પુ•ના International School

Shree Swaminarayan Gurukul, Zundal

Examination P A 1 2021 – 2022					
Student Name				**Grade 12th**	
Date				**Subject**	**MATHEMATICS**
		Time		**Total Marks**	**50**

Solve question 1 to 6 each carry 2 marks each [2 X 6 = 12]

1 Construct a 3 x 4 matrix, whose elements are given by

$a_{ij} = \frac{1}{2}[\,-3i + j\,]$

2 Find the value x, y and z from the following equation

$\begin{bmatrix} 4 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 1 & 5 \end{bmatrix}$

3 Show that the relation R in the set { 1, 2, 3 } given by R = { (1, 2), (2, 1) } is symmetric But neither reflexive nor Transitive

4. Show that the relation R in the set A of all the books in a library of a college, given by R = {(x, y) : x and y have same number of pages} is an equivalence relation.

5. Find the principal value of $\cos^{-1}(3/\sqrt{2})$

6. If a matrix has 24 elements, what are possible orders it can have? What, if it has 13 elements?

Solve question from 7 to 12 each carry 3 marks [3 X 6 = 18]

7. Find the inverse of the matrix

(i) $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

8. If A = $\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ then express the matrix as the sum of a symmetric and a skew symmetric matrix

9. Let R be the relation in the set { 1, 2, 3} given by R = {(1,2),(2,2),(1,1), (4,4),(1,3), (3,3) ,(3,20}. Choose the

Correct answer.

(A) R is reflexive and symmetric but not transitive

(B) R is reflexive and transitive but not symmetric

(C) R is symmetric and transitive but not reflexive.

10. Check the injectivity and surjectivity of the below function:
f : N → N given by $f(x) = x^2$

11. Prove that: $3\sin^{-1}x = \sin^{-1}(3x-4x^3)$, $x \in [-1/2, 1/2]$

12. Prove that: $\tan^{-1}2/11 + \tan^{-1}7/24 = \tan^{-1}1/2$

Solve question 13 to 16 each carry 5 marks

13. check the injectivity and surjectivity of the following function;

(i) f: N→N given by $f(x) = x^2$

(ii) *f*: : Z→Z given by $f(x) = x^2$

(iii) *f*: : R→R given by $f(x) = x^2$

(iv) *f*: : N→N given by $f(x) = x^3$

(v) *f*: : Z→Z given by $f(x) = x^3$

14. If $A = \begin{matrix} 3 & \sqrt{3} & 2 \\ 4 & 2 & 0 \end{matrix}$ and $B = \begin{matrix} 2 & -1 & 2 \\ 1 & 2 & 4 \end{matrix}$ are matrix

verify that (i) $(A')' = A$ (ii) (A+B)' = A' +B'

15. Obtain inverse of $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

16. Write the function in the simplest form: $\tan^{-1}\frac{\sqrt{1+x^2}}{x}$, $x \neq 0$.

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