

Banaras Hindu University

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|---|---------------------------|
| Question Paper Name: | 491 23rd May 2019 Shift 2 |
| Subject Name: | 491 |
| Creation Date: | 2019-05-23 18:23:29 |
| Duration: | 120 |
| Total Marks: | 360 |
| Display Marks: | Yes |
| Share Answer Key With Delivery Engine: | Yes |
| Actual Answer Key: | Yes |

MSc Tech Geophysics

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|------------------------------------|----------|
| Group Number : | 1 |
| Group Id : | 65898820 |
| Group Maximum Duration : | 0 |
| Group Minimum Duration : | 120 |
| Revisit allowed for view? : | No |
| Revisit allowed for edit? : | No |
| Break time: | 0 |
| Group Marks: | 360 |

MSc Tech Geophysics

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|---|-----------|
| Section Id : | 65898820 |
| Section Number : | 1 |
| Section type : | Online |
| Mandatory or Optional: | Mandatory |
| Number of Questions: | 120 |
| Number of Questions to be attempted: | 120 |
| Section Marks: | 360 |
| Display Number Panel: | Yes |
| Group All Questions: | No |

| | |
|-------------------------------------|----------|
| Sub-Section Number: | 1 |
| Sub-Section Id: | 65898820 |
| Question Shuffling Allowed : | Yes |

Question Number : 1 Question Id : 6589882141 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Decomposition of $\frac{5x-11}{2x^2+x-6}$ into partial fractions gives :

Options :

$$1. \frac{3}{x+2} - \frac{1}{2x-3}$$

$$2. \frac{3}{x-2} + \frac{1}{2x-3}$$

$$3. \frac{2}{x+2} - \frac{1}{2x-3}$$

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

Question Number : 2 Question Id : 6589882142 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The $(n + 1)^{\text{th}}$ term of the expression $\frac{5x+6}{(2+x)(1-x)}$, $x < 1$ when expanded in the ascending powers of x is :

Options :

$$1. \frac{1}{3} \left(11 + \frac{(-1)^{n-1}}{2^{n-1}} \right) x^n$$

$$2. \frac{3}{11} x^n$$

$$3. \frac{(-1)^{n-1}}{2^{n-1}} x^n$$

$$4. \frac{1}{2} \left(11 + \frac{(-1)^{n-1}}{2^{n-1}} \right) x^n$$

Question Number : 3 Question Id : 6589882143 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Consider the inequality :

$$\frac{x+y}{2} \geq \sqrt{xy} .$$

The above inequality holds if :

Options :

1. x is any real number and y is any positive real number.
2. x is any positive real number and y is any real number.
3. Both x and y are non-negative real numbers.
4. Both x and y are negative real numbers.

Question Number : 4 Question Id : 6589882144 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let x take real values. Then $x^3 + 1 \leq x^2 + 1$ if and only if :

Options :

1. $x \leq -1$
2. $x \geq -1$
3. $x \leq 0$
4. $x \leq 1$

Question Number : 5 Question Id : 6589882145 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If equations $x^2 + px + q = 0$ and $x^2 + bx + c = 0$, ($p \neq b$ and $q \neq c$) have a common root then it must be equal to :

Options :

1. $\frac{pc + bq}{q - c}$
2. $\frac{q - c}{p - b}$

3. $\frac{c-q}{p-b}$

4. $\frac{b-p}{q-c}$

Question Number : 6 Question Id : 6589882146 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The sum of the fourth powers of the roots of equation $x^3 - 2x^2 + x - 1 = 0$ is :

Options :

1. 2

2. -1

3. 0

4. 10

Question Number : 7 Question Id : 6589882147 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If a, b, c are roots of the equation $x^3 + 2x^2 - 3x - 1 = 0$, then the value of $a^{-3} + b^{-3} + c^{-3}$ is :

Options :

1. -3

2. 13

3. 0

4. -42

Question Number : 8 Question Id : 6589882148 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If points $P(3, 2, -4)$, $Q(5, 4, -6)$ and $R(9, 8, -10)$ are collinear, then the ratio in which point Q divides the line PR is :

Options :

1. 1 : 2
2. 1 : 3
3. 1 : 4
4. 1 : 5

Question Number : 9 Question Id : 6589882149 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If α, β, γ are angles which a line makes with positive direction of axes, then $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$ has value :

Options :

1. 1
2. 2
3. -1
4. 0

Question Number : 10 Question Id : 6589882150 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Distance between planes $x + 2y - 2z = -1$ and $2x + 4y - 4z = -5$ is :

Options :

1. $\frac{1}{3}$
2. $\frac{5}{6}$
3. $\frac{1}{2}$
4. $\frac{1}{4}$

Question Number : 11 Question Id : 6589882151 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The system of equations $3x - y + 4z = 3, x + 2y - 3z = -2, 6x + 5y + \lambda z = -3$ has unique solution if :

Options :

1. $\lambda \neq 5$
2. $\lambda \neq 7$
3. $\lambda \neq -5$
4. $\lambda \neq -7$

Question Number : 12 Question Id : 6589882152 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The determinant of the matrix :

$$\begin{bmatrix} 1 & \lambda & \lambda^2 \\ 1 & \mu & \mu^2 \\ 1 & \nu & \nu^2 \end{bmatrix} \text{ is zero if :}$$

Options :

1. $\lambda \neq \mu$
2. $\mu \neq \nu$
3. $\nu \neq \lambda$
4. $\lambda = \mu$

Question Number : 13 Question Id : 6589882153 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If A is a square matrix such that $A^2 + I = 0$, then :

Options :

1. A^{-1} does not exist

2. A^{-1} exists and $A^{-1} = A$

3. A^{-1} exists and $A^{-1} = -A$

4. determinant of A is 1

Question Number : 14 Question Id : 6589882154 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$. Then rank (A) is :

Options :

1. 0

2. 1

3. 2

4. 3

Question Number : 15 Question Id : 6589882155 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $AX = b$ is the matrix representation of a system of linear equations. Then the given system has infinitely many solutions if :

Options :

1. $\text{rank}(A, b) = \text{rank}(A)$

2. $\text{rank}(A, b) > \text{rank}(A)$

3. $\text{rank}(A, b) \leq \text{rank}(A)$

4. $\text{rank}(A, b) = \text{rank}(A) < \text{number of variables}$

Question Number : 16 Question Id : 6589882156 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 2 \end{bmatrix}$. Then the determinant of BA is :

Options :

1. 8
2. 4
3. 16
4. 32

Question Number : 17 Question Id : 6589882157 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Modulus of the complex number $Z = (1+i)^6$ is :

Options :

1. 8
2. 16
3. 32
4. 64

Question Number : 18 Question Id : 6589882158 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If $z = \cos \frac{2\pi}{n} + i \sin \frac{2\pi}{n}$ for some integer $n \geq 2$, then the value of $z + z^2 + \dots + z^{n-1}$

is :

Options :

1. 0
2. -1
3. 1

4. i

Question Number : 19 Question Id : 6589882159 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If z is a complex number such that real part of z^n is positive for every positive integer n , then z is :

Options :

1. 0

2. 1

3. a positive real number

4. None of the three

Question Number : 20 Question Id : 6589882160 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $f(x) = \frac{e^{1/x} - 1}{e^{1/x} + 1}$, when $x \neq 0$. Then $\lim_{x \rightarrow 0} f(x)$:

Options :

1. 0

2. 1

3. -1

4. does not exist

Question Number : 21 Question Id : 6589882161 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The function $f(x) = |x| |x-1| |x-2|$ is not differentiable only at points :

Options :

1. 0

2. 0, 1
3. 0, 1, 2
4. -1, 0, 1, 2

Question Number : 22 Question Id : 6589882162 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
 No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $f(x) = \begin{cases} 1, & \text{when } x \text{ is rational} \\ -1, & \text{when } x \text{ is irrational} \end{cases}$. Now consider following statements :

- (A) f is nowhere differentiable
- (B) f is nowhere continuous

Options :

1. Both (A) and (B) are true
2. (A) is true but (B) is false
3. (A) is false but (B) is true
4. Both (A) and (B) are false

Question Number : 23 Question Id : 6589882163 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
 No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Let $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right), & \text{where } x \neq 0 \\ 0, & \text{other wise} \end{cases}$. Then :

Options :

1. $f'(0)$ does not exist
2. $f'(0) = 0$
3. $f'(0) = -1$
4. $f'(0) = \frac{1}{2}$

Question Number : 24 Question Id : 6589882164 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The angle that the tangent to the hyperbola $y = \frac{1}{x}$ makes at the point (1, 1) with the x-axis is :

Options :

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

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

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

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

Question Number : 25 Question Id : 6589882165 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If $f(x) = \begin{vmatrix} x^3 & \sin x & \cos x \\ 6 & -1 & 0 \\ 2 & 4 & 6 \end{vmatrix}$. Then $f^{(3)}(0)$ is :

Options :

1. 6

2. 4

3. 0

4. 1

Question Number : 26 Question Id : 6589882166 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If $y = \sin x + \cos x$, then the nth derivative of y with respect to x is :

Options :

1. $\sqrt{1 + \sin 2x}$

2. $\sqrt{1 - \sin 2x}$

3. $\sqrt{1 + (-1)^n \sin 2x}$

4. $1 + (-1)^n \sin 2x$

Question Number : 27 Question Id : 6589882167 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The coefficient of x^3 in the Maclaurin's series expansion of $f(x) = \log(1+x)$ is :

Options :

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

2. 1

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

4. 0

Question Number : 28 Question Id : 6589882168 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The asymptotes to the curve $x^2y^2 = a^2(x^2 + y^2)$, which are parallel to x -axis, are :

Options :

1. $x = \pm a$

2. $x = a$

3. $x = -a$

4. $y = \pm a$

Question Number : 29 Question Id : 6589882169 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The curve $y^2 + |x| = 1$ is symmetric about :

Options :

1. x-axis but not about y-axis
2. both x-axis and y-axis
3. y-axis but not about x-axis
4. neither x-axis nor y-axis

Question Number : 30 Question Id : 6589882170 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The curvature of a circle at any point on it is :

Options :

1. zero
2. 1
3. radius of the circle
4. inverse of radius

Question Number : 31 Question Id : 6589882171 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

$$\text{Let } f(x) = \begin{cases} \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}, \text{ then :}$$

Options :

1. f satisfies Rolle's theorem in $[0, 1]$.
2. f satisfies Lagranges' mean value theorem in $[0, 1]$.
3. f satisfies Cauchy mean value theorem in $[0, 1]$.
4. f does not satisfy Rolle's Theorem in $[0, 1]$.

Question Number : 32 Question Id : 6589882172 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If f is real valued differentiable function on the interval $[0, 1]$ and $f'(x) \geq 0$ for all $x \in [0, 1]$, then f is :

Options :

1. Monotonically increasing in $[0, 1]$
2. Monotonically decreasing in $[0, 1]$
3. f is constant in $[0, 1]$
4. f is the exponential function

Question Number : 33 Question Id : 6589882173 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The greatest and least values of the function $f(x) = 3x^4 - 2x^3 - 6x^2 + 6x + 1$ in the interval $[0, 2]$ are respectively :

Options :

1. 30 and 20
2. 21 and 1
3. 21 and -1
4. 20 and -1

Question Number : 34 Question Id : 6589882174 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The maximum value of the function $f(x) = x^p(1-x)^q$, where p and $q(>1)$ are positive integers, is attained at the point :

Options :

1. $x = 0$
2. $x = 1$
3. $x = \frac{p}{p+q}$

$$x = \frac{q}{p+q}$$

4.

Question Number : 35 Question Id : 6589882175 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The focus and the directrix of the parabola $y^2 = 10x$ are, respectively :

Options :

1. $(5, 0)$ and $x = 5$
2. $(5/2, 0)$ and $x = 5/2$
3. $(5/2, 0)$ and $x = -5/2$
4. $(0, 5/2)$ and $x = -5/2$

Question Number : 36 Question Id : 6589882176 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The asymptotes of the hyperbola $\frac{x^2}{5} - \frac{y^2}{6} = 1$, are :

Options :

1. $y = \pm x$
2. $y = \pm \frac{5}{6}x$
3. $y = \pm \sqrt{\frac{6}{5}}x$
4. $y = \pm \sqrt{\frac{5}{6}}x$

Question Number : 37 Question Id : 6589882177 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The equation $3x^2 - 6xy + 3y^2 + 2x - 7 = 0$ represents :

Options :

1. a parabola
2. an ellipse
3. a hyperbola
4. a pair of straight lines

Question Number : 38 Question Id : 6589882178 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The vertices of an ellipse whose eccentricity is 0.8 and whose foci lie at points $(0, \pm 7)$ are :

Options :

1. $(0, \pm 8)$
2. $(\pm 8.75, 0)$
3. $(0, \pm 8.75)$
4. $(0, 9)$

Question Number : 39 Question Id : 6589882179 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The parametric equation of the cycloid generated by the circle of radius a is :

Options :

1. $x = a(t - \cos t), y = a(1 - \sin t)$
2. $x = a(t - \sin t), y = a(1 - \cos t)$
3. $x = a(t + \sin t), y = a(1 - \cos t)$
4. $x = a(t - \sin t), y = a(1 + \cos t)$

Question Number : 40 Question Id : 6589882180 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The polar equation of the circle $x^2 + (y - 3)^2 = 9$ is :

Options :

1. $r = 2 \sin \theta$
2. $r = 3 \cos \theta$
3. $r = 6 \cos \theta$
4. $r = 6 \sin \theta$

Question Number : 41 Question Id : 6589882181 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The unit vector normal to the curve $y = \frac{x^3}{2} + \frac{1}{2}$ at the point (1, 1) is :

Options :

1. $\frac{2}{\sqrt{13}} \vec{i} + \frac{2}{\sqrt{13}} \vec{j}$
2. $\frac{-3}{\sqrt{13}} \vec{i} + \frac{2}{\sqrt{13}} \vec{j}$
3. $\frac{-2}{\sqrt{13}} \vec{i} + \frac{3}{\sqrt{13}} \vec{j}$
4. $2\vec{i} - 3\vec{j}$

Question Number : 42 Question Id : 6589882182 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The centre and the radius of the sphere $x^2 + y^2 + z^2 + 3x - 4z + 1 = 0$ are :

Options :

1. $(-3/2, 0, 2)$ and $\sqrt{21}/2$
2. $(2, 0, -3)$ and $\sqrt{21}$

3. $(-\frac{3}{2}, 0, 2)$ and 21

4. $(0, 3, -2)$ and 5

Question Number : 43 Question Id : 6589882183 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The equation of the plane passing through points $(0, 0, 1)$, $(2, 0, 0)$ and $(0, 3, 0)$ is :

Options :

1. $3x + 2y + 6z = 6$

2. $2x + 3y + 6z = 6$

3. $6x + 3y + 2z = 6$

4. $3x + 2y + 6z = -6$

Question Number : 44 Question Id : 6589882184 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The length of the smooth curve $r(t) = \cos t \vec{i} + \sin t \vec{j} + t \vec{k}$ ($0 \leq t \leq 2\pi$) is :

Options :

1. 2π

2. 4π

3. $2\pi\sqrt{2}$

4. 6π

Question Number : 45 Question Id : 6589882185 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The curvature of the helix $r(t) = (a \cos t) \vec{i} + (a \sin t) \vec{j} + bt \vec{k}$, $a, b \geq 0$ and $a^2 + b^2 \neq 0$, is :

Options :

1. $\frac{a^2}{a^2 + b^2}$

2. $\frac{a}{a^2 + b^2}$

3. $\frac{b}{a^2 + b^2}$

4. $\frac{b^2}{a^2 + b^2}$

Question Number : 46 Question Id : 6589882186 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The point closest to the origin on the plane $2x + y - z = 5$ is :

Options :

1. $(5/2, 0, 0)$

2. $(0, 5, 0)$

3. $(5/3, 5/6, -5/6)$

4. $(0, 0, -5)$

Question Number : 47 Question Id : 6589882187 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The area of the region bounded by $y = x$ and $y = x^2$ in the first quadrant is :

Options :

1. $1/3$

2. $1/6$

3. $1/8$

4. $1/4$

Question Number : 48 Question Id : 6589882188 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The differential equation of all circles touching y-axis at the origin and centre at the x-axis is :

Options :

1. $2x \frac{dy}{dx} + y^2 - x^2 = 0$

2. $2xy \frac{dy}{dx} + x^2 - y^2 = 0$

3. $2y \frac{dy}{dx} + x^2 - y^2 = 0$

4. $2xy \frac{dy}{dx} + x^2 + y^2 = 0$

Question Number : 49 Question Id : 6589882189 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The orthogonal trajectory of the cardioids $r = a(1 - \cos \theta)$ is :

Options :

1. $r = c(1 + \cos \theta)$

2. $r = c(1 - \cos \theta)$

3. $r = c(1 + \sin \theta)$

4. $r = c(1 - \sin \theta)$

Question Number : 50 Question Id : 6589882190 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The complementary function of the differential equation $(D^3 - 6D^2 + 11D - 6)y = e^{-2x}$ is :

Options :

1. $c_1 e^{-x} + c_2 e^{-2x} + c_3 e^{-3x}$

2. $c_1e^x + c_2e^{2x} - c_3e^{-3x}$

3. $(c_1x + c_2)e^x + c_3e^{2x}$

4. $c_1e^x + c_2e^{2x} + c_3e^{3x}$

Question Number : 51 Question Id : 6589882191 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Solution of the inequality $-2 < \frac{6-2x}{3} < 4$ is :

Options :

1. $-3 < x < 6$

2. $3 < x < 6$

3. $-6 < x < -3$

4. $-6 < x < 3$

Question Number : 52 Question Id : 6589882192 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The rank of a matrix A is equal to the maximum number of linearly independent column vectors of A then :

Options :

1. rank of A > rank of A^T

2. rank of $A^T = 0$

3. rank of A < rank of A^T

4. rank of A = rank of A^T

Question Number : 53 Question Id : 6589882193 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The eigen vectors of $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ are :

Options :

1. $\begin{bmatrix} 1 \\ i \end{bmatrix}$ and $\begin{bmatrix} 1 \\ -i \end{bmatrix}$

2. $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ -i \end{bmatrix}$

3. $\begin{bmatrix} 1 \\ i \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

4. $\begin{bmatrix} 1 \\ i \end{bmatrix}$ and $\begin{bmatrix} -1 \\ i \end{bmatrix}$

Question Number : 54 Question Id : 6589882194 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The determinant of an orthogonal matrix has the value :

Options :

1. +1 or -1

2. +2 or -2

3. 0 or +2

4. 0 or -2

Question Number : 55 Question Id : 6589882195 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The square root of $(1 + i)$ is :

Options :

1. $2^{1/4}[\cos(\pi/8) + i \sin(\pi/8)]$

2. $2^{1/4}[\cos(\pi/8) - i \sin(\pi/8)]$

3. $2^{1/4}[\sin(\pi/8) + i \cos(\pi/8)]$

4. $2^{1/4}[\sin(\pi/8) - i \sin(\pi/8)]$

Question Number : 56 Question Id : 6589882196 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If $u = \log \left\{ \frac{x^2 + y^2}{x + y} \right\}$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is equal to :

Options :

1. 0
2. 1
3. $\frac{1}{2}$
4. 2

Question Number : 57 Question Id : 6589882197 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If $u = f(x - y, y - z, z - x)$, then the value of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$ is :

Options :

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

Question Number : 58 Question Id : 6589882198 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The whole area of the astroid $x^{2/3} + y^{2/3} = a^{2/3}$ is :

Options :

1. πa^2
2. $\frac{\pi a^2}{8}$

3. $12 \pi a^2$

4. $\frac{3\pi a^2}{8}$

Question Number : 59 Question Id : 6589882199 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The volume in the positive octant of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ is :

Options :

1. $\frac{1}{6} \pi abc$

2. πabc

3. $\pi a^2 b^2 c^2$

4. $\pi a^3 b^3 c^3$

Question Number : 60 Question Id : 6589882200 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The condition for a cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ to have three mutually perpendicular generators is :

Options :

1. $a^2 + b^2 + c^2 = 0$

2. $a + b + c = 0$

3. $a^3 + b^3 + c^3 = 0$

4. $b^2 - 4ac = 0$

Question Number : 61 Question Id : 6589882201 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Consider an inertial frame S and another frame S' moving with constant velocity \vec{v} relative to S . If the origins of two frames coincide, the position vector of any particle P at any instant in the two frames are related by :

Options :

1. $\vec{r}' = \vec{r} - \vec{v}t$

2. $\vec{r}' = \vec{r} + \vec{v}t$

3. $\vec{r}' = \vec{r}$

4. $\vec{r}' = \vec{r} - \frac{\vec{v}}{2}t$

Question Number : 62 Question Id : 6589882202 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Total angular momentum in terms of kinetic energy K of an earth's satellite of mass m in a circular orbit of radius r is :

Options :

1. $J = (2mr^2K)^{1/2}$

2. $J = (2mrK)^{1/2}$

3. $J = (mr^2K)^{1/2}$

4. $J = (2m^2rK)^{1/2}$

Question Number : 63 Question Id : 6589882203 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The moment of inertia of a solid cylinder about its own axis is :

Options :

1. $\frac{MR^2}{2}$

2. $\frac{MR^2}{4}$

3. MR^2

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

Question Number : 64 Question Id : 6589882204 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

In a LCR circuit $L = 10 \text{ mH}$, $C = 1 \mu\text{F}$ & $R = 0.1 \text{ ohm}$. The quality factor for the circuit is :

Options :

1. 1000

2. 200

3. 500

4. 400

Question Number : 65 Question Id : 6589882205 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Fourier series is given as :

$$y = \frac{a}{T}t \text{ for } 0 < t < T$$

The coefficient A_0 is :

Options :

1. $a/2$

2. 0

3. a

4. $a/4$

Question Number : 66 Question Id : 6589882206 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Maxwell's equation $\nabla \cdot \vec{D} = \rho$ is a statement of :

Options :

1. Faraday's law of induction
2. Modified Ampere's law
3. Gauss law of electricity
4. Gauss law of magnetism

Question Number : 67 Question Id : 6589882207 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

An electromagnetic wave travels along z-axis. Which of the following pairs of space and time varying fields would generate such a wave ?

Options :

1. E_x, B_y
2. E_y, B_x
3. E_z, B_x
4. E_y, B_z

Question Number : 68 Question Id : 6589882208 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The vector Helmholtz equation in conducting medium is given by :

Options :

1. $\nabla^2 \vec{E} + \omega^2 \mu \epsilon \vec{E} = 0$
2. $\nabla^2 \vec{E} + (\omega^2 \mu \epsilon - j\omega \mu \sigma) \vec{E} = 0$
3. $\nabla^2 \vec{E} + (\omega^2 \mu \epsilon + j\omega \mu \sigma) \vec{E} = 0$
4. $\nabla^2 \vec{E} + (j\omega \mu \sigma - \omega^2 \mu \epsilon) \vec{E} = 0$

Question Number : 69 Question Id : 6589882209 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

At absolute zero a semiconductor behaves like :

Options :

1. an insulator
2. a super conductor
3. a good conductor
4. a variable resistor

Question Number : 70 Question Id : 6589882210 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of the following is donor impurity element ?

Options :

1. Aluminium
2. Boron
3. Phosphorus
4. Germanium

Question Number : 71 Question Id : 6589882211 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If the reverse bias voltage applied to a p-n junction is increased, its barrier capacitance will :

Options :

1. Increase
2. Decrease
3. Remain Constant
4. First increase then decrease

Question Number : 72 Question Id : 6589882212 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The intensity of the principal maxima for a grating of N slits is proportional to :

Options :

1. $1/N$

2. N

3. N^2

4. $1/N^2$

Question Number : 73 Question Id : 6589882213 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The first diffraction minima due to a single slit diffraction is at $\theta = 30^\circ$ for a light of wavelength 5000 \AA . The width of the slit is :

Options :

1. $5 \times 10^{-5} \text{ cm}$

2. $10 \times 10^{-5} \text{ cm}$

3. $2.5 \times 10^{-5} \text{ cm}$

4. $1.25 \times 10^{-5} \text{ cm}$

Question Number : 74 Question Id : 6589882214 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The coherence length for sodium light of wavelength 5890 \AA is $2.945 \times 10^{-2} \text{ m}$, the coherence time is :

Options :

1. $9.82 \times 10^{-11} \text{ s}$

2. $9.28 \times 10^{-11} \text{ s}$

3. $8.92 \times 10^{-11} \text{ s}$

4. $8.29 \times 10^{-11} \text{ s}$

Question Number : 75 Question Id : 6589882215 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

In a doubly refracting crystal, optic axis is a direction along which :

Options :

1. A plane polarized beam does not suffer deviation
2. Any beam of light does not suffer any deviation
3. Double refraction does not take place
4. Ordinary & extraordinary rays undergo maximum deviation

Question Number : 76 Question Id : 6589882216 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The state of polarization of the emerging light when a beam of circularly polarized light is passed through a quarter wave plate is :

Options :

1. Unpolarized
2. Circularly polarized
3. Plane polarized
4. Elliptically polarized

Question Number : 77 Question Id : 6589882217 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A black body emits :

Options :

1. No radiations
2. Radiation of all wavelengths
3. Radiation of only one wavelength

4. Radiations of selected wavelengths

Question Number : 78 Question Id : 6589882218 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If the temperature of the sun is doubled, the rate of energy received on earth will be increased by a factor of :

Options :

1. 2
2. 4
3. 8
4. 16

Question Number : 79 Question Id : 6589882219 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A tungsten cathode having threshold of 230 nm is irradiated by ultraviolet light of wavelength 180 nm. The maximum energy of emitted photoelectrons is :

Options :

1. 1.485 eV
2. 1.548 eV
3. 1.854 eV
4. 4.185 eV

Question Number : 80 Question Id : 6589882220 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Antistokes lines in Raman effect have wavelength :

Options :

1. Shorter as compared to original wavelength
2. Longer as compared to original wavelength

3. Equal to original wavelength
4. Both shorter and longer as compared to original wavelength

Question Number : 81 Question Id : 6589882221 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of the following can be considered to be the best option for an inertial frame :

Options :

1. A frame of reference fixed on the surface of the earth
2. A frame of reference located on the sun
3. A frame of reference fixed on stars

A frame of reference which is moving with a uniform speed relative to an
4. inertial frame.

Question Number : 82 Question Id : 6589882222 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

At what speed a rod should move relative to an observer so that the ratio of the change in the length of the rod to its original length is $\frac{1}{2}$?

Options :

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

Question Number : 83 Question Id : 6589882223 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If an electron moves with a velocity such that its mass doubles its rest mass, the ratio of its kinetic energy to the rest mass energy becomes :

Options :

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

Question Number : 84 Question Id : 6589882224 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of the following quantities remains invariant under Galilean transformation ?

Options :

1. Velocity
2. Acceleration
3. Position coordinate
4. None of the three

Question Number : 85 Question Id : 6589882225 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The radius of gyration of a ring of mass M and radius R about its tangent is :

Options :

1. $\sqrt{\frac{3}{2}} R$
2. \sqrt{R}
3. $\sqrt{\frac{1}{2}} R$

4. $\sqrt{\frac{5}{4}} R$

Question Number : 86 Question Id : 6589882226 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If the distance of a satellite from the earth is doubled , its time period will become :

Options :

1. 8 times

2. 4 times

3. $2\sqrt{2}$ times

4. $\frac{1}{8}$ times

Question Number : 87 Question Id : 6589882227 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

For a planet around the sun :

Options :

1. Angular momentum of planet remains constant

2. Linear momentum of planet remains constant

3. Velocity of the planet remains constant

4. None of the three

Question Number : 88 Question Id : 6589882228 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If a particle of mass m collides inelastically with another particle of mass $2m$ at rest. The ratio of kinetic energies after and before collisions will be :

Options :

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

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

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

4. 1

Question Number : 89 Question Id : 6589882229 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The velocity of sound in a gas, in which two waves of length 1 m and 1.02 m produce 10 beats in two seconds will be :

Options :

1. 510 m/sec

2. 255 m/sec

3. 500 m/sec

4. 450 m/sec

Question Number : 90 Question Id : 6589882230 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

When two simple harmonic motions at right angles to each other having periods in the ratio 1 : 1 and equal amplitudes with phase difference $\frac{\pi}{2}$ superpose, the resultant is :

Options :

1. Oblique ellipse

2. A pair of coincident straight lines

3. A circle

4. Double ellipse overlapping on each other.

Question Number : 91 Question Id : 6589882231 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of the following can not be expanded in the form of Fourier series ?

Options :

1. A saw-tooth wave
2. A Triangular wave
3. A square wave
4. A wave which is aperiodic

Question Number : 92 Question Id : 6589882232 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The fictitious force acting on a body of mass 5 kg in a frame of reference moving vertically upwards with an acceleration 4 m/sec^2 will be :

Options :

1. 49 N downwards
2. 20 N downwards
3. 69 N upwards
4. 20 N upwards

Question Number : 93 Question Id : 6589882233 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The ratio of magnetic field vector H and electric field vector E has the dimension of :

Options :

1. conductance
2. Inductance
3. Capacitance

4. Product of inductance and capacitance

Question Number : 94 Question Id : 6589882234 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A plane electromagnetic wave is travelling in an unbounded lossless dielectric medium having $\mu_r = 1$ and $\epsilon_r = 3$, the velocity of the wave in the medium is :

Where the terms have their usual meanings.

Options :

1. C

2. $\frac{C}{2}$

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

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

Question Number : 95 Question Id : 6589882235 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The permittivity of a medium is twice that of free space while its permeability may be assumed equal to that of free space, the intrinsic impedance of the medium is :

Options :

1. 533Ω

2. 266.6Ω

3. 377Ω

4. 188.5Ω

Question Number : 96 Question Id : 6589882236 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Zener breakdown voltage depends on :

Options :

1. Velocity of the carriers
2. Number of donor atoms
3. Number of acceptor atoms
4. Electric field created across the depletion region

Question Number : 97 Question Id : 6589882237 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The phase difference between the input and output currents in common collector configuration is :

Options :

1. 180°
2. 0°
3. 90°
4. 45°

Question Number : 98 Question Id : 6589882238 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The peak value of half-wave rectifier output voltage V_p (out) for rectifier having silicon diode is given by :

Where V_p (in) is the peak value of input voltage

Options :

1. V_p (in) - 0.7 V
2. V_p (in) + 0.7 V
3. V_p (in) - 0.2 V
4. $\frac{V_p$ (in)}{2}

Question Number : 99 Question Id : 6589882239 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If the diameter of n th dark ring in reflected light system in Newton's ring experiment is 0.5 cm, when a film of air is enclosed between the glass plate and the plane-convex lens. What will be the diameter of n th dark ring in reflected light system if a liquid of refractive index 1.5 is present between glass plate and plano-convex lens ?

Options :

1. 0.75 cm
2. 0.40 cm
3. 0.86 cm
4. 0.61 cm

Question Number : 100 Question Id : 6589882240 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A shift of 100 fringes is observed when the movable Mirror of Michelson mirror moves a distance of 0.002945 cm. The wavelength of light used is :

Options :

1. 5890 \AA
2. 6000 \AA
3. 6500 \AA
4. 7000 \AA

Question Number : 101 Question Id : 6589882241 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load :
No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If a light beam is incident on a slit of width d and distance between the screen and the slit is D . The width of principle maxima and the width of slit will be equal if D is :

Options :

1. $\frac{d^2}{\lambda}$

2. $\frac{2d}{\lambda}$

3. $\frac{2d^2}{\lambda}$

4. $\frac{d^2}{2\lambda}$

Question Number : 102 Question Id : 6589882242 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If a light beam is incident on a transparent glass sheet at Brewster's angle, the reflected and refracted beams are :

Options :

1. At 90° to each other

2. At 45° to each other

3. At 57°

4. At 180°

Question Number : 103 Question Id : 6589882243 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

In Fresnel's biprism, coherent sources are formed due to :

Options :

1. Division of amplitude

2. Multiple reflection

3. Division of wavefront

4. Scattering

Question Number : 104 Question Id : 6589882244 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Diffraction of light can be exhibited by an obstacle having dimension of the order of :

Options :

1. 100 cm
2. 10 cm
3. 10^{-5} cm
4. 10 m

Question Number : 105 Question Id : 6589882245 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If in Fresnel's biprism experiment, the distance, d between two slits producing coherent beams is zero, the width of region of illumination on the screen will be (Where the terms have their usual meaning) :

Options :

1. Infinite
2. $\frac{\lambda D}{d}$
3. $\frac{d}{\lambda D}$
4. Zero

Question Number : 106 Question Id : 6589882246 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A polariser and an analyser are oriented so that the maximum light is transmitted. What is the fraction of maximum light transmitted when analyser is rotated through 60° ?

Options :

1. 0.75

2. 0.25

3. 0.50

4. 1

Question Number : 107 Question Id : 6589882247 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Van der Waals equation of state of a gas takes into account :

Options :

1. The effect of intermolecular forces only

2. The effect of size of the molecules only

3. Both the effect of intermolecular forces and the size of molecules

4. The velocity of molecules only

Question Number : 108 Question Id : 6589882248 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of the following properties of a thermodynamic system remains constant during a reversible adiabatic process ?

Options :

1. Enthalpy

2. Temperature

3. Specific heat

4. Entropy

Question Number : 109 Question Id : 6589882249 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

For solids, which contract on melting, slope of the P vs T curve is :

Options :

1. Positive
2. Negative
3. Zero
4. Infinite

Question Number : 110 Question Id : 6589882250 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

When a liquid film is stretched adiabatically :

Options :

1. Its temperature falls
2. Its temperature remains same
3. Its temperature increases
4. Its temperature becomes zero

Question Number : 111 Question Id : 6589882251 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

In isothermal isobaric equilibrium :

Options :

1. The entropy is maximum
2. Helmholtz free energy is minimum
3. Gibb's free energy is minimum
4. Internal energy is minimum

Question Number : 112 Question Id : 6589882252 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A gas will be cooled as a result of Joule - Thomson expansion if temperature of the gas undergoing expansion is :

Where the terms have their usual meaning.

Options :

1. Less than $\frac{2a}{Rb}$
2. Greater than $\frac{2a}{Rb}$
3. Equal to $\frac{2a}{Rb}$
4. None of the three

Question Number : 113 Question Id : 6589882253 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

At a constant temperature, the internal energy of a Van der Waals gas :

Options :

1. Decreases as the volume increases
2. Increases as the volume increases
3. Remains constant irrespective of change in volume
4. None of the three

Question Number : 114 Question Id : 6589882254 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

The de-Broglie wavelength associated with a 1 MeV electron is approximately :

Options :

1. 3.9 nm
2. 8.7×10^{-4} nm
3. 87 nm
4. 38.9 nm

Question Number : 115 Question Id : 6589882255 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

If the energy density from a star is maximum at 4000 \AA , its temperature will be nearly :

Options :

1. 15000 K
2. 7230 K
3. 5000 K
4. 6000 K

Question Number : 116 Question Id : 6589882256 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Rest mass of a photon is :

Where terms have their usual meaning.

Options :

1. $\frac{h\nu}{c^2}$
2. $h\nu$
3. $\frac{h\nu}{c}$
4. Zero

Question Number : 117 Question Id : 6589882257 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

In Compton scattering the incident photon loses maximum energy to the electron, when photon is scattered at :

Options :

1. 0°
2. 90°

3. 45°

4. 180°

Question Number : 118 Question Id : 6589882258 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

A Carnot's reversible heat engine has efficiency 0.4 when heat extracted from source is 1000 calories. What will be the change in efficiency if heat rejected to the sink is increased by 100 calories ?

Options :

1. 0.1

2. 0.5

3. 0.2

4. 0.4

Question Number : 119 Question Id : 6589882259 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which of these properties must change for a mode to be Raman active ?

Options :

1. Volume

2. Dipole moment

3. Polarisability

4. Surface area

Question Number : 120 Question Id : 6589882260 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical Allowed Progression : Yes Number of Replay : 999 Play On Load : No Control Enable : Yes

Correct Marks : 3 Wrong Marks : 1

Question Label : Multiple Choice Question

Which type of scattering is the strongest ?

Options :

1. Rayleigh

2. Stokes
3. Antistokes
4. None of the three