पुना International School
Shree Swaminarayan Gurukul, Zundal

Student Name					
Date	16/07/2020	Grade	XII SCIENCE	Roll No.	
Subject	Mathematics	Marks	50	Teacher's Sign	

PERIODIC ASSESSMENT – I [2020-21]

Section – A

(Each question in this section carry 1 marks) **[06]**

1 Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right)$

2 Check the continuity of the function f given by $f(x) = 2x + 3$ at $x = 1$.

3 Find the rate of change of the area of a circle per second with respect to its radius r when $r = 5$ cm.

4 Examine whether the function f given by f (x) = x2 is continuous at x = 0.

5 Find the values of a, b, c, and d from the following equation:

$$\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$$

6 Show that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x, \frac{1}{\sqrt{2}} \le x \le 1$

Section – B

(Each question in this section carry 3 marks) **[24]**

1 A stone is dropped into a quiet lake and waves move in circles at a speed of 4cm per second. At the instant, when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?

2 Construct a 3 × 2 matrix whose elements are given by $a_{ij} = \frac{1}{2}|i - 3j|$.

3 Find the derivative of the function given by $f(x) = \sin(x^2)$.

4 Find the value of $\sin^{-1}(\sin\frac{3\pi}{5})$

5 (i) $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x, -\frac{1}{\sqrt{2}} \le x \le \frac{1}{\sqrt{2}}$

(ii) $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x, \frac{1}{\sqrt{2}} \le x \le 1$

6 Prove that the identity function on real numbers given by $f(x) = x$ is continuous at every real number.

7 Find X and Y, if $X+Y=\begin{bmatrix}5 & 2\\ 0 & 9\end{bmatrix}$ and $X-Y=\begin{bmatrix}3 & 6\\ 0 & -1\end{bmatrix}$.

8 Prove that $\tan^{-1} x + \tan^{-1}\frac{2x}{1-x^2} = \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right),\ |x|<\frac{1}{\sqrt{3}}$

Section – C

(Each question in this section carry 4 marks) **[20]**

1 If $A=\begin{bmatrix}1 & 2 & 3\\ 3 & -2 & 1\\ 4 & 2 & 1\end{bmatrix}$, then show that $A^3 - 23A - 40\,I = O$

2 The length x of a rectangle is decreasing at the rate of 3 cm/minute and the width y is increasing at the rate of 2cm/minute. When x =10cm and y = 6cm, find the rates of change of (a) the perimeter and (b) the area of the rectangle.

3 Show that $\sin^{-1}\frac{12}{13}+\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{63}{16}=\pi$

4 Differentiate $\sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$ w.r.t. x.

5 Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$

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