MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

II PUC MATHEMATICS ANNUAL EXAM QUESTION PAPER MARCH -2018

Part A

1. Define bijective function.

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2. Write the principal value branch of $\cos^{-1} x$

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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 is an invertible matrix of order 2 then find $|A^{-1}|$

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5. If $y = e^{x^3}$ find $\frac{dy}{dx}$

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6. Find $\int \frac{x^3 - 1}{x^2} dx$

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7. Find the unit vector in the direction of the vector =

$\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$

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8. If a line makes angle $90^\circ, 60^\circ$ and 30° with the positive direction of x,y and z axis respectively , find its direction cosines.

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9. Define optimal solution in linear programming problem .

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10. If $P(A) = \frac{7}{13}, P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$ find $P(A/B)$

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Part B

1. Let * be a binary operation on Q defind by $a \cdot b = \frac{ab}{2}, \forall a, b \in Q$ Determine whether * is associative or not.

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2. If $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}x\right) = 1$ then find the value of x.

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3. Write the simplest form of $\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right), 0 < x < \frac{\pi}{2}$

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4. Find the area of the triangle whose vertices are (-2,3), (3,2) and (-1,-8) by using determinant method.

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5. Differentiate $x^{\sin x}, x > 0$ with respect to x.

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

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7. Find the slope of the tangent to the curve $y = x^3 - x$ at x=2

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8. Integrate $\frac{e^{\tan^{-1}x}}{1+x^2}$ with respect to x.

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9. Evaluate : $\int_2^3 \frac{x\,dx}{x^2+1}$

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10. find the order and degree of the differential equation:

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11. Find the projection of the vector $\hat{i}+3\hat{j}+\hat{k}$ on the vector $7\hat{i}-\hat{j}+8\hat{k}$

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

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13. Find the angle between the planes whose vector equations are $\overrightarrow{r}.\left(2\hat{i} + 2\hat{j} - 3\hat{k}\right) = 5$ and $\overrightarrow{r}.\left(3\hat{i} - 3\hat{j} + 5\hat{k}\right) = 3$

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14. A random variable X has the following probability distribution :

X	0	1	2	3	4
P(X)	0.1	k	2k	2k	k

find the value of k

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15. A random variable X has the following probability distribution :

X	0	1	2	3	4
P(X)	0.1	k	2k	2k	k

$P(X \geq 2)$

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Part C

1. Show that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a - b|$ is even} is an equivalence relation.

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2. Prove that $2\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{31}{17}\right)$

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3. By using elementary transformations , find the inverse of the matrix

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4. If x= sint, y= cos2t then prove that $\frac{dy}{dx} = -4\sin t$

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5. Verify Roll's theorem for the function $f(x) = x^2 + 2, x \in [-2, 2]$

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6. Find two number whose sum 24 and whose product is as large as possible.

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

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8. Find $\int e^x \sin x dx$

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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 representing the family of curves $y = a\sin(x+b)$ where a,b are arbitrary constant.

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

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12. 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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13. Find the equation of the plane through the intersection of the planes $3x - y + 2z - 4 = 0, x + y + z - 2 = 0$ and the point (2,2,1)

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14. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag.

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Part D

1. Let R_+ be the set of all non-negative real numbers. Show that the function $f : R_+ \to [4, \infty]$ defind by $f(x) = x^2 + 4$ Is invertible and write 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 linear equations by matrix method.

x-y+2z=7

3x+4y-5z=-5

2x-y+3z=12

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4. If $y=(\tan^{-1}x)^2$ show that $(x^2+1)^2y_2+2x(x^2+1)y_1=2$

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5. Sand is pouring from a pipe at the rate of $12cm^3/s$. 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 4cm?

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6. Find $\int \frac{1}{x^2 - 6x + 13}$

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7. Using integration find the area of the region bounded by the triangle whose vertices are (1,0),(2,2) and (3,1).

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8. Find the general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 \log x$

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9. Derive the equation of a line space passing through two given points both in vector and cartesian form.

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10. If a fair coin is tossed 10 times, find the probability of

Exactly six heads

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11. If a fair coin is tossed 10 times, find the probability of

Atleast six heads.

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Part E

1. Evaluate $\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx$

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2. Prove that $\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} = 2(x+y+z)^3$

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3. Minimize and Maximize Z = 3x + 9y subject to the constraints

$x + 3y \leq 60$

x+y ≥ 10

$x \leq y$

$x \geq 0$, y $\geq$ 0 by the graphical method .

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4. Find the relationship between a and b so that the function f defind by $f(x) = \begin{cases} ax + 1 & \text{if } \; x \leq 3 \\ bx + 3 & \text{if } \; x > 3 \end{cases}$ is continuous at x=3

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