Y–12–Y

Roll No. .....

Total No. of Questions : 29]

[*Total No. of Printed Pages* : 8

XIARJKUT23
9212–Y
MATHEMATICS

Time : 3.00 Hours]

[Maximum Marks : 100

Section–A

(Objective Type Questions) 1 each

1. Domain of the function $f(x) = -|x|$ is :

   (A) $(0, \infty)$

   (B) $(-\infty, 0)$

   (C) $(-\infty, \infty)$

   (D) None of these

2. y-coordinate in zx-plane is zero. (True/False)

3. Real part of $-i$ = ...

4. If P(not A) = $\frac{1}{3}$, find P(A).

Section-B

(Very Short Answer Type Questions) 2 each

5. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {1, 2, 3, 4}, B = {2, 4, 6, 8}, verify $(A \cap B)' = A' \cup B'$.

6. Find the value of cosec (–1410°)

7. Find the solution of linear inequation $3(x - 1) \geq 2(x - 3)$.

8. Evaluate :

$$\lim_{x \to \pi} \frac{\sin(\pi - x)}{\pi(\pi - x)}$$

9. Find the derivative of $x^5(3 - 6x^{-9})$ w.r.t. x

10. Using binomial theorem evaluate $(101)^4$.

11. Find the equation of straight line passing through the points (–1, 1) and (2, –4).

12. If the sum of a certain number of terms of an A.P. 25, 22, 19, ... is 116. Find the number of terms.

Section–C

(Short Answer Type Questions) 4 each

13. In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many people can speak both Hindi and English ?

14. Prove the following by using the principle of Mathematical induction for all $n \in N$:

$$1^2 + 3^2 + 5^2 + \ldots\ldots\ldots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

15. Find the general solution of the trigonometric equation :

$$\sin x + \sin 3x + \sin 5x = 0$$

16. Find the coordinates of the foot of perpendicular from the point (–1, 3) to the line $3x - 4y - 16 = 0$.

17. Convert the complex number $Z = \frac{1+7i}{(2-i)^2}$ in polar form.

18. Find the equation of parabola having vertex (0, 0), passing through (2, 3) and axis is along x-axis.

19. Find the ratio in which the yz-plane divides the line segment formed by joining the points (–2, 4, 7) and (3, –5, 8).

20. (a) Write the negation of the following statements :

    (i) Chennai is the capital of Tamil Nadu.

    (ii) The number 2 is greater than 7.

    (b) Write each of the following statements in the form 'if-then' :

    (i) You get a job implies that your credentials are good.

    (ii) A quadrilateral is a parallelogram if its diagonals bisect each other.

21. A card is selected from a pack of 52 cards :

    (a) Find the probability that the card is an ace of spade.

    (b) Find the probability that the card is an ace.

    (c) Find the probability that the card is a black.

Or

If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and P(E and F) = $\frac{1}{8}$, find :

(i) P(E or F)

(ii) P(not E and not F)

22. In the expansion of $(1 + a)^{m+n}$, prove that coefficients of a^m and a^n are equal.

Or

Find the 13th term in the expansion of :

$$\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}, \quad x \neq 0$$

23. Let A = {1, 2, 3, 4, 6} and R be the relation on A defined as R = {(*a*, *b*) : *a*, *b* $\in$ A, *b* is exactly divisible by *a*) :

(i) Write R in roaster form

(ii) Find the domain of R

(iii) Find the range of R

Or

Let f be a subset of $z \times z$ defined by $f : \{(ab, a + b) : a, b \in z\}$ where z is a set of integer. Is f a function from z to z ? Justify your answer.

Section–D

(Long Answer Type Questions) 6 each

24. If $\cot x = \frac{3}{4}$, x lies in 3rd quadrant find the values of other five trigonometric functions.

Or

Prove that :

$$2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$$

25. Find r, if $5.{}^4P_r = 6.{}^5P_{r-1}$.

Or

In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers ?

26. Find sum of n terms of two A.P's are in the ratio $5n + 4 : 9n + 6$. Find the ratio of their 18th terms.

Or

In a, b, c, d are in G.P., show that :

$$(a^2 + b^2 + c^2)(b^2 + c^2 + d^2) = (ab + bc + cd)^2$$

27. Find the derivative of the function $f(n) = \frac{x+1}{x-1}$ from first principle.

Or

If $f(x) = \frac{4x + 5\sin x}{3x + 7\cos x}$, find $f'(x)$.

28. Find the equation of ellipse with length of minor axis 16 and foci $(0, \pm 6)$.

Or

Find the coordinates of the foci, vertices, the eccentricity and the length of the latus rectum of the hyperbola $5y^2 - 9x^2 = 36$.

29. Find the mean and variance for the following frequency distribution :

Classes	Frequencies
0—10	5
10—20	8
20—30	15
30—40	16
40—50	6