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MATHS

BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)

II PUC MATHEMATICS SUPPLEMENTARY EXAM QUESTION PAPER JULY - 2017

Part A

1. Let * be a operation defined on the set of non zero rational numbers by $a \cdot b = \frac{ab}{4}$ Find the identity element.

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2. Write the values of x for which $\tan^{-1}\frac{1}{x} = \cot^{-1} x$ holds.

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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. 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 $y = \sin(x^2)$

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6. Find $\int \cos \quad 3x \quad dx$

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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. Write the direction cosines of y - axis.

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9. Define optimal solution in linear programming problem .

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10. If $P(A) = 0.8, P(B) = 0.5$ and $P(B \mid A) = 0.4$ then find $P(A \cap B)$.

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Part B

1. Show that if f: $A \to B$ and g: $B \to C$ are onto,then go f : $A \to C$ is also onto.

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2. Write the value of x for which

$2\tan^{-1} x = \cos^{-1}\left[\frac{1-x^2}{1+x^2}\right]$ holds:

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3. Find the value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$.

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4. Using determinat method, find the area of the triangle whose vertices are (1,0), (6,0) and (4,3).

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5. Differentiate $(\sin x)^x$ with respect to x.

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6. Find $\frac{dy}{dx}$, if $2x + 3y = \sin y$.

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7. Find the point on the curve $\frac{x^2}{4} + \frac{y^2}{25} = 1$ at which the tangents are parallel to x - axis.

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8. Evaluate : $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

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9. Evaluate : $\int \frac{(x-3)}{(x-1)^3} e^x \quad dx$

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

$\frac{d^4y}{dx^4} + \sin\left(\frac{d^3y}{dx^3}\right) = 0$

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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 given by

$\vec{r} = 2\hat{i} - 5\hat{j} + \hat{k} + \lambda\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right)$ and $\vec{r} = 7\hat{i} - 6\hat{k} + \mu\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$

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14. If A and B are two independent events, then the probability of occurrence of at least one of A and B is given by 1- P(A') P(B').

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Part C

1. Check whether the relation R defined in the set {1,2,3,4,5,6,} as R={(a,b) :b= a+1} is reflexive or symmetric.

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

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3. Using elementary operations, find the inverse of the matrix $\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$

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4. Find $\frac{dy}{dx}$, if $x = a[\cos t + \log(\tan t/2)] \& y = a \sin t$

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5. Verify Mean Value Theorem for the function $f(x) = x^2$ in the interval [2,4].

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6. Find two positive numbers whose sum is 15 and the sum of whose squares is minimum.

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

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8. Evaluate : $\int \frac{x \cos^{-1} x}{\sqrt{1-x^2}} dx$

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9. Find the area bounded by the the curve y=cos x between x=0 and $x = 2\pi.$

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10. Find the equation of a curve passing through the point (-2, 3), given that the slopw of the tangent to the curve at any point (x, y) is $\frac{2x}{y^2}$.

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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. 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 vector and cartesian equation of the plane which passe3s throught the points (5,2,-4) and perpendicular to the line with direction ratios 2,3,-1.

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14. A man is known to speak truth 3 out of 4 times. He throws a dice and reports that it is a six. Find the probability that it is actually a six.

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15. 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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16. 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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17. Solve the following system of equation by using matrix method :

$x + y + z = 6, y + 3z - 11 = 0$ and $x + z = 2y.$

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18. 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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19. Sand is pouring from a pipe at the rate of $12 cm^3 / s$. 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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20. Find the integral of $\sqrt{a^2+x^2}$ with respect to x and hence evaluate $\int\sqrt{1+x^2}dx$

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21. Find the area of the smaller region enclosed by the circle $x^2+y^2=4$ and the line x+y=2 by the integration method.

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22. Find the general solution of the differential equation $ydx-\left(x+2y^2\right)dy=0.$

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

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

Exactly six heads

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Part E

1. a. Minimize $z = -3x + 4y$ subject to constraints.

$x + 2y \leq 8$

$3x + 2y \leq 12$

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

b. Prove that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

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2. For what value of λ is the function defined by

$$f(x) = \begin{cases} \lambda(x^2 - 2x), & \text{if } x \leq 0 \\ 4x + 1, & \text{if } x > 0 \end{cases}$$

continuous at x = 0 ?

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