MATHS

BOOKS - ACCURATE PUBLICATION

SAMPLE QUESTION PAPER-IV

Section A

1. Choose the correct option in the question :

The relation R in the $\{1, 2, 3\}$ given by $R = \{(1, 3), (3, 2), (1, 2)\}$ is

A. Transitive

B. Reflexive

C. Symmetric

D. Transitive and symmetric

Answer: B

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2. Choose the correct option in the question :

Value of $\sin\left[2\cos^{-1}\left(-\frac{3}{5}\right)\right]$ is

A. $\frac{12}{25}$

B. $\frac{13}{25}$

C. $-\frac{24}{25}$

D. $\frac{24}{25}$

Answer: C

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3. Choose the correct option in the question :

If $\begin{bmatrix} x-y & 2x+z \\ 2x-y & 3z+w \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$, then (x + y) is

A. 1

B. 2

C. 3

D. 4

Answer: C

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4. Choose the correct option in the question :

If $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then A^2

A. I

B. 2I

C. I

D. 4I

Answer: A

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5. Choose the correct option in the question :

Value of $\begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{vmatrix}$ is

A. 1

B. 0

C. 2

D. 3

Answer: B

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6. Choose the correct option in the question :

If $f(x) = x^2 - 1, x \neq 1$ then f is continuous at $x = 1$if $f(1)$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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7. The derivative of $f(x) = |x|atx = 2$ equals :

A. 1

B. -1

C. 0

D. 2

Answer: A

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8. Choose the correct option in the question :

$\frac{d}{dx}\left[\cot^{-1}\left(\frac{1-x}{1+x}\right)\right] w.r.t.$ x is

A. x^2

B. $\frac{1}{x^2}$

C. $\frac{2}{1+x^2}$

D. $\frac{1}{1+x^2}$

Answer: D

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9. $\int \frac{dx}{\left(\sqrt{9x-4x^2}\right)}$ equals :

A. $\frac{1}{9}\sin^{-1}\left(\frac{9x-8}{8}\right)+C$

B. $\frac{1}{2}\sin^{-1}\left(\frac{8x-9}{9}\right)+C$

C. $\frac{1}{3}\sin^{-1}\left(\frac{9x-8}{8}\right)+C$

D. $\frac{1}{2}\sin^{-1}\left(\frac{9x-8}{9}\right)+C$

Answer: B

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10. Choose the correct option in the question :

$\int_0^1 \frac{x}{x^2+1}dx$ equals

A. log 2

B. 2 log 2

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

D. $\frac{1}{3}\log 2$

Answer: C

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11. Choose the correct option in the question :

Solution of $\frac{dy}{dx} = \frac{3x^2}{1+y^2}$ is

A. $y + y^2 = x^3 + c$

B. $y + y^3 = x^3 + c$

C. $y + y^3 = x^2 + c$

D. $y + y^2 = x^2 + c$

Answer: B

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12. The general solution of the differential equation $\frac{ydx - xdy}{y} = 0$ is:

A. $xy = C$

B. $x = Cy^2$

C. $y = Cx$

D. $y = Cx^2$

Answer: C

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13. Choose the correct option in the question :

If $\left|\vec{a}\right| = \sqrt{3}, \left|\vec{b}\right| = 2$ and $\vec{a}.\vec{b} = 3,$ then the angle between $\vec{a}$ and $\vec{b}$ is

A. 15°

B. 30°

C. 45°

D. 60°

Answer: B

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14. Choose the correct option in the question :

The projection of $\vec{a} = 2\hat{i} - 2\hat{j} - \hat{k}$ on $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ is equal to

A. $\frac{5\sqrt{6}}{3}$

B. $\frac{6}{\sqrt{14}}$

C. $\frac{\sqrt{6}}{14}$

D. $\frac{5}{\sqrt{6}}$

Answer: B

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15. Distance between plane defined by 3y + 4z + 10 = 0 and the point (7, 5, 0) is :

A. 3 units

B. 4 units

C. 5 units

D. 6 units

Answer: C

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16. If $P(A/B) = \frac{2}{5}, 2P(A) = P(B) = \frac{5}{9}$, find

(i) $P(A \cap B)$

(ii) $P(A \cup B)$

A. $\frac{1}{9}$

B. $\frac{2}{9}$

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

D. $\frac{5}{9}$

Answer: B

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17. Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. Then $(6, 8) \in$ .....

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18. If A and B are symmetric then that $AB + BA$ is .....

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19. Derivative of $\sin^{-1}\left(2x\sqrt{1-x^2}\right), \ -\frac{1}{\sqrt{2}} < x < \frac{1}{\sqrt{2}}$ w.r.t.x is .....

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20. Two positive numbers whose sum is 16 and sum of whose cubes is minimum are.....

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21. $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$ equals :

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22. I.F of $x\frac{dy}{dx} + 4y = \frac{\log x}{x^4}$ is .....

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23. The equation of the plane with intercepts 2,3 and 4 on the x,y and z-axis respectively is .....

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24. If E, F are events of sample space S, then $P(E \mid F) = 1 - \ldots\ldots$.

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25. State rue of false for the followng statements :

$\sin^{-1}\left(2x\sqrt{1-x^2}\right) = \cos^{-1}x, \frac{1}{\sqrt{2}} \leq x \leq 1$

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26. State true of false for the followng statements :

If a matrix A is symmetric as well as skew symmetric, then A = O.

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27. State true of false for the followng statements :

$\frac{d}{dx}\left(\sin x^2\right) = 2x\cos x.$

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28. $\int e^x(f(x)+f'(x))dx$ is equal to :

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29. State true or false for the following statements :

A vector in the direction of $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$, which has magnitude of 6 units is $4\hat{i} - 2\hat{j} + 4\hat{k}$.

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30. The distance of a point P(a,b,c) from x axis is:

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31. State true or false for the following statements :

The random variable X has probability distribution P(X) of the following form, where k is some number:

$$P(X) = \begin{cases} k, & \text{if } x = 0 \\ 2k, & \text{if } x = 1 \\ 3k, & \text{if } x = 2 \\ 0, & \text{otherwise} \end{cases}$$ Then k = 6

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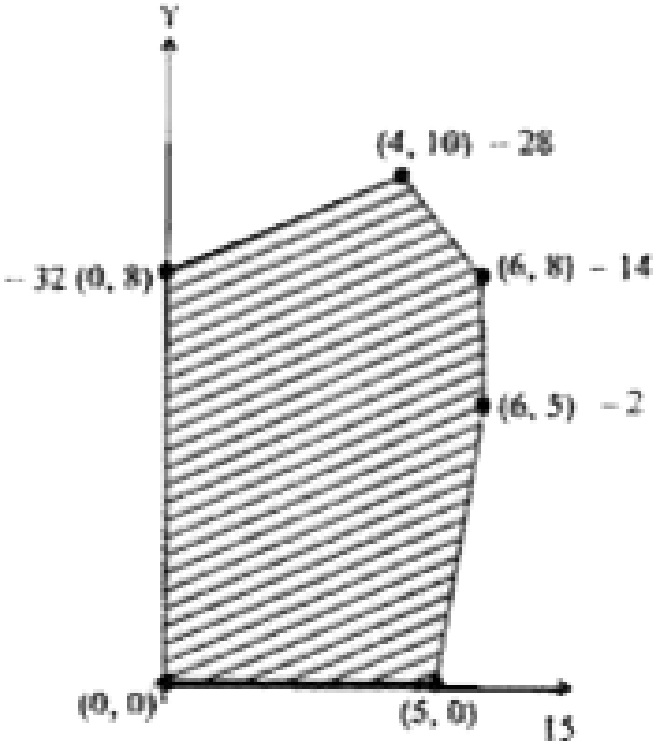
32. State true of false for the followng statements :

The fesible solution for a LPP is shown in Let Z =3 x - 4 y be the objective function. Maximum of Z occurs at (0,8)



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Section B

1. Write the number of all possible matrixes of order 2×2 with each entry 1,2 or 3.

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2. For what value of 'a' if the matrix $\begin{bmatrix} 4 & -3 & -1 \\ 2 & a & 6 \\ 3 & -5 & -4 \end{bmatrix}$ singular ?

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3. Find the points on the curve $y = x^3$ at which the slope of the tangent is equal to the y-coordinate of the point.

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4. Find the values of 'a for which the function : $f(x) = x^2 - 2ax + 6$ is increasing when x > 0

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5. Find $\int \frac{3x}{3x-1} dx$.

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6. Find the area of the region bounded by the curve $y^2 = 4x$ and the line $x = 3$.

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7. Show that the points $A\left(-2\hat{i}+3\hat{j}+5\hat{k}\right), B\left(\hat{i}+2\hat{j}+3\hat{k}\right)$ and $C\left(7\hat{i}-\hat{k}\right)$ are collinear.

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8. Show that the vectors : $2\hat{i}-\hat{j}+\hat{k}, \hat{i}-3\hat{j}-5\hat{k}$ and $3\hat{i}-4\hat{j}-4\hat{k}$ form the vertices of a right angled triangle.

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Section C

1. Prove the following: $\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1}x\right)\right\}\right]=\sqrt{\frac{1+x^2}{2+x^2}}$

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2. Express $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right),\ -\frac{\pi}{2}<x<\frac{\pi}{2}$ in the simplest form.

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3. If $x\sqrt{1+y}+y\sqrt{1+x}=0$ show that $\frac{dy}{dx}=-\frac{1}{(1+x)^2}$

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4. Evaluate $\int \frac{6x+7}{\sqrt{(x-5)(x-4)}} dx.$

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5. Show that $\int_{-1}^{2} |x^3 - x| dx = \frac{11}{4}.$

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6. Solve $\sqrt{1+x^2+y^2+x^2y^2} + xy\frac{dy}{dx} = 0$

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7. If A and B are two independent events such that : $P(\overline{A} \cap B) = \frac{2}{15}$ and $P(A \cap \overline{B}) = \frac{1}{6}$, then find $P(A)$ and $P(B)$.

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8. Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the probability distribution of the number of aces.

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Section D

1. Given that $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$. Find AB.

Use this to solve the following system of equations:

x-y+z=4,x-2y-2z=9,2x+y+3z=1.

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2. Using properties of determinants, prove that:

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

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3. Find the shortest distance between the following lines whose vector equations are :

$\vec{r} = \left(4\hat{i} - \hat{j}\right) + \lambda\left(\hat{i} + 2\hat{j} - 3\hat{k}\right)$ and $\vec{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(2\hat{i} + 4\hat{j} -$

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4. Find the equation of the plane through the line of intersection of the planes given by the equations x + y + z = 1 and 2x + 3y + 4z = 5 which is perpendicular to the plane given by the equation x - y + z = 0.

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5. Solve the following linear programming problem graphically. Maximize the objective function $Z = 9x + 10y$ subject to the constraints $x + 2y \leq 6, x + y \leq 5, x \geq 3, x \geq 0, y \geq 0.$

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6. Graphically minimize and maximize $z = 3x + 4y$ subject to the constraints: $x + y \leq 40x + 2y \leq 80, x - 2y \geq -20x, y \geq 0.$

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