MATHS

BOOKS - ARIHANT PRAKASHAN

SIMILAR TEST 3

Section A

1. If $y = x^{-1} \sin\left(\text{cosec}^{-1}\frac{1}{x}\right)$, then find $\frac{dy}{dx}$

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2. Is $f(x) = x^3$ continuous at x = 2 ?

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3. Integrate $\int 2^x . 4^{-x/2} dx.$

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4. Write the order and degree of the differential equation $\sin\left(\frac{d^2y}{dx^2}\right) = \frac{dy}{dx}$

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5. Write the dR.s of line joining the points $(4, -6, 1)$ and $(0, 3, -1)$

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6. Let A={1,2,3}, B={4,5,6,7} and let f={(1,4),(2,5),(3,6)} be a function from A to B. State whether f is one-one or not.

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7. State the extreme point theorem.

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8. If A is a 2×2 non - singular matrix and $|A| = \frac{1}{4}$ then what is |adjA|

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9. Let A and B be the events such that $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{5}$. Find $P\left(\frac{B}{A}\right)$

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10. Find the scalar triple product of $\vec{a}$, $\vec{b}$ and $\vec{c}$.

$\vec{a} = 5\hat{i} - \hat{j} + 4\hat{k}$, $\vec{b} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ and $\vec{c} = 5\hat{i} - 2\hat{j} + 6\hat{k}$

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Section B

1. Check if the relation R on set of real numbers, defined as $R = \{(a, b) : a \leq b^3\}$ is reflexsive, symmetric or transitive.

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2. Let f : W $\rightarrow$ W be defined as f (x) = x -1 if x is odd and f(x) = x +1 if x is even then show that f is invertible. Find the inverse of f where W is the set of all whole numbers.

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3. Solve for x , $\tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{3}$

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4. Prove that following

$$\cot^{-1}\left(\frac{xy+1}{x-y}\right)+\cot^{-1}\left(\frac{yz+1}{y-z}\right)+\cot^{-1}\left(\frac{zx+1}{z-x}\right)=0,(0<xy,yz,$$

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5. Solve the following LPP graphically Minimise $Z=5x+10y$

Subject to the constraints ,

$x+2y\leq 120$

$x+y\geq 60$

$x-2y\geq 0$ and $x,y\geq 0$

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6. Prove that the following. $\begin{bmatrix}1+a & 1 & 1\\ 1 & 1+b & 1\\ 1 & 1 & 1+c\end{bmatrix}$

= abc(1+1/a+/b+1/c)

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7. Show that the following system is inconsistent.

(a-b)x+(b-c)y+(c-a)z=0

(b-c)x+(c-a)y+(a-b)z=0

(c-a)x+(a-b)y+(b-c)z=1

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8. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, then find k such that $A^2 = kA - 2I$.

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9. On a multiple choice examination with three possible options for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing?

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10. An instructor has a question bank consisting of 300 easy true/false questions, 200 difficult true/false questions, 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected at random from the question bank, then what is the probability that it will be an easy question, given that it is a multiple choice questions?

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11. If $y = \log\left(x + \sqrt{1 + x^2}\right)$, then find $y_2(0)$.

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12. Differentiate the following function w.r.t. x,

$(\log x)^x + x^{\log x}$.

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13. Find the equation of normal to the curve

$y = e^{\sin x} \quad \text{at} \quad x = \frac{\pi}{3}$

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14. Find the approximate value of $f(2.01)$, where $f(x) = 4x^2 + 5x + 2$

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15. Discuss the continuity of the function f(x) at x=1/2 , when f(x) is defined as follows.

$$f(x) = \begin{cases} 1/2 + x & \text{if } 0 \leq x < 1/2 \\ 1 & \text{if } x = 1/2 \\ 3/2 + x & \text{if } 1/2 < x \leq 1 \end{cases}$$

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16. Integrate $\int \cot^{-1} x dx.$

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17. Integrate $\int \sqrt{7x - 10 - x^2} dx$

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18. Evaluate $\int_0^{\pi} |\cos x| dx.$

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19. Find the area bounded by $y = |x - 1|$ and $y = 1$.

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20. Solve $\frac{dy}{dx} + (\sec x)y = \tan x.$

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21. Find the area of the parallelogram whose diagonals are the vectors $3\hat{i}+\hat{j}-2\hat{k}$ and $\hat{i}-3\hat{j}+4\hat{k}$?

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22. Find the angle between the lines whose direction cosines are given by the equations. $3l+m+5n=0, 6mn-2nl+5lm=0.$

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23. Prove that the point (1,2,3),(-1,1,0),(2, 1, 3) and (1, 1, 2) are coplanar.

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24. Find the points of intersection of the line $\frac{x-1}{1}=\frac{y+2}{3}=\frac{z-1}{-1}$ and the plane $2x+y+z=9.$

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Section C

1. Verify Lagaranges mean value theorem for the functions

$$f(x) = \begin{cases} 2 + x^3 & \text{if } x \leq 1 \\ 3x & \text{if } x > 1 \end{cases} \quad \text{on } [-1, 2]$$

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2. Evaluate the following . $\int_1^2 e^x(x+1)dx$

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3. Find the solutions of the following differential equations :

$$x \sin \frac{y}{x} dy = \left(y \sin \frac{y}{x} - x\right) dx$$

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4. Sketch the graph of the curve $y^2 = x$ and $y^2 = 4 - 3x$ and find the area enclosed between them .

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5. Prove the following by vector method. An angle inscribed in a semi-circle is a right angle.

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6. Find the equation of the plane Passing through the intersection of the planes $x + 3y - z + 1 = 0$ and $3x - y + 5z + 3 = 0$ and is at a distance $2/3$units from origin.

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7. Show that $f: N \to N$, given by

$$f(x) = \begin{cases} x+1, \text{if x is odd} \\ x-1, \text{if x is even} \end{cases}$$

is bijective (both one-one and onto).

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8. If $\sin\left[\cot^{-1}(x+1)\right] = \cos\left(\tan^{-1} x\right)$, then find x

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9. Solve the following LPP graphically .

Maximise : $Z = 100x + 300y$

Subject to : $x + y \leq 24,$

and $x \geq 0, y \geq 0$

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10. Compute

$(AB)^{-1}$ if $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & -1 \\ 1 & 0 & 2 \end{bmatrix}$

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11. If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$, then find the real values of x and y such that $(xI + yA)^2 = A$

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12. A shopkeeper sells three types of flower seeds A_1, A_2 and A_3. They are sold as a mixture , where the proportions are $4:4:2$, respectively . The germination rates of the three types of seeds are 45 % , 60 % and 35 % . Calculate the probability

of a randomly chosen seed to germinate

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that it will not germinate given that -the seed is of type A_3

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that it is of the type A_2 given that a randomly chosen seed does not germinate .

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