MATHS

BOOKS - MODERN PUBLICATION

TEST PAPER 10

Exercise

1. Let $f(x) = 2\ln x$ and $g(x) = \ln x^2$ .Do you think $f = g$? Justify

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2. If $\cot^{-1} x + \frac{\sin^{-1} 1}{\sqrt{5}} = \frac{\pi}{4}$ then what is the value of x.

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3. If $A = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then find A - alpha I, alpha in R.

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4. Evaluate $[[-6, 0, 0], [3, -5, 7], [2, 8, 11]]$

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5. Give example of a function whose is continuous but not differentiable at x=2.

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6. Is there any tangent to the curve $y = |2x - 1|$ at $\left(\frac{1}{2}, 0\right)$?

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7. Find the primitive of : $\frac{x+1}{x}$

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8. Is $y = \frac{A}{x+A}$ a solution of the differential equation $x\frac{dy}{dx} + y = y^2$.

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9. Find the co-ordinates of the foot of the perpendicular drawn from origin to the plane, `x + y + z -1 = 0.

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10. Write the projection of $\hat{i} - \hat{j}$ in the direction of $\hat{i} - \hat{j}$.

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11. Let A = {1, 2, 3). Then, show that the number of relations containing (1, 2) and (2, 3) which are reflexive and transitive but not symmetric is three.

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12. A factory uses three different respurce for the manufacture of two different products, 20 units of the resource A, 12 units of B and 16 unit of C being available. One unit of the first

product requires 2,2 and 4 units of the resources and one unit of the second product requires 4,2 and 0 units of the resources taken in order. It is known that the first product gives a profit of ₹20 per unit and the second ₹ 30 prt uniy. Formulate the LPP so as to earn maximum profit.

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13. Verify that $[AB]^T = B^T A^T$ where

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 6 & 7 & 8 \\ 6 & -3 & 4 \end{bmatrix} B = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 2 \\ 5 & 6 & 1 \end{bmatrix}.$$

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14. Solve $x + 2y = 3,\ 3x + y = 4$ by matrix method.

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15. Prove the following :

$$\begin{bmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{bmatrix} = \left(1 - x^3\right)^2$$

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16. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, show that for no values of α, $A^2 = B$.

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17. Prove that $\begin{vmatrix} 1 & a & a^3 \\ 1 & b & b^3 \\ 1 & c & c^3 \end{vmatrix}$ = (a-b)(b-c)(c-a)(a+b+c).

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18. If $x^7y^3 = (x+y)^{10}$, then find $\frac{d^2y}{dx^2}$

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19. If tangents are drawn from the origin to the curve y = sin x, then show that the locus of the points of contact is $x^2y^2 = x^2 - y^2$.

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20. Integrate the following $\int \frac{3x+4}{x\sqrt{2x^2-5}}dx$

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21. Evaluate $\int_0^4 \left(x + e^{2x}\right) dx$, as limit of sum.

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22. Solve : $\frac{dy}{dx} = \sin(x + y) + \cos(x + y)$

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23. Solve the following differential equations

$$(1-x^2)\frac{dy}{dx}+2xy=x\sqrt{1-x^2}$$

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24. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are mutually perpendicular vectors of equal magnitude show that $\vec{a}+\vec{b}+\vec{c}$ is equally inclined to $\vec{a}$, $\vec{b}$, $\vec{c}$.

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25. Prove that the lines joining the midpoints of consecutive sides of a quadrilateral form a parallelogram using vector method.

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26. $\int_0^1 \frac{x^5\left(4-x^2\right)}{\sqrt{1-x^2}}dx$

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27. find the point of intersection of the line through (1,3,-2) and (3,4,1) with the plane $x - 2y + 4z = -1$.

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28. Prove that the lines $\frac{x+3}{2} = \frac{y+5}{3} = \frac{z-7}{-3}$ and $\frac{x+1}{4} = \frac{y+1}{5} = \frac{z+1}{-1}$ are coplanar. Find the equation of plane containing them.

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29. Let R be the relation on the set R of real numbers such that aRb iff a-b is and integer. Test whether R is an equivalence relation. If so find the equivalence class of $1 \text{and} \frac{1}{2}$ wrt. This equivalence relation.

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30. Show that f : A to B, where $A = R - \{3\}$, $B = R - \{1\}$ defined as $f(x) = \frac{x-2}{x-3}$ is bijective. Find f^{-1}.

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31. Find the particular solution of the differential equation $\frac{dy}{dx} + y\cot x = 2x + x^2\cot x$,given that $y = 0$ when $x = \frac{\pi}{2}$.

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32. Prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the

square bounded by $x = 0, x = 4, y = 4$ and $y = 0$ into three equal parts.

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33. A line with direction ratios $< 2, 1, 2 >$ meets each of the lines $x = y + a = z$ and $x + a = 2y = 2z$. Find the co-ordinates of the points of intersection.

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