MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

II PUC MARCH - 2017

Part A

1. Let * be a binary operation on N defined by $a * b = LCM$ of a and b. Find $20 * 16$.

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2. Find the principal value of $\text{cosec}^{-1}(-\sqrt{2})$.

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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 square matrix with $|A| = 8$ then find the value of |A A'|`.

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5. If y=cos $\sqrt{x}$, find $\frac{dy}{dx}$

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6. Find : $\int\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)dx.$

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7. Define collinear vectors.

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8. Find the direction cosines of a line which makes equal angles with the coordinate axes.

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9. Define feasible region in a linear programming Problem.

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10. If A and B are independent events, $P(A)\frac{3}{5}$ and $P(B) = \frac{1}{5}$ then find $P(A \cap B)$.

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Part B

1. If $f: R \to R$, defined by $F(x) = 1 + x^2$, then show that f is neither 1 - 1 nor onto.

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2. 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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3. If $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x, x > 0$ find x

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4. Find the value of k,if area of triangle is 4 sq. units and vertices arw (k,0),(4,0) and(0,2) using determinant.

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5. If $ax + by^2 = \cos y$ find $\frac{dy}{dx}$.

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6. Verify Rolle's theorem for the function $f(x) = x^2 + 2x - 8, x \in [-4, 2]$.

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7. Find the approximate change in the valume of a cube of side x metres caused side by 3%.

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8. Intergrate $\frac{\tan^4 \sqrt{x} \sec^2 \sqrt{x}}{\sqrt{x}}$ with respect to x.

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9. Evaulate $\int_0^{2/3} \frac{dx}{4+9x^2}$

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10. Find the order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2 + \frac{dy}{dx} - \sin^2 y = 0.$

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11. Find the position vectors of a point R which divides the line joining two points P and Q whose position vectors are $\hat{i} + 2\hat{j} - \hat{k} -$ and $-\hat{i} + \hat{j} - \hat{k}$ respectively, in the ration $2:1$.

(i) Internally, (ii) Externally.

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12. Find the area of the parallelogram whose adjacent sides are determined by the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$

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13. Find the vector and the Cartesian equation of the line that passes through the points (3,-2,-5), (3,-2,6).

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14. Find the probability distribution of number of heads in two tosses of a coin .

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Part C

1. Show that the relation R in R (set of real numbers) is defined as R=$\{(a, b), a \leq b\}$is reflexive and transitive but not symmetric.

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2. Write $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right), x \neq 0$ in the simplest form.

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3. If A and B are symmetric matrices of the same order.then show that AB is symmetric if and only if AB=BA.

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4. Differentiate $(\log_e x)\cos x$ with respect to x.

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5. Differentiate $\sin^2 x$ with respect to $e^{\cos x}$.

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6. Find two positive numbers x and y such that $x + y = 60$ and xy^3 is maximum.

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7. Evaluate: $\int \frac{2x}{x^2 + 3x + 2} dx.$

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8. Evaluate : $\int e^x \sin x dx$.

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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. Form the differential equation of the family of circles having centre on y-axis and radius 3 units.

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11. Find x such that the four point A(3,2,1),B(4,x,5),C(4,2,-2) and D(6,5,-1) are coplanar.

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12. Three vectors $\bar{a}, \bar{b}$ and $\bar{c}$ satisfy the condition $\vec{a} + \vec{b} + \vec{c} = \vec{0}$

evaluate

$\mu = \vec{a} . \vec{b} + \vec{b} . \vec{c} + \vec{c} . \vec{a}$ if $\left|\vec{a}\right| = 1, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 2$

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13. Find the shortest distance betweenn the lines.

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

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

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14. Given that the two numbers appearing on throwing two dice are different . Find the probability of the events 'the sum of numbers on the dice is 4' .

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Part D

1. Let $f: N \to R$ be defined by $f(x) = 4x^2 + 12x + 15$, show that $f: N \to S$, where S is the range of f, is invertible. Also find the inverse.

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2. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 7A + 2I = 0$.

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

$x - y + 2z = 1$

$2y - 3z = 1$

and $3x - 2y + 4z = 2$.

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

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5. The length x of rectangle is decreasing at the rate of 5cm/minute and width y is increasing at the rate of 4 cm/minute. When x=8 cm and y=6 cm, find the rate of change of (i) the perimeter and (ii) the Area of the rectangle.

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6. Find the integral of $\sqrt{x^2 - a^2}$ with respect to x and hence evaluate $\int \sqrt{x^2 - 8x + 7} dx$.

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7. Using integration find the area of the triangular region whose sides have the equations $Y = 2x + 1, y = 3x + 1$ and $x = 4$.

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8. solve the differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x \left(0 \leq x < \frac{\pi}{2}\right)$.

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9. 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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Part E

1. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs.

(i) none

(ii) not more than one

(iii) more than fuse after 150 days of use.

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2. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} (2\log\sin x - \log\sin 2x)dx.$

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3. Minimize and Maximize $z = 600x + 400y$

Subject to the constraints :

$x + 2y \leq 12$

$2x + y \leq 12$

$4x + 5y \geq 21$ and $x \geq 0, y \geq 0$ graphical method.

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