MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

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Part A

1. Bijective function

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2. Which of the following of the principal value branch of $\cos^{-1} x$?

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3. Construct a 2×2 matrix, $A = [a_{ij}]$, whose elements are given by $a_{ij} = \frac{i}{j}$

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4. If A is an invertible matrix of order 2, then det $\left(A^{-1}\right)$ is equal to(a) det (A) (B) $\frac{1}{\det(A)}$ (C) 1 (D) 0

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5. If $y = e^{3x}$, find $\frac{dy}{dx}$

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6. Evaluate: $\int \frac{x^3 - 1}{x^2} dx$

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7. Find the unit vector in the direction of the vector $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$.

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8. If a line makes angle $90o$, $60o$and $30o$with the positive direction of x, y and z-axis respectively, find its direction cosines.

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9. Define optimal solution in linear programming problem.

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10. If $P(A)\frac{7}{13}, P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$, find $P\left(\frac{A}{B}\right)$.

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Part B

1. The identity element for the binary operation $*$ defined on Q - {0} as $a * b = \frac{ab}{2}, \forall a, b \in Q - \{0\}$ is

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2. If $\sin\left(\frac{\sin^{-1}1}{5}+\cos^{-1}x\right)=1$, then find the value of x.

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3. Write the following in the simplest form of $\tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right), 0<x<\frac{\pi}{2}$

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4. Find the area of the triangle whose vertices are:

$(-2,-3),(3,2),(-1,-8)$

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5. Differentiate $x^{\sin x}$ with respect to x.

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6. Find $\frac{dy}{dx}$ in the following: $x^2 + xy + y^2 = 100$

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7. Find the slope of the tangent to the curve $y = x^3 \; x \; at \; x = 2.$

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8. Integrate the functions $\frac{e^{\tan \hat{} ((-1)s)}}{1+x^2}$

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9. Evaluate the definite integrals $\int_{2}^{3} \frac{x dx}{x^2+1}$

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10. निचे दिए प्रत्येक अवकलज समीकरण की कोटि एवं घात (यदि परिभाषित हो) ज्ञात कीजिए-

$$\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 + y^5 = 0$$

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11. find the projection of the vector $\hat{i} + 3\hat{j} = 7\hat{k}$ on the vector $7\hat{i} - \hat{j} + 8\hat{k}$

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12. Find the area of the parallelogram whsoe adjacent sides are given by the vectors $\vec{a} = 3\hat{i} + \hat{j} + 4\hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$

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13. Find the angle between the planes whose vector equations are

$\vec{r}.\left(2\hat{i}+2\hat{j}-3\hat{k}\right)=5$ and vecr.(3hati-3hatj+5hatk)=3`.

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14. Probability distribution of x is

x	0	1	2	3	4
$p(X_1)$	0.1	k	$2k$	$2k$	k

Find k .

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Part C

1. Show that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a - b|$ is even $\}$, is an equivalence relation.

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2. Prove that: $2\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 1}{7} = \frac{\tan^{-1}(31)}{17}$

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3. Using elementary transformations, find the inverse of the matrix$[1327]$

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4. If x=sint, y=cos 2t then prove that $\frac{dy}{dx}$=-sin t

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5. Verify Rolle's theorem for the function $f(x) = x^2 + 2, x \in [-2, 2]$

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6. Find two numbers whose sum is 24 and whose product is as large as possible.

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7. Evaluate: $\int \frac{x}{(x+1)(x+2)} dx$

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8. Find $\int e^x \sin x dx$

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

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10. Form the differential equation representing the family of curves $y = as \in (x + b)$, where a, b are arbitrary constants.

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11. Show that the position vector of the point P, which divides the line joining the points A and B having

position vectors $\vec{a}$ and $\vec{b}$ internally in the ratio $m:n$ is $\frac{m\vec{b}+n\vec{a}}{m+n}$

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12. Find x such that the four points $A(3, 2, 1)$, $B(4, x, 5), C(4, 2, 2)$and $D(6, 5, 1)$are coplanar

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13. Find the equation of the plane through the intersection of the planes

$3x - y + 2z - 4 = 0$ and $x + y + z - 2 = 0$ and the point (2,2,1).

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14. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first

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Part D

1. Let R+ be the set of all non-negative real numbers. Show that the function $f: R+ \rightarrow [4, \infty]$ given by $f(x) = x^2 + 4$ is invertible and write the inverse of f.

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2. If $A = [067 - 6087 - 80]$, $B = [011102120]$, $C = [2 - 23]$Calculate AC, BC and $(A + B)C$. Also, verify that $(A + B)C = AC + BC$

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3. Solve the following system of linear equations by matrix method.

x-y+2z=7

3x+4y-5z=-5

2x-y+3z=12

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4. If $y = \left(\tan^{-1} x\right)^2$, show that $\left(x^2+1\right)^2 y_2 + 2x\left(x^2+1\right) y_1 = 2$

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5. Sand is pouring from a pipe at the rate of $12\,cm^3/s$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4 cm?

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6. Find the integral of $\frac{1}{x^2+a^2}$ with respect to x and hence find $\int \frac{1}{x^2-6x+13}dx.$

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7. Using integration find the area of region bounded by the triangle whose vertices are (1, 0), (2, 2) and (3, 1).

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8. Solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 \log x$ is

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9. Derive the equation of a line in space passing through two given plots both in vector and Cartesian

form.

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Part E

1. If a fair coin is tossed 10 times, find the probability of (i) exactly six heads (ii) at least six heads (iii) at most six heads

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2. Prove that :

$$\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & x+a+2y \end{vmatrix} = 2(x+y+)^3$$

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3. Solve the following L.P.P graphically

Minimise and maximise z = 3x + 9y

Subject to the constraints $x + 3y \leq 60$

$x + y \geq 10$

$x \leq y$

$x \geq 0, y \geq 0$

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