O. P. JINDAL SCHOOL, SAVITRI NAGAR

Periodic Test -1 (2023 – 2024)

Class : XII **Max Marks : 20**

Subject: Mathematics **Time: 1 Hour**

Name: _____ Class / Section: _____ Roll No.:_____

General Instructions:

(i) All the questions are compulsory.

(ii) The question paper consists of 13 questions divided into 3 sections. Section A has 8 questions of 1 mark each, section B has 3 questions of 2 marks and section C has 2 questions of 3 marks each.

(iii) There is no overall choice. However, internal choice has been provided in 4 questions You have to attempt only one of the alternatives in all such questions.

Section - A

1. Let the functioin 'f' be defined by $f(x) = 5x^2 + 2 \; \forall \; x \in R$, then 'f' is
   (a) onto function
   (b) one-one, onto function
   (c) one-one, into function
   (d) many-one into function

2. Let T be the set of all triangles in a plane, and let a relation R on T be defined as $T_1 \, R \, T_2$ if T_1 congruent to $T_2 \; \forall \; T_1, T_2 \in T$. Then R is
   (a) reflexive but-not transitive
   (b) transitive but not symmetric
   (c) equivalence
   (d) None of these

   OR

   What type of a relation is $R = \{(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)\}$ on the set $A = \{1, 2, 3, 4\}$
   (a) Reflexive
   (b) Transitive
   (c) Symmetric
   (d) None of these

3. If $A^2 - A + I = 0$ then the inverse of A is :
   (a) A
   (b) $A + I$
   (c) $I - A$
   (d) $A - I$

   OR

   Total number of possible matrices of order 3×3 with each entry 2 or 0 is
   (a) 9
   (b) 27
   (c) 81
   (d) 512

4. The value of x for which the matrix $\begin{bmatrix} 3+x & 5 \\ 4 & 6-x \end{bmatrix}$ is a singular matrix is:
   (a) 4
   (b) 2
   (c) 3
   (d) None of these

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5. The principal value of $\tan^{-1}[\tan(\frac{2\pi}{3})]$ is:
   (a) $\frac{2\pi}{3}$
   (b) $\frac{\pi}{3}$
   (c) $-\frac{\pi}{3}$
   (d) None of these

6. The derivative $y = \log(\cos e^x)$ w.r.t. x is:
   (a) $\tan e^x$
   (b) $e^x \tan e^x$
   (c) $-e^x \tan e^x$
   (d) None of these

7. The derivative of $y = \log \tan \frac{x}{2}$ w.r.t. x is :
   (a) sec(x/2)cosec(x/2)
   (b) $-\sin x$
   (c) cosecx
   (d) None of these

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

8. **Assertion (A)** : If $A=\begin{bmatrix}0 & 1 & 1\\ 0 & 1 & 2\\ 0 & 0 & 4\end{bmatrix}$ then $|3A| = 9|A|$

   Reason (R) : If A is a square matrix of order n then $|kA| = k^n |A|$

   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A.
   (c) A is true but R is false
   (d) A is false but R is true

Section - B

9. Check whether the function $f: R \to R$ defined as $f(x) = x^2$ is one-one and onto or not.

10. Find $\frac{dy}{dx}$, if $y = \tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$

OR

If $x = a(1 - \cos\theta)$, $y = a(\theta - \sin\theta)$, then find the value of $\frac{dy}{dx}$ at $\theta = \frac{\pi}{2}$

11. Find the principal value of $\cos^{-1}(\frac{-1}{\sqrt{2}})$

Section - C

12. . Find the value of 'a' and 'b' if the function f(x) defined by

$$f(x) = \begin{cases} 3ax + b, & x > 1 \\ 11, & x = 1 \\ 5ax - 2b, & x < 1 \end{cases}$$ is continuous at x=1

13. If $A = \begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$, find A^{-1}.

Using A^{-1} solve the system of equations:

$3x - 2y + 3z = 8$

$2x + y - z = 1$

$4x - 3y + 2z = 4$

OR

Evaluate the product AB, where

$A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ *and* $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$

Hence solve the system of linear equations:

$x - y = 3$

$2x + 3y + 4z = 17$

$y + 2z = 7$

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