Test Date	07/01/2020
Test Time	2:30 PM - 5:30 PM
Subject	BTECH

Section : **Physics**

Q.1 A mass of 10 kg is suspended by a rope of length 4 m, from the ceiling. A force F is applied horizontally at the mid-point of the rope such that the top half of the rope makes an angle of 45° with the vertical. Then F equals : (Take $g = 10\ ms^{-2}$ and the rope to be massless)

Options

1. 100 N
2. 90 N
3. 70 N
4. 75 N

Question Type : **MCQ**
Question ID : **4050361245**
Option 1 ID : **4050364607**
Option 2 ID : **4050364605**
Option 3 ID : **4050364606**
Option 4 ID : **4050364608**
Status : **Not Answered**
Chosen Option : **--**

Q.2 A particle of mass m and charge q has an initial velocity $\vec{v} = v_0\hat{j}$. If an electric field $\vec{E} = E_0\hat{i}$ and magnetic field $\vec{B} = B_0\hat{i}$ act on the particle, its speed will double after a time :

Options

1. $\frac{2mv_0}{qE_0}$
2. $\frac{3mv_0}{qE_0}$
3. $\frac{\sqrt{3}mv_0}{qE_0}$
4. $\frac{\sqrt{2}mv_0}{qE_0}$

Question Type : **MCQ**
Question ID : **4050361253**
Option 1 ID : **4050364637**
Option 2 ID : **4050364639**
Option 3 ID : **4050364640**
Option 4 ID : **4050364638**
Status : **Marked For Review**
Chosen Option : **4**

Q.3 In a building there are 15 bulbs of 45 W, 15 bulbs of 100 W, 15 small fans of 10 W and 2 heaters of 1 kW. The voltage of electric main is 220 V. The minimum fuse capacity (rated value) of the building will be :

Options

1. 10 A
2. 25 A
3. 15 A
4. 20 A

Question Type : **MCQ**
Question ID : **4050361254**
Option 1 ID : **4050364641**
Option 2 ID : **4050364644**
Option 3 ID : **4050364643**
Option 4 ID : **4050364642**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.4 An ideal fluid flows (laminar flow) through a pipe of non-uniform diameter. The maximum and minimum diameters of the pipes are 6.4 cm and 4.8 cm, respectively. The ratio of the minimum and the maximum velocities of fluid in this pipe is :

Options
1. $\frac{9}{16}$
2. $\frac{\sqrt{3}}{2}$
3. $\frac{3}{4}$
4. $\frac{81}{256}$

Question Type : **MCQ**
Question ID : **4050361249**
Option 1 ID : **4050364624**
Option 2 ID : **4050364621**
Option 3 ID : **4050364622**
Option 4 ID : **4050364623**
Status : **Not Answered**
Chosen Option : **--**

Q.5 The dimension of $\frac{B^2}{2\mu_0}$, where B is magnetic field and μ_0 is the magnetic permeability of vacuum, is :

Options
1. MLT^{-2}
2. ML^2T^{-1}
3. ML^2T^{-2}
4. $ML^{-1}T^{-2}$

Question Type : **MCQ**
Question ID : **4050361244**
Option 1 ID : **4050364602**
Option 2 ID : **4050364603**
Option 3 ID : **4050364601**
Option 4 ID : **4050364604**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.6 The electric field of a plane electromagnetic wave is given by

$$\vec{E} = E_0 \frac{\hat{i} + \hat{j}}{\sqrt{2}} \cos(kz + \omega t)$$

At $t=0$, a positively charged particle is at the point $(x, y, z) = \left(0, 0, \frac{\pi}{k}\right)$. If its instantaneous velocity at $(t=0)$ is $v_0 \hat{k}$, the force acting on it due to the wave is :

Options

1. parallel to $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$
2. zero
3. antiparallel to $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$
4. parallel to $\hat{k}$

Question Type : **MCQ**
Question ID : **4050361258**
Option 1 ID : **4050364657**
Option 2 ID : **4050364659**
Option 3 ID : **4050364658**
Option 4 ID : **4050364660**
Status : **Not Answered**
Chosen Option : **--**

Q.7 An elevator in a building can carry a maximum of 10 persons, with the average mass of each person being 68 kg. The mass of the elevator itself is 920 kg and it moves with a constant speed of 3 m/s. The frictional force opposing the motion is 6000 N. If the elevator is moving up with its full capacity, the power delivered by the motor to the elevator ($g = 10\ m/s^2$) must be at least :

Options
1. 56300 W
2. 62360 W
3. 48000 W
4. 66000 W

Question Type : **MCQ**
Question ID : **4050361246**
Option 1 ID : **4050364609**
Option 2 ID : **4050364612**
Option 3 ID : **4050364611**
Option 4 ID : **4050364610**
Status : **Not Answered**
Chosen Option : **--**

Q.8 A stationary observer receives sound from two identical tuning forks, one of which approaches and the other one recedes with the same speed (much less than the speed of sound). The observer hears 2 beats/sec. The oscillation frequency of each tuning fork is $\nu_0 = 1400$ Hz and the velocity of sound in air is 350 m/s. The speed of each tuning fork is close to :

Options
1. $\frac{1}{2}$ m/s
2. 1 m/s
3. $\frac{1}{4}$ m/s
4. $\frac{1}{8}$ m/s

Question Type : **MCQ**
Question ID : **4050361252**
Option 1 ID : **4050364634**
Option 2 ID : **4050364633**
Option 3 ID : **4050364635**
Option 4 ID : **4050364636**
Status : **Marked For Review**
Chosen Option : **1**

Q.9 An emf of 20 V is applied at time $t = 0$ to a circuit containing in series 10 mH inductor and 5 Ω resistor. The ratio of the currents at time $t = \infty$ and at $t = 40$ s is close to : (Take $e^2 = 7.389$)

Options
1. 1.06
2. 1.15
3. 1.46
4. 0.84

Question Type : **MCQ**
Question ID : **4050361257**
Option 1 ID : **4050364656**
Option 2 ID : **4050364654**
Option 3 ID : **4050364653**
Option 4 ID : **4050364655**
Status : **Not Answered**
Chosen Option : **--**

Q.10 A thin lens made of glass (refractive index = 1.5) of focal length $f = 16$ cm is immersed in a liquid of refractive index 1.42. If its focal length in liquid is f_l, then the ratio f_l/f is closest to the integer :

Options
1. 1
2. 9
3. 5
4. 17

Question Type : **MCQ**
Question ID : **4050361259**
Option 1 ID : **4050364661**
Option 2 ID : **4050364663**
Option 3 ID : **4050364662**
Option 4 ID : **4050364664**
Status : **Not Answered**
Chosen Option : **--**

Q.11 An electron (of mass m) and a photon have the same energy E in the range of a few eV. The ratio of the de-Broglie wavelength associated with the electron and the wavelength of the photon is (c = speed of light in vacuum)

Options

1. $\frac{1}{c}\left(\frac{2E}{m}\right)^{1/2}$
2. $c\,(2mE)^{1/2}$
3. $\frac{1}{c}\left(\frac{E}{2m}\right)^{1/2}$
4. $\left(\frac{E}{2m}\right)^{1/2}$

Question Type : **MCQ**
Question ID : **4050361261**
Option 1 ID : **4050364670**
Option 2 ID : **4050364669**
Option 3 ID : **4050364672**
Option 4 ID : **4050364671**
Status : **Marked For Review**
Chosen Option : **3**

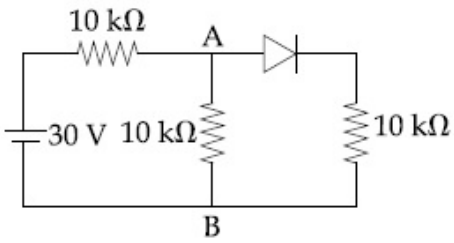
Q.12 A planar loop of wire rotates in a uniform magnetic field. Initially, at t = 0, the plane of the loop is perpendicular to the magnetic field. If it rotates with a period of 10 s about an axis in its plane then the magnitude of induced emf will be maximum and minimum, respectively at :

Options

1. 2.5 s and 7.5 s
2. 2.5 s and 5.0 s
3. 5.0 s and 7.5 s
4. 5.0 s and 10.0 s

Question Type : **MCQ**
Question ID : **4050361255**
Option 1 ID : **4050364648**
Option 2 ID : **4050364645**
Option 3 ID : **4050364646**
Option 4 ID : **4050364647**
Status : **Not Answered**
Chosen Option : **--**

Q.13 In the figure, potential difference between A and B is :



Options
1. 10 V
2. 5 V
3. 15 V
4. zero

Question Type : **MCQ**
Question ID : **4050361263**
Option 1 ID : **4050364679**
Option 2 ID : **4050364678**
Option 3 ID : **4050364680**
Option 4 ID : **4050364677**
Status : **Answered**
Chosen Option : **1**

Q.14 In a Young's double slit experiment, the separation between the slits is 0.15 mm. In the experiment, a source of light of wavelength 589 nm is used and the interference pattern is observed on a screen kept 1.5 m away. The separation between the successive bright fringes on the screen is :

Options
1. 6.9 mm
2. 3.9 mm
3. 5.9 mm
4. 4.9 mm

Question Type : **MCQ**
Question ID : **4050361260**
Option 1 ID : **4050364665**
Option 2 ID : **4050364668**
Option 3 ID : **4050364666**
Option 4 ID : **4050364667**
Status : **Answered**
Chosen Option : **3**

Q.15 The activity of a radioactive sample falls from $700\ s^{-1}$ to $500\ s^{-1}$ in 30 minutes. Its half life is close to :

Options
1. 72 min
2. 62 min
3. 66 min
4. 52 min

Question Type : **MCQ**
Question ID : **4050361262**
Option 1 ID : **4050364676**
Option 2 ID : **4050364674**
Option 3 ID : **4050364675**
Option 4 ID : **4050364673**
Status : **Not Answered**
Chosen Option : **--**

Q.16 A box weighs 196 N on a spring balance at the north pole. Its weight recorded on the same balance if it is shifted to the equator is close to (Take $g = 10\ ms^{-2}$ at the north pole and the radius of the earth $= 6400$ km) :

Options
1. 195.66 N
2. 194.32 N
3. 194.66 N
4. 195.32 N

Question Type : **MCQ**
Question ID : **4050361248**
Option 1 ID : **4050364618**
Option 2 ID : **4050364617**
Option 3 ID : **4050364620**
Option 4 ID : **4050364619**
Status : **Not Answered**
Chosen Option : **--**

Q.17

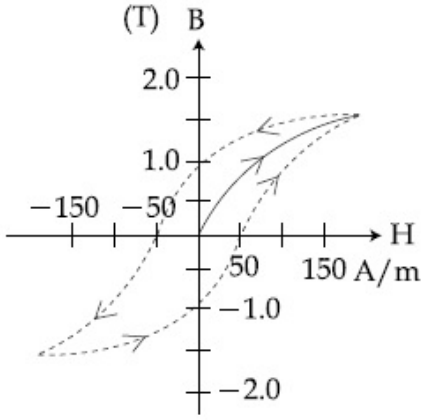
Mass per unit area of a circular disc of radius a depends on the distance r from its centre as $\sigma(r) = A + Br$. The moment of inertia of the disc about the axis, perpendicular to the plane and passing through its centre is :

Options

1. $2\pi a^4\left(\frac{A}{4}+\frac{aB}{5}\right)$
2. $2\pi a^4\left(\frac{aA}{4}+\frac{B}{5}\right)$
3. $\pi a^4\left(\frac{A}{4}+\frac{aB}{5}\right)$
4. $2\pi a^4\left(\frac{A}{4}+\frac{B}{5}\right)$

Question Type : **MCQ**
Question ID : **4050361247**
Option 1 ID : **4050364613**
Option 2 ID : **4050364616**
Option 3 ID : **4050364614**
Option 4 ID : **4050364615**
Status : **Not Answered**
Chosen Option : **--**

Q.18



The figure gives experimentally measured B vs. H variation in a ferromagnetic material. The retentivity, co-ercivity and saturation, respectively, of the material are :

Options

1. 1.5 T, 50 A/m and 1.0 T
2. 1.5 T, 50 A/m and 1.0 T
3. 150 A/m, 1.0 T and 1.5 T
4. 1.0 T, 50 A/m and 1.5 T

Question Type : **MCQ**
Question ID : **4050361256**
Option 1 ID : **4050364650**
Option 2 ID : **4050364652**
Option 3 ID : **4050364651**
Option 4 ID : **4050364649**
Status : **Not Answered**
Chosen Option : **--**

Q.19 Under an adiabatic process, the volume of an ideal gas gets doubled. Consequently the mean collision time between the gas molecule changes from τ_1 to τ_2. If $\frac{C_p}{C_v} = \gamma$ for this gas then a good estimate for $\frac{\tau_2}{\tau_1}$ is given by :

Options

1. 2
2. $\frac{1}{2}$
3. $\left(\frac{1}{2}\right)^{\gamma}$
4. $\left(\frac{1}{2}\right)^{\frac{\gamma+1}{2}}$

Question Type : **MCQ**
Question ID : **4050361251**
Option 1 ID : **4050364629**
Option 2 ID : **4050364632**
Option 3 ID : **4050364631**
Option 4 ID : **4050364630**
Status : **Not Answered**
Chosen Option : **--**

Q.20

Two ideal Carnot engines operate in cascade (all heat given up by one engine is used by the other engine to produce work) between temperatures, T_1 and T_2. The temperature of the hot reservoir of the first engine is T_1 and the temperature of the cold reservoir of the second engine is T_2. T is temperature of the sink of first engine which is also the source for the second engine. How is T related to T_1 and T_2, if both the engines perform equal amount of work ?

Options

1. $T = \frac{2T_1T_2}{T_1 + T_2}$
2. $T = \frac{T_1 + T_2}{2}$
3. $T = \sqrt{T_1T_2}$
4. $T = 0$

Question Type : **MCQ**
Question ID : **4050361250**
Option 1 ID : **4050364627**
Option 2 ID : **4050364625**
Option 3 ID : **4050364626**
Option 4 ID : **4050364628**
Status : **Not Answered**
Chosen Option : **--**

Q.21

The sum of two forces $\vec{P}$ and $\vec{Q}$ is $\vec{R}$ such that $|\vec{R}| = |\vec{P}|$. The angle θ (in degrees) that the resultant of $2\vec{P}$ and $\vec{Q}$ will make with $\vec{Q}$ is, _____.

Given Answer : **5**

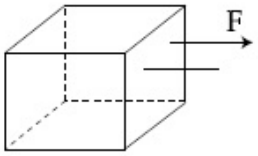
Question Type : **SA**
Question ID : **4050361264**
Status : **Answered**

Q.22 A 60 pF capacitor is fully charged by a 20 V supply. It is then disconnected from the supply and is connected to another uncharged 60 pF capacitor in parallel. The electrostatic energy that is lost in this process by the time the charge is redistributed between them is (in nJ) _____.

Given **5**
Answer :

Question Type : **SA**
Question ID : **4050361266**
Status : **Answered**

Q.23



Consider a uniform cubical box of side a on a rough floor that is to be moved by applying minimum possible force F at a point b above its centre of mass (see figure). If the coefficient of friction is $\mu = 0.4$, the maximum possible value of $100 \times \frac{b}{a}$ for box not to topple before moving is _____.

Given **--**
Answer :

Question Type : **SA**
Question ID : **4050361267**
Status : **Not Answered**

Q.24 The balancing length for a cell is 560 cm in a potentiometer experiment. When an external resistance of 10 Ω is connected in parallel to the cell, the balancing length changes by 60 cm. If the internal resistance of the cell is $\frac{N}{10}\Omega$, where N is an integer then value of N is _____.

Given **5**
Answer :

Question Type : **SA**
Question ID : **4050361268**
Status : **Answered**

Q.25 M grams of steam at 100°C is mixed with 200 g of ice at its melting point in a thermally insulated container. If it produces liquid water at 40°C [heat of vaporization of water is 540 cal/g and heat of fusion of ice is 80 cal/g], the value of M is _____.

Given Answer : **5**

Question Type : **SA**
Question ID : **4050361265**
Status : **Answered**

Section : **Chemistry**

Q.1 The redox reaction among the following is :

Options

1. formation of ozone from atmospheric oxygen in the presence of sunlight
2. reaction of $[Co(H_2O)_6]Cl_3$ with $AgNO_3$
3. reaction of H_2SO_4 with NaOH
4. combination of dinitrogen with dioxygen at 2000 K

Question Type : **MCQ**
Question ID : **4050361279**
Option 1 ID : **4050364726**
Option 2 ID : **4050364729**
Option 3 ID : **4050364727**
Option 4 ID : **4050364728**
Status : **Marked For Review**
Chosen Option : **1**

Q.2 Among statements (a)-(d), the correct ones are :

(a) Decomposition of hydrogen peroxide gives dioxygen.

(b) Like hydrogen peroxide, compounds, such as $KClO_3$, $Pb(NO_3)_2$ and $NaNO_3$ when heated liberate dioxygen.

(c) 2-Ethylanthraquinone is useful for the industrial preparation of hydrogen peroxide.

(d) Hydrogen peroxide is used for the manufacture of sodium perborate.

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

Question Type : **MCQ**
Question ID : **4050361277**
Option 1 ID : **4050364721**
Option 2 ID : **4050364719**
Option 3 ID : **4050364720**
Option 4 ID : **4050364718**
Status : **Marked For Review**
Chosen Option : **1**

Q.3 In the following reactions, products (A) and (B), respectively, are :

$NaOH + Cl_2 \rightarrow$ (A) + side products
(hot and conc.)

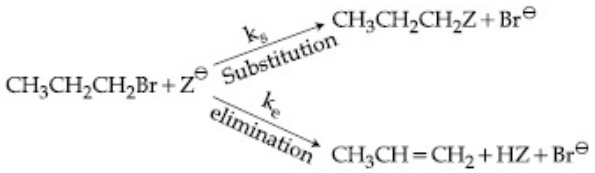
$Ca(OH)_2 + Cl_2 \rightarrow$ (B) + side products
(dry)

Options
1. $NaClO_3$ and $Ca(OCl)_2$
2. $NaClO_3$ and $Ca(ClO_3)_2$
3. NaOCl and $Ca(OCl)_2$
4. NaOCl and $Ca(ClO_3)_2$

Question Type : **MCQ**
Question ID : **4050361278**
Option 1 ID : **4050364723**
Option 2 ID : **4050364724**
Option 3 ID : **4050364722**
Option 4 ID : **4050364725**
Status : **Marked For Review**
Chosen Option : **3**

Q.4

For the following reactions



where,

$Z^{\ominus} = CH_3CH_2O^{\ominus}$ (A) or $H_3C-\overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}}-O^{\ominus}$ (B),

k_s and k_e, are, respectively, the rate constants for substitution and elimination,

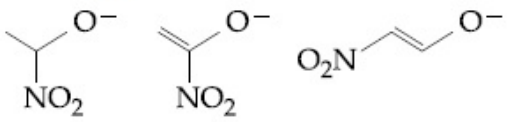
and $\mu = \frac{k_s}{k_e}$, the correct option is _____ .

Options

1. $\mu_B > \mu_A$ and $k_e(A) > k_e(B)$
2. $\mu_A > \mu_B$ and $k_e(B) > k_e(A)$
3. $\mu_B > \mu_A$ and $k_e(B) > k_e(A)$
4. $\mu_A > \mu_B$ and $k_e(A) > k_e(B)$

Question Type : **MCQ**
Question ID : **4050361288**
Option 1 ID : **4050364764**
Option 2 ID : **4050364763**
Option 3 ID : **4050364765**
Option 4 ID : **4050364762**
Status : **Answered**
Chosen Option : **2**

Q.5 The correct order of stability for the following alkoxides is :



(A) (B) (C)

Options

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

Question Type : **MCQ**
Question ID : **4050361284**
Option 1 ID : **4050364748**
Option 2 ID : **4050364747**
Option 3 ID : **4050364746**
Option 4 ID : **4050364749**
Status : **Answered**
Chosen Option : **2**

Q.6 The number of possible optical isomers for the complexes MA_2B_2 with sp^3 and dsp^2 hybridized metal atom, respectively, is :

Note : A and B are unidentate neutral and unidentate monoanionic ligands, respectively.

Options

1. 0 and 2
2. 2 and 2
3. 0 and 0
4. 0 and 1

Question Type : **MCQ**
Question ID : **4050361280**
Option 1 ID : **4050364731**
Option 2 ID : **4050364730**
Option 3 ID : **4050364733**
Option 4 ID : **4050364732**
Status : **Answered**
Chosen Option : **1**

Q.7 A chromatography column, packed with silica gel as stationary phase, was used to separate a mixture of compounds consisting of (A) benzanilide (B) aniline and (C) acetophenone. When the column is eluted with a mixture of solvents, hexane : ethyl acetate (20 : 80), the sequence of obtained compounds is :

Options
1. (B), (C) and (A)
2. (B), (A) and (C)
3. (C), (A) and (B)
4. (A), (B) and (C)

Question Type : **MCQ**
Question ID : **4050361282**
Option 1 ID : **4050364739**
Option 2 ID : **4050364741**
Option 3 ID : **4050364740**
Option 4 ID : **4050364738**
Status : **Not Answered**
Chosen Option : **--**

Q.8 Among the statements (a)-(d), the incorrect ones are :

(a) Octahedral Co(III) complexes with strong field ligands have very high magnetic moments

(b) When $\Delta_0 < P$, the d-electron configuration of Co(III) in an octahedral complex is $t_{eg}^4 e_g^2$

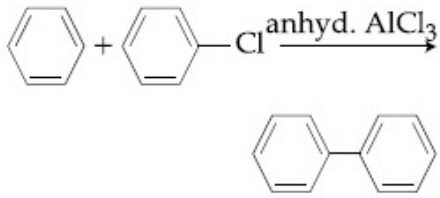
(c) Wavelength of light absorbed by $[Co(en)_3]^{3+}$ is lower than that of $[CoF_6]^{3-}$

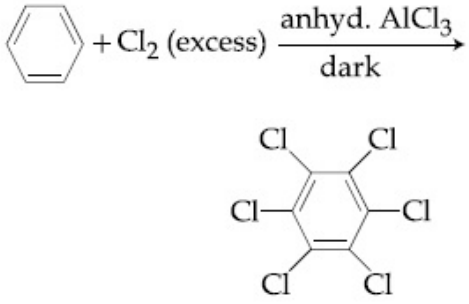
(d) If the Δ_0 for an octahedral complex of Co(III) is 18,000 cm^{-1}, the Δ_t for its tetrahedral complex with the same ligand will be 16,000 cm^{-1}

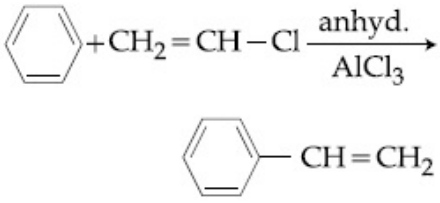
Options
1. (a) and (d) only
2. (c) and (d) only
3. (a) and (b) only
4. (b) and (c) only

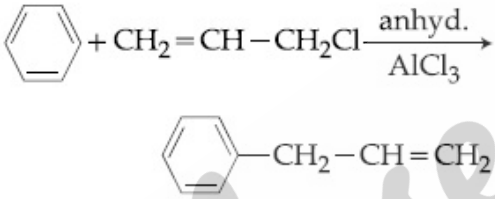
Question Type : **MCQ**
Question ID : **4050361281**
Option 1 ID : **4050364736**
Option 2 ID : **4050364735**
Option 3 ID : **4050364734**
Option 4 ID : **4050364737**
Status : **Answered**
Chosen Option : **1**

Q.9 Consider the following reactions :

(a) 

(b) 

(c) 

(d) 

Which of these reactions are possible ?

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

Question Type : **MCQ**
Question ID : **4050361287**
Option 1 ID : **4050364760**
Option 2 ID : **4050364761**
Option 3 ID : **4050364758**
Option 4 ID : **4050364759**
Status : **Answered**
Chosen Option : **3**

Q.10 The equation that is incorrect is :

Options

1. $\left(\Lambda_m^0\right)_{NaBr} - \left(\Lambda_m^0\right)_{NaCl} = \left(\Lambda_m^0\right)_{KBr} - \left(\Lambda_m^0\right)_{KCl}$

2. $\left(\Lambda_m^0\right)_{KCl} - \left(\Lambda_m^0\right)_{NaCl} = \left(\Lambda_m^0\right)_{KBr} - \left(\Lambda_m^0\right)_{NaBr}$

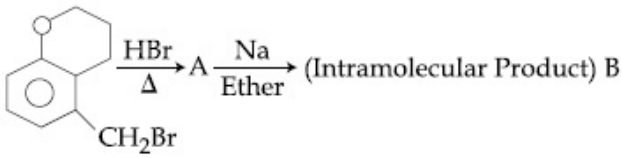
3. $\left(\Lambda_m^0\right)_{H_2O} = \left(\Lambda_m^0\right)_{HCl} + \left(\Lambda_m^0\right)_{NaOH} - \left(\Lambda_m^0\right)_{NaCl}$

4. $\left(\Lambda_m^0\right)_{NaBr} - \left(\Lambda_m^0\right)_{NaI} = \left(\Lambda_m^0\right)_{KBr} - \left(\Lambda_m^0\right)_{NaBr}$

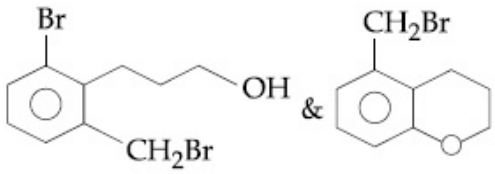
Question Type : **MCQ**
Question ID : **4050361271**
Option 1 ID : **4050364694**
Option 2 ID : **4050364695**
Option 3 ID : **4050364697**
Option 4 ID : **4050364696**
Status : **Answered**
Chosen Option : **4**

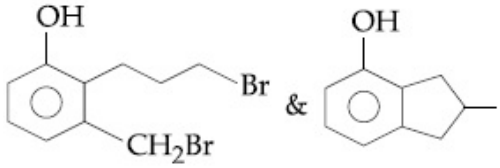
Q.11

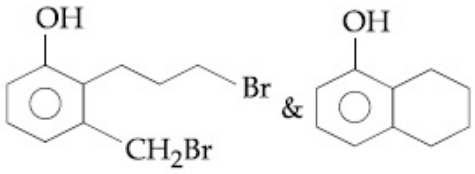
In the following reaction sequence, structures of A and B, respectively will be :

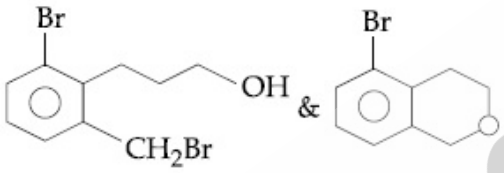


Options

1. 

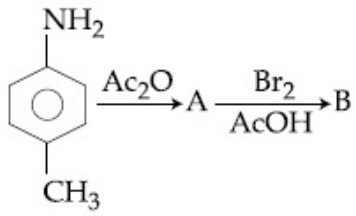
2. 

3. 

4. 

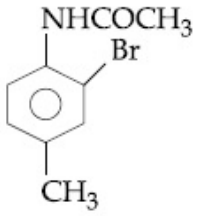
Question Type : **MCQ**
Question ID : **4050361285**
Option 1 ID : **4050364753**
Option 2 ID : **4050364751**
Option 3 ID : **4050364750**
Option 4 ID : **4050364752**
Status : **Answered**
Chosen Option : **4**

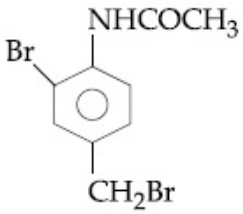
Q.12 In the following reaction sequence,

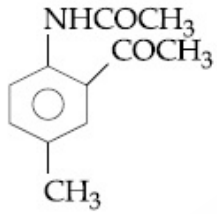


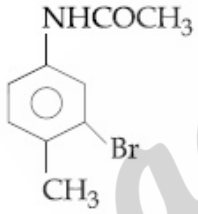
the major product B is :

Options

1. 

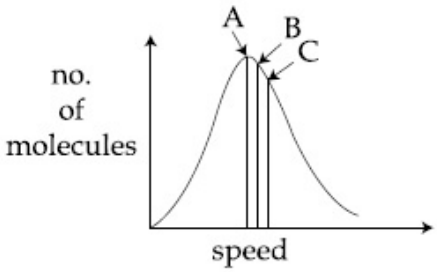
2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **4050361283**
Option 1 ID : **4050364742**
Option 2 ID : **4050364745**
Option 3 ID : **4050364743**
Option 4 ID : **4050364744**
Status : **Marked For Review**
Chosen Option : **1**

Q.13 Identify the correct labels of A, B and C in the following graph from the options given below :



Root mean square speed (V_{rms}); most probable speed (V_{mp}); Average speed (V_{av})

Options

1. A - V_{mp}; B - V_{rms}; C - V_{av}
2. A - V_{av}; B - V_{rms}; C - V_{mp}
3. A - V_{rms}; B - V_{mp}; C - V_{av}
4. A - V_{mp}; B - V_{av}; C - V_{rms}

Question Type : **MCQ**
Question ID : **4050361273**
Option 1 ID : **4050364705**
Option 2 ID : **4050364704**
Option 3 ID : **4050364702**
Option 4 ID : **4050364703**
Status : **Answered**
Chosen Option : **1**

Q.14 The refining method used when the metal and the impurities have low and high melting temperatures, respectively, is :

Options

1. liquation
2. vapour phase refining
3. zone refining
4. distillation

Question Type : **MCQ**
Question ID : **4050361276**
Option 1 ID : **4050364715**
Option 2 ID : **4050364716**
Option 3 ID : **4050364717**
Option 4 ID : **4050364714**
Status : **Not Answered**
Chosen Option : **--**

Q.15 The ammonia (NH_3) released on quantitative reaction of 0.6 g urea (NH_2CONH_2) with sodium hydroxide (NaOH) can be neutralized by :

Options

1. 200 ml of 0.4 N HCl
2. 200 ml of 0.2 N HCl
3. 100 ml of 0.2 N HCl
4. 100 ml of 0.1 N HCl

Question Type : **MCQ**
Question ID : **4050361272**
Option 1 ID : **4050364701**
Option 2 ID : **4050364699**
Option 3 ID : **4050364700**
Option 4 ID : **4050364698**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.16 Within each pair of elements F & Cl, S & Se, and Li & Na, respectively, the elements that release more energy upon an electron gain are :

Options

1. Cl, Se and Na
2. Cl, S and Li
3. F, S and Li
4. F, Se and Na

Question Type : **MCQ**
Question ID : **4050361275**
Option 1 ID : **4050364710**
Option 2 ID : **4050364713**
Option 3 ID : **4050364711**
Option 4 ID : **4050364712**
Status : **Marked For Review**
Chosen Option : **3**

Q.17 The bond order and the magnetic characteristics of CN^- are :

Options

1. $2\frac{1}{2}$, diamagnetic
2. 3, diamagnetic
3. 3, paramagnetic
4. $2\frac{1}{2}$, paramagnetic

Question Type : **MCQ**
Question ID : **4050361274**
Option 1 ID : **4050364706**
Option 2 ID : **4050364709**
Option 3 ID : **4050364707**
Option 4 ID : **4050364708**
Status : **Answered**
Chosen Option : **2**

Q.18 For the reaction

$2H_2(g) + 2NO(g) \rightarrow N_2(g) + 2H_2O(g)$

the observed rate expression is, rate $= k_f[NO]^2[H_2]$. The rate expression for the reverse reaction is :

Options

1. $k_b[N_2][H_2O]^2$
2. $k_b[N_2][H_2O]^2/[NO]$
3. $k_b[N_2][H_2O]$
4. $k_b[N_2][H_2O]^2/[H_2]$

Question Type : **MCQ**
Question ID : **4050361269**
Option 1 ID : **4050364687**
Option 2 ID : **4050364688**
Option 3 ID : **4050364686**
Option 4 ID : **4050364689**
Status : **Answered**
Chosen Option : **4**

Q.19 Which of the following statements is correct ?

Options

1. Gluconic acid can form cyclic (acetal/ hemiacetal) structure
2. Gluconic acid is a dicarboxylic acid
3. Gluconic acid is a partial oxidation product of glucose
4. Gluconic acid is obtained by oxidation of glucose with HNO_3

Question Type : **MCQ**
Question ID : **4050361286**
Option 1 ID : **4050364754**
Option 2 ID : **4050364756**
Option 3 ID : **4050364755**
Option 4 ID : **4050364757**
Status : **Answered**
Chosen Option : **1**

Q.20 Two open beakers one containing a solvent and the other containing a mixture of that solvent with a non volatile solute are together sealed in a container. Over time :

Options

1. the volume of the solution increases and the volume of the solvent decreases
2. the volume of the solution decreases and the volume of the solvent increases
3. the volume of the solution and the solvent does not change
4. the volume of the solution does not change and the volume of the solvent decreases

Question Type : **MCQ**
Question ID : **4050361270**
Option 1 ID : **4050364690**
Option 2 ID : **4050364691**
Option 3 ID : **4050364693**
Option 4 ID : **4050364692**
Status : **Marked For Review**
Chosen Option : **1**

Q.21

Consider the following reactions :

$$NaCl + K_2Cr_2O_7 + H_2SO_4 \xrightarrow[\text{(Conc.)}]{} (A) + \text{side products}$$

$$(A) + NaOH \rightarrow (B) + \text{Side products}$$

$$(B) + H_2SO_4 + H_2O_2 \xrightarrow[\text{(dilute)}]{} (C) + \text{Side products}$$

The sum of the total number of atoms in one molecule each of (A), (B) and (C) is _____.

Given **21**
Answer :

Question Type : **SA**
Question ID : **4050361292**
Status : **Answered**

Q.22

The number of sp^2 hybridised carbons present in "Aspartame" is _____.

Given **2**
Answer :

Question Type : **SA**
Question ID : **4050361293**
Status : **Answered**

Q.23

The standard heat of formation $\left(\Delta_f H^0_{298}\right)$ of ethane (in kJ/mol), if the heat of combustion of ethane, hydrogen and graphite are -1560, -393.5 and -286 kJ/mol, respectively is _____.

Given **880.5**
Answer :

Question Type : **SA**
Question ID : **4050361289**
Status : **Answered**

Q.24 The flocculation value of HCl for arsenic sulphide sol. is 30 m mol L^{-1}. If H_2SO_4 is used for the flocculation of arsenic sulphide, the amount, in grams, of H_2SO_4 in 250 ml required for the above purpose is _____.

(molecular mass of $H_2SO_4 = 98$ g/mol)

Given **0.73**
Answer :

Question Type : **SA**
Question ID : **4050361291**
Status : **Answered**

Q.25 3 g of acetic acid is added to 250 mL of 0.1 M HCl and the solution made up to 500 mL. To 20 mL of this solution $\frac{1}{2}$ mL of 5 M NaOH is added. The pH of the solution is _____.

[Given : pKa of acetic acid = 4.75, molar mass of acetic acid = 60 g/mol, log3 = 0.4771]

Neglect any changes in volume.

Given **--**
Answer :

Question Type : **SA**
Question ID : **4050361290**
Status : **Not Answered**

Section : **Mathematics**

Q.1

Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$. If $\lambda = \vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$ and $\vec{d} = \vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}$, then the ordered pair, $(\lambda, \vec{d})$ is equal to :

Options

1. $\left(\frac{3}{2}, 3\vec{a} \times \vec{c}\right)$
2. $\left(-\frac{3}{2}, 3\vec{c} \times \vec{b}\right)$
3. $\left(\frac{3}{2}, 3\vec{b} \times \vec{c}\right)$
4. $\left(-\frac{3}{2}, 3\vec{a} \times \vec{b}\right)$

Question Type : **MCQ**
Question ID : **4050361310**
Option 1 ID : **4050364836**
Option 2 ID : **4050364837**
Option 3 ID : **4050364838**
Option 4 ID : **4050364835**
Status : **Answered**
Chosen Option : **3**

Q.2

The locus of the mid-points of the perpendiculars drawn from points on the line, $x = 2y$ to the line $x = y$ is :

Options

1. $2x - 3y = 0$
2. $5x - 7y = 0$
3. $3x - 2y = 0$
4. $7x - 5y = 0$

Question Type : **MCQ**
Question ID : **4050361308**
Option 1 ID : **4050364828**
Option 2 ID : **4050364830**
Option 3 ID : **4050364827**
Option 4 ID : **4050364829**
Status : **Not Answered**
Chosen Option : **--**

Q.3

Let $a_1, a_2, a_3, \ldots$ be a G. P. such that $a_1 < 0$, $a_1 + a_2 = 4$ and $a_3 + a_4 = 16$. If $\sum_{i=1}^{9} a_i = 4\lambda$, then λ is equal to :

Options

1. -513
2. -171
3. 171
4. $\frac{511}{3}$

Question Type : **MCQ**
Question ID : **4050361299**
Option 1 ID : **4050364791**
Option 2 ID : **4050364793**
Option 3 ID : **4050364794**
Option 4 ID : **4050364792**
Status : **Marked For Review**
Chosen Option : **4**

Q.4

The value of c in the Lagrange's mean value theorem for the function $f(x) = x^3 - 4x^2 + 8x + 11$, when $x \in [0, 1]$ is :

Options

1. $\frac{4 - \sqrt{5}}{3}$
2. $\frac{4 - \sqrt{7}}{3}$
3. $\frac{2}{3}$
4. $\frac{\sqrt{7} - 2}{3}$

Question Type : **MCQ**
Question ID : **4050361302**
Option 1 ID : **4050364805**
Option 2 ID : **4050364803**
Option 3 ID : **4050364806**
Option 4 ID : **4050364804**
Status : **Marked For Review**
Chosen Option : **2**

Q.5 The coefficient of x^7 in the expression $(1+x)^{10}+x(1+x)^9+x^2(1+x)^8+\ldots+x^{10}$ is :

Options

1. 210
2. 330
3. 120
4. 420

Question Type : **MCQ**
Question ID : **4050361298**
Option 1 ID : **4050364788**
Option 2 ID : **4050364789**
Option 3 ID : **4050364787**
Option 4 ID : **4050364790**
Status : **Answered**
Chosen Option : **2**

Q.6 The area (in sq. units) of the region $\{(x, y) \in R^2 | 4x^2 \le y \le 8x+12\}$ is :

Options

1. $\frac{125}{3}$
2. $\frac{128}{3}$
3. $\frac{124}{3}$
4. $\frac{127}{3}$

Question Type : **MCQ**
Question ID : **4050361305**
Option 1 ID : **4050364816**
Option 2 ID : **4050364818**
Option 3 ID : **4050364815**
Option 4 ID : **4050364817**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.7 In a workshop, there are five machines and the probability of any one of them to be out of service on a day is $\frac{1}{4}$. If the probability that at most two machines will be out of service on the same day is $\left(\frac{3}{4}\right)^3 k$, then k is equal to :

Options

1. $\frac{17}{8}$
2. $\frac{17}{4}$
3. $\frac{17}{2}$
4. 4

Question Type : **MCQ**
Question ID : **4050361311**
Option 1 ID : **4050364842**
Option 2 ID : **4050364839**
Option 3 ID : **4050364840**
Option 4 ID : **4050364841**
Status : **Not Answered**
Chosen Option : **--**

Q.8 Let $f(x)$ be a polynomial of degree 5 such that $x = \pm 1$ are its critical points. If $\lim\limits_{x \to 0}\left(2 + \frac{f(x)}{x^3}\right) = 4$, then which one of the following is not true ?

Options

1. f is an odd function.
2. $f(1) - 4f(-1) = 4$.
3. $x = 1$ is a point of maxima and $x = -1$ is a point of minimum of f.
4. $x = 1$ is a point of minima and $x = -1$ is a point of maxima of f.

Question Type : **MCQ**
Question ID : **4050361303**
Option 1 ID : **4050364807**
Option 2 ID : **4050364809**
Option 3 ID : **4050364808**
Option 4 ID : **4050364810**
Status : **Answered**
Chosen Option : **3**

Q.9 If $3x + 4y = 12\sqrt{2}$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{9} = 1$ for some $a \in R$, then the distance between the foci of the ellipse is :

Options

1. $2\sqrt{7}$
2. 4
3. $2\sqrt{5}$
4. $2\sqrt{2}$

Question Type : **MCQ**
Question ID : **4050361309**
Option 1 ID : **4050364832**
Option 2 ID : **4050364834**
Option 3 ID : **4050364833**
Option 4 ID : **4050364831**
Status : **Not Answered**
Chosen Option : **--**

Q.10 If $\frac{3 + i\sin\theta}{4 - i\cos\theta}$, $\theta \in [0, 2\pi]$, is a real number, then an argument of $\sin\theta + i\cos\theta$ is :

Options

1. $\pi - \tan^{-1}\left(\frac{4}{3}\right)$
2. $\pi - \tan^{-1}\left(\frac{3}{4}\right)$
3. $-\tan^{-1}\left(\frac{3}{4}\right)$
4. $\tan^{-1}\left(\frac{4}{3}\right)$

Question Type : **MCQ**
Question ID : **4050361295**
Option 1 ID : **4050364777**
Option 2 ID : **4050364776**
Option 3 ID : **4050364775**
Option 4 ID : **4050364778**
Status : **Answered**
Chosen Option : **4**

Q.11 Let $y = y(x)$ be the solution curve of the differential equation, $\left(y^2 - x\right)\frac{dy}{dx} = 1$, satisfying $y(0) = 1$. This curve intersects the x-axis at a point whose abscissa is :

Options

1. $2 - e$
2. $-e$
3. 2
4. $2 + e$

Question Type : **MCQ**
Question ID : **4050361306**
Option 1 ID : **4050364821**
Option 2 ID : **4050364822**
Option 3 ID : **4050364819**
Option 4 ID : **4050364820**
Status : **Not Answered**
Chosen Option : **--**

Q.12 Let A, B, C and D be four non-empty sets. The contrapositive statement of "If $A \subseteq B$ and $B \subseteq D$, then $A \subseteq C$" is :

Options

1. If $A \not\subseteq C$, then $A \subseteq B$ and $B \subseteq D$
2. If $A \subseteq C$, then $B \subset A$ or $D \subset B$
3. If $A \not\subseteq C$, then $A \not\subseteq B$ and $B \subseteq D$
4. If $A \not\subseteq C$, then $A \not\subseteq B$ or $B \not\subseteq D$

Question Type : **MCQ**
Question ID : **4050361313**
Option 1 ID : **4050364849**
Option 2 ID : **4050364850**
Option 3 ID : **4050364847**
Option 4 ID : **4050364848**
Status : **Answered**
Chosen Option : **4**

Q.13 Let the tangents drawn from the origin to the circle, $x^2+y^2-8x-4y+16=0$ touch it at the points A and B. The $(AB)^2$ is equal to :

Options

1. $\frac{52}{5}$
2. $\frac{56}{5}$
3. $\frac{64}{5}$
4. $\frac{32}{5}$

Question Type : **MCQ**
Question ID : **4050361307**
Option 1 ID : **4050364824**
Option 2 ID : **4050364825**
Option 3 ID : **4050364826**
Option 4 ID : **4050364823**
Status : **Answered**
Chosen Option : **3**

Q.14 Let α and β be the roots of the equation $x^2-x-1=0$. If $p_k=(\alpha)^k+(\beta)^k$, $k\geq 1$, then which one of the following statements is not true ?

Options

1. $p_3=p_5-p_4$
2. $p_5=11$
3. $(p_1+p_2+p_3+p_4+p_5)=26$
4. $p_5=p_2\cdot p_3$

Question Type : **MCQ**
Question ID : **4050361294**
Option 1 ID : **4050364772**
Option 2 ID : **4050364771**
Option 3 ID : **4050364773**
Option 4 ID : **4050364774**
Status : **Answered**
Chosen Option : **2**

Q.15 The value of α for which $4\alpha \int_{-1}^{2} e^{-\alpha|x|}\, dx = 5$, is :

Options

1. $\log_e 2$
2. $\log_e\left(\frac{3}{2}\right)$
3. $\log_e \sqrt{2}$
4. $\log_e\left(\frac{4}{3}\right)$

Question Type : **MCQ**
Question ID : **4050361304**
Option 1 ID : **4050364812**
Option 2 ID : **4050364814**
Option 3 ID : **4050364813**
Option 4 ID : **4050364811**
Status : **Marked For Review**
Chosen Option : **2**

Q.16 The number of ordered pairs (r, k) for which $6 \cdot {}^{35}C_r = (k^2 - 3) \cdot {}^{36}C_{r+1}$, where k is an integer, is :

Options

1. 3
2. 2
3. 6
4. 4

Question Type : **MCQ**
Question ID : **4050361297**
Option 1 ID : **4050364785**
Option 2 ID : **4050364786**
Option 3 ID : **4050364783**
Option 4 ID : **4050364784**
Status : **Not Answered**
Chosen Option : **--**

Q.17 If the sum of the first 40 terms of the series, $3+4+8+9+13+14+18+19+\ldots$ is $(102)m$, then m is equal to :

Options

1. 20
2. 25
3. 5
4. 10

Question Type : **MCQ**
Question ID : **4050361300**
Option 1 ID : **4050364796**
Option 2 ID : **4050364795**
Option 3 ID : **4050364798**
Option 4 ID : **4050364797**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.18 Let $y=y(x)$ be a function of x satisfying $y\sqrt{1-x^2} = k - x\sqrt{1-y^2}$ where k is a constant and $y\left(\frac{1}{2}\right) = -\frac{1}{4}$. Then $\frac{dy}{dx}$ at $x = \frac{1}{2}$, is equal to :

Options

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

Question Type : **MCQ**
Question ID : **4050361301**
Option 1 ID : **4050364800**
Option 2 ID : **4050364801**
Option 3 ID : **4050364799**
Option 4 ID : **4050364802**
Status : **Not Answered**
Chosen Option : **--**

Q.19 If θ_1 and θ_2 be respectively the smallest and the largest values of θ in $(0, 2\pi) - \{\pi\}$ which satisfy the equation,

$2\cot^2\theta - \frac{5}{\sin\theta} + 4 = 0$, then

$\int_{\theta_1}^{\theta_2} \cos^2 3\theta \, d\theta$ is equal to :

Options

1. $\frac{\pi}{3}$
2. $\frac{2\pi}{3}$
3. $\frac{\pi}{3} + \frac{1}{6}$
4. $\frac{\pi}{9}$

Question Type : **MCQ**
Question ID : **4050361312**
Option 1 ID : **4050364845**
Option 2 ID : **4050364846**
Option 3 ID : **4050364843**
Option 4 ID : **4050364844**
Status : **Not Answered**
Chosen Option : **--**

Q.20 Let $A = [a_{ij}]$ and $B = [b_{ij}]$ be two 3×3 real matrices such that $b_{ij} = (3)^{(i+j-2)} a_{ji}$, where $i, j = 1, 2, 3$. If the determinant of B is 81, then the determinant of A is :

Options

1. 1/3
2. 3
3. 1/81
4. 1/9

Question Type : **MCQ**
Question ID : **4050361296**
Option 1 ID : **4050364779**
Option 2 ID : **4050364782**
Option 3 ID : **4050364781**
Option 4 ID : **4050364780**
Status : **Not Answered**
Chosen Option : **--**

Q.21 If the mean and variance of eight numbers $3, 7, 9, 12, 13, 20, x$ and y be 10 and 25 respectively, then $x \cdot y$ is equal to _____.

Given **72**
Answer :

Question Type : **SA**
Question ID : **4050361318**
Status : **Answered**

Q.22 If the foot of the perpendicular drawn from the point $(1, 0, 3)$ on a line passing through $(\alpha, 7, 1)$ is $\left(\frac{5}{3}, \frac{7}{3}, \frac{17}{3}\right)$, then α is equal to _____.

Given **2.67**
Answer :

Question Type : **SA**
Question ID : **4050361317**
Status : **Answered**

Q.23 Let $X = \{n \in N : 1 \leq n \leq 50\}$. If $A = \{n \in X : n \text{ is a multiple of } 2\}$ and $B = \{n \in X : n \text{ is a multiple of } 7\}$, then the number of elements in the smallest subset of X containing both A and B is _____.

Given **3**
Answer :

Question Type : **SA**
Question ID : **4050361314**
Status : **Answered**

Q.24 If the system of linear equations,

$$x + y + z = 6$$
$$x + 2y + 3z = 10$$
$$3x + 2y + \lambda z = \mu$$

has more than two solutions, then $\mu - \lambda^2$ is equal to _____.

Given **1**
Answer :

Question Type : **SA**
Question ID : **4050361315**
Status : **Answered**

Q.25

If the function f defined on $\left(-\frac{1}{3}, \frac{1}{3}\right)$ by

$$f(x) = \begin{cases} \frac{1}{x} \log_e \left(\frac{1+3x}{1-2x}\right), & \text{when } x \neq 0 \\ k, & \text{when } x = 0 \end{cases}$$

is continuous, then k is equal to _____.

Given **5**
Answer :

Question Type : **SA**
Question ID : **4050361316**
Status : **Answered**