

Quarterly Examination - 2018-19

MATHEMATICS

Class : XII

Time : 3 Hrs. 15 mints

Full Marks : 100

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|------|---|---|
| i | Prove that $\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \frac{1}{2} \cos^{-1} \frac{3}{5}$ | 2 |
| ii | If $\begin{bmatrix} x+y \\ x-y \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix} \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ then find the value of x and y | 2 |
| iii | $\int x \sec^2 x dx$ | 2 |
| iv | Find the principal value of $\tan^{-1} 1 + \cos^{-1} \frac{-1}{2}$ | 2 |
| v | Show that the function f defined as follows is continuous at | 2 |
| | $x=2 f(x) = \begin{cases} x-2, & 0 \leq x \leq 1 \\ 2x^2 - x, & 1 < x \leq 2 \\ 5x-4, & 2 < x \end{cases}$ | |
| vi | Evaluate : $\int \frac{dx}{x - \sqrt{x}}$. | 2 |
| vii | Evaluate $\int \frac{x+1 dx}{x(x+\log x)}$ | 2 |
| viii | Without expanding evaluate | 2 |
| | $\begin{vmatrix} bc & a(b+c) \\ ca & b(c+a) \\ ab & c(a+b) \end{vmatrix}$ | |
| ix | Differentiate $\sin^{-1} \left(\frac{1-x^2}{1+x^2} \right)$ | 2 |
| x | If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ then show that $A^2 - 4A + 3I = 0$. Hence find A^{-1} | 2 |
| 2 | Prove by using properties that | 4 |
| | $\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ a+b & b+c & c+a \end{vmatrix} = a^3 + b^3 + c^3 - 3abc$ | |
| 3 | Solve by Matrix's rule $x+2y+z=1$, $2x+3y+2z=1$, $3x+y-2z=0$ | 4 |

4	If $\sin^{-1} x + \tan^{-1} x = \frac{\pi}{2}$ Prove that $2x^2 + 1 = \sqrt{5}$	4	16 Find the area of a parallelogram whose diagonals are $6\hat{i} + 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 2\hat{k}$.	4
5	Solve $\sin^{-1}(1-x) - 2\sin^{-1}(x) = \frac{\pi}{2}$	4	17 Find k so that the four points are coplanar $A(-1, 4, -3), B(3, k, -5), C(-3, 8, -5)$, and $D(-3, 2, k)$	4
6	Prove that	4	18 If $\vec{a}, \vec{b}, \vec{c}$ are coplanar, then prove that $\vec{b} + \vec{c}, \vec{c} + \vec{a}, \vec{a} + \vec{b}$ are coplanar	4
7	$\begin{vmatrix} 1 & a^2 + bc & a^3 \\ 1 & b^2 + ca & b^3 \\ 1 & c^2 + ab & c^3 \end{vmatrix} = -(a-b)(b-c)(c-a)(a^2 + b^2 + c^2)$	4	19 If \vec{a} and \vec{b} are unit vectors and θ is the angle between them. Then prove that $\frac{\theta}{2} = \frac{1}{2} \vec{a} + \vec{b} $	4
8	Differentiate $\tan^{-1} \frac{\sqrt{1+x^2}-1}{x}$	4		
9	Find $\frac{dy}{dx}$, if $x^{\sin y} + (\sin x)^y = a^y$	4		
10	Evaluate a) $\int \frac{x+1}{\sqrt{2x^2+3x+5}} dx$	4		
11	Evaluate a) $\int \tan^{-1} \sqrt{x} dx$,	4		
12	Find the product of matrices A and B , $A = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 4 & 1 \\ 1 & -3 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 11 & -5 & -14 \\ -1 & -1 & 2 \\ -7 & 1 & 6 \end{bmatrix}$, and hence solve the following equations; $x-2y+3z=6$, $x+4y+z=12$, $x-3y+2z=1$	6		
13	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 & 3 \\ 1 & -4 & 1 \\ 1 & -3 & -2 \end{bmatrix}$ using elementary transformations	6		
14	Evaluate $\int \sqrt{\cot x} dx$	6		
15	$\int \left(\log(\log x) + \left(\frac{1}{\log x} \right)^2 \right) dx$	6		
	Section B (Only for Section A and B Students)			
	If the coordinates of 4 points are	4		

.Section B

(Only for Section A and B Students)

15 If the coordinates of 4 points are $A(2,3,4), B(5,4,-1), C(3,6,2)$, and $D(1,2,0)$ then show that AB is perpendicular to CD.