MATHS

BOOKS - CBSE COMPLEMENTARY MATERIAL

MATHS (HINGLISH)

PRACTICE PAPER II

Section A

1. If $R = \{(x, y) : x + 2y = 8\}$ is a relation on N, then write the range of R.

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2. If $\sin\left(\sin^{-1}\left(\frac{3}{5}\right)+\cos^{-1}x\right)=1$ then find value of x.

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3. How many matrices of order 2 x 2 are possible with entry 2 × 2.

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4. If $A=\begin{bmatrix}2 & 1\\ 0 & 5\end{bmatrix}$, find $\left|A^{-1}\right|$

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5. If y=|x|, then find dy/dx.

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6. If $y = \sin x + \tan^{-1}(1)$, find dy/dx

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7. Find the mimimum value of sin x cos x.

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8. which of the following functinon are strictly decreasing on $(0, \pi/2)$ a) cosx b)cos2x c) cos3x d) tanx

A. sin 2x

B. cos 3x

C. tanx

D. cos 2x

Answer: D

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9. The curves $y = ae^x$ and $y = be^{-x}$ cut orthogonally, if $a = b$ (b) $a = -b$ (c) $ab = 1$ (d) $ab = 2$

A. a=b

B. ab=-b

C. ab=1

D. ab=2

Answer: C

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10. Evaluate : $\int \frac{dx}{1 - \sin^2 x}$

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11. Evaluate: $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$

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12. Evaluate : $\int \frac{\sin x}{\sin 2x} dx$

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13. The degree of $\frac{dy}{dx} + \cos y = 0$ is not defined true or false ?

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14. Write the order and degree of the following differential equations.

$$\sqrt{1+\frac{dy}{dx}}=\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}}$$

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15. write integrating factor of the following differential equation:-

$$\frac{dx}{dy}+x\cos y=\sin y$$

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16. If $\hat{i}, \hat{j}$ and $\hat{k}$ are three mutually perpendicular vectors, then find the value of $\hat{j}.\left(\hat{k} \times \hat{i}\right)$.

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17. What is the perpendicular distance of plane 2x-y+3z =10 from origin

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18. Define an objective function.

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19. Find P (A/B) if P(A) =0.4 , P(B) =0.8 and P (B/A) =0.6

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20. Three coins are tossed once. Find the probability of getting at least one head.

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21. Given $A = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Write the value of AB.

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22. Write the degree of the differential equation $\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 = 2x^2 \log\left(\frac{d^2y}{dx^2}\right)$.

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23. Find the angle between the line $\vec{r} = \left(2\hat{i} - \hat{j} + 3\hat{k}\right) + \lambda\left(3\hat{i} - \hat{j} + 2\hat{k}\right)$ and the plane $\vec{r}.\left(\hat{i} + \hat{j} + \hat{k}\right) = 3$.

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24. Find the co-ordinates of the point, where the line $\left(\frac{x+2}{1}\right) = \left(\frac{y-5}{3}\right) = \left(\frac{x+1}{5}\right)$ cuts the yz-

plane.

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25. If $y = \sin^{-1} x + \cos^{-1} x$, then $\frac{dy}{dx} =$

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26. If $f(x) = x + 1$, then write the value of $\frac{d}{dx}(fof)(x)$.

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27. If A is a square martin of order 3 with |A|=4. Then write all value of |-2A|.

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28. If event A and B are mutually exclusive and exhaustive events and $P(A) = \frac{1}{3}P(B)$ then Find P (A)

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29. In which quadrant the bounded region for in equations x+y $\leq$ 1 and x-y $\leq$ 1 is situated?

A. I,II

B. I,III

C. II,III

D. All four quadrants.

Answer:

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30. Write the derivative of e^x wrt. $\sqrt{x}$

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31. Find the differential equation representing the family of curves $y = a.\, e^{2x} + 5$, where a is an arbitrary constant.

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32. Write the maximum value of $f(x) = \frac{\log x}{x}$, if it exists.

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33. Evaluate : $\int \frac{1 + \cos x}{x + \sin x} dx.$

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34. Evaluate $\int_2^3 3^x dx$

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35. Find the integrating factor of $x\frac{dy}{dy} + 2y = x\cos x$

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36. Write the value of $\left(\hat{k}X\hat{j}\right).\left(\hat{i}+\hat{j}+\hat{k}\right)$

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37. Evaluate : $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \sin^3 x dx$

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38. Evaluate: $\int \frac{2x}{(x^2+1)(x^2+3)} dx$

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39. Slope of tangent of the curve $y = x^2 + x + 1$ at x=1 is ___

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40. $\cos^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right), \frac{\pi}{4} < x < \frac{5\pi}{4}$

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Section B

1. Show that the function $f: R \to R$ is given by $f(x) = 1 + x^2$ is not invertible.

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2. a a+b a+2b 10. Using properties of determinants, show that $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix} = 9b^2(a+b)$

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3. Show that the elements on the main diagonal of a skew-symmetric matrix are all zero.

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4. Find the domain of continuity of f(x) = $\sin^{-1} x - [x]$, [] represents greatest integer function .

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5. If $y = x^x$, find $\frac{d^2y}{dx^2}$.

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

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7. Find the equation of the plane passing through the point (-2,1,-3) and making equal intercept on the coordinate axes

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8. Two balls are drawn at random from a bag containing 6 red and 4 green balls, find the probability that both ball are of same colour.

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9. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, show that (A-2 I) A-3 I) =0

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10. Check whether the relation R in R defined by $R = \{(a, b) : a \leq b^3\}$ is reflexive, symmetric or transitive.

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11. Show that the function $f: R \to R$ given by $f(x) = \cos x$ for all $x \in R$, is neither one-one nor onto.

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12. Find $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} dx.$

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

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14. $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx$

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15. Find the volume of a cuboid whose edges are given by $-3\hat{i} + 7\hat{j} + 5\hat{k}$, $-5\hat{i} + 7\hat{j} - 3\hat{k}$ and $-7\hat{i} - 5\hat{j} - 3\hat{k}$

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16. Find the probability distribution of X; the number of heads in two tosses of a coin (or a simultaneous toss of two coins).

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Section C

1. Prove that the relation R on the set $N \times N$ defined by $(a, b)R(c, d) a + d = b + c$ for all $(a, b), (c, d) \in N \times N$ is an equivalence relation. Also, find the equivalence classes [(2, 3)] and [(1, 3)].

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2. Let $f: N \overrightarrow{R}$ be a function defined as $f(x) = 4x^2 + 12x + 15$. Show that $f: N \overrightarrow{S}$, where S is the range of f, is invertible. Also find the inverse of f

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3. Evaluate :

$$\int \frac{\cos(x + a)}{\cos(x - a)} dx$$

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4. $\int \frac{x}{x^4 + x^2 + 1} dx$

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5. Solve the following differential equations

$\left(x^3 + y^3\right) dx = \left(x^2 y + x y^2\right) dy.$

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6. Decompose the vector $6\hat{i} - 3\hat{j} - 6\hat{k}$ into vectors which are parallel and perpendicular to the vector $\hat{i} + \hat{j} + \hat{k}$.

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7. A company produces two types of belts A and B. Profits on these belts are Rs. 2 and Rs. 1.50 per belt respectively. A belt of type A requires twice as much time as belt of type B. The company can produce at most 1000 belts of type B per day. Material for 800 belts per day is available. At most 400 buckles for belts of type A and 700 for type B are available per day. How much belts of each type should the company produce so as to maximise the profit?

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8. Two urns A and B contain 6 black and 4 white, 4 black and 6 white balls respectively. Two balls are drawn from one of the urns. If both the balls drawn are white, find the probability that the balls are drawn from urn B.

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9. If $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$, x > 0 find the value of x and hence find the value of $\sec^{-1}\left(\frac{2}{x}\right)$

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10. The scalar product of the vector $\hat{i}+\hat{j}+\hat{k}$ with a unit vedctor along the sum of the vectors $2\hat{i}+3\hat{j}-5\hat{k}$ and $\lambda\hat{i}+2\hat{j}+3\hat{k}$ is equal to one. Find the value of lamda.

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11. If $(\sin x)^2 = x + y$ find $\frac{dy}{dx}$

Find $\frac{dy}{dx}$ if $y = \sin^{-1}\left[\frac{2^{x+1}}{1+4^x}\right]$

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12. If $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \\ 5 & 1 & 1 \end{bmatrix}$, find A^{-1}

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13. If $y = e^x(\sin x + \cos x)$, prove that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = 2y = 0$

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14. Minimize $z = 6x + 3y$ subject to the constraints

$4x + y \geq 80, x + 5y > 115, 3x + 2y \leq 150, x \geq 0, y \geq 0$

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15. Corner poins of the feasible region determned by the system of linear constrainsts are (0,3), (1,1), and (3,0). Let Z=px+qy. Where $p, q < 0$ Condition on p and q, so that the minimum f Z occurs at (3,0) and (1,1) is

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16. If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$, find P (not A and not B).

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Section D

1. If $A = [1 - 1121 - 3111]$, find A^{-1} and hence solve the system of linear equation.

$x + 2y + z = 4, \ -x + y + z = 0, x - 3y + z = 2$

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2. Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius R is $\frac{2R}{\sqrt{3}}$. Also find the maximum volume.

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3. Find the area of the greatest rectangle that can be inscribed in an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

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4. Find the area of the region.

$\{(x, y): y28, 6x, x2+y27(6\}$

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5. Using integration, find the area of the triangle whose vertices are $(-1, 0)(1, 3)$ and (3, 2).

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6. Find the coordinates of the foot of perpendicular drawn from the point $2\hat{i} - \hat{j} + \hat{5}k$ to the line $\bar{r} = \left(11\hat{i} + 2\hat{j} - 8\hat{k}\right) + \lambda\left(10\hat{i} - 4\hat{j} - 11\hat{k}\right)$. Also , find the length of perpendicular .

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7. Using matrices, solve the following system of linear equations: $3x - 2y + 3z = 8$ $2x + y - z = 1$ $4x - 3y + 2z = 4$

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8. Find the vector and cartesian equations of the plane passing through the points (2,2,-1), (3,4,2) and (7,06) also find the vector equation of a plane passing through (4,3,1) and parallel to the plane obtained above.

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9. Find the equation of the line passing through (2,1,-2) and (5,3,4) and of the plane passing through (2,0,3) , (1,1,5) and (3,2,4) . Also find their point of intersection.

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10. Using integration find the area of the triangle whose vertices are A (1,0) ,B(2,2) and C (3,1)

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11. The area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

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12. Show that the right circular cylinder, open at the top, and of given surface area and maximum volume is such that its height is equal to the radius of the base.

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