MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

II PUC APRIL 2020 CLASS - XII

Part A

1. Let $*$ be the binary opertion on N given by $a * b = L.C.M.$ of a and b. Find

(i) $5 * 7, 20 * 16$

(ii) Is $*$ commutative ?

(iii) Is $*$ associative ?

(iv) Find the identity of $*$?

(v) Which elements of N are invertible for the opertion $*$?

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2. Write the range of the function $y = \sec^{-1} x$.

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3. If a matrix has 5 elements what are the possilbe orders it can have?

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4. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then x is equal to

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5. If $y = \tan(\sqrt{x})$, find $\frac{dy}{dx}$.

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6. Find $\int (2x^2 + e^x) dx.$

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7. Co-initial vectors; coterminous vector and co-planar vectors; negative of a vector; reciprocal vectors

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8. If a line makes angles $90^\circ, 135^\circ$ and 45° with the 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 $P(A) = \frac{3}{5}$ 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. If $f: R \to R$ and $g: R \to R$ are given by by f(x)=cos x and $g(x) = 3x^2$, then shown that $gof \neq fog$.

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2. Prove that $\cot^{-1}(-x) = \pi - \cot^{-1} x, \forall \text{ x } \in$ R.

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

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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. Find $\frac{dy}{dx}$, if $\sin^2 x + \cos^2$ y= 1

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6. If $y = x^x$, find $\frac{dy}{dx}$

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7. Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is (a) strictly increasing (b) strictly decreasing.

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8. $\int \cot \times x \log(\sin x) dx = ?$

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9. Find $\int$ x $\sec^2$ x dx.

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

$$\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0$$

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11. Find the projection of the vector $\hat{i}+3\hat{j}-7\hat{k}$ 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 vectors $\overrightarrow{a}=\hat{i}-\hat{j}+3\hat{k}$ and $\overrightarrow{b}=2\hat{i}-7\hat{j}+\hat{k}$

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13. Find the equation of the plane with the intercept 2,3 and 4 on x,y and z axes respectively.

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

$X=x$	2	4	6	8	$x>8$
$P(X=x)$	$2k$	$4k$	$6k$	$6k$	0

Find the value of K.

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Part C

1. Show that the relation R defined in the set A of all triangles as $R=\{(T_1, T_2): T_1 \text{ is similar to } T_2\}$, is equivalence relation.

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2. Prove that $2\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{1}{7}\right)=\sin^{-1}\left(\frac{31}{25\sqrt{2}}\right)$

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3. If $F(x)=\begin{bmatrix}\cos x & -\sin x & 0\\ \sin x & \cos x & 0\\ 0 & 0 & 1\end{bmatrix}$ show that F(x)F(y)=F(x+y)`

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4. If $x=2at^2, y=at^4$ then find $\frac{dy}{dx}$.

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5. Verify mean value theorem for the function $f(x)=x^2+4x-3$ in the interval [-2,2]

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6. Use differential to approximate $\sqrt{36.6}$

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

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8. Evaluate : $(i)\int_0^{\pi/2}\cos^3 x dx \ (ii)\int_0^{\pi/2}\sin^4 x dx$

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

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

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11. Find a unit vector perpendicular to each of the vector $\left(\vec{a} + \vec{b}\right)$ 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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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 man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

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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 $A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}, B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$ and $c = \begin{bmatrix} 4 & 1 & 2 \\ 0 & 3 & 2 \\ 1 & -2 & 3 \end{bmatrix}$,

then compure (A+B) and (B-C), Also , verify that A+(B-C)=(A+B)-C.`

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3. Solve system of linear equations, using matrix method,

$2x + 3y + 3z = 5x - 2y + z = -43x - y2z = 3$

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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. 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 1/6th of the radius of the base. How fast does the height of the sand cone increase when the height in 4 cm?

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6. Find the integral of $\frac{1}{x^2 + a^2}$ w.r.t.x and hence evaluate $\int \frac{1}{x^2 + 2x + 3}$ dx.

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7. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the line $\frac{x}{3} + \frac{y}{2} = 1$.

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

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9. Derive the equation of a line in space passing through a given pont and parallel to a given vector in both vector and Cartesian form.

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10. A person buys a lottery ticket in 50 lotteries, in each of which his chance of winning a prize is $\frac{1}{100}$. What is the probability that he will win a prize(a) at least once (b) exactly once (c) at least twice?

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Part E

1. Prove that $\int_{-a}^{a} dx = \begin{cases} 2\int_0^a f(x)dx & \text{if } f(x)\text{is even} \\ 0 & \text{if } f(x)\text{is odd} \end{cases}$ and hence evaluate

(a) $\int_{-1}^{1} \sin^5 x \cos^4 x dx.$

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2. (a)Maximise z = 4x + y

subject to constraints :

x + y $\leq$ 50

3x + y $\leq$ 90

x $\geq$ 0

y $\geq$ 0

by graphical method.

(b) Find the value of K, if f(x) = $\begin{cases} Kx+1 & \text{if} x \leq \pi \\ \cos x & \text{if } x > \pi \end{cases}$ is continuous at x = π.

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