MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

II PUC MATHEMATICS (ANNUAL EXAM QUESTIONS PAPER MARCH -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. Find $\frac{dy}{dx}$, if $y = \sin(x^2 + 5)$

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

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

.

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8. IF a line has direction rations 2,-1,-2 then determine its direction cosines .

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9. In linear propagmming problem , define linear objective function.

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10. IF $P(E) = 0.6, P(F) = 0.3$ and $P(E \cap F) = 0.2,$ find $P(F \mid E).$

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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. Prove that $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, x \in [-1, 1]$

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

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

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5. Find $\frac{dy}{dx}$, if $y = \log x^{\cos x}$

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6. Find $\frac{dy}{dx}$, if $ax + by^3 = \cos y$

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

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

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9. Evaluate : $\int \sin 2x . \cos 3x dx$

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10. Find the order degree , (if defined) of the differential equation .

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11. Find $\left|\vec{b}\right|$ if $\left(\vec{a}+\vec{b}\right).\left(\vec{a}-\vec{b}\right)=8$ and $\left|\vec{a}\right|=8\left|\vec{b}\right|$

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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 probaility that the problem is solved .

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Part C

1. show that $\cos^{-1}\left(\frac{4}{5}\right)+\cos^{-1}\left(\frac{12}{13}\right)=\cos^{-1}\left(\frac{33}{65}\right)$

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

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3. If $x = a(\theta + \sin\theta)$ and $y = a(1 - \cos\theta)$, prove that $\frac{dy}{dx} = \tan(\theta/2)$

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4. Verify Rolles theorem for the function:

$f(x) = x^2 + 2x - 8, x \in [-4, 2]$

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5. Find the interval in which the following f is given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is

I. strictly increasing

II. Strictly decreasing

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6. Find $\int \times \log \times dx$

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

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

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9. Form the differential equation of family of curces $y = ae^{2x} + be^{-2x}$ by eliminating the arbitary constants a & b.

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

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11. 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 coplahar .

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12. Find the vector equation of the plane the passes through three points (2,5,-3),(-2,-3,5) and (5 ,3,-3)`

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13. A insurance company insured 2000 scooter drivers , 4000 car drivers and 6000 truck dirvers . The probability of an accident are 0.01 , 0.03 and 0.15 respectively one of the insured persons meets with an accident . What is the probability that he is scooter diriver?

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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 $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ then show that $A^3 - 23A - 40I = 0.$

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

$3x - 2y + 3z = 8$

$2x + y - z = 1$

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

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

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5. IF length of x reactangle is decreasing at the rate of 3 cm / minute and the width is increasing at the rate of 2 cm / minute , when x=10 cm and y=6 cm . Find the rate of change

of

I. The perimeter

II. The area of the reactange

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6. Find $\int \frac{dx}{x^2 - a^2}$. Hence evaluate $\int \frac{dx}{x^2 - 16}$

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7. Find the small area enclosed by the circle $x^2 + y^2 = 4$ and $x + y = 2$

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8. solve the differential equation $\frac{dy}{dx} + y \sec x = \tan x, 0 \leq x \leq \frac{\pi}{2}$

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9. Derive the equation of the line in space passing through a point and parallel to a vector both in vector and cartesian form.

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10. Five cards are drawn successively with replacement from a with replacement from a well shuffled deck of 52 cards . What is the probability that

I. all five cards are spades ?

II. Only 3 cards are spades ?

III. None is spade ?

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

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12. Using properties of determinants prove that :

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc + bc + ca + ab$$

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13. Minimise and Maximise $z = 5x + 10y$

subject to constraints :

$x + 2y \leq 120,$

$x + y \geq 60,$

$x - 2y \geq 0,$

$x > 0 \text{ and } y \geq 0$

by graphical method.

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14. Find the value of K so that the function $f(x) = \begin{cases} kx + 1 & \text{if} x \leq 5 \\ 3x - 5 & \text{if} x \geq 5 \end{cases}$ at$x = 5$ is a continuous function.

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