National Testing Agency

Question Paper Name :	B Tech 28 Jun 2022 Shift 2
Subject Name :	B. Tech
Duration :	180
Total Marks :	300
Display Marks:	Yes

B. Tech

Group Number :	1
Group Maximum Duration :	0
Group Minimum Duration :	180
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300

Mathematics Section A

Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $R_1 = \{(a, b) \in N \times N : |a - b| \leq 13\}$ and

$R_2 = \{(a, b) \in N \times N : |a - b| \neq 13\}$. Then on N :

Options :

A. Both R_1 and R_2 are equivalence relations

B. Neither R_1 nor R_2 is an equivalence relation

C. R_1 is an equivalence relation but R_2 is not

D. R_2 is an equivalence relation but R_1 is not

Question Number : 2 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f(x) be a quadratic polynomial such that $f(-2) + f(3) = 0$. If one of the roots of $f(x) = 0$ is -1, then the sum of the roots of $f(x) = 0$ is equal to :

Options :

A. $\frac{11}{3}$

B. $\frac{7}{3}$

C. $\frac{13}{3}$

D. $\frac{14}{3}$

Question Number : 3 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The number of ways to distribute 30 identical candies among four children C_1, C_2, C_3 and C_4 so that C_2 receives at least 4 and at most 7 candies, C_3 receives at least 2 and at most 6 candies, is equal to :

Options :

A. 205

B. 615

C. 510

D. 430

Question Number : 4 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The term independent of x in the expansion of

$$(1-x^2+3x^3)\left(\frac{5}{2}x^3-\frac{1}{5x^2}\right)^{11},\ x\neq 0$$

is :

Options :

A. $\frac{7}{40}$

B. $\frac{33}{200}$

C. $\frac{39}{200}$

D. $\frac{11}{50}$

Question Number : 5 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If n arithmetic means are inserted between a and 100 such that the ratio of the first mean to the last mean is 1 : 7 and a + n = 33, then the value of n is :

Options :

A. 21

B. 22

C. 23

D. 24

Question Number : 6 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f, g : R → R be functions defined by

$$f(x) = \begin{cases} [x] & , \ x < 0 \\ |1 - x| & , \ x \geq 0 \end{cases}$$

and

$$g(x) = \begin{cases} e^x - x & , \ x < 0 \\ (x-1)^2 - 1 & , \ x \geq 0 \end{cases}$$

where [x] denote the greatest integer less than or equal to x. Then, the function fog is discontinuous at exactly :

Options :

A. one point

B. two points

C. three points

D. four points

Question Number : 7 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f : R → R be a differentiable function such that

$$f\left(\frac{\pi}{4}\right) = \sqrt{2}\ ,\ f\left(\frac{\pi}{2}\right) = 0$$

and

$$f'\left(\frac{\pi}{2}\right) = 1$$

and

let

$$g(x) = \int_{x}^{\pi/4} (f'(t)\sec t + \tan t \sec t\, f(t))\, dt$$

for

$$x \in \left[\frac{\pi}{4}, \frac{\pi}{2}\right)$$

. Then

$$\lim_{x \to \left(\frac{\pi}{2}\right)^{-}} g(x)$$

is equal to :

Options :

A. 2

B. 3

C. 4

D. -3

Question Number : 8 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let f : R → R be a continuous function satisfying f(x) + f(x + k) = n, for all x ∈ R where k > 0 and n is a positive integer. If

$$I_1 = \int_{0}^{4nk} f(x)dx$$

and

$$I_2 = \int_{-k}^{3k} f(x)dx$$

, then :

Options :

A. $I_1 + 2I_2 = 4nk$

B. $I_1 + 2I_2 = 2nk$

C. $I_1 + nI_2 = 4n^2k$

D. $I_1 + nI_2 = 6n^2k$

Question Number : 9 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The area of the bounded region enclosed by the curve

$$y = 3 - \left|x - \frac{1}{2}\right| - |x + 1|$$

and the x-axis is :

Options :

A. $\frac{9}{4}$

B. $\frac{45}{16}$

C. $\frac{27}{8}$

D. $\frac{63}{16}$

Question Number : 10 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let x = x(y) be the solution of the differential equation

$$2y\,e^{x/y^2}dx + \left(y^2 - 4xe^{x/y^2}\right)dy = 0$$

such that x(1) = 0. Then, x(e) is equal to :

Options :

A. $e\log_e(2)$

B. $-e\log_e(2)$

C. $e^2\log_e(2)$

D. $-e^2\log_e(2)$

Question Number : 11 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the slope of the tangent to a curve y = f(x) at (x, y) be given by $2\tan x(\cos x - y)$. If the curve passes through the point

$$\left(\frac{\pi}{4}, 0\right)$$

, then the value of

$$\int_0^{\pi/2} y\,dx$$

is equal to :

Options :

A. $(2-\sqrt{2}\,)+\frac{\pi}{\sqrt{2}}$

B. $2-\frac{\pi}{\sqrt{2}}$

C. $(2+\sqrt{2}\,)+\frac{\pi}{\sqrt{2}}$

D. $2+\frac{\pi}{\sqrt{2}}$

Question Number : 12 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a triangle be bounded by the lines $L_1 : 2x + 5y = 10$; $L_2 : 4x + 3y = 12$ and the line L_3, which passes through the point P(2, 3), intersects L_2 at A and L_1 at B. If the point P divides the line-segment AB, internally in the ratio 1 : 3, then the area of the triangle is equal to :

Options :

A. $\frac{110}{13}$

B. $\frac{132}{13}$

C. $\frac{142}{13}$

D. $\frac{151}{13}$

Question Number : 13 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let a > 0, b > 0. Let e and l respectively be the eccentricity and length of the latus rectum of the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

. Let e' and l' respectively be the eccentricity and length of the latus rectum of its conjugate hyperbola. If

$$e^2 = \frac{11}{14}l$$

and

$$(e')^2 = \frac{11}{8}l'$$

, then the value of $77a + 44b$ is equal to :

Options :

A. 100

B. 110

C. 120

D. 130

Question Number : 14 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let

$$\vec{a} = \alpha\hat{i} + 2\hat{j} - \hat{k}$$

and

$$\vec{b} = -2\hat{i} + \alpha\hat{j} + \hat{k}$$

, where $\alpha \in R$. If the area of the parallelogram whose adjacent sides are represented by the vectors $\vec{a}$ and $\vec{b}$ is $\sqrt{15(\alpha^2 + 4)}$, then the value of

$$2\left|\vec{a}\right|^2 + \left(\vec{a} \cdot \vec{b}\right)\left|\vec{b}\right|^2$$

is equal to :

Options :

A. 10

B. 7

C. 9

D. 14

Question Number : 15 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If vertex of a parabola is $(2, -1)$ and the equation of its directrix is $4x - 3y = 21$, then the length of its latus rectum is :

Options :

A. 2

B. 8

C. 12

D. 16

Question Number : 16 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The probability that a randomly chosen one-one function from the set $\{a, b, c, d\}$ to the set $\{1, 2, 3, 4, 5\}$ satisfies $f(a) + 2f(b) - f(c) = f(d)$ is :

Options :

A. $\frac{1}{24}$

B. $\frac{1}{40}$

C. $\frac{1}{30}$

D. $\frac{1}{20}$

Question Number : 17 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The value of

$$\lim_{n \to \infty} 6\tan\left\{ \sum_{r=1}^{n} \tan^{-1}\left(\frac{1}{r^2 + 3r + 3}\right)\right\}$$

is equal to :

Options :

A. 1

B. 2

C. 3

D. 6

Question Number : 18 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $\vec{a}$ be a vector which is perpendicular to the vector

$$3\hat{i} + \frac{1}{2}\hat{j} + 2\hat{k}$$

. If

$$\vec{a} \times \left(2\hat{i} + \hat{k}\right) = 2\hat{i} - 13\hat{j} - 4\hat{k}$$

, then the projection of the vector $\vec{a}$ on the vector $2\hat{i} + 2\hat{j} + \hat{k}$ is :

Options :

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

B. 1

C. $\frac{5}{3}$

D. $\frac{7}{3}$

Question Number : 19 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If $\cot\alpha = 1$ and $\sec\beta =$

$$-\frac{5}{3}$$

, where

$$\pi < \alpha < \frac{3\pi}{2}$$

and

$$\frac{\pi}{2} < \beta < \pi$$

, then the value of $\tan(\alpha + \beta)$ and the quadrant in which $\alpha + \beta$ lies, respectively are :

Options :

$$-\frac{1}{7}$$

A. and IVth quadrant

B. 7 and Ist quadrant

C. -7 and IVth quadrant

D. $\frac{1}{7}$ and Ist quadrant

Question Number : 20 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let the plane ax + by + cz = d pass through (2, 3, −5) and is perpendicular to the planes 2x + y − 5z = 10 and 3x + 5y − 7z = 12. If a, b, c, d are integers d > 0 and gcd (|a|, |b|, |c|, d) = 1, then the value of a + 7b + c + 20d is equal to :

Options :

A. 18

B. 20

C. 24

D. 22

Mathematics Section B

Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 21 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let the image of the point P(1, 2, 3) in the line

$$L : \frac{x-6}{3} = \frac{y-1}{2} = \frac{z-2}{3}$$

be Q. Let R (α, β, γ) be a point that divides internally the line segment PQ in the ratio 1 : 3. Then the value of $22\ (\alpha + \beta + \gamma)$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 22 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Suppose a class has 7 students. The average marks of these students in the mathematics examination is 62, and their variance is 20. A student fails in the examination if he/she gets less than 50 marks, then in worst case, the number of students can fail is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes

Answers Type : Equal
Text Areas : PlainText

Question Number : 23 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If one of the diameters of the circle

$$x^2 + y^2 - 2\sqrt{2}\,x - 6\sqrt{2}\,y + 14 = 0$$

is a chord of the circle

$$(x - 2\sqrt{2}\,)^2 + (y - 2\sqrt{2}\,)^2 = r^2$$

, then the value of r^2 is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 24 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If

$$\lim_{x \to 1} \frac{\sin(3x^2 - 4x + 1) - x^2 + 1}{2x^3 - 7x^2 + ax + b} = -2$$

, then the value of $(a - b)$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 25 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let for n = 1, 2, ..., 50, S_n be the sum of the infinite geometric progression whose first term is n^2 and whose common ratio is

$$\frac{1}{(n+1)^2}$$

. Then the value of

$$\frac{1}{26} + \sum_{n=1}^{50} \left(S_n + \frac{2}{n+1} - n - 1 \right)$$

is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 26 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

If the system of linear equations

$$2x - 3y = \gamma + 5$$

,

$$\alpha x + 5y = \beta + 1$$

, where $\alpha, \beta, \gamma \in R$ has infinitely many solutions then the value of $| 9\alpha + 3\beta + 5\gamma |$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 27 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let

$$A = \begin{pmatrix} 1+i & 1 \\ -i & 0 \end{pmatrix}$$

where

$$i = \sqrt{-1}$$

. Then, the number of elements in the set $\{ n \in \{1, 2, ..., 100\} : A^n = A \}$ is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 28 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Sum of squares of modulus of all the complex numbers z satisfying

$$z = iz^2 + z^2 - z$$

is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 29 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

Let $S = \{1, 2, 3, 4\}$. Then the number of elements in the set $\{ f : S \times S \to S : f$ is onto and $f(a, b) = f(b, a) \geq a \; \forall \; (a, b) \in S \times S \}$ is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 30 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The maximum number of compound propositions, out of $p \vee r \vee s$, $p \vee r \vee \sim s$, $p \vee \sim q \vee s$, $\sim p \vee \sim r \vee s$, $\sim p \vee \sim r \vee \sim s$, $\sim p \vee q \vee \sim s$, $q \vee r \vee \sim s$, $q \vee \sim r \vee \sim s$, $\sim p \vee \sim q \vee \sim s$ that can be made simultaneously true by an assignment of the truth values to p, q, r and s, is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Physics Section A

Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 31 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Velocity (v) and acceleration (a) in two systems of units 1 and 2 are related as

$$v_2 = \frac{n}{m^2} v_1$$

and

$$a_2 = \frac{a_1}{mn}$$

respectively. Here m and n are constants. The relations for distance and time in two systems respectively are :

Options :

A.

$$\frac{n^3}{m^3} L_1 = L_2$$

and

$$\frac{n^2}{m} T_1 = T_2$$

B.

$$L_1 = \frac{n^4}{m^2} L_2$$

and

$$T_1 = \frac{n^2}{m} T_2$$

C.

$$L_1 = \frac{n^2}{m} L_2$$

and

$$T_1 = \frac{n^4}{m^2} T_2$$

$$\frac{n^2}{m}L_1 = L_2$$

and

D. $$\frac{n^4}{m^2}T_1 = T_2$$

Question Number : 32 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A ball is spun with angular acceleration $\alpha = 6t^2 - 2t$ where t is in second and α is in $rads^{-2}$. At t = 0, the ball has angular velocity of 10 $rads^{-1}$ and angular position of 4 rad. The most appropriate expression for the angular position of the ball is :

Options :

A. $$\frac{3}{2}t^4 - t^2 + 10t$$

B. $$\frac{t^4}{2} - \frac{t^3}{3} + 10t + 4$$

C. $$\frac{2t^4}{3} - \frac{t^3}{6} + 10t + 12$$

D. $$2t^4 - \frac{t^3}{2} + 5t + 4$$

Question Number : 33 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A block of mass 2 kg moving on a horizontal surface with speed of 4 ms^{-1} enters a rough surface ranging from x = 0.5 m to x = 1.5 m. The retarding force in this range of rough surface is related to distance by F = − kx where k = 12 Nm^{-1}. The speed of the block as it just crosses the rough surface will be :

Options :

A. zero

B. 1.5 ms^{-1}

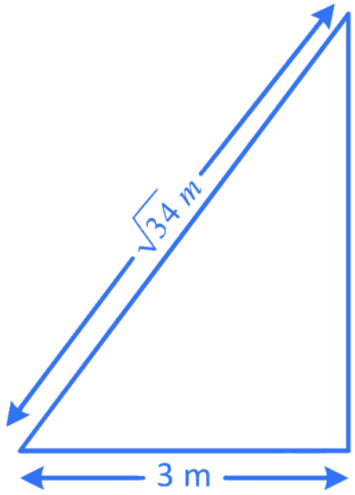
C. 2.0 ms^{-1}

D. 2.5 ms^{-1}

Question Number : 34 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A $\sqrt{34}$ m long ladder weighing 10 kg leans on a frictionless wall. Its feet rest on the floor 3 m away from the wall as shown in the figure. If E_f and F_w are the reaction forces of the floor and the wall, then ratio of F_w/F_f will be :

(Use g = 10 m/s^2.)



Options :

A. $\frac{6}{\sqrt{110}}$

B. $\frac{3}{\sqrt{113}}$

C. $\frac{3}{\sqrt{109}}$

D. $\frac{2}{\sqrt{109}}$

Question Number : 35 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Water falls from a 40 m high dam at the rate of 9×10^4 kg per hour. Fifty percentage of gravitational potential energy can be converted into electrical energy. Using this hydroelectric energy number of 100 W lamps, that can be lit, is :

(Take g = 10 ms^{-2})

Options :

A. 25

B. 50

C. 100

D. 18

Question Number : 36 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two objects of equal masses placed at certain distance from each other attracts each other with a force of F. If one-third mass of one object is transferred to the other object, then the new force will be :

Options :

A. $\frac{2}{9}$ F

B. $\frac{16}{9}$ F

C. $\frac{8}{9}$ F

D. F

Question Number : 37 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A water drop of radius 1 μm falls in a situation where the effect of buoyant force is negligible. Co-efficient of viscosity of air is 1.8×10^{-5} Nsm^{-2} and its density is negligible as compared to that of water 10^{6} gm^{-3}. Terminal velocity of the water drop is :

(Take acceleration due to gravity = 10 ms^{-2})

Options :

A. 145.4×10^{-6} ms^{-1}

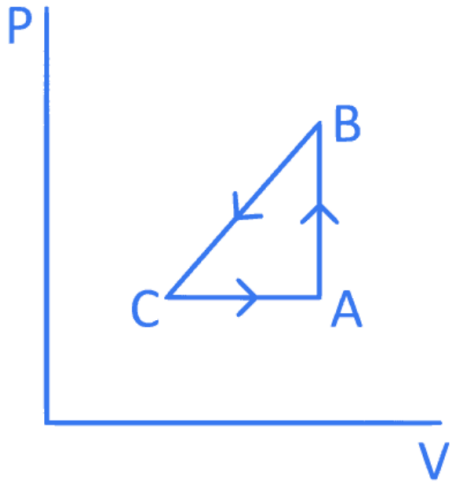
B. 118.0×10^{-6} ms^{-1}

C. 132.6×10^{-6} ms^{-1}

D. 123.4×10^{-6} ms^{-1}

Question Number : 38 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A sample of an ideal gas is taken through the cyclic process ABCA as shown in figure. It absorbs, 40 J of heat during the part AB, no heat during BC and rejects 60 J of heat during CA. A work of 50 J is done on the gas during the part BC. The internal energy of the gas at A is 1560 J. The workdone by the gas during the part CA is :



Options :

A. 20 J

B. 30 J

C. −30 J

D. −60 J

Question Number : 39 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What will be the effect on the root mean square velocity of oxygen molecules if the temperature is doubled and oxygen molecule dissociates into atomic oxygen?

Options :

A. The velocity of atomic oxygen remains same

B. The velocity of atomic oxygen doubles

C. The velocity of atomic oxygen becomes half

D. The velocity of atomic oxygen becomes four times

Question Number : 40 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two point charges A and B of magnitude $+8 \times 10^{-6}$ C and -8×10^{-6} C respectively are placed at a distance d apart. The electric field at the middle point O between the charges is 6.4×10^{4} NC^{-1}. The distance 'd' between the point charges A and B is :

Options :

A. 2.0 m

B. 3.0 m

C. 1.0 m

D. 4.0 m

Question Number : 41 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Resistance of the wire is measured as 2 Ω and 3 Ω at 10°C and 30°C respectively. Temperature co-efficient of resistance of the material of the wire is :

Options :

A. $0.033\ °C^{-1}$

B. $-0.033\ °C^{-1}$

C. $0.011\ °C^{-1}$

D. $0.055\ °C^{-1}$

Question Number : 42 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The space inside a straight current carrying solenoid is filled with a magnetic material having magnetic susceptibility equal to 1.2×10^{-5}. What is fractional increase in the magnetic field inside solenoid with respect to air as medium inside the solenoid?

Options :

A. 1.2×10^{-5}

B. 1.2×10^{-3}

C. 1.8×10^{-3}

D. 2.4×10^{-5}

Question Number : 43 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two parallel, long wires are kept 0.20 m apart in vacuum, each carrying current of x A in the same direction. If the force of attraction per meter of each wire is 2×10^{-6} N, then the value of x is approximately :

Options :

A. 1

B. 2.4

C. 1.4

D. 2

Question Number : 44 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A coil is placed in a time varying magnetic field. If the number of turns in the coil were to be halved and the radius of wire doubled, the electrical power dissipated due to the current induced in the coil would be :

(Assume the coil to be short circuited.)

Options :

A. Halved

B. Quadrupled

C. The same

D. Doubled

Question Number : 45 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An EM wave propagating in x-direction has a wavelength of 8 mm. The electric field vibrating y-direction has maximum magnitude of 60 Vm^{-1}. Choose the correct equations for electric and magnetic fields if the EM wave is propagating in vacuum :

Options :

A.

$$E_y = 60 \sin\left[\frac{\pi}{4} \times 10^3 (x - 3 \times 10^8 t)\right] \hat{j}\ Vm^{-1}$$

$$B_z = 2 \sin\left[\frac{\pi}{4} \times 10^3 (x - 3 \times 10^8 t)\right] \hat{k}\ T$$

B.

$$E_y = 60 \sin\left[\frac{\pi}{4} \times 10^3 (x - 3 \times 10^8 t)\right] \hat{j}\ Vm^{-1}$$

$$B_z = 2 \times 10^{-7} \sin\left[\frac{\pi}{4} \times 10^3 (x - 3 \times 10^8 t)\right] \hat{k}\ T$$

C.

$$E_y = 2\times10^{-7}\sin\left[\frac{\pi}{4}\times10^3(x-3\times10^8t)\right]\hat{j}\ Vm^{-1}$$
$$B_z = 60\sin\left[\frac{\pi}{4}\times10^3(x-3\times10^8t)\right]\hat{k}\ T$$

D.

$$E_y = 2\times10^{-7}\sin\left[\frac{\pi}{4}\times10^4(x-4\times10^8t)\right]\hat{j}\ Vm^{-1}$$
$$B_z = 60\sin\left[\frac{\pi}{4}\times10^4(x-4\times10^8t)\right]\hat{k}\ T$$

Question Number : 46 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In Young's double slit experiment performed using a monochromatic light of wavelength λ, when a glass plate ($\mu = 1.5$) of thickness xλ is introduced in the path of the one of the interfering beams, the intensity at the position where the central maximum occurred previously remains unchanged. The value of x will be :

Options :

A. 3

B. 2

C. 1.5

D. 0.5

Question Number : 47 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let K_1 and K_2 be the maximum kinetic energies of photo-electrons emitted when two monochromatic beams of wavelength λ_1 and λ_2, respectively are incident on a metallic surface. If $\lambda_1 = 3\lambda_2$ then :

Options :

A. $K_1 > \frac{K_2}{3}$

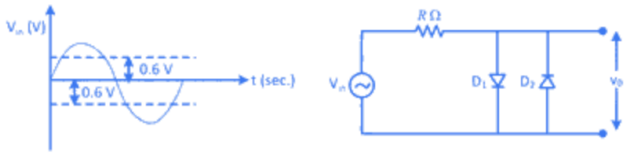
B. $K_1 < \frac{K_2}{3}$

C. $K_1 = \frac{K_2}{3}$

D. $K_2 = \frac{K_1}{3}$

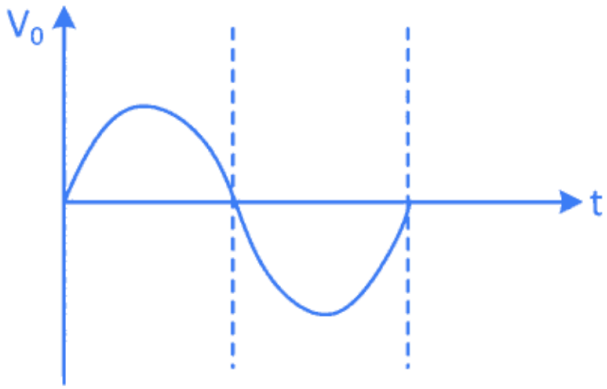
Question Number : 48 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the given circuit the input voltage V_{in} is shown in figure. The cut-in voltage of p-n junction diode (D_1 or D_2) is 0.6 V. Which of the following output voltage (V_0) waveform across the diode is correct?

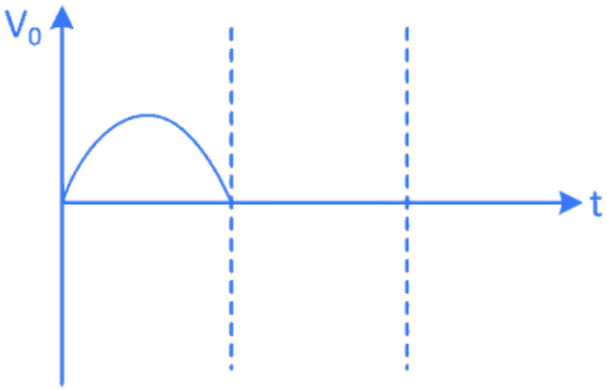


Options :

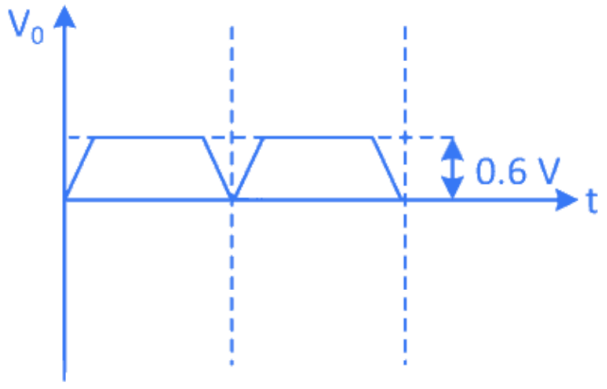
A.



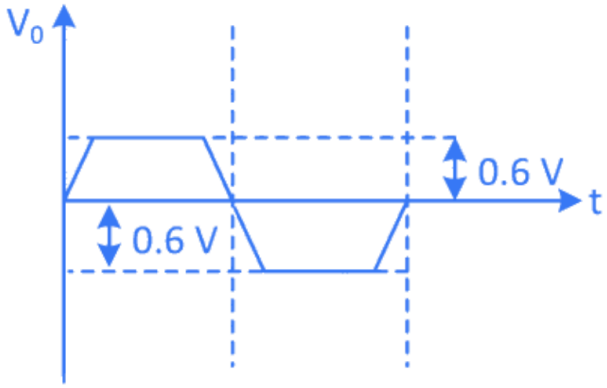
B.



C.



D.



Question Number : 49 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Following statements related to radioactivity are given below :

(A) Radioactivity is a random and spontaneous process and is dependent on physical and chemical conditions.

(B) The number of un-decayed nuclei in the radioactive sample decays exponentially with time.

(C) Slope of the graph of $\log_e$ (no. of undecayed nuclei) Vs. time represents the reciprocal of mean life time (τ).

(D) Product of decay constant (λ) and half-life time ($T_{1/2}$) is not constant.

Choose the most appropriate answer from the options given below :

Options :

A. (A) and (B) only

B. (B) and (D) only

C. (B) and (C) only

D. (C) and (D) only

Question Number : 50 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Amplitude modulated wave is represented by

$$V_{AM} = 10\,[1 + 0.4\cos(2\pi \times 10^4 t)]\cos(2\pi \times 10^7 t)$$

. The total bandwidth of the amplitude modulated wave is :

Options :

A. 10 kHz

B. 20 MHz

C. 20 kHz

D. 10 MHz

Physics Section B

Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 51 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A student in the laboratory measures thickness of a wire using screw gauge. The readings are 1.22 mm, 1.23 mm, 1.19 mm and 1.20 mm. The percentage error is

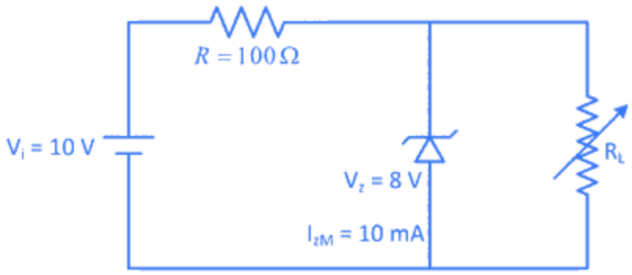
$$\frac{x}{121}\%$$

. The value of x is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 52 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A zener of breakdown voltage V_z = 8 V and maximum zener current, I_{ZM} = 10 mA is subjectd to an input voltage V_i = 10 V with series resistance R = 100 Ω. In the given circuit R_L represents the variable load resistance. The ratio of maximum and minimum value of R_L is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 53 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

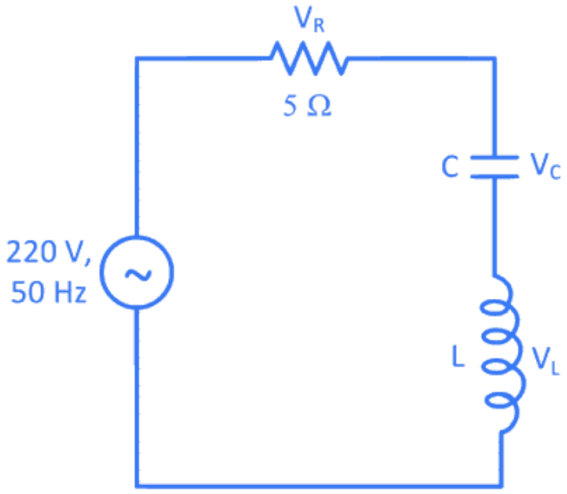
In a Young's double slit experiment, an angular width of the fringe is 0.35° on a screen placed at 2 m away for particular wavelength of 450 nm. The angular width of the fringe, when whole system is immersed in a medium of refractive index 7/5, is $\frac{1}{\alpha}$. The value of α is _____.

Response Type : Numeric
Evaluation Required For SA : Yes

Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 54 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

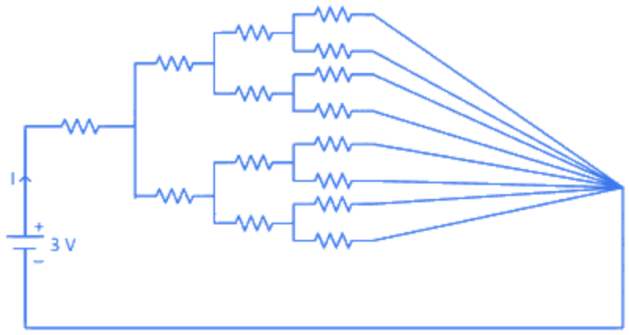
In the given circuit, the magnitude of V_L and V_C are twice that of V_R. Given that f = 50 Hz, the inductance of the coil is $\frac{1}{K\pi}$ mH. The value of K is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 55 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

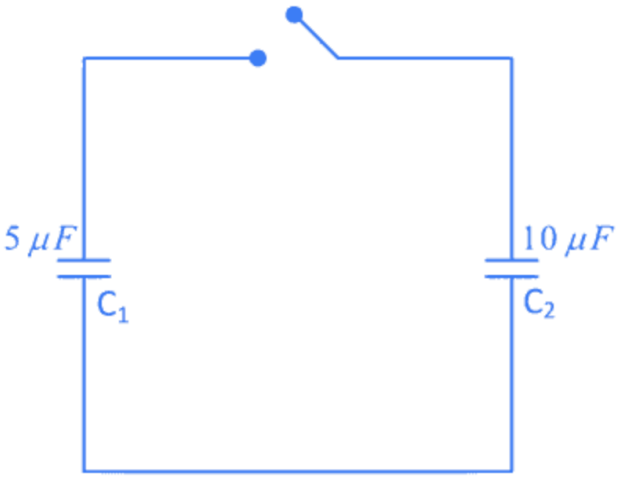
All resistances in figure are 1 Ω each. The value of current 'I' is $\frac{a}{5}$ A. The value of a is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 56 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A capacitor C_1 of capacitance 5 μF is charged to a potential of 30 V using a battery. The battery is then removed and the charged capacitor is connected to an uncharged capacitor C_2 of capacitance 10 μF as shown in figure. When the switch is closed charge flows between the capacitors. At equilibrium, the charge on the capacitor C_2 is _____ μC.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 57 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A tunning fork of frequency 340 Hz resonates in the fundamental mode with an air column of length 125 cm in a cylindrical tube closed at one end. When water is slowly poured in it, the minimum height of water required for observing resonance once again is _____ cm.

(Velocity of sound in air is 340 ms^{-1})

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 58 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

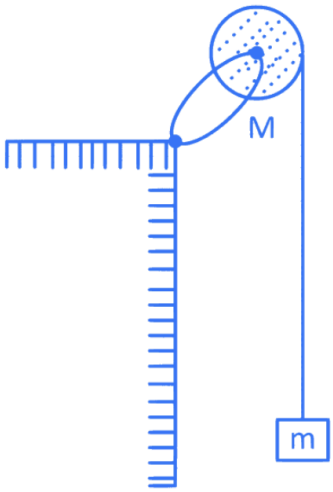
A liquid of density 750 kgm^{-3} flows smoothly through a horizontal pipe that tapers in cross-sectional area from $A_1 = 1.2 \times 10^{-2}$ m^2 to $A_2 = \frac{A_1}{2}$. The pressure difference between the wide and narrow sections of the pipe is 4500 Pa. The rate of flow of liquid is _____ $\times 10^{-3}$ m^3s^{-1}.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 59 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A uniform disc with mass M = 4 kg and radius R = 10 cm is mounted on a fixed horizontal axle as shown in figure. A block with mass m = 2 kg hangs from a massless cord that is wrapped around the rim of the disc. During the fall of the block, the cord does not slip and there is no friction at the axle. The tension in the cord is _____ N.

(Take g = 10 ms^{-2})



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 60 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A car covers AB distance with first one-third at velocity v_1 ms^{-1}, second one-third at v_2 ms^{-1} and last one-third at v_3 ms^{-1}. If $v_3 = 3v_1$, $v_2 = 2v_1$ and $v_1 = 11$ ms^{-1} then the average velocity of the car is _____ ms^{-1}.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Chemistry Section A

Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 61 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Compound A contains 8.7% Hydrogen, 74% Carbon and 17.3% Nitrogen. The molecular formula of the compound is,

Given : Atomic masses of C, H and N are 12, 1 and 14 amu respectively.

The molar mass of the compound A is 162 g mol^{-1}.

Options :

A. $C_4H_6N_2$

B. C_2H_3N

C. C_5H_7N

D. $C_{10}H_{14}N_2$

Question Number : 62 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements :

(A) The principal quantum number 'n' is a positive integer with values of 'n' = 1, 2, 3, ...

(B) The azimuthal quantum number 'l' for a given 'n' (principal quantum number) can have values as 'l' = 0, 1, 2, ... n

(C) Magnetic orbital quantum number 'm_l' for a particular 'l' (azimuthal quantum number) has (2l + 1) values.

(D) $\pm$ 1/2 are the two possible orientations of electron spin.

(E) For l = 5, there will be a total of 9 orbital

Which of the above statements are correct?

Options :

A. (A), (B) and (C)

B. (A), (C), (D) and (E)

C. (A), (C) and (D)

D. (A), (B), (C) and (D)

Question Number : 63 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the structure of SF_4, the lone pair of electrons on S is in.

Options :

A. equatorial position and there are two lone pair - bond pair repulsions at 90°.

B. equatorial position and there are three lone pair - bond pair repulsions at 90°.

C. axial position and there are three lone pair - bond pair repulsion at 90°.

D. axial position and there are two lone pair - bond pair repulsion at 90°.

Question Number : 64 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A student needs to prepare a buffer solution of propanoic acid and its sodium salt with pH 4. The ratio of

$$\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]}$$

required to make buffer is _____.

Given :

$$K_a(CH_3CH_2COOH) = 1.3 \times 10^{-5}$$

Options :

A. 0.03

B. 0.13

C. 0.23

D. 0.33

Question Number : 65 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II :

	List-I (Oxide)		**List-II (Nature)**
(A)	Cl_2O_7	(I)	Amphoteric
(B)	Na_2O	(II)	Basic
(C)	Al_2O_3	(III)	Neutral
(D)	N_2O	(IV)	Acidic

Choose the correct answer from the options given below :

Options :

A. (A) - (IV), (B) - (III), (C) - (I), (D) - (II)

B. (A) - (IV), (B) - (II), (C) - (I), (D) - (III)

C. (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

D. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Question Number : 66 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Among the following, basic oxide is :

Options :

A. SO_3

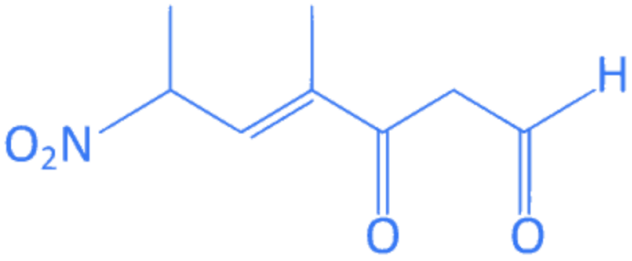
B. SiO_2

C. CaO

D. Al_2O_3

Question Number : 67 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The correct IUPAC name of the following compound is :



Options :

A. 4-methyl-2-nitro-5-oxohept-3-enal

B. 4-methyl-5-oxo-2-nitrohept-3-enal

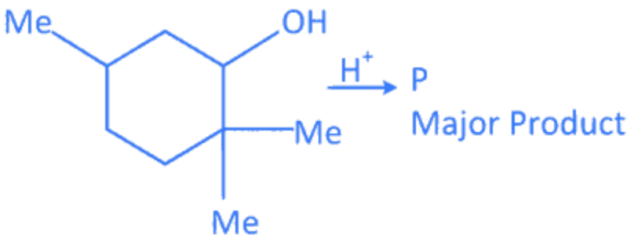
C. 4-methyl-6-nitro-3-oxohept-4-enal

D. 6-formyl-4-methyl-2-nitrohex-3-enal

Question Number : 68 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

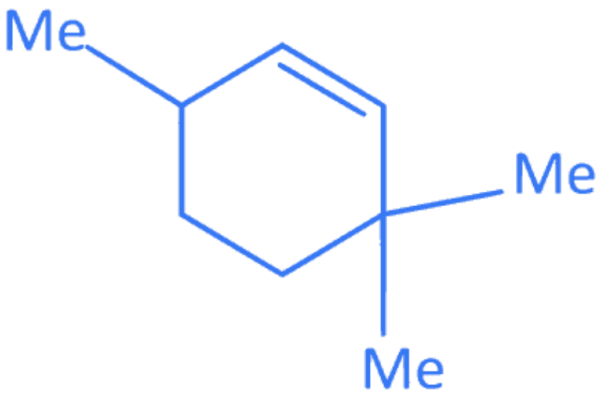
The major product (P) of the given reaction is

(where, Me is $-CH_3$)

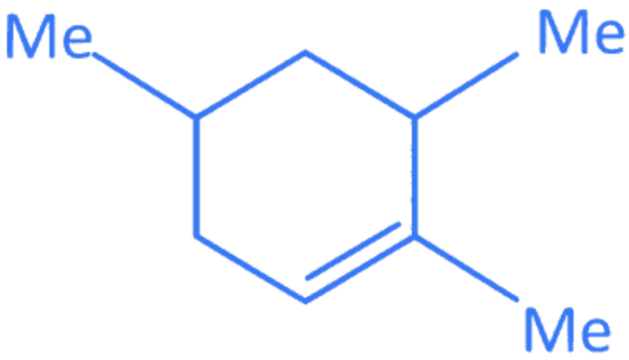


Options :

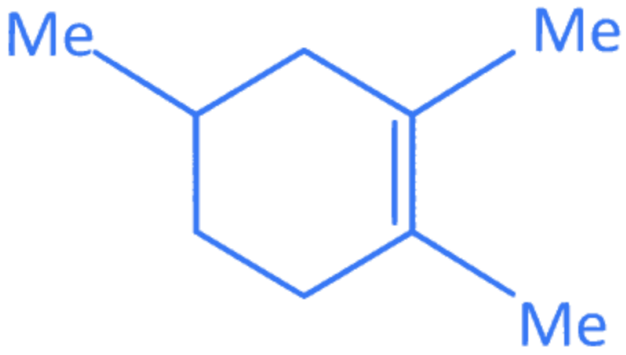
A.



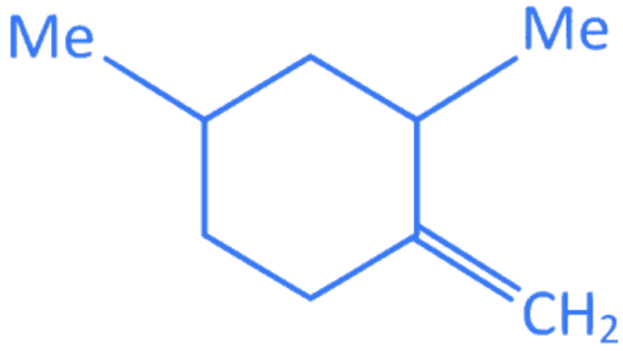
B.



C.



D.



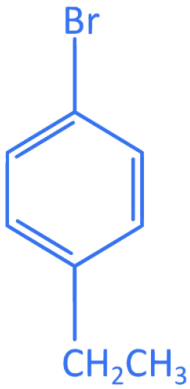
Question Number : 69 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical



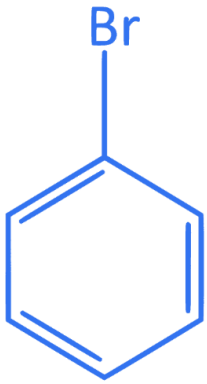
In the above reaction 'A' is

Options :

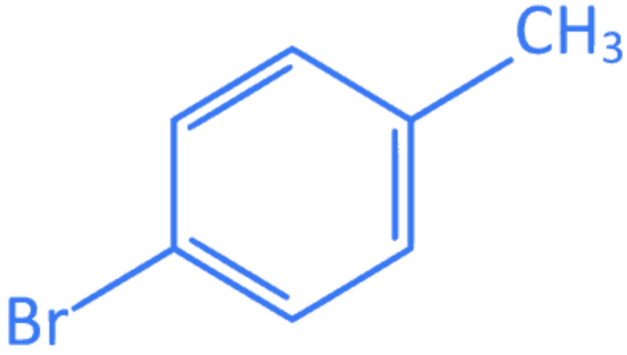
A.



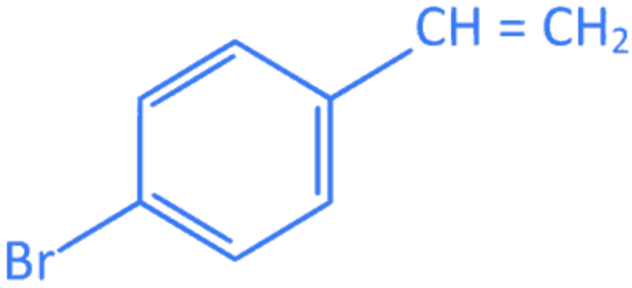
B.



C.



D.

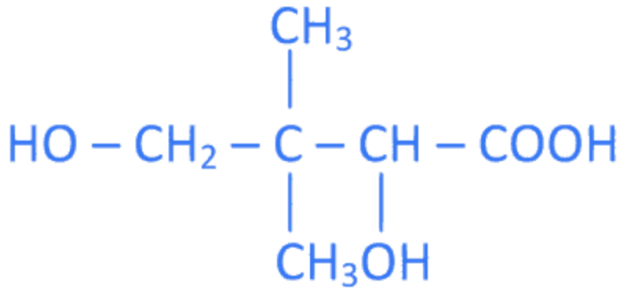


Question Number : 70 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

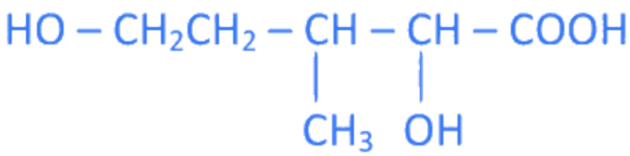
Isobutyraldehyde on reaction with formaldehyde and K_2CO_3 gives compound 'A'. Compound 'A' reacts with KCN and yields compound 'B', which on hydrolysis gives a stable compound 'C'. The compound 'C' is

Options :

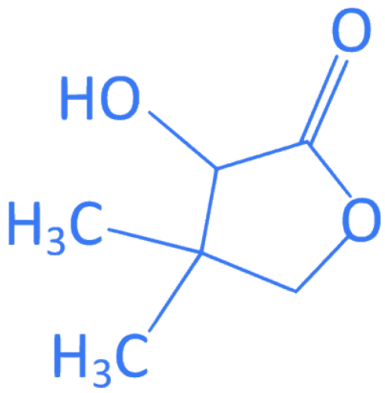
A.



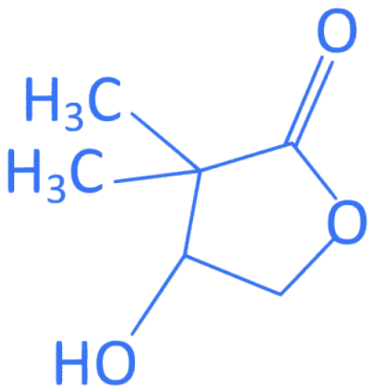
B.



C.

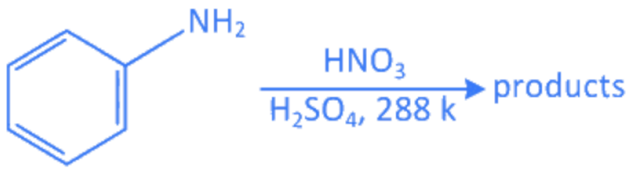


D.



Question Number : 71 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

With respect to the following reaction, consider the given statements :



(A) o-Nitroaniline and p-nitroaniline are the predominant products.

(B) p-Nitroaniline and m-nitroaniline are the predominant products.

(C) HNO_3 acts as an acid.

(D) H_2SO_4 acts as an acid.

Choose the correct option.

Options :

A. (A) and (C) are correct statements.

B. (A) and (D) are correct statements.

C. (B) and (D) are correct statements.

D. (B) and (C) are correct statements.

Question Number : 72 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When sugar 'X' is boiled with dilute H_2SO_4 in alcoholic solution, two isomers 'A' and 'B' are formed. 'A' on oxidation with HNO_3 yields saccharic acid where as 'B' is laevorotatory. The compound 'X' is :

Options :

A. Maltose

B. Sucrose

C. Lactose

D. Starch

Question Number : 73 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match List - I with List - II :

	List-I		**List-II**
(A)	negatively charged sol	(I)	$Fe_2O_3 . xH_2O$
(B)	macromolecular colloid	(II)	CdS sol
(C)	positively charged sol	(III)	Starch
(D)	Cheese	(IV)	a gel

Choose the correct answer from the options given below:

Options :

A. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

B. (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

C. (A) - (II), (B) - (III), (C) - (I), (D) - (IV)

D. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

Question Number : 74 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the metallurgical extraction of copper, following reaction is used :

$FeO + SiO_2 \rightarrow FeSiO_3$

FeO and $FeSiO_3$ respectively are.

Options :

A. gangue and flux.

B. flux and slag.

C. slag and flux.

D. gangue and slag.

Question Number : 75 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Hydrogen has three isotopes : protium (^1H), deuterium (^2H or D) and tritium (^3H or T). They have nearly same chemical properties but different physical properties. They differ in :

Options :

A. number of protons.

B. atomic number.

C. electronic configuration.

D. atomic mass.

Question Number : 76 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Among the given oxides of nitrogen ; N_2O, N_2O_3, N_2O_4 and N_2O_5, the number of compound/(s) having N - N bond is :

Options :

A. 1

B. 2

C. 3

D. 4

Question Number : 77 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following oxoacids of sulphur contains "S" in two different oxidation states?

Options :

A. $H_2S_2O_3$

B. $H_2S_2O_6$

C. $H_2S_2O_7$

D. $H_2S_2O_8$

Question Number : 78 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct statement about photo-chemical smog is :

Options :

A. It occurs in humid climate.

B. It is a mixture of smoke, fog and SO_2.

C. It is reducing smog.

D. It results from reaction of unsaturated hydrocarbons.

Question Number : 79 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements, one is Assertion (A) and other is Reason (R).

Assertion (A) : Natural rubber is a linear polymer of isoprene called cis-polyisoprene with elastic properties.

Reason (R) : The cis-polyisoprene molecules consist of various chains held together by strong polar interactions with coiled structure.

In the light of the above statements, choose the correct one from the options given below :

Options :

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

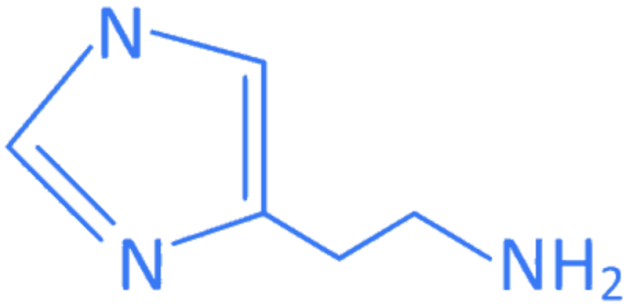
C. (A) is true but (R) is false.

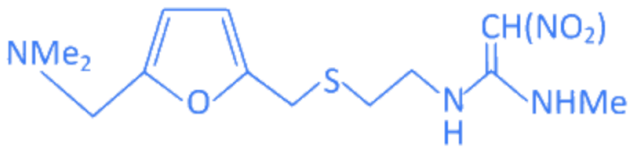
D. (A) is false but (R) is true.

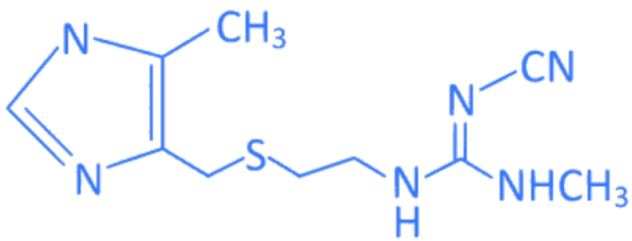
Question Number : 80 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

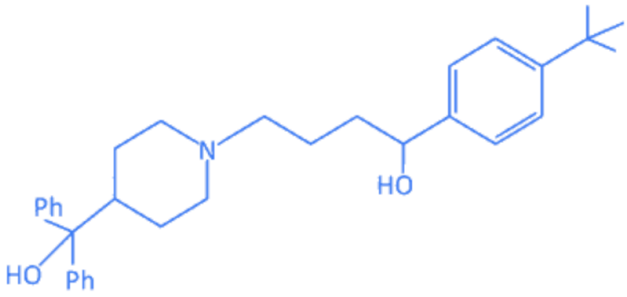
The drug tegamet is :

Options :

A. 

B. 

C. 

D. 

Chemistry Section B

Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Maximum Instruction Time :	0
Sub-Section Number :	1
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 81 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For combustion of one mole of magnesium in an open container at 300 K and 1 bar pressure, $\Delta_C H^{\Theta} = -601.70$ kJ mol^{-1}, the magnitude of change in internal energy for the reaction is _____ kJ. (Nearest integer)

(Given : R = 8.3 J K^{-1} mol^{-1})

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 82 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

2.5 g of protein containing only glycine ($C_2H_5NO_2$) is dissolved in water to make 500 mL of solution. The osmotic pressure of this solution at 300 K is found to be 5.03×10^{-3} bar. The total number of glycine units present in the protein is _____.

(Given : R = 0.083 L bar K^{-1} mol^{-1})

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 83 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

For the given reactions

$Sn^{2+} + 2e^- \rightarrow Sn$

$Sn^{4+} + 4e^- \rightarrow Sn$

the electrode potentials are ;

$$E^o_{Sn^{2+}/Sn} = -0.140$$

V and

$$E^o_{Sn^{4+}/Sn} = +0.010$$

V. The magnitude of standard electrode potential for Sn^{4+}/Sn^{2+} i.e. $E^o_{Sn^{4+}/Sn^{2+}}$ is _____ $\times 10^{-2}$ V. (Nearest integer)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 84 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

A radioactive element has a half life of 200 days. The percentage of original activity remaining after 83 days is _____. (Nearest integer)

(Given : antilog 0.125 = 1.333, antilog 0.693 = 4.93)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 85 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

$$[Fe(CN)_6]^{4-}$$

$$[Fe(CN)_6]^{3-}$$

$$[Ti(CN)_6]^{3-}$$

$$[Ni(CN)_4]^{2-}$$

$$[Co(CN)_6]^{3-}$$

Among the given complexes, number of paramagnetic complexes is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 86 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

(a) $CoCl_3.4NH_3$, (b) $CoCl_3.5NH_3$, (c) $CoCl_3.6NH_3$ and (d) $CoCl(NO_3)_2.5NH_3$.

Number of complex(es) which will exist in cis-trans form is/are _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes

Answers Type : Equal
Text Areas : PlainText

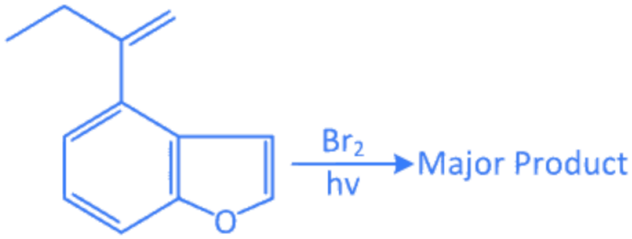
Question Number : 87 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The complete combustion of 0.492 g of an organic compound containing 'C', 'H' and 'O' gives 0.793 g of CO_2 and 0.442 g of H_2O. The percentage of oxygen composition in the organic compound is _____. (nearest integer)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 88 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

The major product of the following reaction contains _____ bromine atom(s).



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 89 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

0.01 M $KMnO_4$ solution was added to 20.0 mL of 0.05 M Mohr's salt solution through a burette. The initial reading of 50 mL burette is zero. The volume of $KMnO_4$ solution left in the burette after the end point is _____ mL. (nearest integer)

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Question Number : 90 Question Type : SA Display Question Number : Yes Keyboard Layout : Inscript

100 g of an ideal gas is kept in a cylinder of 416 L volume at 27°C under 1.5 bar pressure. The molar mass of the gas is _____ g mol^{-1}. (Nearest integer)

(Given : R = 0.083 L bar K^{-1} mol^{-1})

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText