaller diameter

Q.3 9 A thin hollow prism of refracting angle 3° , filled with water gives a deviation of 1°.The refractive index of water is

Ans ✗ 1. 1.59

✔ 2. 1.33

✗ 3. 1.46

✗ 4. 1.51

Q.4 A body is projected vertically from the surface of the earth of radius 'R' with velocity equal to
0 half of the escape velocity. The maximum height reached by the body is

Ans ✗ 1. R/5

✔ 2. R/3

✗ 3. R/2

✗ 4. R/4

Question Type : **MCQ**

Question ID : **469665470**

Option 1 ID : **4696651880**

Option 2 ID : **4696651878**

Option 3 ID : **4696651877**

Option 4 ID : **4696651879**

Status : **Answered**

Chosen Option : **2**

Q.4 In biprism experiment ,the distance between source and eyepiece is 1.2 m,the distance
1 between two virtual sources is 0.84 mm. Then the wavelength of light used if eyepiece is to
be moved transversely through a distance of 2.799 cm to shift 30 fringes is

Ans 1. 6533 Å

2. 6537 Å

3. 6535 Å

4. 6351 Å

**Note: For this question, discrepancy is found in question/answer. Full Marks is being awarded
to all candidates.**

Question Type : **MCQ**

Question ID : **469665453**

Option 1 ID : **4696651810**

Option 2 ID : **4696651812**

Option 3 ID : **4696651811**

Option 4 ID : **4696651809**

Status : **Answered**

Chosen Option : **4**

Q.4 When photons of energy $h\nu$ fall on metal plate of work function 'W$_0$', photoelectrons of
2 maximum kinetic enrgy 'K' are ejected. If the frequency of the radiation is doubled, the
maximum kinetic energy of the ejected photoelectrons will be

Ans ✗ 1. $K + W_0$

✔ 2. $K + h\nu$

✗ 3. K

✗ 4. $2K$

Question Type : **MCQ**

Question ID : **469665493**

Option 1 ID : **4696651971**

Q.4 If a star emitting yellow light is accelerated towards earth, them to an observer on earth it will
3 appear

Ans   ✗ 1. becoming orange.

    ✗ 2. shining yellow.

    ✔ 3. gradually changing to blue.

    ✗ 4. gradually changing to red.

Q.4
4 The magnitude of magnetic induction at a point on the axis at a large distance (r) from the centre of circular coil of ' n ' turns, and area ' A ' carrying current (I) is given by

Ans

  ✗ 1. $B_{axis} = \dfrac{\mu_0}{4\pi} \cdot \dfrac{nA}{Ir^3}$

  ✔ 2. $Baxis = \dfrac{\mu_0}{4\pi} \cdot \dfrac{2nIA}{r^3}$

  ✗ 3. $Baxis = \dfrac{\mu_0}{4\pi} \cdot \dfrac{2nI}{Ar^3}$

  ✗ 4. $Baxis = \dfrac{\mu_0}{4\pi} \cdot \dfrac{nIA}{r^3}$

Q.4 A metal sphere of radius 'R' and density 'ϱ_1' is dropped in a liquid of density 'σ' moves with
5 terminal velocity 'V'. Another metal sphere of same radius and density 'ϱ_2' is dropped in the
same liquid, its terminal velocity will be

Ans   ✗ 1. $V[(\varrho_2+\sigma)/(\varrho_1+\sigma)]$

    ✗ 2. $V[(\varrho_1+\sigma)/(\varrho_2+\sigma)]$

    ✔ 3. $V[(\varrho_2-\sigma)/(\varrho_1-\sigma)]$

Q.46 If ∝ is the coefficient of performance of a refrigerator and 'Q_1' is heat released to the hot reservoir, then the heat extracted from the cold reservoir 'Q_2' is

Ans

✗ 1. $\dfrac{\alpha Q_1}{\alpha - 1}$

✗ 2. $\dfrac{\alpha - 1}{\alpha} Q_1$

✔ 3. $\dfrac{\alpha Q_1}{1 + \alpha}$

✗ 4. $\dfrac{1 + \alpha}{\alpha} Q_1$

Q.47 The real force 'F' acting on a particle of mass 'm' performing circular motion acts along the radius of circle 'r' and is directed towards the centre of circle. The square root of magnitude of such force is (T = periodic time)

Ans

✔ 1. $\dfrac{2\pi}{T}\sqrt{mr}$

✗ 2. $\dfrac{Tmr}{4\pi}$

✗ 3. $\dfrac{2\pi T}{\sqrt{mr}}$

✗ 4. $\dfrac{T^2 mr}{4\pi}$

Q.4 Dimensions of Gyromagnetic ratio are
8

Ans ✗ 1. $[L^1M^0T^1I^1]$

✔ 2. $[L^0M^{-1}T^1I^1]$

✗ 3. $[L^1M^0T^0I^1]$

✗ 4. $[L^{-1}M^0T^1I^1]$

Q.4 The maximum velocity of the photoelectron emitted by the metal surface is ' V '.
9 Charge and mass of the photoelectron is denoted by ' e ' and ' m ' respectively. The stopping potential in volt is

Ans

✗ 1. $\dfrac{V^2}{2\left(\dfrac{m}{e}\right)}$

✔ 2. $\dfrac{V^2}{2\left(\dfrac{e}{m}\right)}$

✗ 3. $\dfrac{V^2}{\left(\dfrac{e}{m}\right)}$

✗ 4. $\dfrac{V^2}{\left(\dfrac{m}{e}\right)}$

Q.5 The equiconvex lens has a focal length ' f '. If the lens is cut along the line
0 perpendicular to principal axis and passing through the pole,what will be the focal length of any half part ?

Ans

1. ✗ $\dfrac{f}{2}$

2. ✓ $2f$

3. ✗ $\dfrac{3f}{2}$

4. ✗ f

Question Type : **MCQ**
Question ID : **469665474**
Option 1 ID : **4696651893**
Option 2 ID : **4696651896**
Option 3 ID : **4696651895**
Option 4 ID : **4696651894**
Status : **Answered**
Chosen Option : **4**

Section : **Chemistry**

Q.1 Which of following methods is used to separate wolframite and stannic oxide present in cassiterite?

Ans ✗ 1. Hydraulic washing using Wilfley table

✗ 2. Froth flotation

✗ 3. Hydraulic classifier

✓ 4. Magnetic separation

Question Type : **MCQ**
Question ID : **469665526**
Option 1 ID : **4696652104**
Option 2 ID : **4696652101**
Option 3 ID : **4696652103**
Option 4 ID : **4696652102**
Status : **Answered**
Chosen Option : **4**

Q.2 In the reaction , $MnO_4^{-1}{}_{(aq.)} + Br^{-1}{}_{(aq.)} \rightarrow MnO_{2(s)} + BrO_{3(aq)}^{-1}$,the correct change in oxidation number of the species involved is

Ans ✗ 1. Br^{+5} to Br^{-1}

✗ 2. Mn^{+7} to Mn^{+2}

✗ 3. Mn^{+7} to Mn^{+3}

✓ 4. Br^{-1} to Br^{+5}

Question Type : **MCQ**
Question ID : **469665534**
Option 1 ID : **4696652136**
Option 2 ID : **4696652133**
Option 3 ID : **4696652134**