MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

II PUC MATHEMATICS ANNUAL EXAM QUESTION PEPER MARCH -17

Part A

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

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

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3. Construct a 2×2 matrix $A = \left[a_{ij}\right]$, whose elements are given by $a_{ij} = \frac{i}{j}$

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4. If A is a square matrix with |A| = 6, find the value of $|AA'|$.

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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, passing through origin and lying in the first octant, making equal angles with the three coordinate axes.

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9. Define Feasible region in LPP.

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10. If A and B are mutually exclusive events, given that $P(A) = \frac{3}{5}, P(B) = \frac{1}{5}$, then P(A or B) is

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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. Show that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x, \frac{1}{\sqrt{2}} \leq x \leq 1.$

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

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4. Find values of k if area of triangle is 4 sq. units and vertices are

$(i)(k, 0), (4, 0), (0, 2)$ $(-2, 0), (0, 4), (0, k)$

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

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6. Verify Rolles theorem for the function:

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

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

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9. Choose the correct answer

$\int_0^{\frac{2}{3}} \frac{dx}{4+9x^2}$ equals

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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 positioon vector 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 ratio 2 : 1 Internally

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12. Find the area of the parallelogram whose adjcent sides are determined by the vector.

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13. Find the vector and cartesian equation of the line that passes through the points $(3 \quad -2 \quad -5)$ and $(3 \quad -2 \quad 6)$

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

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3. If A and B are symmetric matrices of the same order , then $(AB - BA)$ is a :

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

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5. Differentiate $\sin^2 x$ w.r.t $e^{\cos x}$

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

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

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

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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 points 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 $\vec{a}, \vec{b}$ and $\vec{c}$ satisfy the condition $\vec{a} + \vec{b} + \vec{c} = \vec{0}$. Evaluate the quantity $\mu = \vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$, if $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 2.$

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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. Given that the two numbers appearing on throwing two dice are different. Find the probabitlity of the event 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 function f, is invertible. Also find the inverse of f.

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2. If

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}, Prove \hat{A}^3 - 6A^2 + 7A + 21 = 0$$

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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 $y = \left(\tan^{-1} x\right)^2$ show that $\left(x^2 + 1\right)^2 y_2 + 2x\left(x^2 + 1\right) y_1 = 2$

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5. The length x of a rectangle is decreasing at the rate of 5 cm/minute and the width y is increasing at the rate of 4 cm/minute. When x = 8cm and y = 6cm, 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 $\sqrt{x^2 - a^2}$ w.r.t xand 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 and Cartesian form.

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10. 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 one (iv) at least one will fuse after 150 days of use?

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11. Show that

$$\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix} = (x-y)(y-z)(z-x)(xy+yz+zx)$$

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12. 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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