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Grade: XII	Subject: Maths	Marks : 80
Practice Paper {Syllabus: Ch.1,2,3,4,5,6}		Time :3 Hrs

General Instructions:

i) *Section-A contains Questions 1 (i-x) and 2 (xi-xx) are of 1 mark each.*

ii) *Section-B contains Questions 3-7 are of 2 marks each.*

iii) *Section-C contains Questions 8-12 are of 4 marks each.*

iv) *Section-A contains Questions 13-17 are of 6 marks each.*

v) *All the questions are compulsory.*

vi) *Use of calculator is not allowed.*

vii) *An additional 10 minutes time will be given to just read the question paper.*

SECTION – A

1. Choose the correct answer in Q. i – x:

i. If $a, b, c,$ are in A.P, then the determinant $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$ is

(A) 0 (B) 1 (C) x (D) $2x$

ii. The equation of normal to the curve $3x^2 - y^2 = 8$ which is parallel to the line $x + 3y = 8$ is

(A) $3x - y = 8$ (B) $3x + y + 8 = 0$

(C) $x + 3y\ 8 = 0$ (D) $x + 3y = 0$

iii. Let R be the relation in the set **N** given by R = $\{(a, b) : a = b - 2, b > 6\}$. Choose the correct answer.

(A) $(2, 4) \in R$ (B) $(3, 8) \in R$ (C) $(6, 8) \in R$ (D) $(8, 7) \in R$.

iv. Number of binary operations on the set $\{a, b\}$ are

(A) 10 (B) 16 (C) 20 (D) 8

v. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to

(A) π (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{3}$ (D) $\frac{2\pi}{3}$

vi. The number of all possible matrices of order 3 × 3 with each entry 0 or 1 is:

(A) 27 (B) 18 (C) 81 (D) 512

vii. If A, B are symmetric matrices of same order, then AB – BA is a

(A) Skew symmetric matrix (B) Symmetric matrix

(C) Zero matrix (D) Identity matrix

viii. If area of triangle is 35 sq units with vertices (2, – 6), (5, 4) and (k, 4). Then k is

(A) 12 (B) –2 (C) –12, –2 (D) 12, –2

ix. Let $f : \mathbf{R} \to \mathbf{R}$ be defined as $f(x) = 3x$. Choose the correct answer.

(A) f is one-one onto (B) f is many-one onto

(C) f is one-one but not onto (D) f is neither one-one nor onto.

x. If x is real, the minimum value of $x^2 - 8x + 17$ is

(A) –1 (B) 0 (C) 1 (D) 2

2. State True or False for the statements in Q. xi - xx:

xi. Let A be a finite set. Then, each injective function from A into itself is not surjective.

xii. A binary operation on a set has always the identity element.

xiii. The value of the expression $(\cos^{-1} x)^2$ is equal to $\sec^2 x$.

xiv. The domain of trigonometric functions can be restricted to any one of their branch (not necessarily principal value) in order to obtain their inverse functions.

xv. Matrix subtraction is associative.

xvi. AB = AC ⇒ B = C for any three matrices of same order.

xvii. $y = |x - 1|$ is a continuous function.

xviii. Rolle's theorem is applicable for the function $f(x) = |x - 1|$ in [0, 2].

xix. If $f \cdot g$ is continuous at $x = a$, then f and g are separately continuous at $x = a$.

xx. The maximum value of $\sin x + \cos x$ is $\sqrt{2}$.

SECTION – B

3. Find the values of a, b, c, d from the equation:

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

4. A stone is dropped into a quiet lake and waves move in circles at the speed of 5 cm/s. At the instant when the radius of the circular wave is 8 cm, how fast is the enclosed area increasing?

5. Show that the Show that the function $f : \mathbf{R} \to \mathbf{R}$, defined as $f(x) = x^2$, is neither one-one nor onto.

6. Show that:

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

7. Find a point on the curve $y = (x - 2)^2$ at which the tangent is parallel to the chord joining the points (2, 0) and (4, 4).

SECTION – C

8. Find the approximate value of $f(3.02)$, where $f(x) = 3x^2 + 5x + 3$.

9. Consider the binary operations $* : \mathbf{R} \times \mathbf{R} \to \mathbf{R}$ and $o : \mathbf{R} \times \mathbf{R} \to \mathbf{R}$ defined as $a * b = |a - b|$ and $a \, o \, b = a$, $\forall$ $a, b \in \mathbf{R}$. Show that * is commutative but not associative, o is associative but not commutative. Further, show that $\forall$ $a, b, c \in \mathbf{R}$, $a * (b \, o \, c) = (a * b) \, o \, (a * c)$.

10. If $y = 3e^{2x} + 2e^{3x}$, prove that

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0.$$

11. Prove that:

$$\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$$

12. Verify Mean Value Theorem, if $f(x) = x^2 - 4x - 3$ in the interval $[a, b]$, where $a = 1$ and $b = 4$.

SECTION – D

13. The sum of three numbers is 6. If we multiply third number by 3 and add second number to it, we get 11. By adding first and third numbers, we get double of the second number. Represent it algebraically and find the numbers using matrix method.

14. Find $\frac{dy}{dx}$ if $y^x + x^y + x^x = a^b$.

15. A square piece of tin of side 18 cm is to be made into a box without top, by cutting a square from each corner and folding up the flaps to form the box. What should be the side of the square to be cut off so that the volume of the box is the maximum possible.

16. A window is in the form of a rectangle surmounted by a semicircular opening. The total perimeter of the window is 10 m. Find the dimensions of the window to admit maximum light through the whole opening.

17. Using properties of determinants, prove that

$$\begin{vmatrix} \alpha & \alpha^2 & \beta+\gamma \\ \beta & \beta^2 & \gamma+\alpha \\ \gamma & \gamma^2 & \alpha+\beta \end{vmatrix} = (\beta-\gamma)\ (\gamma-\alpha)\ (\alpha-\beta)\ (\alpha+\beta+\gamma)$$

"ALL THE VERY BEST"

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