MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

II PUC MATHEMATICS (SUPPLEMENTARY EXAM QUESTION PAPER JUNE -2019)

Part A

1. Let * be the binary operation on N given by

a * b = L.C.M. of a and b. Find 5 * 7.

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2. Find the principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

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3. Construct 2×2 matrix A=[aij] whose elements are given by:

$a_{ij} = \frac{1}{2}|-3i+j|$

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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 $y = \cos^{-1}(e^x)$, find $\frac{dy}{dx}$

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6. Find $\int \sec^2(7 - 4x)dx$

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7. If $\vec{a} = \left(2\hat{i} + 3\hat{j} + \hat{k}\right)$ then write the direction cosines of $\vec{a}$

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8. Find the intercepts cutoff the plane $2x + y - z = 5$.

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9. Define Feasible region in LPP.

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

If A and B are independent events

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Part B

1. Find the gof and fog if f(x) = $8x^3$ and $g(x) = x^{\frac{1}{3}}$

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2. Prove that $\tan^{-1}\frac{2}{11} + \tan^{-1}\frac{7}{24} = \tan^{-1}\frac{1}{2}$

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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 the triangle with vertices $(2, 8), (-4, 2)$ and $(5, 1)$ using determinats

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5. Find $\frac{dy}{dx}$ if $x^2 + xy + y^2 = 100$

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6. Find $\frac{dy}{dx}$, If $x^2 + xy + y^2 = 100$

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7. Find the interval in which the function f given $f(x) = 2x^2 - 3x$ is stricitly increasing

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8. Find $\int \frac{\left(x^4 - x\right)^{\frac{1}{4}}}{x^5} dx$

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9. Integrate $x \sec^2 x$ with respect to x .

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10. find the order and degree (if defined) of the differenal equation $y^{111} + y^2 + e^{y^1} = 0$.

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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 $\frac{x+3}{3}=\frac{y-1}{5}=\frac{z+3}{4}$ and $\frac{x+1}{1}=\frac{y-4}{1}=\frac{z-5}{2}$

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14. The probability distribution of random variable X is as follows :

X	0	1	2
P(X)	$\frac{188}{221}$	$\frac{32}{221}$	$\frac{1}{221}$

find expectation of X.

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Part C

1. Determine whether the relation R in the set $A = \{1, 2, 3, \ldots . .13, 14\}$ defined as $R = \{(x, y) : 3x - y = 0\}$ is reflexive symmetric and transitive.

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2. Solve : $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$

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

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

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5. verify mean value therem for the function $f(x) = x^2 - 4x - 3$ in the interval [1,4]

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6. Find the point at which the tangent to the curve $y = \sqrt{4x - 3} - 1$ has its slope $\frac{2}{3}$

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

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8. Evaluate : $\int_2^3 \frac{xdx}{x^2+1}$

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9. Find the area of the region bounded by the curve $y^2 = 9x, x = 2, x = 4$ and the x-axis in the first quadrant.

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

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11. Show that the position vector of the point P, which divides the line joining the points A and B having

position vectors $\vec{a}$ and $\vec{b}$ internally in ratio m:n is

$$\frac{m\vec{b}+n\vec{a}}{m+n}$$

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12. 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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13. Find the shortest distance between the following pair of lines :

$$\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}, \frac{x-2}{3}=\frac{y-3}{4}=\frac{z-5}{5}$$

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14. A Bag I contain 3 red and 4 black balls. White bag II contains 5 red 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from bag II.

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Part D

1. Prove that the function $f: R \to R$ defined by $f(x) = 4x + 3$ is invertible and find the inverse of $'f'$.

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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 equations by matrix method.

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

$2x + y - z = 1$

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

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4. If $y = 3\cos(\log x) + 4\sin(\log x)$ show that $x^2 y_2 + x y_1 + y = 0$

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5. Sand is pouring from a pipe at the rate of $12 cm^3/\text{sec}$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4 cm?

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6. Find the integral of $\sqrt{x^2+a^2}$ with respect to x and hence find $\int\sqrt{x^2+2x+5}dx$

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7. Using integration find the area of the region in the first quadrant enclosed by the x- axis , the line y=x , ad circle $x^2+y^2=32$

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8. Find the general solution of the differential equation $(x+y)\frac{dy}{dx}=1$

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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 die is thrown 6 time if getting an odd numbers is a success. What is the probability of

a. 5 successes

b. at least 5 successes

c. at most 5 successes

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Part E

1. Prove that $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$ and hence evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{\tan x}}dx.$

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

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3. Prove that $\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = \left(1 - x^3\right)^2$

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