Section (01 to 30) contains **30** multiple choice questions which have only one correct answer. Each question carries **+4** marks for correct answer and **0** mark for wrong answer.

A line makes angles a, b, g, d with the four diagonals of a cube. Then $\cos^2 a + \cos^2 b + \cos^2 g + \cos^2 d$ is equal to

- 1
- 3/2
- 4/3
- 2/3

ABCD is a parallelogram whose diagonals AC and BD meet at O. Then area of ABCD is equal to

- Area of the parallelogram with OA and OB adjacent sides
- 2 (Area of the parallelogram with OA and OB as adjacent sides)
- 1/2 (Area of the parallelogram with OA and OB as adjacent sides)
- 4 (Area of the parallelogram with OA and OB as adjacent sides.

Equation of the two equal sides of an isosceles triangles are $3x - y - 4 = 0$ and $3x + y + 2 = 0$. If the third side passes through the point $(-1, 2)$, the equation of the third side is

- $x + 1 = 0$
- $y = 2$
- $x - y + 1 = 0$
- $2x + y = 0$

Two of the lines of a concurrent system are $2x - y + 3 = 0$ and $x - 3y + 4 = 0$. The line belonging to the system, passing through the origin is

- $x + y = 0$
- $x = y$
- $3x = 4y$
- $x + 2y = 0$

$$\int_2^3 \frac{\sqrt{5-x}}{\sqrt{x}+\sqrt{5-x}}\,dx \text{ equals}$$

- 2
- 1/2
- -2
- -1/2

$$\int\left\{\frac{\log x-1}{1+(\log x)^2}\right\}^2 dx \text{ is equal to}$$

- $\dfrac{xe^x}{x^2+1}+C$
- $\dfrac{x}{1+(\log x)^2}+C$
- $\dfrac{\log x}{1+(\log x)^2}+C$
- $\dfrac{x}{x^2+1}+C$

If $x = \sum_{n=0}^{\infty} a^n$, $y = \sum_{n=0}^{\infty} b^n$; $0 < a < b < 1$ and $z = \sum_{n=0}^{\infty} \left(\frac{a}{b}\right)^n$, then

- $x + yz = x(y + z)$
- $xyz + x + y + z$
- $xy + z = y(x + z)$
- $x + y + z = xy$

$$\tan^{-1}\left[\frac{1}{\sqrt{3}}\tan\left(\frac{x}{2}\right)\right]=$$

- ○ $\frac{1}{2}\cos^{-1}\left(\frac{1+\cos x}{1-\cos x}\right)$
- ○ $\frac{1}{2}\cos^{-1}\left(\frac{1+2\cos x}{2+\cos x}\right)$
- ○ $\frac{1}{2}\sin^{-1}\left(\frac{1+2\cos x}{2+\cos x}\right)$
- ○ $\frac{1}{2}\sin^{-1}\left(\frac{1-\cos x}{1+\cos x}\right)$

100 distinct beads are to be threaded to form a circular chain. The number of distinct chains that could be formed if the cubical white bead and the octahedral blue bead are to be in consecutive positions is:

- $2!\ 98!$
- $98!$
- $99! - 1$
- $\frac{98!}{2!}$

If f and g are two functions defined as $f(x) = |x|$ and $g(x) = [x]$ then $f \circ g\left(\frac{-7}{3}\right) - g \circ f\left(\frac{-7}{3}\right) =$

- 1
- -1
- 0
- 5

India plays two matches each with West Indies and Australia. In any match the probability of India getting points 0, 1, 2, are 0.45, 0.05 and 0.50 respectively. Assuming that the outcomes are equally likely and independent, probability of getting at least 7 points is

- 0.025
- 0.0625
- 0.0875
- 0.00625

The length of the tangent to the circle $2x^2 + 2y^2 - 3x + 7y - 4 = 0$ from the point (-1, 3) is

- $2\sqrt{10}$
- $2\sqrt{5}$
- 2
- $\sqrt{5}$

The point of intersection of the lines $\frac{x+1}{1}=\frac{y-2}{2}=\frac{z+1}{4}$ and $\frac{x-3}{1}=\frac{y+3}{-1}=\frac{z-2}{1}$ is

- $\left(\frac{-4}{3},\frac{4}{3},\frac{-7}{3}\right)$
- $\left(\frac{4}{3},\frac{-4}{3},\frac{7}{3}\right)$
- (0, 4, -3)
- (0, 1, 2)

The solution of the differential equation $y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right)$ is

- y = c (a + x)
- y = c (a + x) (1 - ay)
- y = c (a + x) (1 + ay)
- y = c (x - ay)

A person standing at some distance from the foot of a tower observed its top at an angle of elevation 'a'. After one week he saw the top of the tower had risen 'h' metres high after further construction. Then he saw the top at angle of elevation 'b'. The total height of the tower is

- $\dfrac{h\cot\beta}{\cot\beta - \cot\alpha}$
- $\dfrac{h\tan\beta}{\tan\beta - \tan\alpha}$
- $\dfrac{h\tan\alpha}{\tan\beta - \tan\alpha}$
- h (cota + cot b)

The value of 'c' of the Mean Value Theorem for the function $f(x) = 6x^3 - 9x^2 - 12x + 8$ in the interval $[-1, 2]$ is

- $\frac{1 \pm \sqrt{3}}{2}$
- $\frac{1 \pm \sqrt{2}}{2}$
- 1/2
- 1/3

The period of $f(x) = 3\sin\frac{\pi}{3}x + 4\cos\frac{\pi x}{4}$ is

- 6p
- 8
- 24
- 2p

A fair coin is tossed 5 times in succession and getting a head is treated to be ' a success' and getting a tail is a the failure. If X denotes the number of successes, then the mean and variance of the distribution of X is

- ○ 5, $\sqrt{5}$
- ○ 2.5, 1. 25
- ○ 2, $\frac{1}{\sqrt{2}}$
- ○ 2, $\frac{1}{2}$

The value of the determinant $\begin{vmatrix} 1 & \cos(\alpha-\beta) & \cos\alpha \\ \cos(\alpha-\beta) & 1 & \cos\beta \\ \cos\alpha & \cos\beta & 1 \end{vmatrix}$ is

- 0
- 1
- 2 cos a cos b
- cos (a + b) cos (a - b)

If $\bar{a} = 2\bar{i} - 3\bar{j} + 4\bar{k}$, $\bar{b} = 3\bar{i} + \bar{j} - 2\bar{k}$, $\bar{c} = \bar{i} + \bar{j} + \bar{k}$, then the value of $\left[\bar{a} \times \bar{b}, \bar{b} \times \bar{c}, \bar{c} \times \bar{a}\right]$ is

- 225
- 196
- 841
- 900

Equations of the tangent and normal to the curve $4x^2 + 9y^2 = 36$ at the point whose eccentric angle is $\frac{\pi}{6}$ are

- ○ $2x - y\sqrt{3} = 4\sqrt{3}$, $x\sqrt{3} + 2y = 7$
- ○ $2x + y\sqrt{3} = 4\sqrt{3}$, $4y - 2\sqrt{3}x + 5 = 0$
- ○ $x + 2\sqrt{3}y = 4$, $y - 2\sqrt{3}x - 1 = 0$
- ○ $2x + y = \sqrt{3}$, $x - 2y = \sqrt{3}$

The coefficient of x^n in the expansion $e^{2x+3} + \log\left(1+5x+6x^2\right)$ is

- $e^3 \cdot \frac{2^n}{n!} + \frac{(-1)^{n-1}}{n}\left(3^n + 2^n\right)$
- $e^3 \cdot \frac{2^n}{n!} - \frac{1}{n}\left(3^n + 2^n\right)$
- $e^3 \cdot \frac{2^n}{n!} + \frac{1}{n}\left(3^n + 2^n\right)$
- $\frac{e^3}{n!}\left(2^n + 3^n\right)$

Based on a diet problem the linear constraints regarding the vitamins A and B in the food x and y are in such a way that

$3x + 3y\ ^{3}\ 18$

$3x + 2y\ ^{3}\ 15$

$x\ ^{3}\ 0,\ y\ ^{3}\ 0$

The vertices of the feasible region are (5, 0) (3, 3) and (0, 6). The cost function is $z = 30x + 25y$ the least cost of the food mixture that will produce the diet is

- 150
- 180
- 165
- 120

The mean and standard deviation respectively of a group of 5 observations are 30 and 2 and those of another group of 10 observations are 45 and 3. The standard deviation of the combined group of 15 observations is

- 7.57
- 7.67
- 7.4
- 7.21

A point P moves such that the sum of its distances from the points (-3, 0) and (3, 0) is always 10. The equation of the locus of P is

- $16x^2 - 25y^2 = 400$
- $16x^2 + 25y^2 = 400$
- $16x^2 + 250x + 25y^2 = 400$
- $x^2 + y^2 = 400$

$f(x)=\begin{cases} 2x+3 \; ; & x \leq 2 \\ x+k \; ; & x>2 \end{cases}$ is continuous at x = 2, then k equals

- 3
- 4
- 5
- 10

Given $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 4 & -6 \\ 3 & -2 & -2 \end{bmatrix}$ and adj $A = \begin{bmatrix} -20 & -2 & -34 \\ -8 & -16 & 32 \\ -22 & 13 & -7 \end{bmatrix}$, then the solution of the system of equations

$2x + 3y + 4z = -3$
$5x + 4y - 6z = 4$
$3x - 2y - 2z = 6$
is

- $x = -1, y = 1, z = \frac{-1}{2}$
- $x = \frac{1}{2}, y = \frac{1}{3}, z = -1$
- $x = 1, y = -1, z = \frac{-1}{2}$
- $x = 2, y = -2, z = \frac{1}{3}$

Root of the mean of the deviations of the mean from each of the scores is

- S. D
- Variance
- Mean Derivation
- 0

$\frac{C_0}{1} + \frac{C_1}{2} + \frac{C_2}{3} + ... + \frac{C_n}{n+1}$ is equal to

- 2^n
- $\frac{2^{n+1}}{n+1}$
- $\frac{2^{n+1}-1}{n+1}$
- $2^n - 1$

A binary operation * , on the set of rationals is defined by a * b = a + b - ab Ñ a, b Î Q. The inverse element of a, if it exists is

- $\frac{a}{1-a}$
- $\frac{a}{a-1}$
- $\frac{1}{1-a}$
- 1/a