MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

II PUC (ANNUAL EXAMINATION 2019)

Part A

1. Define Binary Operation.

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2. Find the principal value of: $\cos^{-1}\left(-\frac{1}{2}\right)$

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3. Define a scalar matrix.

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4. Find the value of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$

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5. If $y = \sin\left(x^2 + 5\right), then \frac{dy}{dx} =$

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6. $\int(1-x)\sqrt{x}dx$

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7. Find the value of x for which $x\left(\hat{i}+\hat{j}+\hat{k}\right)$ is a unit vector.

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8. If as line has direction ratios 2, -1, -2, determine its direction cosines.

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9. Objective function of a linear programming problem is

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10. If P(E)=0.6, P(F)=0.3 $P(E \cap F) = 0.2$ then find $P(F/E)$.

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Part B

1. Show that the function $f: N \to N$, given by $f(x) = 2x$, is one-one but not onto.

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2. If $\left|\sin^{-1} x\right| + \left|\cos^{-1} x\right| = \frac{\pi}{2}$, then $x \in$

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3. Write $\cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right), |x| > 1$ in the simplest form.

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4. Find the area of triangle whose vertices are (2,7), (1,1) and (10,8).

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5. If $y = (\log)^{\cos x}$ find $\frac{dy}{dx}$.

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6. $ax + by^2 = \cos y$

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7. Find the approximate change in the volume V of a cube of side x meters caused by increasing by side by 2%.

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8. $\int \frac{1}{\cos^2 x(1 - \tan x)^2} dx$

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9. Find $\int \sin 2x . \cos 3x dx.$

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10. Determine order and degree (if defined) of differential equations given $\left(\frac{d^2y}{dx^2}\right)^2 + \cos\left(\frac{dy}{dx}\right) = 0$

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11. If $\left|\vec{a}\right| = 5, \left|\vec{a} - \vec{b}\right| = 8 and \left|\vec{a} + \vec{b}\right| = 10$, then find $\left|\vec{b}\right|$.

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12. Find the projection of the vector $\vec{a} = 2\hat{i} + 3\hat{j} + 2\hat{k}$ on the vector $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$

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13. Find the distance of the point (3,-2,1) from the plane 2x-y+2z+3=0.

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14. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that (i) the problem is solved (ii) exactly one of them solves the problem.

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Part C

1. Check whether the relation R on R defined by $R = \{(a, b) : a \leq b^3\}$ is reflexive, symmetric or transitive.

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2. Prove that $\cos^{-1}.\frac{4}{5} + \cos^{-1}.\frac{12}{13} = \cos^{-1}.\frac{33}{65}$

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3. By using the elementary transformation, find the inverse of the matrix, $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$.

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4. If $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ then show that $\frac{dy}{dx} = \tan\left(\frac{\theta}{2}\right)$.

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5. Verify Rolles theorem for the function $f(x) = x^2 + 2x - 8, x \in [-4, 2]$.

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6. Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is

(a) strictly increasing (b) strictly decreasing?

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7. $\int x \log x dx$

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8. $\int_0^{\pi/2} \frac{\sin x}{1+\cos^2 x} dx.$

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

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10. Find the differential equation of the family of curves $y = Ae^{2x} + Be^{-2x}$, where A and B are arbitrary constants.

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11. Find a unit vector perpendicular to each of the vectors $(\rightarrow a + \rightarrow b)$ and $(\rightarrow a - \rightarrow b)$, where $\rightarrow a = \hat{i} + \hat{j} + \hat{k}, \rightarrow b = \hat{i} + 2\hat{j} + 3\hat{k}$.

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12. Show that the four points with position vectors $4\hat{i} + 8\hat{j} + 12\hat{k}, 2\hat{i} + 4\hat{j} + 6\hat{k}, 3\hat{i} + 5\hat{j} + 4\hat{k}$ and $5\hat{i} + 8\hat{j} + 5\hat{k}$ are coplanar.

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13. Find the vector equation of the plane passing thrugh the points (2,5,-3),(-2,-3,5),(5,3,-3).

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14. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he i

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Part D

1. Let $f: N \overrightarrow{Y}$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N : y = 4x + 3 \text{ for some } x \in N\}$. Show that f is invertible and its inverse is (1) $g(y) = \frac{3y + 4}{3}$ (2) $g(y) = 4 + \frac{y + 3}{4}$ (3) $g(y) = \frac{y + 3}{4}$ (4) $g(y) = \frac{y - 3}{4}$

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2. If $A = [1233 - 21421]$, then show that $A^3 - 23A - 401 = 0$.

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

$3x - 2y + 3z = 8, 2x + y - z = 1, 4x - 3y + 2z = 4$

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4. If $y = \sin^{-1} x$, show that $\left(1 - x^2\right) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = 0.$

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5. The length x of a rectangle is decreasing at the rate of 3 cm/minute and the width y is increasing at the rate of 2cm/minute. When $x = 10$cm and $y = 6$cm, find the rates of change of (a) the perimeter and (b) the area of the rectangle.

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6. Find the integral of $\frac{1}{x^2 - a^2}$ with respectto x and hence evaluate $\int \frac{1}{x^2 - 16} dx$

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7. Smaller area enclosed by the circle $x^2 + y^2 = 4$ and line x+y=2 is

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8. Find the general solution of the differential equation $\frac{dy}{dx} + (\sec x)y = \tan x, \left(0 \leq x \leq \frac{\pi}{2}\right).$

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9. Derive the equation of a line in space passing through a given pont and parallel to a given vector in both vector and Cartesian form.

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10. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that (i) all the five cards are spades? (ii) only 3 cards are spades? (iii) none is a spade?

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Part E

1. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos^5 x}{\sin^5 + x + \cos^5 x} dx.$

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2. Show that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

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3. 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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4. The function is defined by $f(x) = \begin{cases} kx + 1 & \text{if} \quad x \leq 5 \\ 3x - 5 & \text{if} \quad x > 5 \end{cases}$ is continuous at x = 5. Find k.

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