MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

ANNUAL EXAM QUESTION PAPER MARCH -2014

Part A

1. A relation R on A $= \{1, 2, 3\}$ defined by $R = \{(1, 1), (1, 2), (3, 3)\}$ is not symmetric. Why?

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2. Write the domain of $f(x) = \cos^{-1} x$.

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3. define a scalar matrix.

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4. IF $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$, find |2A|.

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5. If $y = \log(\sin x), \quad \text{find} \quad \frac{dy}{dx}$.

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6. Evaluate : $\int (\sin x + \cos x) dx$.

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7. Find the direction cosines of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$.

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8. Find the equation of plane with intercept 4 on z axis and parallel to XY plane.

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9. Define Feasible region in LPP.

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10. IF $P(A) = \frac{4}{5} \quad P(B/A) = \frac{2}{4}$ find $P(A \cap B)$

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Part B

1. Verify whether the operation * defined on Q by a $a \cdot b = ab/2$ is associative or not.

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2. Write in the simplest form of $\tan^{-1}\sqrt{\frac{1-\cos x}{1+\cos x}}, 0 < x < \pi$

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3. $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to

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4. Find the equation of a line passing through (3,1) and (9,3) using determinants.

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5. $y + \sin y = \cos x$ find $\frac{dy}{dx}$

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6. If $y = x^x$, find $\frac{dy}{dx}$

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7. Approximate change in the volume V of a cube of side x metres caused by increasing the side be 3% is

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8. Evaluate $\int \frac{\sin^2 x}{1 + \cos x} dx$

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9. Evaluate $\int_2^3 \frac{1}{x} dx$

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10. Find the order and degree of the differential equation

$$xy\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 - y\frac{dy}{dx} = 0$$

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11. If $\vec{a}$ is a unit vector such that $\left(\vec{x} - \vec{a}\right).\left(\vec{x} + \vec{a}\right) = 8$, find |x|.

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

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13. Find the angle between the pair of lines

$$\vec{r} = 3\hat{i} + 5\hat{j} - \hat{k} + \lambda\left(\hat{i} + \hat{j} + \hat{k}\right) \text{ and } \vec{r} = 7\hat{i} + 4\hat{k} + \mu\left(2\hat{i} + 2\hat{j} + 2\hat{k}\right)$$

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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. If $f: R \rightarrow R$ and $g: R \rightarrow R$ are given by $f(x) = \cos x$ and $g(x) = 3x^2$ .Show that $gof \neq fog$

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2. Prove that $3\cos^{-1}x = \cos^{-1}(4x^3 - 3x) \quad x \in \left[\frac{1}{2}, 1\right]$

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3. Using elementary transformations, find the inverse of the matrices

$$\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$$

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4. The normal to the curve :

$x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$

at any point $'\theta'$ is such that:

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

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6. Find the interval in which the function f given by $f(x) = x^2 - 4x + 6$ is strictly decreasing.

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7. Find $\int \frac{(x^2+1)e^x}{(x+1)^2} dx.$

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8. Evaluate $\int \tan^{-1} x dx.$

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

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10. Form the differential equation of family of curves $y = mx$ where m is arbitrary constant.

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11. Prove that $\left[\vec{a} + \vec{b}\,\vec{b} + \vec{c}\,\vec{c} + \vec{a}\right] = 2\left[\vec{a}\,\vec{b}\,\vec{c}\right]$

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12. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k},\ \vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j},$ then th such that $\vec{a} + t\vec{b}$ is at right angles to $\vec{c}$, will be equal to :

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13. Find the distance of a point (2,5,-3) from the plane . $\vec{r}\left(6\hat{i} - 3\hat{j} + 2\hat{k}\right)$ = 4

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14. A die is tossed thrice. Find the probability of getting an odd number at least once.

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Part D

1. Prove that the function $f: N \to Y$ defined by $f(x) = 4x + 3,$ where $Y = [y: y = 4x + 3, x \in N]$ is invertible . Also write inverse of f(x).

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2. If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}, C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$ 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 equation by matrix method.

$x - y + 2z = 1$

$2y - 3z = 1$

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

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4. If $y = 3e^{2x} + 2e^{3x}$ prove that $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$

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5. A ladder 24 ft long leans against a vertical wall. The lower end is moving away at rate of 3 ft/sec find the rate at which the top of the ladder is moving downwards. If its foot is 8ft from the wall.

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6. Find $\int \frac{dx}{x^2 - a^2}$ and hence Evaluate $\int \frac{dx}{3x^2 + 13x - 10}$

Given $\int \frac{dx}{x^2 - a^2}$ (Multiply and divide by 2a)

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7. Area of the region bounded by two parabolas $y = x^2$ and $x = y^2$ is

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8. Find the general solution of $e^x \tan y dx + (1 - e^x)\sec^2 y dy = 0$

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9. Derive the equation of a plane in normal form both in the vector and Cartesian form .

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10. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning a prize is 1//100. what is the probability that he will win a prize

atleast once

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Part E

1. a) Solve the following linear programming problem graphically : Minimize and maximize Z = x + 2y, subject to constraints

$x + 2y \geq 100, 2x - y \leq 0, 2x + y \leq 200, x, y \geq 0.$

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2. Prove that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & b+a \end{vmatrix}$ = 4abc

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3. Evaulate $\int_0^{\pi/4} \log(1 + \tan x)dx.$

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4. $f(x) = \begin{cases} \frac{k \cos x}{\pi - 2x} \text{if} & x \neq \frac{\pi}{2} \\ 3 & \text{if} x = \frac{\pi}{2} \end{cases}$ at $x = \frac{\pi}{2}$, f (x) is containuous , find the value of k .

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