

Roll No.

Z-7-C

[Total No. of Printed Pages : 8]

Total No. of Questions : 31]

11th ARF(SZ) JKUT 2024-25
207-C

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.

11th ARF(SZ) JKUT 2024-25

207-C

Turn Over

Z-7-C

Section-A

(Objective Type/Multiple Choice Questions)

1 each

1. If $Y = \{-1, 0, 1\}$, then $P(A)$ has :
 - (A) 8 elements
 - (B) 6 elements
 - (C) 4 elements
 - (D) 3 elements
2. The domain of the function $f : \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = \sqrt{x^2 - 9}$ is :
 - (A) $(0, 3]$
 - (B) $[-3, 3]$
 - (C) $(-3, 0]$
 - (D) $(-3, 3)$
3. $\tan x = 4$ for some value of x in its domain. (True/False)
4. The value of $i^{18} + i^{16} + 1$ is :
 - (A) 1
 - (B) -1
 - (C) $-i$
 - (D) i

5. The value of $\frac{n!}{(n-r)!}$, when $n = 6$, $r = 3$ is :
- (A) 230
(B) 220
(C) 120
(D) 130
6. The coordinates of the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{36} = 1$ are
7. The equation of the parabola with focus $(-2, 0)$ and vertex $(0, 0)$ is
8. The solution of the inequality $5x + 4 > -6$ is :
- (A) $[-2, \infty)$
(B) $(-2, -\infty)$
(C) $(-8, -2)$
(D) $(-\infty, -2]$
9. Define primary data.

(4)

10. For an event F if

$$P(F') = \frac{7}{8}$$

then $P(F)$ is equal to :

- (A) $\frac{1}{8}$
- (B) $\frac{1}{4}$
- (C) $\frac{3}{8}$
- (D) $\frac{5}{8}$

Section-B

(Very Short Answer Type Questions)

2 each

11. Form all the subsets of the set $A = \{a, b, c\}$.

12. If

$$P = \{1, 2, 3, 4, 5, 7\}$$

$$Q = \{2, 3, 5, 9, 11\}$$

then find $P - Q$ and $Q - P$.

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13. Find the equation of the line passing through the points $(-1, 1)$ and $(2, -4)$.

14. Find the centre and the radius of the circle

$$x^2 + y^2 - 8x + 10y - 12 = 0.$$

15. Find the equation of the ellipse whose vertices are $(\pm 13, 0)$ and foci $(\pm 5, 0)$.

16. Prove that :

$$\tan 3x = \frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x}$$

17. If A and B are events such that :

$$P(A) = 0.5$$

$$P(B) = 0.35$$

and

$$P(A \text{ or } B) = 0.7$$

then find $P(A \text{ and } B)$.

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 :

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

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

Roll No.

Z-7-A

Total No. of Questions : 31]

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11th ARF(SZ)JKUT2024-25
207-A
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[Maximum Marks : 80

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

Z-7-A

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 :

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

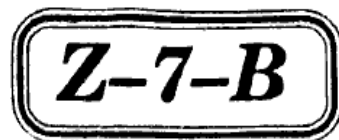
31. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

Or

Find the mean and variance for the frequency distribution table :

Diameters	No. of Circles
33—36	15
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11th ARF(SZ) JKUT 2024-25

207-B

Turn Over

Z-7-B

(Objective Type/Multiple Choice Questions)

1 each

1. For the set $A = \{1, 2, 3\}$ $P(A)$ has :

- (A) 3 elements
- (B) 4 elements
- (C) 6 elements
- (D) 8 elements

2. The domain of the function $f : \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = \sqrt{x^2 - 16}$ is :

- (A) $(-4, 0)$
- (B) $[-4, 4]$
- (C) $(0, 4)$
- (D) $[4, \infty)$

3. $\sin x = 2$ for some value of x in its domain.

(True/False)

4. i^{4k+3} is equal to :

- (A) $-i$
- (B) -1
- (C) 1
- (D) i

5. ${}^nC_r + {}^nC_{r-1}$ is equal to :
- (A) ${}^{n+1}C_{r-1}$
- (B) ${}^{n+1}C_r$
- (C) ${}^nC_{r+1}$
- (D) ${}^{n-1}C_{r-1}$
6. The coordinates of the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are
7. The equation of the parabola with focus (6, 0) and directrix $x = -6$ is
8. The solution of the inequality $4x - 3 > 7$ is the interval :
- (A) $(2, \infty)$
- (B) $[2, 2.5]$
- (C) $(2.5, \infty)$
- (D) $(7, 10)$
9. Define range.

10. For an event E, if

$$P(E) = \frac{1}{5}$$

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

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

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

(C) $\frac{1}{3}$

(D) $\frac{4}{5}$

Section-B

(Very Short Answer Type Questions)

2 each

11. Form all the subsets of the set $\{1, 2, 3\}$.

12. If

$$A = \{2, 4, 6, 8, 10, 12\}$$

and

$$B = \{4, 8, 16\}$$

find $A - B$ and $B - A$.

13. Find the angle between the X-axis and the line joining the points (3, -1) and (4, -2).

14. Find the centre and the radius of the circle

$$x^2 + y^2 + 8x + 10y - 8 = 0.$$

15. Find the equation of the ellipse having the ends of major axis ($\pm 3, 0$) and the ends of minor axis ($0, \pm 2$).

16. Prove that :

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

17. If

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

and

$$P(B) = \frac{1}{5}$$

find $P(A \text{ or } B)$ when A and B are mutually exclusive events.

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,, is 128.

Section-C

(Short Answer Type Questions)

4 each

21. If

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

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