JEE (Main) 2020

COMPUTER BASED TEST (CBT)

Questions & Solutions

Date: 06 September, 2020 (SHIFT-2) | TIME : (03.00 p.m. to 06.00 p.m)
Duration: 3 Hours | Max. Marks: 300

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This section contains 20 Single choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which Only One is correct.

1. Let \( \theta = \frac{\theta}{5} \) and \( A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix} \). If \( B = A + A^4 \), then det (B) :

   (1) is zero
   (2) is one
   (3) lies in (2, 3)
   (4) lies in (1, 2)

Ans. (4)

Sol. 

\[
A^2 = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix} = \begin{bmatrix} \cos^2 \theta + \sin^2 \theta & \cos \theta \sin \theta - \sin \theta \cos \theta \\ -\sin \theta \cos \theta + \cos \theta \sin \theta & \cos^2 \theta + \sin^2 \theta \end{bmatrix}
\]

\[
A^4 = \begin{bmatrix} \cos 4\theta & \sin 4\theta \\ -\sin 4\theta & \cos 4\theta \end{bmatrix}
\]

\[
B = A + A^4 = \begin{bmatrix} \cos \theta + \cos 4\theta & \sin \theta + \sin 4\theta \\ -\sin \theta - \sin 4\theta & \cos \theta + \cos 4\theta \end{bmatrix}
\]

\[
= \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} \cos 4\theta + \cos \theta & \sin 4\theta + \sin \theta \\ -\sin 4\theta + \sin \theta & \cos 4\theta + \cos \theta \end{bmatrix}
\]

\[
\Rightarrow B = (\cos 4\theta + \cos \theta)^2 + (\sin 4\theta + \sin \theta)^2
\]

\[
= 2 + 2 \cos(4\theta + \theta)
\]

\[
= 2 + 2 \cos 3\theta
\]

\[
|B| = 2 + 2 \cos \frac{3\pi}{5}
\]

\[
= 2 + \frac{5 - \sqrt{5}}{2} \in (1, 2)
\]

2. The area (in sq. units) of the region enclosed by the curves \( y = x^2 - 1 \) and \( y = 1 - x^2 \) is equal to :

   (1) \( \frac{8}{3} \)
   (2) \( \frac{7}{2} \)
   (3) \( \frac{4}{3} \)
   (4) \( \frac{16}{3} \)

Ans. (1)
Sol.

Given curves are \( y = x^2 - 1 \) and \( y = 1 - x^2 \) so intersection point are \((\pm1, 0)\)

bounded area = \[ 4 \int_{0}^{1} (1-x^2)\,dx = 4 \left[ x - \frac{x^3}{3} \right]_{0}^{1} = 4 \left( 1 - \frac{1}{3} \right) = \frac{8}{3} \text{ sq. units} \]

3. Let \( L \) denote the line in the \( xy \)-plane with \( x \) and \( y \) intercepts as 3 respectively. Then the image of the point \((-1, -4)\) in the line is:

(1) \( \frac{8}{5}, \frac{29}{5} \)
(2) \( \frac{11}{5}, \frac{28}{5} \)
(3) \( \frac{29}{5}, \frac{8}{5} \)
(4) \( \frac{29}{5}, \frac{11}{5} \)

Ans. (2)

Sol.

Equation of line is
\[ \frac{x}{3} + \frac{y}{1} = 1 \Rightarrow x + 3y - 3 = 0 \]

If image is \((x_1, y_1)\) then
\[ \frac{x_1 + 1}{1} = \frac{y_1 + 4}{3} = -2, \quad 12 - 3 = 10 \]
\[ \frac{x_1 + 1}{1} = \frac{y_1 + 4}{3} = \frac{16}{5} \]
\[ \Rightarrow x_1 = \frac{11}{5}, y_1 + 1 = \frac{28}{5} \]

4. If \( \alpha \) and \( \beta \) are the roots of the equation \( 2x(2x + 1) = 1 \), then \( \beta \) is equal to:

(1) \( 2\alpha (\alpha - 1) \)
(2) \( 2\alpha (\alpha + 1) \)
(3) \( 2\alpha^2 \)
(4) \( -2\alpha (\alpha + 1) \)

Ans. (4)

Sol.

Given equation is \( 2x(2x + 1) = 1 \) \Rightarrow \( 4x^2 + 2x - 1 = 0 \) \( ..........(1) \)

roots of equation (1) are \( \alpha \) and \( \beta \)
\[ \therefore \alpha + \beta = -\frac{1}{2} \Rightarrow \beta = -\frac{1}{2} - \alpha \quad \therefore \quad (2) \]

and
\[ 4\alpha^2 + 2\alpha - 1 = 0 \Rightarrow \alpha^2 = \frac{1}{4} - \frac{\alpha}{2} \quad \therefore \quad (3) \]

now
\[ -2\alpha (\alpha + 1) = -2\alpha^2 - 2\alpha \]
\[ = -2 \left( \frac{1}{4} - \frac{\alpha}{2} \right) - 2\alpha = -\frac{1}{2} - \alpha = \beta \]
5. For a suitably chosen real constant $a$, let a function, $f : \mathbb{R} - \{ -a \} \to \mathbb{R}$ be defined by $f(x) = \frac{a-x}{a+x}$. Further suppose that for any real number $x \neq -a$ and $f(x) \neq -a$, $(f \circ f)(x) = x$. Then $f\left(\frac{1}{2}\right)$ is equal to:

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

Ans. (1)

Sol. $f(f(x)) = \frac{a-f(x)}{a+f(x)} = x$

$\Rightarrow \frac{a-ax}{1+x} = f(x)$

$\Rightarrow \frac{a(1-x)}{1+x} = \frac{a-x}{a+x}$

$\Rightarrow a = 1$

so $f(x) = \frac{1-x}{1+x}$

$f\left(\frac{1}{2}\right) = 3$

6. If the tangent to the curve, $y = f(x) = x \log_e x$ ($x > 0$) at a point $(c, f(c))$ is parallel to the line-segment joining the points $(1, 0)$ and $(e, e)$, then $c$ is equal to:

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

Ans. (3)

Sol. $f'(c) = 1 + \frac{e}{e-1}$

$\therefore nc = e$  

$c = e^{\frac{1}{e-1}}$

7. If the constant term in the binomial expansion of $\left(\sqrt[5]{x} - \frac{k}{x^2}\right)^{10}$ is 405, then $|k|$ equals:

(1) 3  (2) 2  (3) 1  (4) 9

Ans. (1)

Sol. $T_{r+1} = ^{10}C_r \cdot \left(\frac{-k}{x^2}\right)^r \left(\sqrt[5]{x}\right)^{10-r}$

$= ^{10}C_r \cdot \left(-k\right)^r \cdot x^{\frac{5-5r}{2}}$

for constant term $\Rightarrow 5 - \frac{5r}{2} = 0 \Rightarrow r = 2$

$\Rightarrow T_2 = ^{10}C_2 \cdot k^2 = 405 \Rightarrow \frac{10(9)}{2} k^2 = 405 \Rightarrow k^2 = 9 \Rightarrow |k| = 3$
8. The probabilities of three events A, B and C are given \( P(A) = 0.6, P(B) = 0.4 \) and \( P(C) = 0.5 \). If \( P(A \cup B) = 0.8, P(A \cap C) = 0.3, P(A \cap B \cap C) = 0.2, P(B \cap C) = \beta \) and \( P(A \cup B \cup C) = \gamma \), where \( 0.85 \leq \gamma \leq 0.95 \), then \( \beta \) lies in the interval:

(1) \([0.36, 0.40]\)  \( \quad \) (2) \([0.35, 0.36]\)  \( \quad \) (3) \([0.25, 0.35]\)  \( \quad \) (4) \([0.20, 0.25]\)

Ans. (3)

Sol. \( P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C) \)

\( \Rightarrow \alpha = 1.4 - P(A \cap B) - \beta \Rightarrow \alpha + \beta = 1.4 - P(A \cap B) \)  

\( \therefore P(A \cap B) = P(A) + P(B) - P(A \cap B) \) \( \Rightarrow P(A \cap B) = 0.2 \)  

by (1) and (2) \( \alpha = 1.2 - \beta \)

now \( 0.85 \leq \alpha \leq 0.95 \)

\( \Rightarrow 0.85 \leq 1.2 - \beta \leq 0.95 \Rightarrow \beta \in [0.25, 0.35] \)

9. The integral \( \int_{1}^{2} e^{x} \cdot x^{2} \left( 2 + \log_{e} x \right) dx \) equals:

(1) \( e(2e - 1) \)  \( \quad \) (2) \( e(4e + 1) \)  \( \quad \) (3) \( 4e^{2} - 1 \)  \( \quad \) (4) \( e(4e - 1) \)

Ans. (4)

Sol. Let \( y = (ex)^{x} \)

\( \therefore ny = [1 + \ln x] \)

\( \frac{1}{y} \frac{dy}{dx} = (2 + \ln x) \)

\( \Rightarrow \frac{dy}{dx} = (ex)^{x} (2 + \ln x) \) \( dx \)

\( \int_{1}^{2} e^{x} \cdot x^{2} \left( 2 + \log_{e} x \right) dx = \left( y^{2} \right) = (ex)^{x^{2}} - e \)

10. The common difference of the A.P. \( b_{1}, b_{2}, \ldots, b_{m} \) is 2 more than common difference of A.P. \( a_{1}, a_{2}, \ldots, a_{n} \). If \( a_{40} = -159, a_{100} = -399 \) and \( b_{100} = a_{70} \), then \( b_{1} \) is equal to:

(1) \( 127 \)  \( \quad \) (2) \( 81 \)  \( \quad \) (3) \( 127 \)  \( \quad \) (4) \( -81 \)

Ans. (4)

Sol. Let \( a_{1}, a_{1} + d, a_{1} + 2d \) …… first A.P.

\( a_{40} = a_{1} + 39d = -159 \quad \) ............(1)

\( a_{100} = a_{1} + 99d = -399 \quad \) ............(2)

from equation (1) and (2)

\( d = -4, a_{1} = -3 \)

now

\( b_{100} = a_{70} \)

\( \Rightarrow b_{1} + 99D = a_{1} + 69d \)

\( b_{1} + 99 \times -2 = -3 + 69 \times -4 \) (According to question \( D = d + 2 \))

\( \Rightarrow b_{1} = -81 \)

11. If the normal at an end of latus rectum of an ellipse passes through an extremity of the minor axis, the eccentricity \( e \) of the ellipse satisfies:

(1) \( e^{4} + 2e^{2} - 1 = 0 \)  \( \quad \) (2) \( e^{2} + e - 1 = 0 \)

(3) \( e^{2} + 2e - 1 = 0 \)  \( \quad \) (4) \( e^{4} + e^{2} - 1 = 0 \)

Ans. (4)
Equation of normal at \( \left( \frac{a e, b^2}{a} \right) \)

\[ \frac{a^2 x - b^2 y}{ae} = a^2 - b^2 \]

It passes through \((0, -b)\)

\[ ab = a^2 e^2 \]

\[ a^2 b^2 = a^4 e^4 \quad (b^2 = a^2 (1-e^2)) \]

\[ 1 - e^2 = e^4 \]

12. Let \( f : \mathbb{R} \rightarrow \mathbb{R} \) be a function defined by \( f(x) = \max \{x, x^2\} \). Let \( S \) denote the set of all points in \( \mathbb{R} \), where \( f \) is not differentiable. Then:

(1) \( \emptyset \) (an empty set)

(2) \( \{1\} \)

(3) \( \{0\} \)

(4) \( \{0, 1\} \)

Ans. (4)

Sol.

\[ y = x^2 \]

\[ y = x \]

0,0

13. The set of all real values \( \lambda \) for which the function \( f(x) = (1 - \cos^2 x) \cdot (\lambda + \sin x) \), \( x \epsilon (-\pi/2, \pi/2) \), has exactly one maxima and exactly one minima, is:

(1) \( \left[ \frac{1}{2}, \frac{1}{2} \right] \) \( \emptyset \)

(2) \( \left[ \frac{3}{2}, \frac{3}{2} \right] \)

(3) \( \left[ -\frac{1}{2}, \frac{1}{2} \right] \)

(4) \( \left[ -\frac{3}{2}, \frac{3}{2} \right] \) \( \emptyset \)

Ans. (4)

Sol.

\[ f(x) = \sin^2 x \cdot (\lambda + \sin x) \]

\[ f'(x) = \sin x \cos x \cdot (2\lambda + 3\sin x) \]

\[ \sin x = 0 \] (one point)

\[ \sin x = -\frac{2\lambda}{3} \in (-1,1) - \{0\} \]

\[ \lambda \in \left[ -\frac{3}{2}, \frac{3}{2} \right] - \{0\} \]

14. Consider the statement: “For an integer \( n \), if \( n^3 - 1 \) is even, then \( n \) is odd”. The contrapositive statement of this statement is:

(1) For an integer \( n \), if \( n \) is even, then \( n^3 - 1 \) is odd.

(2) For an integer \( n \), if \( n \) is even, then \( n^3 - 1 \) is even.

(3) For an integer \( n \), if \( n^3 - 1 \) is not even, then \( n \) is not odd.

(4) For an integer \( n \), if \( n \) is odd, then \( n^3 - 1 \) is even.

Ans. (1)
Sol.  
\( P : n^3 - 1 \) is even, \( q : n \) is odd

contrapositive of \( p \rightarrow q \Rightarrow \neg q \rightarrow \neg p \)

\( \Rightarrow " \text{If } n \text{ is not odd then } n^3 - 1 \text{ is not even}" \)

\( \Rightarrow \text{For an integer } n, \text{ if } n \text{ is even, then } n^3 - 1 \text{ is odd.} \)

15.  
The centre of the circle passing through the point (0, 1) and touching the parabola \( y = x^2 \) at the point (2, 4) is:

\[
1\begin{align*}
(1) & \left( \frac{3}{10}, \frac{16}{5} \right) \\
(2) & \left( -\frac{53}{10}, \frac{16}{5} \right) \\
(3) & \left( -\frac{16}{5}, \frac{53}{10} \right) \\
(4) & \left( \frac{6}{5}, -\frac{3}{10} \right)
\end{align*}
\]

Ans.  
(3)

Sol.  
\( y = x^2, (2, 4) \)

tangent at (2,4) is

\[
\frac{1}{2}(y + 4) = 2x
\]

\( y + 4 = 4x \Rightarrow 4x - y - 4 = 0 \)

Equation of circle \((x - 2)^2 + (y - 4)^2 + \lambda(4x - y - 4) = 0\)

it passes through (0,1)

\( : 4 + 9 + \lambda(0 - 1 - 4) = 0 \)

\( 13 = 5\lambda \Rightarrow \lambda = \frac{13}{5} \)

\( \Rightarrow \text{circle is } x^2 - 4x + 4 + y^2 - 8y + 16 + \frac{13}{5}(4x - y - 4) = 0 \)

\( \Rightarrow x^2 + y^2 + \left( \frac{52}{5} - 4 \right)x - \left( 8 + \frac{13}{5} \right)y + 20 - \frac{52}{5} = 0 \)

\( \Rightarrow x^2 + y^2 + \frac{32}{5}x - \frac{53}{5}y + \frac{48}{5} = 0 \)

\( \Rightarrow \text{centre is } \left( -\frac{16}{5}, \frac{53}{10} \right) \)

16.  
If \( y = \left( \frac{2}{\pi} x - 1 \right) \) cosec \( x \) is the solution of the differential equation, \( \frac{dy}{dx} + p(x)y = \frac{2}{\pi} \) cosec \( x \), \( 0 < x < \frac{\pi}{2} \), then the function \( p(x) \) is equal to:

(1) tan \( x \)  
(2) cosec \( x \)  
(3) cot \( x \)  
(4) sec \( x \)

Ans.  
(3)

Sol.  
\( y = \left( \frac{2}{\pi} x - 1 \right) \) cosec \( x \)

\( \Rightarrow \frac{dy}{dx} = \frac{2}{\pi} \) cosec \( x \left( \frac{2}{\pi} x - 1 \right) \) cosec \( x \cot x \)

\( \Rightarrow \frac{dy}{dx} + \left( \frac{2}{\pi} x - 1 \right) \) cosec \( x \cot x = \frac{2}{\pi} \) cosec \( x \)

\( \Rightarrow \frac{dy}{dx} + y \cot x = \frac{2}{\pi} \) cosec \( x \)

\( \Rightarrow P(x) = \cot x \)
17. Let \( z = x + iy \) be a non-zero complex number such that \( z^2 = i \cdot |z|^2 \), where \( i = \sqrt{-1} \), then \( z \) lies on the:

(1) real axis  
(2) line, \( y = x \)  
(3) line, \( y = -x \)  
(4) imaginary axis

**Ans. (2)**

**Sol.**

\[
(x + iy)^2 = i(x^2 + y^2)
\]

\[% x^2 - y^2 + 2ixy = i(x^2 + y^2) \]

compare real and imaginary parts

\( \Rightarrow x = y \)

18. A plane \( P \) meets the coordinate axes at \( A, B \) and \( C \) respectively. The centroid of \( \triangle ABC \) is given to be \((1,1,2)\). Then the equation of the line through this centroid and perpendicular to the plane \( P \) is:

(1) \[
\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{1}
\]

(2) \[
\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{2}
\]

(3) \[
\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{2}
\]

(4) \[
\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{1}
\]

**Ans. (4)**

**Sol.**

Let \( A(\alpha,0,0) \), \( B(0,\beta,0) \), \( C(0,0,\gamma) \) then \( G\left(\frac{\alpha}{3}, \frac{\beta}{3}, \frac{\gamma}{3}\right) = (1,1,2) \)

\[
\alpha = 3, \; \beta = 3, \; \gamma = 6
\]

\( \Rightarrow \) equation of plane is \( \frac{x}{3} + \frac{y}{3} + \frac{z}{6} = 1 \)

\( \Rightarrow 2x + 2y + z = 6 \)

\( \Rightarrow \) required line \( \frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1} \)

19. The angle of elevation of the summit of a mountain from a point on the ground is 45º. After climbing up one km towards the summit at an inclination of 30º from the ground, the angle of elevation of the summit is found to be 60º. Then the height (in km) of the summit from the ground is:

(1) \( \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \)  
(2) \( \frac{1}{\sqrt{3} + 1} \)  
(3) \( \frac{1}{\sqrt{3} - 1} \)  
(4) \( \frac{\sqrt{3} - 1}{\sqrt{3} + 1} \)

**Ans. (3)**
Sol.  

In \( \triangle CDF \)
\[
\sin 30^\circ = \frac{z}{1} \quad [CD = 1 \text{ km}(\text{given})]
\]
\[
z = \frac{1}{2}
\]
\[
\cos 30^\circ = \frac{y}{1} \quad \Rightarrow \quad \frac{\sqrt{3}}{2}
\]

now in \( \triangle ABC \)
\[
\tan 45^\circ = \frac{h}{x + y}
\]
\[
\Rightarrow h = x + y
\]
\[
\Rightarrow x = h - \frac{\sqrt{3}}{2}
\]

now in \( \triangle BDE \)
\[
\tan 60^\circ = \frac{h - z}{x}
\]
\[
\sqrt{3} = \frac{1}{2} \quad \Rightarrow \quad \sqrt{3}\left(h - \frac{\sqrt{3}}{2}\right) = h - \frac{1}{2} \quad \Rightarrow \quad (\sqrt{3} - 1)h = 1
\]
\[
h = \frac{1}{\sqrt{3} - 1} \text{ km}
\]

20. For all twice differentiable functions \( f : \mathbb{R} \to \mathbb{R} \), with \( f(0) = f(1) = f'(0) = 0 \),
(1) \( f''(x) = 0 \), for some \( x \in (0, 1) \)
(2) \( f''(x) = 0 \), at every point \( x \in (0, 1) \)
(3) \( f''(0) = 0 \)
(4) \( f''(x) \neq 0 \), at every point \( x \in (0, 1) \)

Ans. (1)

Sol. Applying Rolle's theorem in \([0,1] \) for function \( f(x) \)
\[
f'(c) = 0, \ c \in (0,1)
\]
again applying Rolle's theorem in \([0,c] \) for function \( f'(x) \)
\[
f''(c) = 0, \ c \in (0,0)
\]
option (1) is correct
21. The number of words (with or without meaning) that can be formed from all the letters of the word “LETTER” in which vowels never come together is……..

Ans. 120

Sol. Consonants are L, T, T, R
Vowels are E, E,
Total number of words (with or without meaning) from letters of word ‘LETTER’ = \( \frac{6!}{2!} = 180 \)
Total number of words (with or without meaning) from letters of word ‘LETTER’ if vowels are together = \( \frac{5!}{2!} = 60 \)
\( \therefore \) Required = 180 – 60 = 120

22. Consider the data on x taking the values 0, 2, 4, 8, …., \( 2^n \) with frequencies \( n^n C_0, n^n C_1, n^n C_2, …., n^n C_n \) respectively. If the mean of this data is \( \frac{728}{2^n} \), then n is equal to……..

Ans. 6

Sol. \[
\begin{array}{c|cccc}
\text{x (observation)} & 0 & 2 & 2^2 & \vdots & 2^n \\
\text{f (frequency)} & n^n C_0 & n^n C_1 & n^n C_2 & \vdots & n^n C_n \\
\end{array}
\]
\[
\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{n^n C_0 + 2 \times n^n C_1 + 2^2 \times n^n C_2 + \ldots + 2^n \times n^n C_n}{n^n C_0 + n^n C_1 + n^n C_2 + \ldots + n^n C_n} = \frac{3^n - 1}{2^n} = \frac{728}{2^n}
\]
\[\Rightarrow \quad 3^n = 3^6\]
\[\Rightarrow \quad n = 6\]

23. Suppose that a function \( f : \mathbb{R} \to \mathbb{R} \) satisfies \( f(x + y) = f(x)f(y) \) for all \( x, y \in \mathbb{R} \) and \( f(1) = 3 \). If \( \sum_{i=1}^{n} f(i) = 363 \), then n is equal to……..

Ans. 5

Sol. \[
f(x) = a^x
\]
\[\Rightarrow f(1) = a = 3\]
so \( f(x) = 3^x \)
\[
\sum_{i=1}^{n} f(i) = 363
\]
\[\Rightarrow 3 + 3^2 + \ldots + 3^n = 363
\]
\[3(3^n - 1) = 363 \]
\[3^n = 243 \Rightarrow n = 5\]
24. If \( \vec{x} \) and \( \vec{y} \) be two non-zero vectors such that \( |\vec{x} + \vec{y}| = |\vec{x}| \) and \( 2\vec{x} + \lambda \vec{y} \) is perpendicular to \( \vec{y} \), then the value of \( \lambda \) is………

Ans. 1

Sol. 

\[ |\vec{x} + \vec{y}| = |\vec{x}| \]

\[ \Rightarrow |\vec{y}|^2 + 2\vec{x} \cdot \vec{y} = 0 \] \hspace{1cm} (1)

and \( (2\vec{x} + \lambda \vec{y}) \vec{y} = 0 \)

\[ \Rightarrow \lambda |\vec{y}|^2 + 2\vec{x} \cdot \vec{y} = 0 \] \hspace{1cm} (2)

by (1) and (2) \( \lambda = 1 \)

25. The sum of distinct values of \( \lambda \) for which the system of equations:

\( (\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0 \)

\( (\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0 \)

\( 2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0 \),

Has non-zero solutions, is………

Ans. 3

Sol.

\[
\begin{vmatrix}
\lambda - 1 & 3\lambda + 1 & 2\lambda \\
\lambda - 1 & 4\lambda - 2 & \lambda + 3 \\
2 & 3\lambda + 1 & 3(\lambda - 1)
\end{vmatrix} = 0
\]

\( R_2 \rightarrow R_2 - R_1 \)

\( R_3 \rightarrow R_3 - R_1 \)

\[
\begin{vmatrix}
\lambda - 1 & 3\lambda + 1 & 2\lambda \\
0 & \lambda - 3 & -\lambda + 3 \\
3 - \lambda & 0 & \lambda - 3
\end{vmatrix} = 0
\]

\( C_1 \rightarrow C_1 + C_3 \)

\[
\begin{vmatrix}
3\lambda - 1 & 3\lambda + 1 & 2\lambda \\
3 - \lambda & \lambda - 3 & 3 - \lambda \\
0 & 0 & \lambda - 3
\end{vmatrix} = 0
\]

\( \Rightarrow (\lambda - 3)^2 [6\lambda] = 0 \Rightarrow \lambda = 0, 3 \)

sum of values of \( \lambda = 3 \)
Announcing

**Rank Booster Part-2**

An Exhaustive Online Preparation Course of 3 Weeks for JEE (Advanced) 2020

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**Course Features**

- New specially designed 18 Advanced Worksheets
- Online Live Discussion class (6 per week) each of 1.5 hours for Advanced worksheets
- Exclusive **Unit wise Work Sheets** covering tough & important concepts
- **Revision DPPs** for more practice on daily basis
- Medium of **Teaching and Content** would be only **English**
- **Gyan Sutra** booklet: Specially designed package for quick revision of P, C & M

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**Course Brief**

The Rank Booster Part-2 course is recommended for students aiming a top rank in JEE (Advanced) 2020. The course structure is tailored to better the chances through rigorous practice of 18 Advanced Worksheets and their exhaustive conceptual discussion. Also, unit wise worksheets for self-practice to strengthen tough and important concepts.

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**Boosting Aspirations to Reality**

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**Course Details**

- **Course Starts** 07 Sept.
- **Course Duration** 3 Weeks
- **Course Mode** Online
- **Course Fee** (inclusive of GST) ₹5000/-

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