

Roll No.

Z-7-A

Total No. of Questions : 31]

[Total No. of Printed Pages : 8

11th ARF(SZ)JKUT2024-25
207-A
MATHEMATICS

[Maximum Marks : 80

Time : 3 Hours]

General Instructions :

- (i) This question paper contains 4 Sections A, B, C and D. Each Section is compulsory.
- (ii) **Section-A** : Q. No. 1 to 10 comprises of 10 questions of 1 mark each.
- (iii) **Section-B** : Q. No. 11 to 20 comprises of 10 Very Short Answer (V.S.A.) type questions of 2 marks each.
- (iv) **Section-C** : Q. No. 21 to 28 comprises of 8 Short Answer (S.A.) type questions of 4 marks each.
- (v) **Section-D** : Q. No. 29 to 31 comprises of 3 Long Answer (L.A.) type questions of 6 marks each.

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Turn Over

Section-A

(Objective Type/ Multiple Choice Questions)

1 each

1. If $X = \{0, -1\}$ then $P(A)$ has :
(A) 4 elements
(B) 3 elements
(C) 2 elements
(D) 6 elements
2. The domain of the function $f : \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = \sqrt{x^2 - 4}$ is :
(A) $[0, 4]$
(B) $[-2, 2]$
(C) $(-2, 2)$
(D) $(4, 0)$
3. $\cos x = 0.6$ for some value of x in its domain. (True/False)
4. i^{8k+6} is equal to :
(A) $-i$
(B) 1
(C) -1
(D) i

5. The value of $\frac{n!}{(n-r)!}$, when $n = 5$, $r = 2$ is :
- (A) 20
- (B) 10
- (C) 30
- (D) 15
6. The coordinates of the foci of the ellipse $\frac{x^2}{100} + \frac{y^2}{9} = 1$ are
7. The equation of the parabola with focus $(0, -3)$ and directrix $y = 3$ is
8. The solution of the inequality $7x - 8 \geq 6$ is :
- (A) $[2, \infty)$
- (B) $(2, 8)$
- (C) $[4, \infty)$
- (D) $(14, \infty)$
9. Define secondary data.

(4)

10. For an event A if

$$P(A) = \frac{3}{5}$$

then $P(A')$ is equal to :

(A) $\frac{7}{8}$

(B) $\frac{5}{3}$

(C) $\frac{2}{3}$

(D) $\frac{2}{5}$

Section-B

(Very Short Answer Type Questions)

2 each

11. Form all the subsets of the set $\{-1, 0, 1\}$.

12. If

$$X = \{3, 5, 7, 9, 11, 13\}$$

$$Y = \{1, 2, 3, 4, 5, 6\}$$

then find $X - Y$ and $Y - X$.

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13. Find the equation of line through $(-2, 3)$ with slope -4 .

14. Find the centre and the radius of the circle

$$x^2 + y^2 - 4x - 8y - 45 = 0.$$

15. Find the equation of the ellipse with ends of major axis $(0, \pm\sqrt{5})$ and ends of minor axis $(\pm 1, 0)$.

16. Prove that :

$$\cos 3x = 4 \cos^3 x - 3 \cos x.$$

17. If A and B are events such that :

$$P(A) = 0.42$$

$$P(B) = 0.48$$

and

$$P(A \text{ and } B) = 0.16$$

then determine $P(A \text{ or } B)$.

18. Find the mean deviation about the median of the data :
36, 72, 46, 42, 60, 45, 53, 46, 51, 49.

19. Find n , if

$${}^{n-1}P_3 : {}^nP_4 = 1 : 9.$$

20. Find which term of the sequence :

$$2, 2\sqrt{2}, 4, \dots, \text{is } 128.$$

Section-C

(Short Answer Type Questions)

4 each

21. If

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$A = \{2, 4, 6, 8\}$$

and

$$B = \{2, 3, 5, 7\}$$

verify that :

$$(A \cap B)' = A' \cup B'.$$

22. Prove that :

$$2 \sin^2 \frac{\pi}{6} + \operatorname{cosec}^2 \frac{7\pi}{6} \cos^2 \frac{\pi}{3} = \frac{3}{2}$$

(7)

23. Represent

$$Z = 1 + i\sqrt{3}$$

in the polar form.

24. Solve the inequality :

$$\frac{1}{2} \left(\frac{3x}{5} + 4 \right) \geq \frac{1}{3} (x - 6)$$

25. Find the distance between the parallel lines :

$$15x + 8y - 34 = 0$$

and

$$15x + 8y + 31 = 0$$

26. Evaluate :

$$\lim_{x \rightarrow 2} \left[\frac{x^3 - 4x^2 + 4x}{x^2 - 4} \right]$$

27. If

$$y = \frac{px^2 + qx + r}{ax + b}$$

find :

$$\frac{dy}{dx}$$

28. From a committee of 8 persons, in how many ways can we choose a chairman and a vice chairman assuming one person cannot hold more than one position ?

Section-D**(Long Answer Type Questions)**

6 each

29. Prove that :

$$\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$$

Or

Find the general solution of the equation :

$$\cos 3x + \cos x - \cos 2x = 0$$

30. The sum of n terms of two arithmetic progressions are in the ratio :

$$5n + 4 : 9n + 6$$

Find the ratio of their 18th terms. <https://www.jkboseonline.com>

Or

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

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

31. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

Or

Find the mean and variance for the frequency distribution table :

Diameters	No. of Circles
33—36	15
37—40	17
41—44	21
45—48	22
49—52	55