Test Date	07/01/2020
Test Time	9:30 AM - 12:30 PM
Subject	BTECH

Section : **Physics**

Q.1 A litre of dry air at STP expands adiabatically to a volume of 3 litres. If $\gamma = 1.40$, the work done by air is : $(3^{1.4} = 4.6555)$ [Take air to be an ideal gas]

Options

1. 60.7 J
2. 90.5 J
3. 100.8 J
4. 48 J

Question Type : **MCQ**
Question ID : **4050368**
Option 1 ID : **40503630**
Option 2 ID : **40503631**
Option 3 ID : **40503632**
Option 4 ID : **40503629**
Status : **Not Answered**
Chosen Option : **--**

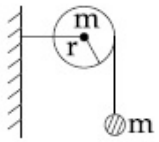
Q.2 A 60 HP electric motor lifts an elevator having a maximum total load capacity of 2000 kg. If the frictional force on the elevator is 4000 N, the speed of the elevator at full load is close to : (1 HP = 746 W, $g = 10\ ms^{-2}$)

Options

1. $1.7\ ms^{-1}$
2. $1.9\ ms^{-1}$
3. $1.5\ ms^{-1}$
4. $2.0\ ms^{-1}$

Question Type : **MCQ**
Question ID : **4050363**
Option 1 ID : **40503611**
Option 2 ID : **40503610**
Option 3 ID : **40503612**
Option 4 ID : **4050369**
Status : **Not Answered**
Chosen Option : **--**

Q.3



As shown in the figure, a bob of mass m is tied by a massless string whose other end portion is wound on a fly wheel (disc) of radius r and mass m. When released from rest the bob starts falling vertically. When it has covered a distance of h, the angular speed of the wheel will be :

Options

1. $\frac{1}{r}\sqrt{\frac{4gh}{3}}$

2. $r\sqrt{\frac{3}{2gh}}$

3. $\frac{1}{r}\sqrt{\frac{2gh}{3}}$

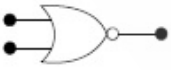
4. $r\sqrt{\frac{3}{4gh}}$

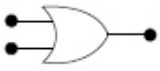
Question Type : **MCQ**
Question ID : **4050362**
Option 1 ID : **4050365**
Option 2 ID : **4050368**
Option 3 ID : **4050367**
Option 4 ID : **4050366**
Status : **Not Answered**
Chosen Option : **--**

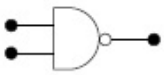
Q.4

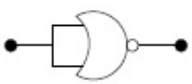
Which of the following gives a reversible operation ?

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **40503619**
Option 1 ID : **40503676**
Option 2 ID : **40503675**
Option 3 ID : **40503674**
Option 4 ID : **40503673**
Status : **Not Answered**
Chosen Option : **--**

Q.5 Consider a circular coil of wire carrying constant current I, forming a magnetic dipole. The magnetic flux through an infinite plane that contains the circular coil and excluding the circular coil area is given by ϕ_i. The magnetic flux through the area of the circular coil area is given by ϕ_0. Which of the following option is correct ?

Options

1. $\phi_i = \phi_0$
2. $\phi_i > \phi_0$
3. $\phi_i < \phi_0$
4. $\phi_i = -\phi_0$

Question Type : **MCQ**
Question ID : **40503613**
Option 1 ID : **40503649**
Option 2 ID : **40503651**
Option 3 ID : **40503650**
Option 4 ID : **40503652**
Status : **Answered**
Chosen Option : **3**

Q.6 A polarizer - analyser set is adjusted such that the intensity of light coming out of the analyser is just 10% of the original intensity. Assuming that the polarizer - analyser set does not absorb any light, the angle by which the analyser need to be rotated further to reduce the output intensity to be zero, is :

Options

1. $71.6°$
2. $18.4°$
3. $90°$
4. $45°$

Question Type : **MCQ**
Question ID : **40503617**
Option 1 ID : **40503667**
Option 2 ID : **40503666**
Option 3 ID : **40503665**
Option 4 ID : **40503668**
Status : **Not Answered**
Chosen Option : **--**

Q.7 A LCR circuit behaves like a damped harmonic oscillator. Comparing it with a physical spring-mass damped oscillator having damping constant 'b', the correct equivalence would be :

Options

1. $L \leftrightarrow m, C \leftrightarrow k, R \leftrightarrow b$
2. $L \leftrightarrow \frac{1}{b}, C \leftrightarrow \frac{1}{m}, R \leftrightarrow \frac{1}{k}$
3. $L \leftrightarrow k, C \leftrightarrow b, R \leftrightarrow m$
4. $L \leftrightarrow m, C \leftrightarrow \frac{1}{k}, R \leftrightarrow b$

Question Type : **MCQ**
Question ID : **4050361**
Option 1 ID : **4050361**
Option 2 ID : **4050364**
Option 3 ID : **4050363**
Option 4 ID : **4050362**
Status : **Not Answered**
Chosen Option : **--**

Q.8 A satellite of mass m is launched vertically upwards with an initial speed u from the surface of the earth. After it reaches height R (R = radius of the earth), it ejects a rocket of mass $\frac{m}{10}$ so that subsequently the satellite moves in a circular orbit. The kinetic energy of the rocket is (G is the gravitational constant; M is the mass of the earth) :

Options

1. $\frac{m}{20}\left(u^2+\frac{113}{200}\frac{GM}{R}\right)$

2. $5m\left(u^2-\frac{119}{200}\frac{GM}{R}\right)$

3. $\frac{3m}{8}\left(u+\sqrt{\frac{5GM}{6R}}\right)^2$

4. $\frac{m}{20}\left(u-\sqrt{\frac{2GM}{3R}}\right)^2$

Question Type : **MCQ**
Question ID : **4050366**
Option 1 ID : **40503622**
Option 2 ID : **40503621**
Option 3 ID : **40503623**
Option 4 ID : **40503624**
Status : **Not Answered**
Chosen Option : **--**

Q.9

A long solenoid of radius R carries a time (t) - dependent current $I(t) = I_0 t(1-t)$. A ring of radius 2R is placed coaxially near its middle. During the time interval $0 \le t \le 1$, the induced current (I_R) and the induced EMF(V_R) in the ring change as :

Options

1. Direction of I_R remains unchanged and V_R is maximum at $t = 0.5$
2. At $t = 0.25$ direction of I_R reverses and V_R is maximum
3. Direction of I_R remains unchanged and V_R is zero at $t = 0.25$
4. At $t = 0.5$ direction of I_R reverses and V_R is zero

Question Type : **MCQ**
Question ID : **40503614**
Option 1 ID : **40503653**
Option 2 ID : **40503656**
Option 3 ID : **40503655**
Option 4 ID : **40503654**
Status : **Not Answered**
Chosen Option : **--**

Q.10

Speed of a transverse wave on a straight wire (mass 6.0 g, length 60 cm and area of cross-section 1.0 mm^2) is 90 ms^{-1}. If the Young's modulus of wire is $16 \times 10^{11}\ Nm^{-2}$, the extension of wire over its natural length is :

Options

1. 0.03 mm
2. 0.02 mm
3. 0.04 mm
4. 0.01 mm

Question Type : **MCQ**
Question ID : **4050369**
Option 1 ID : **40503633**
Option 2 ID : **40503634**
Option 3 ID : **40503636**
Option 4 ID : **40503635**
Status : **Answered**
Chosen Option : **3**

Q.11

Two moles of an ideal gas with $\frac{C_P}{C_V} = \frac{5}{3}$ are mixed with 3 moles of another ideal gas with $\frac{C_P}{C_V} = \frac{4}{3}$. The value of $\frac{C_P}{C_V}$ for the mixture is :

Options
1. 1.45
2. 1.50
3. 1.47
4. 1.42

Question Type : **MCQ**
Question ID : **4050367**
Option 1 ID : **40503628**
Option 2 ID : **40503625**
Option 3 ID : **40503626**
Option 4 ID : **40503627**
Status : **Not Answered**
Chosen Option : **--**

Q.12

If we need a magnification of 375 from a compound microscope of tube length 150 mm and an objective of focal length 5 mm, the focal length of the eye-piece, should be close to :

Options
1. 22 mm
2. 12 mm
3. 2 mm
4. 33 mm

Question Type : **MCQ**
Question ID : **40503616**
Option 1 ID : **40503662**
Option 2 ID : **40503661**
Option 3 ID : **40503664**
Option 4 ID : **40503663**
Status : **Not Answered**
Chosen Option : **--**

Q.13 The time period of revolution of electron in its ground state orbit in a hydrogen atom is 1.6×10^{-16} s. The frequency of revolution of the electron in its first excited state (in s^{-1}) is :

Options
1. 1.6×10^{14}
2. 7.8×10^{14}
3. 6.2×10^{15}
4. 5.6×10^{12}

Question Type : **MCQ**
Question ID : **40503618**
Option 1 ID : **40503670**
Option 2 ID : **40503671**
Option 3 ID : **40503669**
Option 4 ID : **40503672**
Status : **Not Answered**
Chosen Option : **--**

Q.14

A parallel plate capacitor has plates of area A separated by distance 'd' between them. It is filled with a dielectric which has a dielectric constant that varies as $k(x) = K(1 + \alpha x)$ where 'x' is the distance measured from one of the plates. If $(\alpha d) << 1$, the total capacitance of the system is best given by the expression :

Options

1. $\frac{AK\epsilon_0}{d}\left(1 + \frac{\alpha d}{2}\right)$

2. $\frac{A\epsilon_0 K}{d}\left(1 + \left(\frac{\alpha d}{2}\right)^2\right)$

3. $\frac{A\epsilon_0 K}{d}\left(1 + \frac{\alpha^2 d^2}{2}\right)$

4. $\frac{AK\epsilon_0}{d}(1 + \alpha d)$

Question Type : **MCQ**
Question ID : **40503611**
Option 1 ID : **40503644**
Option 2 ID : **40503643**
Option 3 ID : **40503641**
Option 4 ID : **40503642**
Status : **Answered**
Chosen Option : **1**

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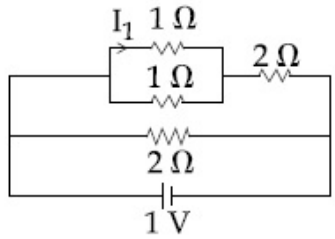
Q.15 The current I_1 (in A) flowing through 1 Ω resistor in the following circuit is :



Options
1. 0.4
2. 0.5
3. 0.2
4. 0.25

Question Type : **MCQ**
Question ID : **40503612**
Option 1 ID : **40503645**
Option 2 ID : **40503646**
Option 3 ID : **40503647**
Option 4 ID : **40503648**
Status : **Answered**
Chosen Option : **3**

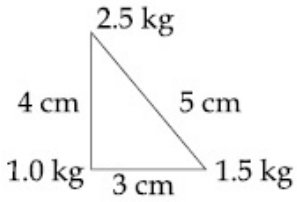
Q.16 Visible light of wavelength 6000×10^{-8} cm falls normally on a single slit and produces a diffraction pattern. It is found that the second diffraction minimum is at 60° from the central maximum. If the first minimum is produced at θ_1, then θ_1 is close to :

Options
1. 20°
2. 30°
3. 25°
4. 45°

Question Type : **MCQ**
Question ID : **40503620**
Option 1 ID : **40503680**
Option 2 ID : **40503678**
Option 3 ID : **40503679**
Option 4 ID : **40503677**
Status : **Not Answered**
Chosen Option : **--**

Q.17

Three point particles of masses 1.0 kg, 1.5 kg and 2.5 kg are placed at three corners of a right angle triangle of sides 4.0 cm, 3.0 cm and 5.0 cm as shown in the figure. The center of mass of the system is at a point :

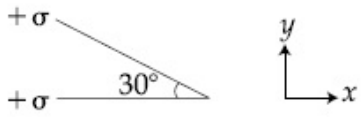


Options

1. 0.6 cm right and 2.0 cm above 1 kg mass
2. 1.5 cm right and 1.2 cm above 1 kg mass
3. 2.0 cm right and 0.9 cm above 1 kg mass
4. 0.9 cm right and 2.0 cm above 1 kg mass

Question Type : **MCQ**
Question ID : **4050364**
Option 1 ID : **40503615**
Option 2 ID : **40503616**
Option 3 ID : **40503614**
Option 4 ID : **40503613**
Status : **Not Answered**
Chosen Option : **--**

Q.18 Two infinite planes each with uniform surface charge density $+\sigma$ are kept in such a way that the angle between them is 30°. The electric field in the region shown between them is given by :



Options

1. $\frac{\sigma}{2\epsilon_0}\left[\left(1+\sqrt{3}\right)\hat{y}-\frac{\hat{x}}{2}\right]$

2. $\frac{\sigma}{\epsilon_0}\left[\left(1+\frac{\sqrt{3}}{2}\right)\hat{y}+\frac{\hat{x}}{2}\right]$

3. $\frac{\sigma}{2\epsilon_0}\left[\left(1+\sqrt{3}\right)\hat{y}+\frac{\hat{x}}{2}\right]$

4. $\frac{\sigma}{2\epsilon_0}\left[\left(1-\frac{\sqrt{3}}{2}\right)\hat{y}-\frac{\hat{x}}{2}\right]$

Question Type : **MCQ**
Question ID : **40503610**
Option 1 ID : **40503640**
Option 2 ID : **40503638**
Option 3 ID : **40503639**
Option 4 ID : **40503637**
Status : **Not Answered**
Chosen Option : **--**

Q.19 If the magnetic field in a plane electromagnetic wave is given by $\vec{B} = 3 \times 10^{-8} \sin(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{j}$ T, then what will be expression for electric field ?

Options

1. $\vec{E} = \left(60\sin(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{k}\ \text{V/m}\right)$
2. $\vec{E} = \left(9\sin(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{k}\ \text{V/m}\right)$
3. $\vec{E} = \left(3 \times 10^{-8}\sin(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{j}\ \text{V/m}\right)$
4. $\vec{E} = \left(3 \times 10^{-8}\sin(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{i}\ \text{V/m}\right)$

Question Type : **MCQ**
Question ID : **40503615**
Option 1 ID : **40503660**
Option 2 ID : **40503658**
Option 3 ID : **40503657**
Option 4 ID : **40503659**
Status : **Answered**
Chosen Option : **2**

Q.20 The radius of gyration of a uniform rod of length l, about an axis passing through a point $\frac{l}{4}$ away from the centre of the rod, and perpendicular to it, is :

Options

1. $\frac{1}{4}l$
2. $\frac{1}{8}l$
3. $\sqrt{\frac{7}{48}}l$
4. $\sqrt{\frac{3}{8}}l$

Question Type : **MCQ**
Question ID : **4050365**
Option 1 ID : **40503617**
Option 2 ID : **40503620**
Option 3 ID : **40503619**
Option 4 ID : **40503618**
Status : **Not Answered**
Chosen Option : **--**

Q.21 A Carnot engine operates between two reservoirs of temperatures 900 K and 300 K. The engine performs 1200 J of work per cycle. The heat energy (in J) delivered by the engine to the low temperature reservoir, in a cycle, is _____.

Given **600**
Answer :

Question Type : **SA**
Question ID : **40503623**
Status : **Answered**

Q.22 A non-isotropic solid metal cube has coefficients of linear expansion as : $5\times10^{-5}/°C$ along the x-axis and $5\times10^{-6}/°C$ along the y and the z-axis. If the coefficient of volume expansion of the solid is $C\times10^{-6}/°C$ then the value of C is _____.

Given **15**
Answer :

Question Type : **SA**
Question ID : **40503622**
Status : **Answered**

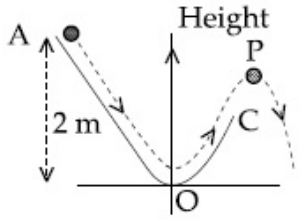
Q.23 A loop ABCDEFA of straight edges has six corner points A(0, 0, 0), B(5, 0, 0), C(5, 5, 0), D(0, 5, 0), E(0, 5, 5) and F(0, 0, 5). The magnetic field in this region is $\vec{B} = (3\hat{i} + 4\hat{k})T$. The quantity of flux through the loop ABCDEFA (in Wb) is _____.

Given **25**
Answer :

Question Type : **SA**
Question ID : **40503624**
Status : **Answered**

Q.24

A particle (m = 1 kg) slides down a frictionless track (AOC) starting from rest at a point A (height 2 m). After reaching C, the particle continues to move freely in air as a projectile. When it reaching its highest point P (height 1 m), the kinetic energy of the particle (in J) is : (Figure drawn is schematic and not to scale; take $g = 10\ ms^{-2}$) _____.



Given **0**
Answer :

Question Type : **SA**
Question ID : **40503621**
Status : **Answered**

Q.25

A beam of electromagnetic radiation of intensity $6.4 \times 10^{-5}\ W/cm^2$ is comprised of wavelength, $\lambda = 310$ nm. It falls normally on a metal (work function $\varphi = 2eV$) of surface area of $1\ cm^2$. If one in 10^3 photons ejects an electron, total number of electrons ejected in 1 s is 10^x. ($hc = 1240\ eVnm$, $1eV = 1.6 \times 10^{-19}$ J), then x is _____.

Given **20**
Answer :

Question Type : **SA**
Question ID : **40503625**
Status : **Answered**

Section : **Chemistry**

Q.1 The number of orbitals associated with quantum numbers $n=5$, $m_s = +\frac{1}{2}$ is :

Options
1. 11
2. 25
3. 50
4. 15

Question Type : **MCQ**
Question ID : **40503629**
Option 1 ID : **405036101**
Option 2 ID : **405036100**
Option 3 ID : **40503698**
Option 4 ID : **40503699**
Status : **Not Answered**
Chosen Option : **--**

Q.2 Given that the standard potentials (E°) of Cu^{2+}/Cu and Cu^{+}/Cu are 0.34 V and 0.522 V respectively, the E° of Cu^{2+}/Cu^{+} is :

Options
1. 0.182 V
2. +0.158 V
3. −0.182 V
4. −0.158 V

Question Type : **MCQ**
Question ID : **40503627**
Option 1 ID : **40503690**
Option 2 ID : **40503692**
Option 3 ID : **40503691**
Option 4 ID : **40503693**
Status : **Answered**
Chosen Option : **1**

Q.3 In comparison to the zeolite process for the removal of permanent hardness, the synthetic resins method is :

Options

1. less efficient as it exchanges only anions
2. more efficient as it can exchange both cations as well as anions
3. less efficient as the resins cannot be regenerated
4. more efficient as it can exchange only cations

Question Type : **MCQ**
Question ID : **40503634**
Option 1 ID : **405036118**
Option 2 ID : **405036119**
Option 3 ID : **405036121**
Option 4 ID : **405036120**
Status : **Not Answered**
Chosen Option : **--**

Q.4 Match the following :

(i)	Riboflavin	(a)	Beriberi
(ii)	Thiamine	(b)	Scurvy
(iii)	Pyridoxine	(c)	Cheilosis
(iv)	Ascorbic acid	(d)	Convulsions

Options

1. (i)-(a), (ii)-(d), (iii)-(c), (iv)-(b)
2. (i)-(c), (ii)-(d), (iii)-(a), (iv)-(b)
3. (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)
4. (i)-(d), (ii)-(b), (iii)-(a), (iv)-(c)

Question Type : **MCQ**
Question ID : **40503642**
Option 1 ID : **405036153**
Option 2 ID : **405036152**
Option 3 ID : **405036150**
Option 4 ID : **405036151**
Status : **Not Answered**
Chosen Option : **--**

Q.5

At 35°C, the vapour pressure of CS_2 is 512 mm Hg and that of acetone is 344 mm Hg. A solution of CS_2 in acetone has a total vapour pressure of 600 mm Hg. The false statement amongst the following is :

Options

1. Raoult's law is not obeyed by this system
2. a mixture of 100 mL CS_2 and 100 mL acetone has a volume < 200 mL
3. CS_2 and acetone are less attracted to each other than to themselves
4. heat must be absorbed in order to produce the solution at 35°C

Question Type : **MCQ**
Question ID : **40503626**
Option 1 ID : **40503689**
Option 2 ID : **40503687**
Option 3 ID : **40503688**
Option 4 ID : **40503686**
Status : **Answered**
Chosen Option : **2**

Q.6

A solution of m-chloroaniline, m-chlorophenol and m-chlorobenzoic acid in ethyl acetate was extracted initially with a saturated solution of $NaHCO_3$ to give fraction A. The left over organic phase was extracted with dilute NaOH solution to give fraction B. The final organic layer was labelled as fraction C. Fractions A, B and C, contain respectively :

Options

1. m-chlorobenzoic acid, m-chloroaniline and m-chlorophenol
2. m-chlorobenzoic acid, m-chlorophenol and m-chloroaniline
3. m-chlorophenol, m-chlorobenzoic acid and m-chloroaniline
4. m-chloroaniline, m-chlorobenzoic acid and m-chlorophenol

Question Type : **MCQ**
Question ID : **40503641**
Option 1 ID : **405036147**
Option 2 ID : **405036148**
Option 3 ID : **405036149**
Option 4 ID : **405036146**
Status : **Not Answered**
Chosen Option : **--**

Q.7

What is the product of following reaction ?

Hex-3-ynal $\xrightarrow[\text{(ii) } PBr_3 \text{ (iii) Mg/ether (iv) } CO_2/H_3O^+]{\text{(i) } NaBH_4}$?

Options

1. 
2. 
3. 
4. 

Question Type : **MCQ**
Question ID : **40503643**
Option 1 ID : **405036155**
Option 2 ID : **405036156**
Option 3 ID : **405036154**
Option 4 ID : **405036157**
Status : **Answered**
Chosen Option : **1**

Q.8 Amongst the following statements, that which was not proposed by Dalton was :

Options

1. chemical reactions involve reorganization of atoms. These are neither created nor destroyed in a chemical reaction.
2. all the atoms of a given element have identical properties including identical mass. Atoms of different elements differ in mass.
3. when gases combine or reproduced in a chemical reaction they do so in a simple ratio by volume provided all gases are at the same T & P.
4. matter consists of indivisible atoms.

Question Type : **MCQ**
Question ID : **40503631**
Option 1 ID : **405036109**
Option 2 ID : **405036107**
Option 3 ID : **405036108**
Option 4 ID : **405036106**
Status : **Answered**
Chosen Option : **3**

Q.9 The dipole moments of CCl_4, $CHCl_3$ and CH_4 are in the order :

Options

1. $CHCl_3 < CH_4 = CCl_4$
2. $CCl_4 < CH_4 < CHCl_3$
3. $CH_4 < CCl_4 < CHCl_3$
4. $CH_4 = CCl_4 < CHCl_3$

Question Type : **MCQ**
Question ID : **40503628**
Option 1 ID : **40503697**
Option 2 ID : **40503695**
Option 3 ID : **40503694**
Option 4 ID : **40503696**
Status : **Not Answered**
Chosen Option : **--**

Q.10 The IUPAC name of the complex $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$ is :

Options

1. Diamminechlorido(methanamine) platinum(II)chloride
2. Diammine(methanamine)chlorido platinum(II)chloride
3. Diamminechlorido(aminomethane) platinum(II)chloride
4. Bisammine(methanamine)chlorido platinum(II)chloride

Question Type : **MCQ**
Question ID : **40503638**
Option 1 ID : **405036136**
Option 2 ID : **405036135**
Option 3 ID : **405036137**
Option 4 ID : **405036134**
Status : **Answered**
Chosen Option : **4**

Q.11 The purest form of commercial iron is :

Options

1. pig iron
2. wrought iron
3. cast iron
4. scrap iron and pig iron

Question Type : **MCQ**
Question ID : **40503633**
Option 1 ID : **405036115**
Option 2 ID : **405036114**
Option 3 ID : **405036116**
Option 4 ID : **405036117**
Status : **Answered**
Chosen Option : **2**

Q.12 The electron gain enthalpy (in kJ/mol) of fluorine, chlorine, bromine and iodine, respectively, are :

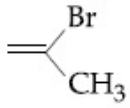
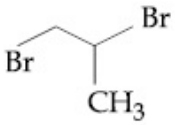
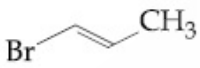
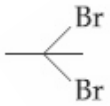
Options

1. $-296, -325, -333$ and -349
2. $-349, -333, -325$ and -296
3. $-333, -349, -325$ and -296
4. $-333, -325, -349$ and -296

Question Type : **MCQ**
Question ID : **40503632**
Option 1 ID : **405036113**
Option 2 ID : **405036111**
Option 3 ID : **405036110**
Option 4 ID : **405036112**
Status : **Answered**
Chosen Option : **1**

Q.13 1-methyl ethylene oxide when treated with an excess of HBr produces :

Options

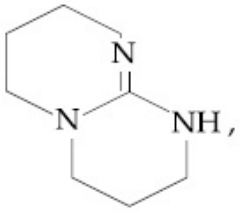
1. 
2. 
3. 
4. 

Question Type : **MCQ**
Question ID : **40503644**
Option 1 ID : **405036159**
Option 2 ID : **405036160**
Option 3 ID : **405036158**
Option 4 ID : **405036161**
Status : **Not Answered**
Chosen Option : **--**

Q.14 The increasing order of pK_b for the following compounds will be :

$NH_2-CH=NH$,

(A)



(B)

CH_3NHCH_3

(C)

Options

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

Question Type : **MCQ**
Question ID : **40503640**
Option 1 ID : **405036143**
Option 2 ID : **405036142**
Option 3 ID : **405036144**
Option 4 ID : **405036145**
Status : **Answered**
Chosen Option : **4**

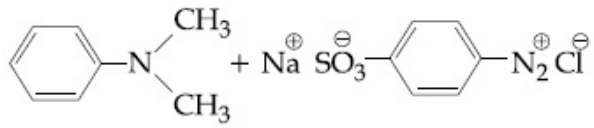
Q.15 Oxidation number of potassium in K_2O, K_2O_2 and KO_2, respectively, is :

Options

1. $+2, +1$ and $+\frac{1}{2}$
2. $+1, +1$ and $+1$
3. $+1, +4$ and $+2$
4. $+1, +2$ and $+4$

Question Type : **MCQ**
Question ID : **40503635**
Option 1 ID : **405036124**
Option 2 ID : **405036125**
Option 3 ID : **405036123**
Option 4 ID : **405036122**
Status : **Answered**
Chosen Option : **1**

Q.16 Consider the following reaction :



$\xrightarrow{OH^-}$ 'X'

The product 'X' is used :

Options

1. in protein estimation as an alternative to ninhydrin
2. in acid base titration as an indicator
3. as food grade colourant
4. in laboratory test for phenols

Question Type : **MCQ**
Question ID : **40503639**
Option 1 ID : **405036139**
Option 2 ID : **405036140**
Option 3 ID : **405036138**
Option 4 ID : **405036141**
Status : **Not Answered**
Chosen Option : **--**

Q.17 The atomic radius of Ag is closest to :

Options

1. Au
2. Ni
3. Cu
4. Hg

Question Type : **MCQ**
Question ID : **40503636**
Option 1 ID : **405036129**
Option 2 ID : **405036126**
Option 3 ID : **405036127**
Option 4 ID : **405036128**
Status : **Not Answered**
Chosen Option : **--**

Q.18 The theory that can completely/properly explain the nature of bonding in $[Ni(Co)_4]$ is :

Options
1. Werner's theory
2. Molecular orbital theory
3. Crystal field theory
4. Valence bond theory

Question Type : **MCQ**
Question ID : **40503637**
Option 1 ID : **405036130**
Option 2 ID : **405036133**
Option 3 ID : **405036132**
Option 4 ID : **405036131**
Status : **Answered**
Chosen Option : **3**

Q.19 Consider the following reactions :

(a) $(CH_3)_3CCH(OH)CH_3 \xrightarrow{\text{conc. } H_2SO_4}$

(b) $(CH_3)_2CHCH(Br)CH_3 \xrightarrow{\text{alc. KOH}}$

(c) $(CH_3)_2CHCH(Br)CH_3 \xrightarrow{(CH_3)_3O^{\ominus}K^{\oplus}}$

(d) $(CH_3)_2\underset{\underset{OH}{|}}{C}-CH_2-CHO \xrightarrow{\Delta}$

Which of these reaction(s) will **not** produce Saytzeff product ?

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

Question Type : **MCQ**
Question ID : **40503645**
Option 1 ID : **405036164**
Option 2 ID : **405036162**
Option 3 ID : **405036165**
Option 4 ID : **405036163**
Status : **Not Answered**
Chosen Option : **--**

Q.20 The relative strength of interionic/ intermolecular forces in decreasing order is :

Options

1. dipole-dipole > ion-dipole > ion-ion
2. ion-dipole > ion-ion > dipole-dipole
3. ion-dipole > dipole-dipole > ion-ion
4. ion-ion > ion-dipole > dipole-dipole

Question Type : **MCQ**
Question ID : **40503630**
Option 1 ID : **405036105**
Option 2 ID : **405036102**
Option 3 ID : **405036104**
Option 4 ID : **405036103**
Status : **Answered**
Chosen Option : **4**

Q.21 Chlorine reacts with hot and concentrated NaOH and produces compounds (X) and (Y). Compound (X) gives white precipitate with silver nitrate solution. The average bond order between Cl and O atoms in (Y) is _____.

Given Answer : **2**

Question Type : **SA**
Question ID : **40503649**
Status : **Answered**

Q.22 The number of chiral carbons in chloramphenicol is _____.

Given Answer : **6**

Question Type : **SA**
Question ID : **40503650**
Status : **Answered**

Q.23 During the nuclear explosion, one of the products is ^{90}Sr with half life of 6.93 years. If 1 μg of ^{90}Sr was absorbed in the bones of a newly born baby in place of Ca, how much time, in years, is required to reduce it by 90% if it is not lost metabolically _____.

Given **5.36**
Answer :

Question Type : **SA**
Question ID : **40503646**
Status : **Answered**

Q.24 For the reaction ;

$A(l) \rightarrow 2B(g)$

$\Delta U = 2.1$ kcal, $\Delta S = 20$ cal K^{-1} at 300 K.
Hence ΔG in kcal is _____.

Given **-3.9**
Answer :

Question Type : **SA**
Question ID : **40503648**
Status : **Answered**

Q.25 Two solutions, A and B, each of 100 L was made by dissolving 4 g of NaOH and 9.8 g of H_2SO_4 in water, respectively. The pH of the resultant solution obtained from mixing 40 L of solution A and 10 L of solution B is _____.

Given **7**
Answer :

Question Type : **SA**
Question ID : **40503647**
Status : **Answered**

Section : **Mathematics**

Q.1 If

$$y(\alpha) = \sqrt{2\left(\frac{\tan\alpha + \cot\alpha}{1+\tan^2\alpha}\right) + \frac{1}{\sin^2\alpha}},\ \alpha \in \left(\frac{3\pi}{4}, \pi\right),$$

then $\frac{dy}{d\alpha}$ at $\alpha = \frac{5\pi}{6}$ is :

Options
1. 4
2. $\frac{4}{3}$
3. -4
4. $-\frac{1}{4}$

Question Type : **MCQ**
Question ID : **40503669**
Option 1 ID : **405036246**
Option 2 ID : **405036243**
Option 3 ID : **405036245**
Option 4 ID : **405036244**
Status : **Not Answered**
Chosen Option : **--**

Q.2 Five numbers are in A.P., whose sum is 25 and product is 2520. If one of these five numbers is $-\frac{1}{2}$, then the greatest number amongst them is :

Options
1. 27
2. 7
3. $\frac{21}{2}$
4. 16

Question Type : **MCQ**
Question ID : **40503656**
Option 1 ID : **405036194**
Option 2 ID : **405036191**
Option 3 ID : **405036193**
Option 4 ID : **405036192**
Status : **Answered**
Chosen Option : **4**

Q.3 If $g(x)=x^2+x-1$ and $(gof)(x)=4x^2-10x+5$, then $f\left(\frac{5}{4}\right)$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **40503651**
Option 1 ID : **405036174**
Option 2 ID : **405036171**
Option 3 ID : **405036172**
Option 4 ID : **405036173**
Status : **Not Answered**
Chosen Option : **--**

Q.4 Total number of 6-digit numbers in which only and all the five digits 1, 3, 5, 7 and 9 appear, is :

Options

1. $\frac{1}{2}(6!)$
2. $6!$
3. 5^6
4. $\frac{5}{2}(6!)$

Question Type : **MCQ**
Question ID : **40503655**
Option 1 ID : **405036188**
Option 2 ID : **405036187**
Option 3 ID : **405036190**
Option 4 ID : **405036189**
Status : **Answered**
Chosen Option : **2**

Q.5

A vector $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ $(\alpha, \beta \in R)$ lies in the plane of the vectors, $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c} = \hat{i} - \hat{j} + 4\hat{k}$. If $\vec{a}$ bisects the angle between $\vec{b}$ and $\vec{c}$, then :

Options

1. $\vec{a} \cdot \hat{i} + 3 = 0$
2. $\vec{a} \cdot \hat{i} + 1 = 0$
3. $\vec{a} \cdot \hat{k} + 2 = 0$
4. $\vec{a} \cdot \hat{k} + 4 = 0$

Question Type : **MCQ**
Question ID : **40503666**
Option 1 ID : **405036233**
Option 2 ID : **405036231**
Option 3 ID : **405036232**
Option 4 ID : **405036234**
Status : **Not Answered**
Chosen Option : **--**

Q.6

Let $x^k + y^k = a^k$, $(a, k > 0)$ and $\frac{dy}{dx} + \left(\frac{y}{x}\right)^{\frac{1}{3}} = 0$, then k is :

Options

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

Question Type : **MCQ**
Question ID : **40503658**
Option 1 ID : **405036202**
Option 2 ID : **405036201**
Option 3 ID : **405036199**
Option 4 ID : **405036200**
Status : **Answered**
Chosen Option : **2**

Q.7

Let α and β be two real roots of the equation $(k+1)\tan^2 x - \sqrt{2}\cdot\lambda\tan x = (1-k)$, where $k(\neq -1)$ and λ are real numbers. If $\tan^2(\alpha+\beta)=50$, then a value of λ is :

Options

1. $10\sqrt{2}$
2. 10
3. 5
4. $5\sqrt{2}$

Question Type : **MCQ**
Question ID : **40503667**
Option 1 ID : **405036237**
Option 2 ID : **405036236**
Option 3 ID : **405036235**
Option 4 ID : **405036238**
Status : **Answered**
Chosen Option : **3**

Q.8

If $f(a+b+1-x)=f(x)$, for all x, where a and b are fixed positive real numbers, then $\frac{1}{a+b}\int_a^b x(f(x)+f(x+1))dx$ is equal to :

Options

1. $\int_{a+1}^{b+1} f(x)dx$
2. $\int_{a-1}^{b-1} f(x)dx$
3. $\int_{a-1}^{b-1} f(x+1)dx$
4. $\int_{a+1}^{b+1} f(x+1)dx$

Question Type : **MCQ**
Question ID : **40503660**
Option 1 ID : **405036209**
Option 2 ID : **405036207**
Option 3 ID : **405036208**
Option 4 ID : **405036210**
Status : **Not Answered**
Chosen Option : **--**

Q.9

The area of the region, enclosed by the circle $x^2+y^2=2$ which is not common to the region bounded by the parabola $y^2=x$ and the straight line $y=x$, is :

Options

1. $\frac{1}{6}(24\pi-1)$
2. $\frac{1}{3}(6\pi-1)$
3. $\frac{1}{3}(12\pi-1)$
4. $\frac{1}{6}(12\pi-1)$

Question Type : **MCQ**
Question ID : **40503661**
Option 1 ID : **405036211**
Option 2 ID : **405036213**
Option 3 ID : **405036214**
Option 4 ID : **405036212**
Status : **Not Answered**
Chosen Option : **--**

Q.10

If the system of linear equations

$2x+2ay+az=0$

$2x+3by+bz=0$

$2x+4cy+cz=0,$

where a, b, c $\in$ R are non-zero and distinct;
has a non-zero solution, then :

Options

1. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.
2. a, b, c are in G.P.
3. $a+b+c=0$
4. a, b, c are in A.P.

Question Type : **MCQ**
Question ID : **40503654**
Option 1 ID : **405036184**
Option 2 ID : **405036185**
Option 3 ID : **405036183**
Option 4 ID : **405036186**
Status : **Not Answered**
Chosen Option : **--**

Q.11 Let P be a plane passing through the points (2, 1, 0), (4, 1, 1) and (5, 0, 1) and R be any point (2, 1, 6). Then the image of R in the plane P is :

Options
1. $(6, 5, 2)$
2. $(6, 5, -2)$
3. $(4, 3, 2)$
4. $(3, 4, -2)$

Question Type : **MCQ**
Question ID : **40503665**
Option 1 ID : **405036229**
Option 2 ID : **405036227**
Option 3 ID : **405036228**
Option 4 ID : **405036230**
Status : **Not Answered**
Chosen Option : **--**

Q.12 The logical statement $(p \Rightarrow q) \wedge (q \Rightarrow \sim p)$ is equivalent to :

Options
1. p
2. q
3. $\sim p$
4. $\sim q$

Question Type : **MCQ**
Question ID : **40503670**
Option 1 ID : **405036247**
Option 2 ID : **405036248**
Option 3 ID : **405036249**
Option 4 ID : **405036250**
Status : **Not Answered**
Chosen Option : **--**

Q.13 If the distance between the foci of an ellipse is 6 and the distance between its directrices is 12, then the length of its latus rectum is :

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

Question Type : **MCQ**
Question ID : **40503664**
Option 1 ID : **405036226**
Option 2 ID : **405036225**
Option 3 ID : **405036223**
Option 4 ID : **405036224**
Status : **Not Answered**
Chosen Option : **--**

Q.14 An unbiased coin is tossed 5 times. Suppose that a variable X is assigned the value k when k consecutive heads are obtained for k = 3, 4, 5, otherwise X takes the value −1. Then the expected value of X, is :

Options
1. $\frac{3}{16}$
2. $\frac{1}{8}$
3. $-\frac{3}{16}$
4. $-\frac{1}{8}$

Question Type : **MCQ**
Question ID : **40503668**
Option 1 ID : **405036239**
Option 2 ID : **405036242**
Option 3 ID : **405036240**
Option 4 ID : **405036241**
Status : **Not Answered**
Chosen Option : **--**

Q.15 If $y = mx + 4$ is a tangent to both the parabolas, $y^2 = 4x$ and $x^2 = 2by$, then b is equal to :

Options

1. -32
2. -64
3. -128
4. 128

Question Type : **MCQ**
Question ID : **40503663**
Option 1 ID : **405036222**
Option 2 ID : **405036221**
Option 3 ID : **405036219**
Option 4 ID : **405036220**
Status : **Not Answered**
Chosen Option : **--**

Q.16 The greatest positive integer k, for which $49^k + 1$ is a factor of the sum $49^{125} + 49^{124} + \ldots + 49^2 + 49 + 1$, is :

Options

1. 32
2. 63
3. 60
4. 65

Question Type : **MCQ**
Question ID : **40503657**
Option 1 ID : **405036195**
Option 2 ID : **405036197**
Option 3 ID : **405036196**
Option 4 ID : **405036198**
Status : **Not Answered**
Chosen Option : **--**

Q.17

If $\mathrm{Re}\left(\frac{z-1}{2z+i}\right)=1$, where $z=x+iy$, then the point (x, y) lies on a :

Options

1. circle whose centre is at $\left(-\frac{1}{2}, -\frac{3}{2}\right)$.
2. straight line whose slope is $-\frac{2}{3}$.
3. straight line whose slope is $\frac{3}{2}$.
4. circle whose diameter is $\frac{\sqrt{5}}{2}$.

Question Type : **MCQ**
Question ID : **40503652**
Option 1 ID : **405036177**
Option 2 ID : **405036175**
Option 3 ID : **405036176**
Option 4 ID : **405036178**
Status : **Not Answered**
Chosen Option : **--**

Q.18

Let α be a root of the equation $x^2+x+1=0$

and the matrix $A=\frac{1}{\sqrt{3}}\begin{bmatrix}1 & 1 & 1\\ 1 & \alpha & \alpha^2\\ 1 & \alpha^2 & \alpha^4\end{bmatrix}$,

then the matrix A^{31} is equal to :

Options

1. A
2. I_3
3. A^2
4. A^3

Question Type : **MCQ**
Question ID : **40503653**
Option 1 ID : **405036179**
Option 2 ID : **405036182**
Option 3 ID : **405036180**
Option 4 ID : **405036181**
Status : **Not Answered**
Chosen Option : **--**

Q.19

If $y = y(x)$ is the solution of the differential equation, $e^y\left(\frac{dy}{dx} - 1\right) = e^x$ such that $y(0) = 0$, then $y(1)$ is equal to :

Options

1. $1 + \log_e 2$
2. $2 + \log_e 2$
3. $2e$
4. $\log_e 2$

Question Type : **MCQ**
Question ID : **40503662**
Option 1 ID : **405036215**
Option 2 ID : **405036217**
Option 3 ID : **405036218**
Option 4 ID : **405036216**
Status : **Not Answered**
Chosen Option : **--**

Q.20

Let the function, $f : [-7, 0] \to R$ be continuous on $[-7, 0]$ and differentiable on $(-7, 0)$. If $f(-7) = -3$ and $f'(x) \leq 2$, for all $x \in (-7, 0)$, then for all such functions f, $f(-1) + f(0)$ lies in the interval :

Options

1. $(-\infty, 20]$
2. $[-3, 11]$
3. $(-\infty, 11]$
4. $[-6, 20]$

Question Type : **MCQ**
Question ID : **40503659**
Option 1 ID : **405036206**
Option 2 ID : **405036204**
Option 3 ID : **405036203**
Option 4 ID : **405036205**
Status : **Not Answered**
Chosen Option : **--**

Q.21

$\lim\limits_{x \to 2} \frac{3^x + 3^{3-x} - 12}{3^{-x/2} - 3^{1-x}}$ is equal to _____.

Given Answer : **0**

Question Type : **SA**
Question ID : **40503673**
Status : **Answered**

Q.22

If the sum of the coefficients of all even powers of x in the product $(1+x+x^2+...+x^{2n})(1-x+x^2-x^3+...+x^{2n})$ is 61, then n is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **40503672**
Status : **Not Answered**

Q.23

Let S be the set of points where the function, $f(x) = |2-|x-3||, x \in \mathbf{R}$, is not differentiable. Then $\sum_{x \in S} f(f(x))$ is equal to _____.

Given **9**
Answer :

Question Type : **SA**
Question ID : **40503674**
Status : **Answered**

Q.24

If the variance of the first n natural numbers is 10 and the variance of the first m even natural numbers is 16, then m + n is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **40503671**
Status : **Not Answered**

Q.25

Let A(1, 0), B(6, 2) and $C\left(\frac{3}{2}, 6\right)$ be the vertices of a triangle ABC. If P is a point inside the triangle ABC such that the triangles APC, APB and BPC have equal areas, then the length of the line segment PQ, where Q is the point $\left(-\frac{7}{6}, -\frac{1}{3}\right)$, is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **40503675**
Status : **Not Answered**