MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

II PUC TOPPER ANSWERS MARCH-2016

Part A

1. Find $\int \operatorname{cosec} x(\operatorname{cosec} x + \cot x)dx.$

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2. Find the values of x for which $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$

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3. If $y = a^{1/2\log_a(\cos x)}$, find $\frac{dy}{dx}$.

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4. $\cos\left(\sec^{-1}x + \cos ec^{-1}x\right), |x| \geq 1$

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5. If vector $\overline{AB} = 2\hat{i} - \hat{j} + \hat{k}$ and $\overline{OB} = 3\hat{i} - 4\hat{j} + 4\hat{k}$, find the position vector $\overline{OA}$

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6. Find the distance of the point (-6, 0, 0) from the plane 2x - 3y + 6z = 2.

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7. If $\begin{bmatrix} x+2 & y-3 \\ 0 & 4 \end{bmatrix}$ is a scalar matrix. Find x and y.

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8. " (b) If "P(A)=0.8,P(B)=0.5" and "P(B/A)=0.4," then find P(A/B)

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9. An operation * on z^+ (the set of all non-negative integers) is defined as $a \cdot b = |\ a - b|,\ \forall q, b \in z^+$.Is * a binary operation on z^+?

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10. Define feasible region in a linear programming Problem.

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Part B

1. Write the simplest form of $\tan^{-1}\left[\frac{a\cos x - b\sin x}{b\cos x + a\sin x}\right]$, if $\frac{a}{b}\tan x > -1$.

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2. Using determinants show that points A(a, b + c), B(b, c + a) and C(c, a + b) are collinear.

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3. If functions $f: R \to R$ and $g: R \to R$ are given by $f(x) = |x|$ and $g(x) = [x]$, where [x] is greatest integer function find $fog\left(-\frac{1}{2}\right)$ and $gof\left(-\frac{1}{2}\right)$.

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4. Prove the following:

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

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5. Find $\frac{dy}{dx}$, if $y = \sec^{-1}\left(\frac{1}{2x^2-1}\right), 0 < x < \frac{1}{\sqrt{2}}$

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6. If $x^y = a^x$, prove that $\frac{dy}{dx} = \frac{x\log_e a - y}{x\log_e x}$.

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7. Evaluate: $\int \frac{1}{\sin x \cos^3 x}\, dx$

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8. Using differentials, find the approximate value of $(25)^{\frac{1}{3}}$.

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9. $\int_0^{\pi} \left(\frac{\sin^2 x}{2} - \frac{\cos^2 x}{2} \right) dx$

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10. Statement 1 : If $\left| \vec{a} + \vec{b} \right| = \left| \vec{a} - \vec{b} \right|$, then $\vec{a}$ and $\vec{b}$ are perpendicular to each other.

Statement 2 : If the diagonals of a parallelogram are equal in magnitude, then the parallelogram is a rectangle.

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11. Find the order and degree, it defined of the differential equation $\frac{d^4y}{dx^4} + \frac{\sin(d^3y)}{dx^3} = 0$

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12. Find angle between the vectors $\vec{a} = \vec{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + \hat{k}$.

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13. The random variable X has a probability distribution P(X) of the following form, where K is some number $P(X) = \begin{cases} K & \text{if x} = 0 \\ 2K & \text{if x} = 1 \\ 3K & \text{if x} = 2 \\ 0 & \text{otherwise} \end{cases}$

(a) Determine the value of K.

(b) Find $P(X < 2)$.

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14. Find the Cartesian equation of the line parallel to y-axis and passing through the point (1, 1, 1).

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Part C

1. Show $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{2}{11}+\tan^{-1}\frac{4}{3}=\frac{\pi}{2}$.

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2. Using elementary transformations, find the inverse of the matrix $[1-123]$

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3. Show that the relation R in the set $A=\{x\in z, 0\leq x\leq 12\}$ given by $R=\{(a,b):|a-b|$ is a multiple of 4$\}$ is an equivalence relation.

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4. Verify Mean Value Theorem if$(x) = x^3$ - $5x^2$ - 3xin the interval [1, 3].

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5. If $x = a\cos^3 0$ and $y = a\sin^3 = 0$, prove that $\frac{dy}{dx} = -\sqrt[3]{\frac{y}{x}}$.

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6. Box I contains 2 gold coins, while another Box-Il contains I gold and 1 silver coin. A person chooses a box at random and takes out a coin. If the coin is gold, what is the probability that the other coin in the box is also of gold?

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7. $\int \frac{x}{(x-1)(x-2)} dx$

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8. Integrate $\frac{2x}{(x^2+1)(x^2+2)}$ with respect to x.

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9. Find two numbers whose product is 100 and whose sum is minimum.

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10. Find area lying between the curves $y^2 = 4x$ and $y = 2x$ is

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11. For any three vectors $\vec{a}, \vec{b}, \vec{c}$ the value of $\left[\vec{a}-\vec{b} \quad \vec{b}-\vec{c} \quad \vec{c}-\vec{a}\right]$, is

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12. Find the angle between the following pairs of lines :

$\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$ & $\vec{r} = 5\hat{i} - 2\hat{j} + \mu\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right)$

Note : Angle between two lines is the angle between $\vec{b_1}$ and $\vec{b_2}$

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13. Find the sine of the angle between the vectors $\hat{i} + 2\hat{j} + 2\hat{k}$ and $3\hat{i} + 2\hat{j} + 6\hat{k}$.

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14. Find the equation of the curve passing though the point (1, 1) given that the slope of the tangent to the curve at any point is $\frac{y}{x} + 1$.

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Part D

1. If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$, $B = [1, 3, -6]$, verify that $(AB)'B'A'$.

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2. Solve the system of linear equations by matrix method : $2x - 3y + 5z = 11, 3x + 2y - 4z = -5, x + y - 2x = -3.$

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3. Let $f: N \to R$ be a function defined as $f(x) = 4x^2 + 12x + 15.$

Show that $f: N \to S$, where S is the range of f, is invertible. Also find the inverse of f. Hence find $f^{-1}(31)$.

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4. The length x of a rectangle is decreasing at the rate of 3 cm/min and the width y is increasing at the rate of 2cm/min. When x=10cm and y=6cm,

find the ration of change (i) the perimeter and (ii) the area of the reactangle.

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5. If $y = \left(\sin^{-1} x\right)^2$, show that $\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 2$

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6. Find the integral of $\frac{1}{x^2 + a^2}$ w.r.t. x and hence find $\int \frac{1}{3 + 2x + x^2} dx$.

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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. Derive the equation of a plane perpendicular to a given vector and passing through a given point in both vector form and Cartesian form.

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9. The probability that a student is not a swimmer is $\frac{1}{5}$. What is the probability that out of 5 students, 4 are swimmers?

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10. Solve the differential equation ydx + (x - ye^y)dy=0

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Part E

1. Maximize and Minimize $Z = 5x + 10y$, subject to constraints are

$x + 2y \leq 120, x + y \geq 60, x - 2y \geq 0$ and $x, y \geq 0.$

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2. $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$

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