

**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  $-i = \dots\dots\dots$

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

**XIARJKUT23-9212-Y**

**Turn Over**

**Y-12-Y**

## 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

$$(A \cap B)^c = A^c \cup B^c.$$

6. Find the value of  $\operatorname{cosec}(-1410^\circ)$

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

8. Evaluate :

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

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  $n \in \mathbb{N}$  :

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

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.

**Turn Over**

XIARJKUT23-9212-Y  
Y-12-Y

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.

( 5 )

Or

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

find :

(i)  $P(E \text{ or } F)$

(ii)  $P(\text{not } E \text{ and not } F)$

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  $R = \{(a, b) :$

$a, b \in A, b \text{ is exactly divisible by } a\}$ :

(i) Write R in roster form

(ii) Find the domain of R

(iii) Find the range of R

Turn Over

XIARJKUT23-9212-Y  
Y-12-Y

( 6 )

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  $5 \cdot {}^4P_r = 6 \cdot {}^5P_{r-1}$ .

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 ?

XIARJKUT23-9212-Y

Y-12-Y

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  $f(x) = \frac{x+1}{x-1}$  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  $5y^2 - 9x^2 = 36$ .

XIAR/KUT23-9212-Y

Y-12-Y

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

<https://www.jkboseonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

XIAR/KUT23-9212-Y

**Y-12-Y**