# JEE April 2019

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| Roll No. | |
| Candidate Name | |
| Application No | |
| Test Date | 10/04/2019 |
| Test Time | 9:30 AM - 12:30 PM |
| Subject | Paper I EH |

Section : **Physics**

**Q.1** Two radioactive materials A and B have decay constants $10\lambda$ and $\lambda$, respectively. If initially they have the same number of nuclei, then the ratio of the number of nuclei of A to that of B will be $1/e$ after a time :

**Options**

1. $\frac{1}{9\lambda}$
2. $\frac{1}{11\lambda}$
3. $\frac{11}{10\lambda}$
4. $\frac{1}{10\lambda}$

Question Type : **MCQ**
Question ID : **41652913081**
Option 1 ID : **41652951105**
Option 2 ID : **41652951103**
Option 3 ID : **41652951104**
Option 4 ID : **41652951102**
Status : **Answered**
Chosen Option : **1**

**Q.2** A particle of mass m is moving along a trajectory given by

$x = x_0 + a\cos\omega_1 t$

$y = y_0 + b\sin\omega_2 t$

The torque, acting on the particle about the origin, at $t = 0$ is :

**Options**

1. $m(-x_0 b + y_0 a)\omega_1^2\hat{k}$
2. $+my_0 a\omega_1^2\hat{k}$
3. Zero
4. $-m(x_0 b\omega_2^2 - y_0 a\omega_1^2)\hat{k}$

Question Type : **MCQ**
Question ID : **41652913058**
Option 1 ID : **41652951011**
Option 2 ID : **41652951010**
Option 3 ID : **41652951013**
Option 4 ID : **41652951012**
Status : **Not Answered**
Chosen Option : **--**

**Q.3** The value of acceleration due to gravity at Earth's surface is 9.8 $ms^{-2}$. The altitude above its surface at which the acceleration due to gravity decreases to 4.9 $ms^{-2}$, is close to : (Radius of earth = $6.4 \times 10^6$ m)

**Options**
1. $2.6 \times 10^6$ m
2. $6.4 \times 10^6$ m
3. $9.0 \times 10^6$ m
4. $1.6 \times 10^6$ m

Question Type : **MCQ**
Question ID : **41652913063**
Option 1 ID : **41652951030**
Option 2 ID : **41652951031**
Option 3 ID : **41652951033**
Option 4 ID : **41652951032**
Status : **Answered**
Chosen Option : **2**

**Q.4** A moving coil galvanometer allows a full scale current of $10^{-4}$ A. A series resistance of 2 MΩ is required to convert the above galvanometer into a voltmeter of range 0 - 5 V. Therefore the value of shunt resistance required to convert the above galvanometer into an ammeter of range 0-10 mA is :

**Options**
1. 500 Ω
2. 100 Ω
3. 200 Ω
4. 10 Ω

Question Type : **MCQ**
Question ID : **41652913084**
Option 1 ID : **41652951116**
Option 2 ID : **41652951115**
Option 3 ID : **41652951114**
Option 4 ID : **41652951117**
Status : **Answered**
Chosen Option : **1**

**Q.5**

A thin disc of mass M and radius R has mass per unit area $\sigma(r) = kr^2$ where r is the distance from its centre. Its moment of inertia about an axis going through its centre of mass and perpendicular to its plane is :

**Options**

1. $\frac{MR^2}{3}$
2. $\frac{2MR^2}{3}$
3. $\frac{MR^2}{6}$
4. $\frac{MR^2}{2}$

Question Type : **MCQ**
Question ID : **41652913062**
Option 1 ID : **41652951029**
Option 2 ID : **41652951027**
Option 3 ID : **41652951026**
Option 4 ID : **41652951028**
Status : **Answered**
Chosen Option : **1**

**Q.6**

In a photoelectric effect experiment the threshold wavelength of light is 380 nm. If the wavelength of incident light is 260 nm, the maximum kinetic energy of emitted electrons will be :

Given E (in eV) $= \frac{1237}{\lambda(\text{in nm})}$

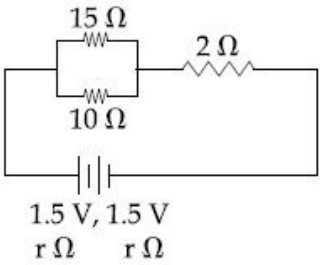
**Options**

1. 1.5 eV
2. 3.0 eV
3. 4.5 eV
4. 15.1 eV

Question Type : **MCQ**
Question ID : **41652913080**
Option 1 ID : **41652951101**
Option 2 ID : **41652951098**
Option 3 ID : **41652951099**
Option 4 ID : **41652951100**
Status : **Answered**
Chosen Option : **1**

**Q.7**

In the given circuit, an ideal voltmeter connected across the 10 Ω resistance reads 2 V. The internal resistance r, of each cell is :

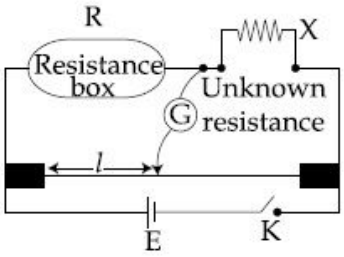



**Options**

1. 1 Ω
2. 0.5 Ω
3. 1.5 Ω
4. 0 Ω

Question Type : **MCQ**
Question ID : **41652913072**
Option 1 ID : **41652951066**
Option 2 ID : **41652951068**
Option 3 ID : **41652951067**
Option 4 ID : **41652951069**
Status : **Answered**
Chosen Option : **2**

**Q.8** In a meter bridge experiment, the circuit diagram and the corresponding observation table are shown in figure.




| Sl. No. | R (Ω) | $l$ (cm) |
|---|---|---|
| 1. | 1000 | 60 |
| 2. | 100 | 13 |
| 3. | 10 | 1.5 |
| 4. | 1 | 1.0 |

Which of the readings is inconsistent ?

**Options**

1. 3
2. 2
3. 4
4. 1

Question Type : **MCQ**
Question ID : **41652913085**
Option 1 ID : **41652951120**
Option 2 ID : **41652951119**
Option 3 ID : **41652951121**
Option 4 ID : **41652951118**
Status : **Answered**
Chosen Option : **4**

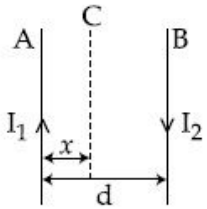
**Q.9** A proton, an electron, and a Helium nucleus, have the same energy. They are in circular orbits in a plane due to magnetic field perpendicular to the plane. Let $r_p$, $r_e$ and $r_{He}$ be their respective radii, then,

**Options**

1. $r_e > r_p = r_{He}$
2. $r_e < r_p = r_{He}$
3. $r_e < r_p < r_{He}$
4. $r_e > r_p > r_{He}$

Question Type : **MCQ**
Question ID : **41652913074**
Option 1 ID : **41652951076**
Option 2 ID : **41652951077**
Option 3 ID : **41652951074**
Option 4 ID : **41652951075**
Status : **Answered**
Chosen Option : **1**

**Q.10** Two wires A & B are carrying currents $I_1$ & $I_2$ as shown in the figure. The separation between them is d. A third wire C carrying a current I is to be kept parallel to them at a distance $x$ from A such that the net force acting on it is zero. The possible values of $x$ are :




**Options**

1. $x=\left(\frac{I_1}{I_1-I_2}\right)d$ and $x=\frac{I_2}{(I_1+I_2)}d$
2. $x=\left(\frac{I_2}{I_1+I_2}\right)d$ and $x=\left(\frac{I_2}{I_1-I_2}\right)d$
3. $x=\left(\frac{I_1}{I_1+I_2}\right)d$ and $x=\frac{I_2}{(I_1-I_2)}d$

4. $x=\pm\frac{I_1 d}{(I_1-I_2)}$

Question Type : **MCQ**
Question ID : **41652913075**
Option 1 ID : **41652951080**
Option 2 ID : **41652951081**
Option 3 ID : **41652951079**
Option 4 ID : **41652951078**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.11** Two coaxial discs, having moments of inertia $I_1$ and $\frac{I_1}{2}$, are rotating with respective angular velocities $\omega_1$ and $\frac{\omega_1}{2}$, about their common axis. They are brought in contact with each other and thereafter they rotate with a common angular velocity. If $E_f$ and $E_i$ are the final and initial total energies, then $(E_f-E_i)$ is :

**Options**

1. $-\frac{I_1\omega_1^2}{12}$
2. $\frac{I_1\omega_1^2}{6}$
3. $\frac{3}{8}I_1\omega_1^2$
4. $-\frac{I_1\omega_1^2}{24}$

Question Type : **MCQ**
Question ID : **41652913061**
Option 1 ID : **41652951022**
Option 2 ID : **41652951024**
Option 3 ID : **41652951025**
Option 4 ID : **41652951023**
Status : **Answered**
Chosen Option : **3**

**Q.12** A cylinder with fixed capacity of 67.2 lit contains helium gas at STP. The amount of heat needed to raise the temperature of the gas by 20°C is : [Given that $R=8.31\ J\ mol^{-1}\ K^{-1}$]

**Options**

1. 350 J
2. 374 J
3. 748 J

4. 700 J

Question Type : **MCQ**
Question ID : **41652913070**
Option 1 ID : **41652951061**
Option 2 ID : **41652951060**
Option 3 ID : **41652951059**
Option 4 ID : **41652951058**
Status : **Not Answered**
Chosen Option : **--**

**Q.13** The electric field of a plane electromagnetic wave is given by

$$\vec{E}=E_0\hat{i}\cos(kz)\cos(\omega t)$$

The corresponding magnetic field $\vec{B}$ is then given by :

**Options**

1. $\vec{B}=\frac{E_0}{C}\hat{j}\sin(kz)\sin(\omega t)$
2. $\vec{B}=\frac{E_0}{C}\hat{j}\sin(kz)\cos(\omega t)$
3. $\vec{B}=\frac{E_0}{C}\hat{j}\cos(kz)\sin(\omega t)$
4. $\vec{B}=\frac{E_0}{C}\hat{k}\sin(kz)\cos(\omega t)$

Question Type : **MCQ**
Question ID : **41652913077**
Option 1 ID : **41652951086**
Option 2 ID : **41652951087**
Option 3 ID : **41652951088**
Option 4 ID : **41652951089**
Status : **Answered**
Chosen Option : **2**

**Q.14** A uniformly charged ring of radius 3a and total charge q is placed in *xy*-plane centred at origin. A point charge q is moving towards the ring along the *z*-axis and has speed $v$ at $z=4a$. The minimum value of $v$ such that it crosses the origin is :

**Options**

1. $\sqrt{\frac{2}{m}}\left(\frac{4}{15}\frac{q^2}{4\pi\epsilon_0 a}\right)^{1/2}$
2. $\sqrt{\frac{2}{m}}\left(\frac{1}{5}\frac{q^2}{4\pi\epsilon_0 a}\right)^{1/2}$
3. $\sqrt{\frac{2}{m}}\left(\frac{2}{15}\frac{q^2}{4\pi\epsilon_0 a}\right)^{1/2}$

4. $\sqrt{\frac{2}{m}}\left(\frac{1}{15}\frac{q^2}{4\pi\epsilon_0 a}\right)^{1/2}$

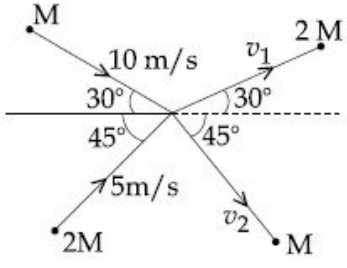
Question Type : **MCQ**
Question ID : **41652913071**
Option 1 ID : **41652951065**
Option 2 ID : **41652951064**
Option 3 ID : **41652951063**
Option 4 ID : **41652951062**
Status : **Not Answered**
Chosen Option : **--**

**Q.15** The ratio of surface tensions of mercury and water is given to be 7.5 while the ratio of their densities is 13.6. Their contact angles, with glass, are close to 135° and 0°, respectively. It is observed that mercury gets depressed by an amount $h$ in a capillary tube of radius $r_1$, while water rises by the same amount $h$ in a capillary tube of radius $r_2$. The ratio, $(r_1/r_2)$, is then close to :

**Options**
1. 4/5
2. 2/5
3. 3/5
4. 2/3

Question Type : **MCQ**
Question ID : **41652913064**
Option 1 ID : **41652951035**
Option 2 ID : **41652951034**
Option 3 ID : **41652951037**
Option 4 ID : **41652951036**
Status : **Not Answered**
Chosen Option : **--**

**Q.16** Two particles, of masses M and 2M, moving, as shown, with speeds of 10 m/s and 5 m/s, collide elastically at the origin. After the collision, they move along the indicated directions with speeds $v_1$ and $v_2$, respectively. The values of $v_1$ and $v_2$ are nearly :




**Options**
1. 6.5 m/s and 6.3 m/s

2. 3.2 m/s and 6.3 m/s
3. 6.5 m/s and 3.2 m/s
4. 3.2 m/s and 12.6 m/s

Question Type : **MCQ**
Question ID : **41652913060**
Option 1 ID : **41652951020**
Option 2 ID : **41652951021**
Option 3 ID : **41652951018**
Option 4 ID : **41652951019**
Status : **Answered**
Chosen Option : **1**

**Q.17** A stationary source emits sound waves of frequency 500 Hz. Two observers moving along a line passing through the source detect sound to be of frequencies 480 Hz and 530 Hz. Their respective speeds are, in $ms^{-1}$,
(Given speed of sound = 300 m/s)

**Options**
1. 12, 16
2. 12, 18
3. 16, 14
4. 8, 18

Question Type : **MCQ**
Question ID : **41652913068**
Option 1 ID : **41652951053**
Option 2 ID : **41652951050**
Option 3 ID : **41652951051**
Option 4 ID : **41652951052**
Status : **Answered**
Chosen Option : **4**

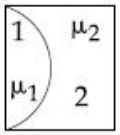
**Q.18** A transformer consisting of 300 turns in the primary and 150 turns in the secondary gives output power of 2.2 kW. If the current in the secondary coil is 10 A, then the input voltage and current in the primary coil are :

**Options**
1. 220 V and 20 A
2. 440 V and 20 A
3. 440 V and 5 A
4. 220 V and 10 A

Question Type : **MCQ**
Question ID : **41652913076**
Option 1 ID : **41652951085**
Option 2 ID : **41652951082**
Option 3 ID : **41652951084**

Option 4 ID : **41652951083**
Status : **Answered**
Chosen Option : **2**

**Q.19** One plano-convex and one plano-concave lens of same radius of curvature 'R' but of different materials are joined side by side as shown in the figure. If the refractive index of the material of 1 is $\mu_1$ and that of 2 is $\mu_2$, then the focal length of the combination is :




**Options**

1. $\frac{R}{\mu_1 - \mu_2}$
2. $\frac{2R}{\mu_1 - \mu_2}$
3. $\frac{R}{2(\mu_1 - \mu_2)}$
4. $\frac{R}{2-(\mu_1 - \mu_2)}$

Question Type : **MCQ**
Question ID : **41652913078**
Option 1 ID : **41652951090**
Option 2 ID : **41652951091**
Option 3 ID : **41652951092**
Option 4 ID : **41652951093**
Status : **Answered**
Chosen Option : **1**

**Q.20** n moles of an ideal gas with constant volume heat capacity $C_V$ undergo an isobaric expansion by certain volume. The ratio of the work done in the process, to the heat supplied is :

**Options**

1. $\frac{nR}{C_V + nR}$
2. $\frac{nR}{C_V - nR}$
3. $\frac{4nR}{C_V - nR}$
4. $\frac{4nR}{C_V + nR}$

Question Type : **MCQ**
Question ID : **41652913065**

Option 1 ID : **41652951041**
Option 2 ID : **41652951039**
Option 3 ID : **41652951038**
Option 4 ID : **41652951040**
Status : **Not Answered**
Chosen Option : **--**

**Q.21** A current of 5 A passes through a copper conductor (resistivity $= 1.7 \times 10^{-8}$ Ωm) of radius of cross-section 5 mm. Find the mobility of the charges if their drift velocity is $1.1 \times 10^{-3}$ m/s.

**Options**
1. $1.8\ m^2/Vs$
2. $1.5\ m^2/Vs$
3. $1.3\ m^2/Vs$
4. $1.0\ m^2/Vs$

Question Type : **MCQ**
Question ID : **41652913073**
Option 1 ID : **41652951071**
Option 2 ID : **41652951070**
Option 3 ID : **41652951073**
Option 4 ID : **41652951072**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.22** An npn transistor operates as a common emitter amplifier, with a power gain of 60 dB. The input circuit resistance is 100 Ω and the output load resistance is 10 kΩ. The common emitter current gain β is :

**Options**
1. $10^2$
2. $60$
3. $6 \times 10^2$
4. $10^4$

Question Type : **MCQ**
Question ID : **41652913082**
Option 1 ID : **41652951108**
Option 2 ID : **41652951107**
Option 3 ID : **41652951106**
Option 4 ID : **41652951109**
Status : **Answered**
Chosen Option : **3**

**Q.23**

The displacement of a damped harmonic oscillator is given by

$x(t) = e^{-0.1t}\cos(10\pi t + \varphi)$. Here t is in seconds.

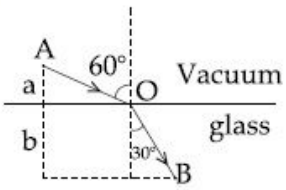
The time taken for its amplitude of vibration to drop to half of its initial value is close to :

**Options**

1. 4 s
2. 7 s
3. 13 s
4. 27 s

Question Type : **MCQ**
Question ID : **41652913067**
Option 1 ID : **41652951046**
Option 2 ID : **41652951048**
Option 3 ID : **41652951049**
Option 4 ID : **41652951047**
Status : **Answered**
Chosen Option : **3**

**Q.24** A ray of light AO in vacuum is incident on a glass slab at angle 60° and refracted at angle 30° along OB as shown in the figure. The optical path length of light ray from A to B is :




**Options**

1. $\frac{2\sqrt{3}}{a} + 2b$
2. $2a + \frac{2b}{3}$
3. $2a + \frac{2b}{\sqrt{3}}$
4. $2a + 2b$

Question Type : **MCQ**
Question ID : **41652913079**
Option 1 ID : **41652951095**
Option 2 ID : **41652951097**
Option 3 ID : **41652951094**
Option 4 ID : **41652951096**
Status : **Answered**
Chosen Option : **3**

**Q.25**

A $25\times10^{-3}$ $m^3$ volume cylinder is filled with 1 mol of $O_2$ gas at room temperature (300 K). The molecular diameter of $O_2$, and its root mean square speed, are found to be 0.3 nm and 200 m/s, respectively. What is the average collision rate (per second) for an $O_2$ molecule ?

**Options**

1. $\sim10^{12}$
2. $\sim10^{11}$
3. $\sim10^{10}$
4. $\sim10^{13}$

Question Type : **MCQ**
Question ID : **41652913066**
Option 1 ID : **41652951042**
Option 2 ID : **41652951043**
Option 3 ID : **41652951044**
Option 4 ID : **41652951045**
Status : **Answered**
Chosen Option : **3**

**Q.26** A message signal of frequency 100 MHz and peak voltage 100 V is used to execute amplitude modulation on a carrier wave of frequency 300 GHz and peak voltage 400 V. The modulation index and difference between the two side band frequencies are :

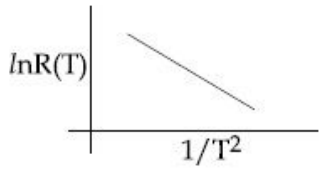
**Options**

1. $4\ ;1\times10^8$ Hz
2. $4\ ;2\times10^8$ Hz
3. $0.25\ ;2\times10^8$ Hz
4. $0.25\ ;1\times10^8$ Hz

Question Type : **MCQ**
Question ID : **41652913083**
Option 1 ID : **41652951113**
Option 2 ID : **41652951111**
Option 3 ID : **41652951112**
Option 4 ID : **41652951110**
Status : **Answered**
Chosen Option : **3**

**Q.27**

In an experiment, the resistance of a material is plotted as a function of temperature (in some range). As shown in the figure, it is a straight line.




One may conclude that :

**Options**

1. $R(T)=\frac{R_0}{T^2}$
2. $R(T)=R_0e^{-T_0^2/T^2}$
3. $R(T)=R_0e^{-T^2/T_0^2}$
4. $R(T)=R_0e^{T^2/T_0^2}$

Question Type : **MCQ**
Question ID : **41652913057**
Option 1 ID : **41652951006**
Option 2 ID : **41652951008**
Option 3 ID : **41652951007**
Option 4 ID : **41652951009**
Status : **Answered**
Chosen Option : **3**

**Q.28** A ball is thrown upward with an initial velocity $V_0$ from the surface of the earth. The motion of the ball is affected by a drag force equal to $m\gamma v^2$ (where m is mass of the ball, $v$ is its instantaneous velocity and $\gamma$ is a constant). Time taken by the ball to rise to its zenith is :

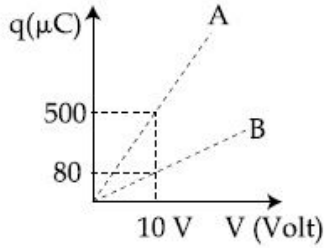
**Options**

1. $\frac{1}{\sqrt{\gamma g}}\tan^{-1}\left(\sqrt{\frac{\gamma}{g}}V_0\right)$
2. $\frac{1}{\sqrt{\gamma g}}\sin^{-1}\left(\sqrt{\frac{\gamma}{g}}V_0\right)$
3. $\frac{1}{\sqrt{\gamma g}}\ln\left(1+\sqrt{\frac{\gamma}{g}}V_0\right)$
4. $\frac{1}{\sqrt{2\gamma g}}\tan^{-1}\left(\sqrt{\frac{2\gamma}{g}}V_0\right)$

Question Type : **MCQ**
Question ID : **41652913059**
Option 1 ID : **41652951016**
Option 2 ID : **41652951017**

Option 3 ID : **41652951015**
Option 4 ID : **41652951014**
Status : **Not Answered**
Chosen Option : **--**

**Q.29** Figure shows charge (q) versus voltage (V) graph for series and parallel combination of two given capacitors. The capacitances are :




**Options**
1. 40 μF and 10 μF
2. 60 μF and 40 μF
3. 50 μF and 30 μF
4. 20 μF and 30 μF

Question Type : **MCQ**
Question ID : **41652913069**
Option 1 ID : **41652951056**
Option 2 ID : **41652951057**
Option 3 ID : **41652951054**
Option 4 ID : **41652951055**
Status : **Answered**
Chosen Option : **1**

**Q.30** Given below in the left column are different modes of communication using the kinds of waves given in the right column.

| | | | |
|---|---|---|---|
| A. | Optical Fibre Communication | P. | Ultrasound |
| B. | Radar | Q. | Infrared Light |
| C. | Sonar | R. | Microwaves |
| D. | Mobile Phones | S. | Radio Waves |

From the options given below, find the most appropriate match between entries in the left and the right column.

**Options**
1. A - Q, B - S, C - R, D - P
2. A - S, B - Q, C - R, D - P
3. A - Q, B - S, C - P, D - R
4. A - R, B - P, C - S, D - Q

Question Type : **MCQ**
Question ID : **41652913056**
Option 1 ID : **41652951002**
Option 2 ID : **41652951004**
Option 3 ID : **41652951003**
Option 4 ID : **41652951005**
Status : **Answered**
Chosen Option : **4**

Section : **Chemistry**

**Q.1** The regions of the atmosphere, where clouds form and where we live, respectively, are :

**Options**
1. Troposphere and Stratosphere
2. Stratosphere and Troposphere
3. Troposphere and Troposphere
4. Stratosphere and Stratosphere

Question Type : **MCQ**
Question ID : **41652913105**
Option 1 ID : **41652951199**
Option 2 ID : **41652951200**
Option 3 ID : **41652951198**
Option 4 ID : **41652951201**
Status : **Answered**
Chosen Option : **1**

**Q.2** The species that can have a *trans*-isomer is :
(en = ethane-1, 2-diamine, ox = oxalate)

**Options**
1. $[Zn(en)Cl_2]$
2. $[Pt(en)Cl_2]$
3. $[Cr(en)_2(ox)]^+$
4. $[Pt(en)_2Cl_2]^{2+}$

Question Type : **MCQ**
Question ID : **41652913104**
Option 1 ID : **41652951195**
Option 2 ID : **41652951194**
Option 3 ID : **41652951196**
Option 4 ID : **41652951197**
Status : **Answered**
Chosen Option : **3**

**Q.3** Ethylamine ($C_2H_5NH_2$) can be obtained from N-ethylphthalimide on treatment with :

**Options**
1. $NH_2NH_2$
2. $CaH_2$

3. $NaBH_4$

4. $H_2O$

Question Type : **MCQ**
Question ID : **41652913091**
Option 1 ID : **41652951145**
Option 2 ID : **41652951142**
Option 3 ID : **41652951143**
Option 4 ID : **41652951144**
Status : **Answered**
Chosen Option : **1**

**Q.4** The oxoacid of sulphur that **does not** contain bond between sulphur atoms is :

**Options**

1. $H_2S_4O_6$

2. $H_2S_2O_3$

3. $H_2S_2O_7$

4. $H_2S_2O_4$

Question Type : **MCQ**
Question ID : **41652913100**
Option 1 ID : **41652951179**
Option 2 ID : **41652951180**
Option 3 ID : **41652951181**
Option 4 ID : **41652951178**
Status : **Answered**
Chosen Option : **3**

**Q.5** Consider the hydrated ions of $Ti^{2+}$, $V^{2+}$, $Ti^{3+}$, and $Sc^{3+}$. The **correct** order of their spin-only magnetic moments is :

**Options**

1. $V^{2+} < Ti^{2+} < Ti^{3+} < Sc^{3+}$

2. $Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$

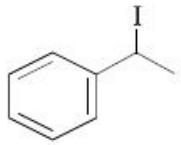
3. $Ti^{3+} < Ti^{2+} < Sc^{3+} < V^{2+}$

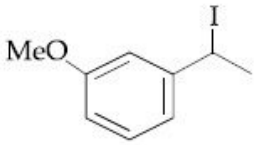
4. $Sc^{3+} < Ti^{3+} < V^{2+} < Ti^{2+}$

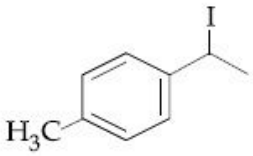
Question Type : **MCQ**
Question ID : **41652913102**
Option 1 ID : **41652951189**
Option 2 ID : **41652951186**
Option 3 ID : **41652951187**
Option 4 ID : **41652951188**
Status : **Answered**
Chosen Option : **4**

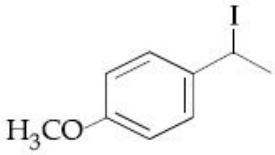
**Q.6**

Increasing rate of $S_N1$ reaction in the following compounds is :


(A)


(B)


(C)


(D)

**Options**

1. (A) < (B) < (C) < (D)
2. (B) < (A) < (C) < (D)
3. (B) < (A) < (D) < (C)
4. (A) < (B) < (D) < (C)

Question Type : **MCQ**
Question ID : **41652913090**
Option 1 ID : **41652951140**
Option 2 ID : **41652951139**
Option 3 ID : **41652951138**
Option 4 ID : **41652951141**
Status : **Answered**
Chosen Option : **4**

**Q.7** Amylopectin is composed of :

**Options**

1. α-D-glucose, $C_1-C_4$ and $C_1-C_6$ linkages
2. β-D-glucose, $C_1-C_4$ and $C_2-C_6$ linkages
3. β-D-glucose, $C_1-C_4$ and $C_1-C_6$ linkages
4. α-D-glucose, $C_1-C_4$ and $C_2-C_6$ linkages

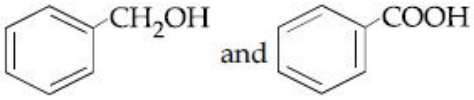
Question Type : **MCQ**
Question ID : **41652913088**
Option 1 ID : **41652951132**
Option 2 ID : **41652951133**
Option 3 ID : **41652951131**
Option 4 ID : **41652951130**
Status : **Answered**
Chosen Option : **3**

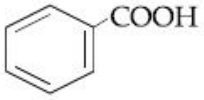
**Q.8** A process will be spontaneous at all temperatures if :

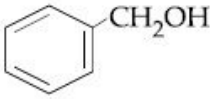
Options
1. $\Delta H < 0$ and $\Delta S < 0$
2. $\Delta H > 0$ and $\Delta S < 0$
3. $\Delta H < 0$ and $\Delta S > 0$
4. $\Delta H > 0$ and $\Delta S > 0$

Question Type : **MCQ**
Question ID : **41652913110**
Option 1 ID : **41652951219**
Option 2 ID : **41652951221**
Option 3 ID : **41652951220**
Option 4 ID : **41652951218**
Status : **Answered**
Chosen Option : **3**

**Q.9** Major products of the following reaction are :


Options
1. 

2. $CH_3OH$ and 

3. HCOOH and 

4. $CH_3OH$ and $HCO_2H$

Question Type : **MCQ**
Question ID : **41652913087**
Option 1 ID : **41652951128**
Option 2 ID : **41652951126**
Option 3 ID : **41652951127**
Option 4 ID : **41652951129**
Status : **Answered**
Chosen Option : **1**

**Q.10** Match the refining methods **(Column I)** with metals **(Column II)**.

| **Column I (Refining methods)** | | **Column II (Metals)** | |
|---|---|---|---|
| (I) | Liquation | (a) | Zr |
| (II) | Zone Refining | (b) | Ni |
| (III) | Mond Process | (c) | Sn |
| (IV) | Van Arkel Method | (d) | Ga |

Options
1. (I) - (c); (II) - (a); (III) - (b); (IV) - (d)
2. (I) - (b); (II) - (c); (III) - (d); (IV) - (a)

3. (I) - (c); (II) - (d); (III) - (b); (IV) - (a)
4. (I) - (b); (II) - (d); (III) - (a); (IV) - (c)

Question Type : **MCQ**
Question ID : **41652913097**
Option 1 ID : **41652951166**
Option 2 ID : **41652951168**
Option 3 ID : **41652951167**
Option 4 ID : **41652951169**
Status : **Answered**
Chosen Option : **3**

**Q.11** A gas undergoes physical adsorption on a surface and follows the given Freundlich adsorption isotherm equation

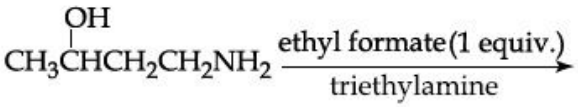
$$\frac{x}{m} = kp^{0.5}$$

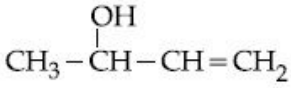
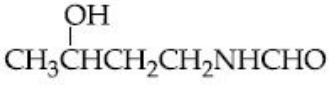
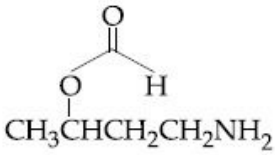
Adsorption of the gas increases with :

**Options**
1. Decrease in p and increase in T
2. Decrease in p and decrease in T
3. Increase in p and decrease in T
4. Increase in p and increase in T

Question Type : **MCQ**
Question ID : **41652913115**
Option 1 ID : **41652951240**
Option 2 ID : **41652951241**
Option 3 ID : **41652951239**
Option 4 ID : **41652951238**
Status : **Answered**
Chosen Option : **3**

**Q.12** The major product of the following reaction is :




**Options**
1. 
2. 
3. 
4. $CH_3CH=CH-CH_2NH_2$

Question Type : **MCQ**
Question ID : **41652913095**

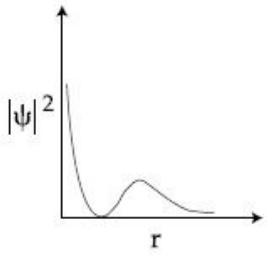
Option 1 ID : **41652951161**
Option 2 ID : **41652951159**
Option 3 ID : **41652951158**
Option 4 ID : **41652951160**
Status : **Not Answered**
Chosen Option : **--**

**Q.13** The alloy used in the construction of aircrafts is :

**Options**
1. Mg - Al
2. Mg - Zn
3. Mg - Sn
4. Mg - Mn

Question Type : **MCQ**
Question ID : **41652913099**
Option 1 ID : **41652951174**
Option 2 ID : **41652951176**
Option 3 ID : **41652951175**
Option 4 ID : **41652951177**
Status : **Answered**
Chosen Option : **1**

**Q.14** The graph between $|\psi|^2$ and r(radial distance) is shown below. This represents :




**Options**
1. 3s orbital
2. 2s orbital
3. 1s orbital
4. 2p orbital

Question Type : **MCQ**
Question ID : **41652913108**
Option 1 ID : **41652951212**
Option 2 ID : **41652951211**
Option 3 ID : **41652951210**
Option 4 ID : **41652951213**
Status : **Answered**
Chosen Option : **4**

**Q.15** The synonym for water gas when used in the production of methanol is :

**Options**
1. natural gas
2. fuel gas

3. laughing gas
4. syn gas

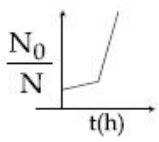
Question Type : **MCQ**
Question ID : **41652913098**
Option 1 ID : **41652951171**
Option 2 ID : **41652951170**
Option 3 ID : **41652951172**
Option 4 ID : **41652951173**
Status : **Answered**
Chosen Option : **4**

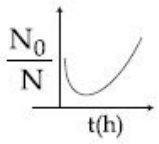
**Q.16** Three complexes,
$[CoCl(NH_3)_5]^{2+}$ (I),
$[Co(NH_3)_5\,H_2O]^{3+}$ (II) and
$[Co(NH_3)_6]^{3+}$ (III)
absorb light in the visible region. The correct order of the wavelength of light absorbed by them is :

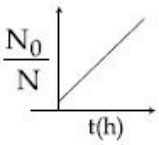
**Options**
1. (III) > (I) > (II)
2. (III) > (II) > (I)
3. (II) > (I) > (III)
4. (I) > (II) > (III)

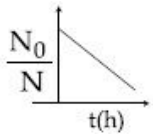
Question Type : **MCQ**
Question ID : **41652913103**
Option 1 ID : **41652951192**
Option 2 ID : **41652951193**
Option 3 ID : **41652951190**
Option 4 ID : **41652951191**
Status : **Not Answered**
Chosen Option : **--**

**Q.17** A bacterial infection in an internal wound grows as $N'(t) = N_0 \exp(t)$, where the time t is in hours. A dose of antibiotic, taken orally, needs 1 hour to reach the wound. Once it reaches there, the bacterial population goes down as $\frac{dN}{dt} = -5N^2$.
What will be the plot of $\frac{N_0}{N}$ vs. t after 1 hour ?

**Options**
1. 

2. 


3. 


4. 


Question Type : **MCQ**
Question ID : **41652913114**
Option 1 ID : **41652951236**
Option 2 ID : **41652951234**
Option 3 ID : **41652951235**
Option 4 ID : **41652951237**
Status : **Answered**
Chosen Option : **3**

**Q.18** The correct order of catenation is :

**Options**
1. $C > Sn > Si \approx Ge$
2. $C > Si > Ge \approx Sn$
3. $Si > Sn > C > Ge$
4. $Ge > Sn > Si > C$

Question Type : **MCQ**
Question ID : **41652913101**
Option 1 ID : **41652951185**
Option 2 ID : **41652951184**
Option 3 ID : **41652951182**
Option 4 ID : **41652951183**
Status : **Answered**
Chosen Option : **2**

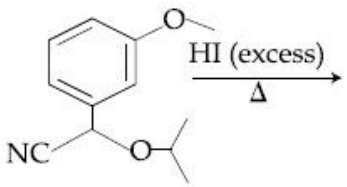
**Q.19** At room temperature, a dilute solution of urea is prepared by dissolving 0.60 g of urea in 360 g of water. If the vapour pressure of pure water at this temperature is 35 mmHg, lowering of vapour pressure will be :
(molar mass of urea = 60 g $mol^{-1}$)

**Options**
1. 0.027 mmHg
2. 0.028 mmHg
3. 0.017 mmHg
4. 0.031 mmHg

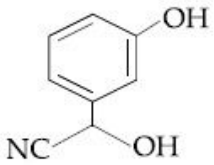
Question Type : **MCQ**
Question ID : **41652913111**
Option 1 ID : **41652951222**
Option 2 ID : **41652951225**

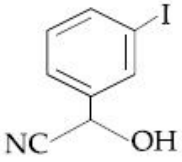
Option 3 ID : **41652951224**
Option 4 ID : **41652951223**
Status : **Not Answered**
Chosen Option : **--**

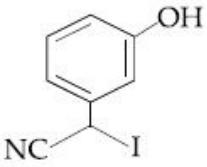
**Q.20** The major product of the following reaction is :

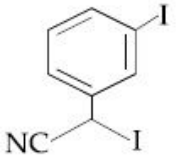



**Options**

1.


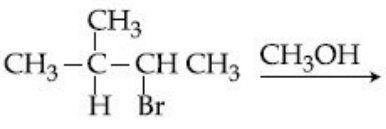

2.



3.


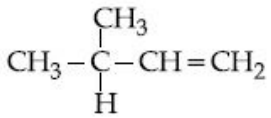

4.


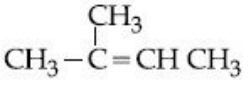

Question Type : **MCQ**
Question ID : **41652913092**
Option 1 ID : **41652951146**
Option 2 ID : **41652951148**
Option 3 ID : **41652951147**
Option 4 ID : **41652951149**
Status : **Answered**
Chosen Option : **2**

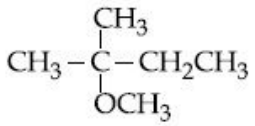
**Q.21** The major product of the following reaction is :

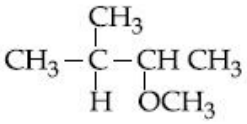



**Options**

1.



2.


3. 

4. 

Question Type : **MCQ**
Question ID : **41652913093**
Option 1 ID : **41652951153**
Option 2 ID : **41652951151**
Option 3 ID : **41652951152**
Option 4 ID : **41652951150**
Status : **Answered**
Chosen Option : **3**

**Q.22**

Consider the following table :

| Gas | a/(k Pa $dm^6$ $mol^{-1}$) | b/($dm^3$ $mol^{-1}$) |
|---|---|---|
| A | 642.32 | 0.05196 |
| B | 155.21 | 0.04136 |
| C | 431.91 | 0.05196 |
| D | 155.21 | 0.4382 |

a and b are van der Waals constants. The **correct** statement about the gases is :

**Options**

1. Gas C will occupy more volume than gas A; gas B will be more compressible than gas D

2. Gas C will occupy lesser volume than gas A; gas B will be lesser compressible than gas D

3. Gas C will occupy more volume than gas A; gas B will be lesser compressible than gas D

4. Gas C will occupy lesser volume than gas A; gas B will be more compressible than gas D

Question Type : **MCQ**
Question ID : **41652913107**
Option 1 ID : **41652951208**
Option 2 ID : **41652951209**
Option 3 ID : **41652951207**
Option 4 ID : **41652951206**
Status : **Answered**
Chosen Option : **3**

**Q.23**

Consider the statements S1 and S2 :

S1 : Conductivity always increases with decrease in the concentration of electrolyte.

S2 : Molar conductivity always increases with decrease in the concentration of electrolyte.

The correct option among the following is :

Options
1. Both S1 and S2 are wrong
2. S1 is wrong and S2 is correct
3. Both S1 and S2 are correct
4. S1 is correct and S2 is wrong

Question Type : **MCQ**
Question ID : **41652913113**
Option 1 ID : **41652951231**
Option 2 ID : **41652951232**
Option 3 ID : **41652951230**
Option 4 ID : **41652951233**
Status : **Answered**
Chosen Option : **2**

**Q.24** Consider the following statements

(a) The pH of a mixture containing 400 mL of 0.1 M $H_2SO_4$ and 400 mL of 0.1 M NaOH will be approximately 1.3.

(b) Ionic product of water is temperature dependent.

(c) A monobasic acid with $K_a = 10^{-5}$ has a pH = 5. The degree of dissociation of this acid is 50%.

(d) The Le Chatelier's principle is not applicable to common-ion effect.

The correct statements are :

Options
1. (a), (b) and (d)
2. (a), (b) and (c)
3. (b) and (c)
4. (a) and (b)

Question Type : **MCQ**
Question ID : **41652913112**
Option 1 ID : **41652951227**
Option 2 ID : **41652951226**
Option 3 ID : **41652951229**
Option 4 ID : **41652951228**

Status : **Answered**
Chosen Option : **1**

**Q.25** The principle of column chromatography is :

**Options**
1. Gravitational force.
2. Capillary action.
3. Differential absorption of the substances on the solid phase.
4. Differential adsorption of the substances on the solid phase.

Question Type : **MCQ**
Question ID : **41652913089**
Option 1 ID : **41652951137**
Option 2 ID : **41652951136**
Option 3 ID : **41652951135**
Option 4 ID : **41652951134**
Status : **Answered**
Chosen Option : **3**

**Q.26** The isoelectronic set of ions is :

**Options**
1. $N^{3-}, O^{2-}, F^{-}$ and $Na^{+}$
2. $N^{3-}, Li^{+}, Mg^{2+}$ and $O^{2-}$
3. $F^{-}, Li^{+}, Na^{+}$ and $Mg^{2+}$
4. $Li^{+}, Na^{+}, O^{2-}$ and $F^{-}$

Question Type : **MCQ**
Question ID : **41652913096**
Option 1 ID : **41652951162**
Option 2 ID : **41652951164**
Option 3 ID : **41652951165**
Option 4 ID : **41652951163**
Status : **Answered**
Chosen Option : **1**

**Q.27** Which of the following is a condensation polymer ?

**Options**
1. Buna - S
2. Neoprene
3. Teflon
4. Nylon 6, 6

Question Type : **MCQ**
Question ID : **41652913094**
Option 1 ID : **41652951154**
Option 2 ID : **41652951157**
Option 3 ID : **41652951156**
Option 4 ID : **41652951155**
Status : **Answered**

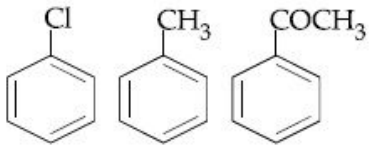
Chosen Option : **2**

**Q.28** At 300 K and 1 atmospheric pressure, 10 mL of a hydrocarbon required 55 mL of $O_2$ for complete combustion, and 40 mL of $CO_2$ is formed. The formula of the hydrocarbon is :

**Options**
1. $C_4H_{10}$
2. $C_4H_6$
3. $C_4H_7Cl$
4. $C_4H_8$

Question Type : **MCQ**
Question ID : **41652913106**
Option 1 ID : **41652951204**
Option 2 ID : **41652951202**
Option 3 ID : **41652951205**
Option 4 ID : **41652951203**
Status : **Not Answered**
Chosen Option : **--**

**Q.29** The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reactions is :




(I) (II) (III)

**Options**
1. II < I < III
2. III < II < I
3. III < I < II
4. I < III < II

Question Type : **MCQ**
Question ID : **41652913086**
Option 1 ID : **41652951122**
Option 2 ID : **41652951125**
Option 3 ID : **41652951124**
Option 4 ID : **41652951123**
Status : **Answered**
Chosen Option : **1**

**Q.30** During the change of $O_2$ to $O_2^-$, the incoming electron goes to the orbital :

**Options**
1. $\pi 2p_y$
2. $\sigma^* 2p_z$

3. $\pi^* 2p_x$

4. $\pi 2p_x$

Question Type : **MCQ**
Question ID : **41652913109**
Option 1 ID : **41652951217**
Option 2 ID : **41652951214**
Option 3 ID : **41652951215**
Option 4 ID : **41652951216**
Status : **Answered**
Chosen Option : **2**

Section : **Mathematics**

**Q.1** Let $f(x)=x^2$, $x \in \mathbf{R}$. For any $A \subseteq \mathbf{R}$, define $g(A)=\{x \in \mathbf{R} : f(x) \in A\}$. If $S=[0, 4]$, then which one of the following statements is **not** true ?

**Options**

1. $g(f(S)) \neq S$
2. $f(g(S))=S$
3. $g(f(S))=g(S)$
4. $f(g(S)) \neq f(S)$

Question Type : **MCQ**
Question ID : **41652913116**
Option 1 ID : **41652951244**
Option 2 ID : **41652951243**
Option 3 ID : **41652951245**
Option 4 ID : **41652951242**
Status : **Answered**
Chosen Option : **2**

**Q.2** Let $f : \mathbf{R} \to \mathbf{R}$ be differentiable at $c \in \mathbf{R}$ and $f(c)=0$. If $g(x)=|f(x)|$, then at $x=c$, g is :

**Options**

1. not differentiable if $f'(c)=0$
2. differentiable if $f'(c) \neq 0$
3. differentiable if $f'(c)=0$
4. not differentiable

Question Type : **MCQ**
Question ID : **41652913127**
Option 1 ID : **41652951288**
Option 2 ID : **41652951286**
Option 3 ID : **41652951287**
Option 4 ID : **41652951289**
Status : **Answered**
Chosen Option : **1**

**Q.3**

ABC is a triangular park with AB = AC = 100 metres. A vertical tower is situated at the mid-point of BC. If the angles of elevation of the top of the tower at A and B are $\cot^{-1}\left(3\sqrt{2}\right)$ and $\operatorname{cosec}^{-1}\left(2\sqrt{2}\right)$ respectively, then the height of the tower (in metres) is :

**Options**

1. $\frac{100}{3\sqrt{3}}$
2. $10\sqrt{5}$
3. 20
4. 25

Question Type : **MCQ**
Question ID : **41652913144**
Option 1 ID : **41652951354**
Option 2 ID : **41652951357**
Option 3 ID : **41652951356**
Option 4 ID : **41652951355**
Status : **Not Answered**
Chosen Option : **--**

**Q.4**

If $a_1, a_2, a_3, \ldots\ldots\ldots, a_n$ are in A.P. and $a_1 + a_4 + a_7 + \ldots\ldots\ldots + a_{16} = 114$, then $a_1 + a_6 + a_{11} + a_{16}$ is equal to :

**Options**

1. 98
2. 76
3. 38
4. 64

Question Type : **MCQ**
Question ID : **41652913122**
Option 1 ID : **41652951269**
Option 2 ID : **41652951268**
Option 3 ID : **41652951266**
Option 4 ID : **41652951267**
Status : **Answered**
Chosen Option : **2**

**Q.5**

The value of $\int_0^{2\pi} \left[\sin 2x(1+\cos 3x)\right] dx$, where [t] denotes the greatest integer function, is :

**Options**

1. $\pi$
2. $-\pi$
3. $-2\pi$
4. $2\pi$

Question Type : **MCQ**
Question ID : **41652913130**
Option 1 ID : **41652951300**
Option 2 ID : **41652951301**
Option 3 ID : **41652951299**
Option 4 ID : **41652951298**
Status : **Answered**
Chosen Option : **1**

**Q.6**

If $\Delta_1=\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ and

$\Delta_2=\begin{vmatrix} x & \sin 2\theta & \cos 2\theta \\ -\sin 2\theta & -x & 1 \\ \cos 2\theta & 1 & x \end{vmatrix}$, $x \neq 0$; then

for all $\theta \in \left(0, \frac{\pi}{2}\right)$:

**Options**

1. $\Delta_1-\Delta_2=-2x^3$
2. $\Delta_1-\Delta_2=x(\cos 2\theta-\cos 4\theta)$
3. $\Delta_1+\Delta_2=-2(x^3+x-1)$
4. $\Delta_1+\Delta_2=-2x^3$

Question Type : **MCQ**
Question ID : **41652913119**
Option 1 ID : **41652951254**
Option 2 ID : **41652951257**
Option 3 ID : **41652951256**
Option 4 ID : **41652951255**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.7**

If a>0 and $z=\frac{(1+i)^2}{a-i}$, has magnitude

$\sqrt{\frac{2}{5}}$, then $\bar{z}$ is equal to :

**Options**

1. $-\frac{1}{5}-\frac{3}{5}i$
2. $-\frac{3}{5}-\frac{1}{5}i$
3. $\frac{1}{5}-\frac{3}{5}i$
4. $-\frac{1}{5}+\frac{3}{5}i$

Question Type : **MCQ**
Question ID : **41652913117**
Option 1 ID : **41652951246**
Option 2 ID : **41652951248**

Option 3 ID : **41652951249**
Option 4 ID : **41652951247**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.8** Which one of the following Boolean expressions is a tautology ?

**Options**
1. $(p \wedge q) \vee (p \wedge \sim q)$
2. $(p \vee q) \vee (p \vee \sim q)$
3. $(p \vee q) \wedge (p \vee \sim q)$
4. $(p \vee q) \wedge (\sim p \vee \sim q)$

Question Type : **MCQ**
Question ID : **41652913145**
Option 1 ID : **41652951359**
Option 2 ID : **41652951361**
Option 3 ID : **41652951360**
Option 4 ID : **41652951358**
Status : **Answered**
Chosen Option : **1**

**Q.9** If the system of linear equations

$x + y + z = 5$

$x + 2y + 2z = 6$

$x + 3y + \lambda z = \mu$, $(\lambda, \mu \in \mathbf{R})$, has infinitely many solutions, then the value of $\lambda + \mu$ is :

**Options**
1. 12
2. 9
3. 7
4. 10

Question Type : **MCQ**
Question ID : **41652913120**
Option 1 ID : **41652951258**
Option 2 ID : **41652951260**
Option 3 ID : **41652951261**
Option 4 ID : **41652951259**
Status : **Not Answered**
Chosen Option : **--**

**Q.10** If $\lim\limits_{x \to 1} \dfrac{x^4 - 1}{x - 1} = \lim\limits_{x \to k} \dfrac{x^3 - k^3}{x^2 - k^2}$, then k is :

**Options**
1. $\dfrac{8}{3}$
2. $\dfrac{3}{8}$
3. $\dfrac{3}{2}$

4. $\frac{4}{3}$

Question Type : **MCQ**
Question ID : **41652913125**
Option 1 ID : **41652951279**
Option 2 ID : **41652951280**
Option 3 ID : **41652951281**
Option 4 ID : **41652951278**
Status : **Answered**
Chosen Option : **1**

**Q.11** If $\alpha$ and $\beta$ are the roots of the quadratic equation, $x^2 + x\sin\theta - 2\sin\theta = 0$, $\theta \in \left(0, \frac{\pi}{2}\right)$, then $\frac{\alpha^{12} + \beta^{12}}{\left(\alpha^{-12} + \beta^{-12}\right)\cdot(\alpha - \beta)^{24}}$ is equal to :

**Options**

1. $\frac{2^{12}}{(\sin\theta - 4)^{12}}$
2. $\frac{2^{12}}{(\sin\theta + 8)^{12}}$
3. $\frac{2^{12}}{(\sin\theta - 8)^{6}}$
4. $\frac{2^{6}}{(\sin\theta + 8)^{12}}$

Question Type : **MCQ**
Question ID : **41652913118**
Option 1 ID : **41652951253**
Option 2 ID : **41652951252**
Option 3 ID : **41652951251**
Option 4 ID : **41652951250**
Status : **Answered**
Chosen Option : **2**

**Q.12** If the circles $x^2 + y^2 + 5Kx + 2y + K = 0$ and $2(x^2 + y^2) + 2Kx + 3y - 1 = 0$, $(K \epsilon \mathbf{R})$, intersect at the points P and Q, then the line $4x + 5y - K = 0$ passes through P and Q, for :

**Options**

1. infinitely many values of K
2. no value of K.
3. exactly two values of K
4. exactly one value of K

Question Type : **MCQ**
Question ID : **41652913134**
Option 1 ID : **41652951316**

Option 2 ID : **41652951317**
Option 3 ID : **41652951315**
Option 4 ID : **41652951314**
Status : **Not Answered**
Chosen Option : **--**

**Q.13** If the line $x-2y=12$ is tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at the point $\left(3, \frac{-9}{2}\right)$, then the length of the latus rectum of the ellipse is :

**Options**
1. $9$
2. $12\sqrt{2}$
3. $5$
4. $8\sqrt{3}$

Question Type : **MCQ**
Question ID : **41652913136**
Option 1 ID : **41652951322**
Option 2 ID : **41652951325**
Option 3 ID : **41652951324**
Option 4 ID : **41652951323**
Status : **Answered**
Chosen Option : **4**

**Q.14** If $Q(0, -1, -3)$ is the image of the point P in the plane $3x-y+4z=2$ and R is the point $(3, -1, -2)$, then the area (in sq. units) of $\Delta PQR$ is :

**Options**
1. $2\sqrt{13}$
2. $\frac{\sqrt{91}}{4}$
3. $\frac{\sqrt{91}}{2}$
4. $\frac{\sqrt{65}}{2}$

Question Type : **MCQ**
Question ID : **41652913139**
Option 1 ID : **41652951335**
Option 2 ID : **41652951334**
Option 3 ID : **41652951337**
Option 4 ID : **41652951336**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.15** Let $f(x)=e^x-x$ and $g(x)=x^2-x$, $\forall x \in \mathbf{R}$. Then the set of all $x \in \mathbf{R}$, where the function $h(x)=(f\circ g)(x)$ is increasing, is :

**Options**
1. $\left[-1, \frac{-1}{2}\right]\cup\left[\frac{1}{2}, \infty\right)$

2. $\left[0, \frac{1}{2}\right] \cup [1, \infty)$

3. $[0, \infty)$

4. $\left[\frac{-1}{2}, 0\right] \cup [1, \infty)$

Question Type : **MCQ**
Question ID : **41652913128**
Option 1 ID : **41652951292**
Option 2 ID : **41652951291**
Option 3 ID : **41652951293**
Option 4 ID : **41652951290**
Status : **Answered**
Chosen Option : **2**

**Q.16** All the pairs $(x, y)$ that satisfy the inequality $2^{\sqrt{\sin^2 x - 2\sin x + 5}} \cdot \frac{1}{4^{\sin^2 y}} \leq 1$ also satisfy the equation :

**Options**

1. $2|\sin x| = 3\sin y$

2. $2\sin x = \sin y$

3. $\sin x = 2\sin y$

4. $\sin x = |\sin y|$

Question Type : **MCQ**
Question ID : **41652913143**
Option 1 ID : **41652951353**
Option 2 ID : **41652951351**
Option 3 ID : **41652951350**
Option 4 ID : **41652951352**
Status : **Not Answered**
Chosen Option : **--**

**Q.17** If the coefficients of $x^2$ and $x^3$ are both zero, in the expansion of the expression $(1 + ax + bx^2)(1 - 3x)^{15}$ in powers of $x$, then the ordered pair (a, b) is equal to :

**Options**

1. $(28, 861)$

2. $(-54, 315)$

3. $(28, 315)$

4. $(-21, 714)$

Question Type : **MCQ**
Question ID : **41652913124**
Option 1 ID : **41652951276**
Option 2 ID : **41652951275**
Option 3 ID : **41652951277**
Option 4 ID : **41652951274**
Status : **Not Answered**
Chosen Option : **--**

**Q.18**

If $f(x)=\begin{cases}\dfrac{\sin(p+1)x+\sin x}{x}, & x<0\\ q, & x=0\\ \dfrac{\sqrt{x+x^2}-\sqrt{x}}{x^{3/2}}, & x>0\end{cases}$

is continuous at $x=0$, then the ordered pair (p, q) is equal to :

**Options**

1. $\left(-\frac{3}{2},-\frac{1}{2}\right)$
2. $\left(-\frac{1}{2},\frac{3}{2}\right)$
3. $\left(-\frac{3}{2},\frac{1}{2}\right)$
4. $\left(\frac{5}{2},\frac{1}{2}\right)$

Question Type : **MCQ**
Question ID : **41652913126**
Option 1 ID : **41652951285**
Option 2 ID : **41652951284**
Option 3 ID : **41652951282**
Option 4 ID : **41652951283**
Status : **Answered**
Chosen Option : **2**

**Q.19**

Let A(3, 0, −1), B(2, 10, 6) and C(1, 2, 1) be the vertices of a triangle and M be the midpoint of AC. If G divides BM in the ratio, 2 : 1, then $\cos(\angle GOA)$ (O being the origin) is equal to :

**Options**

1. $\frac{1}{2\sqrt{15}}$
2. $\frac{1}{\sqrt{15}}$
3. $\frac{1}{6\sqrt{10}}$
4. $\frac{1}{\sqrt{30}}$

Question Type : **MCQ**
Question ID : **41652913138**
Option 1 ID : **41652951332**
Option 2 ID : **41652951330**
Option 3 ID : **41652951333**
Option 4 ID : **41652951331**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.20** The region represented by $|x-y| \le 2$ and $|x+y| \le 2$ is bounded by a :

**Options**

1. square of side length $2\sqrt{2}$ units
2. rhombus of side length 2 units
3. square of area 16 sq. units
4. rhombus of area $8\sqrt{2}$ sq. units

Question Type : **MCQ**
Question ID : **41652913133**
Option 1 ID : **41652951312**
Option 2 ID : **41652951310**
Option 3 ID : **41652951313**
Option 4 ID : **41652951311**
Status : **Answered**
Chosen Option : **1**

**Q.21** The number of 6 digit numbers that can be formed using the digits 0, 1, 2, 5, 7 and 9 which are divisible by 11 and no digit is repeated, is :

**Options**

1. 72
2. 60
3. 48
4. 36

Question Type : **MCQ**
Question ID : **41652913121**
Option 1 ID : **41652951264**
Option 2 ID : **41652951263**
Option 3 ID : **41652951262**
Option 4 ID : **41652951265**
Status : **Not Answered**
Chosen Option : **--**

**Q.22** The line $x=y$ touches a circle at the point (1, 1). If the circle also passes through the point $(1, -3)$, then its radius is :

**Options**

1. 3
2. $2\sqrt{2}$
3. 2
4. $3\sqrt{2}$

Question Type : **MCQ**
Question ID : **41652913135**
Option 1 ID : **41652951319**
Option 2 ID : **41652951320**
Option 3 ID : **41652951318**
Option 4 ID : **41652951321**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.23** If the length of the perpendicular from the point $(\beta, 0, \beta)$ $(\beta \neq 0)$ to the line, $\frac{x}{1} = \frac{y-1}{0} = \frac{z+1}{-1}$ is $\sqrt{\frac{3}{2}}$, then $\beta$ is equal to :

**Options**

1. $1$
2. $2$
3. $-1$
4. $-2$

Question Type : **MCQ**
Question ID : **41652913140**
Option 1 ID : **41652951340**
Option 2 ID : **41652951341**
Option 3 ID : **41652951339**
Option 4 ID : **41652951338**
Status : **Answered**
Chosen Option : **1**

**Q.24** If $y = y(x)$ is the solution of the differential equation $\frac{dy}{dx} = (\tan x - y)\sec^2 x$, $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, such that $y(0) = 0$, then $y\left(-\frac{\pi}{4}\right)$ is equal to :

**Options**

1. $e - 2$
2. $\frac{1}{2} - e$
3. $2 + \frac{1}{e}$
4. $\frac{1}{e} - 2$

Question Type : **MCQ**
Question ID : **41652913132**
Option 1 ID : **41652951307**
Option 2 ID : **41652951306**
Option 3 ID : **41652951308**
Option 4 ID : **41652951309**
Status : **Not Answered**
Chosen Option : **--**

**Q.25**

If $\int \frac{dx}{\left(x^2-2x+10\right)^2}$

$=A\left(\tan^{-1}\left(\frac{x-1}{3}\right)+\frac{f(x)}{x^2-2x+10}\right)+C$

where C is a constant of integration, then :

**Options**

1. $A=\frac{1}{54}$ and $f(x)=3(x-1)$
2. $A=\frac{1}{81}$ and $f(x)=3(x-1)$
3. $A=\frac{1}{27}$ and $f(x)=9(x-1)$
4. $A=\frac{1}{54}$ and $f(x)=9(x-1)^2$

Question Type : **MCQ**
Question ID : **41652913129**
Option 1 ID : **41652951296**
Option 2 ID : **41652951294**
Option 3 ID : **41652951295**
Option 4 ID : **41652951297**
Status : **Answered**
Chosen Option : **3**

**Q.26** The sum

$\frac{3\times 1^3}{1^2}+\frac{5\times\left(1^3+2^3\right)}{1^2+2^2}+\frac{7\times\left(1^3+2^3+3^3\right)}{1^2+2^2+3^2}+\ldots\ldots$

upto $10^{th}$ term, is :

**Options**

1. 680
2. 600
3. 660
4. 620

Question Type : **MCQ**
Question ID : **41652913123**
Option 1 ID : **41652951273**
Option 2 ID : **41652951270**
Option 3 ID : **41652951272**
Option 4 ID : **41652951271**
Status : **Answered**
Chosen Option : **3**

**Q.27** Assume that each born child is equally likely to be a boy or a girl. If two families have two children each, then the conditional probability that all children are girls given that at least two are girls is :

**Options**

1. $\frac{1}{11}$

2. $\frac{1}{10}$

3. $\frac{1}{12}$

4. $\frac{1}{17}$

Question Type : **MCQ**
Question ID : **41652913141**
Option 1 ID : **41652951343**
Option 2 ID : **41652951342**
Option 3 ID : **41652951344**
Option 4 ID : **41652951345**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.28** If a directrix of a hyperbola centred at the origin and passing through the point $\left(4, -2\sqrt{3}\right)$ is $5x = 4\sqrt{5}$ and its eccentricity is e, then :

**Options**

1. $4e^4 - 24e^2 + 27 = 0$

2. $4e^4 - 12e^2 - 27 = 0$

3. $4e^4 - 24e^2 + 35 = 0$

4. $4e^4 + 8e^2 - 35 = 0$

Question Type : **MCQ**
Question ID : **41652913137**
Option 1 ID : **41652951326**
Option 2 ID : **41652951327**
Option 3 ID : **41652951329**
Option 4 ID : **41652951328**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

**Q.29** $\lim\limits_{n\to\infty}\left(\frac{(n+1)^{1/3}}{n^{4/3}} + \frac{(n+2)^{1/3}}{n^{4/3}} + \cdots\cdots + \frac{(2n)^{1/3}}{n^{4/3}}\right)$ is equal to :

**Options**

1. $\frac{3}{4}(2)^{4/3} - \frac{3}{4}$

2. $\frac{4}{3}(2)^{4/3}$

3. $\frac{3}{4}(2)^{4/3} - \frac{4}{3}$

4. $\frac{4}{3}(2)^{3/4}$

Question Type : **MCQ**
Question ID : **41652913131**

Option 1 ID : **41652951302**
Option 2 ID : **41652951303**
Option 3 ID : **41652951304**
Option 4 ID : **41652951305**
Status : **Answered**
Chosen Option : **1**

**Q.30** If for some $x \in \mathbf{R}$, the frequency distribution of the marks obtained by 20 students in a test is :

| Marks | 2 | 3 | 5 | 7 |
|---|---|---|---|---|
| Frequency | $(x+1)^2$ | $2x-5$ | $x^2-3x$ | $x$ |

then the mean of the marks is :

**Options**
1. 3.2
2. 3.0
3. 2.5
4. 2.8

Question Type : **MCQ**
Question ID : **41652913142**
Option 1 ID : **41652951347**
Option 2 ID : **41652951348**
Option 3 ID : **41652951346**
Option 4 ID : **41652951349**
Status : **Not Answered**
Chosen Option : **--**