



INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2022
MATHEMATICS - (Code-041)



CLASS: XI
DATE: 19-11-22

TIME ALLOTTED: 3 HRS.
MAXIMUM MARKS: 80

GENERAL INSTRUCTIONS:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

SECTION A (Multiple Choice Questions)

Each question carries 1 mark

1. The value of $\sec^2\theta + \operatorname{cosec}^2\theta$ is equal to
(a) $\tan^2\theta + \cot^2\theta$ (b) $\sec^2\theta \operatorname{cosec}^2\theta$ (c) $\sec \theta \operatorname{cosec} \theta$ (d) $\sin^2\theta \cos^2\theta$
2. A positive value of m for which the coefficient of x^2 in the expansion $(1+x)^m$ is 6, is
(a) 3 (b) 4 (c) 0 (d) None of these
3. Find the value of $\sin(40^\circ + \theta) \cos(10^\circ + \theta) - \cos(40^\circ + \theta) \sin(10^\circ + \theta)$.
(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) 1 (d) 0
4. If $-8 \leq 5x - 3 < 7$, then $x \in$ -----
(a) $(-1, 2)$ (b) $[-1, 2)$ (c) $[-2, \infty)$ (d) $[-2, 0)$
5. The number of six-digit numbers, whose all digits are odd is-----
(a) 6^5 (b) 5^6 (c) $\frac{6!}{2!}$ (d) None of these
6. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$ then find the value of x .
(a) 90 (b) 100 (c) 80 (d) 9
7. If ${}^nC_9 = {}^nC_8$, then find ${}^nC_{17}$
(a) 1 (b) 2 (c) 0 (d) 3

8. A coin is tossed twice. If the second throw results in a tail, a die is thrown. Then, the total number of possible outcomes of this experiment is
 (a) 11 (b) 13 (c) 14 (d) 16
9. If A and B are any two events, then $P(A \cap B') =$ -----
 (a) $P(A) + P(B')$ (b) $P(A) + P(A \cap B)$ (c) $P(B) - P(A \cap B)$ (d) $P(A) - P(A \cap B)$
10. If A and B be any two sets, then $A \cap (A \cup B)'$ is equal to
 (a) A (b) B (c) \emptyset (d) None of these
11. Which of the following is a null set?
 (a) $\{0\}$ (b) $\{x: x > 0 \text{ or } x < 0\}$ (c) $\{x: x^2 = 4 \text{ or } x = 3\}$ (d) $\{x: x^2 + 1 = 0, x \in \mathbb{R}\}$
12. Let $A = \{x, y, z\}$ and $B = \{a, b, c, d\}$. Then, which one of the following is not a relation from A to B?
 (a) $\{(x, a), (x, c)\}$ (b) $\{(y, c), (y, d)\}$ (c) $\{(z, a), (z, d)\}$ (d) $\{(z, b), (y, b), (a, d)\}$
13. Domain of $\sqrt{3^2 - x^2}$, is
 (a) $(-3, 3)$ (b) $[-3, 3]$ (c) $[0, 3]$ (d) $(-3, 0]$
14. If $A = \{a, b, c\}$, $B = \{b, c, d\}$ and $C = \{a, d, c\}$, then $(A - B) \times (B \cap C) =$ -----
 (a) $\{(a, c), (a, d)\}$ (b) $\{(a, b), (c, d)\}$ (c) $\{(c, a), (a, d)\}$ (d) $\{(a, c), (a, d), (b, d)\}$
15. The value of $(1+i)^4 \left(1 + \frac{1}{i}\right)^4$ is
 (a) 12 (b) 2 (c) 8 (d) 16
16. If $z = 1 + i$, then the multiplicative inverse of z^2 is (where, $i = \sqrt{-1}$)
 (a) $2i$ (b) $1-i$ (c) $\frac{-i}{2}$ (d) $\frac{i}{2}$
17. If $A + B = \frac{\pi}{4}$, then value of $(1 + \tan A)(1 + \tan B)$ equals
 (a) 1 (b) 2 (c) -2 (d) -1
18. If mean of the n observations $x_1, x_2, x_3, \dots, x_n$ be \bar{x} , then the mean of n observations $2x_1 + 3, 2x_2 + 3, 2x_3 + 3, \dots, 2x_n + 3$ is
 (a) $3\bar{x} + 2$ (b) $2\bar{x} + 3$ (c) $\bar{x} + 3$ (d) $2\bar{x}$

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.

19. **Assertion:** If sample space of an experiment is $S = \{1, 2, 3, 4, 5, 6\}$ and the events A and B are defined as
 A: "a number less than or equal to 3 appears".
 B: "a number greater than or equal to 3 appears", then A and B are exhaustive events.
Reason: Events are exhaustive if at least one of them necessarily occurs whenever the experiment is performed.

20. **Assertion:** The number of non-empty subsets of the set $\{a, b, c, d\}$ are 15.
Reason: Number of non-empty subsets of a set having n elements are $2^n - 1$

SECTION B

This section comprises of very short answer type-questions (VSA) of 2 marks each.

21. Solve the system of inequalities $3x - 7 < 5 + x$ and $11 - 5x \leq 1$
22. A convex polygon has 65 diagonals. Find the number of sides of the polygon.
23. How many 3-digits even numbers can be formed from the digits 1, 2, 3, 4, 5, 6, if the digits can be repeated?

OR

How many words, each of 3 vowels and 2 consonants can be formed from the letters of the word 'INVOLUTE'?

24. Find the value of $\cos 55^\circ + \cos 125^\circ + \cos 300^\circ$

OR

If $5 \sin x = 3$, x lies in 1st quadrant, then find the value of $\frac{\sec x + \tan x}{\sec x - \tan x}$

25. If $z = 2 + i$, then evaluate $(z-1)(\bar{z}-5) + (\bar{z}-1)(z-5)$

SECTION C

This section comprises of short answer type questions (SA) of 3 marks each.

26. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$ and $\cos B = -\frac{12}{13}$, $\pi < B < \frac{3\pi}{2}$ then find $\sin(A - B)$.

OR

Prove that: $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$

27. Prove that: $\frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

28. Find the conjugate of $\frac{2-i}{(1-2i)^2}$

OR

Solve the quadratic equation: $9x^2 - 4x + 20 = 0$

29. The length of a rectangle is three times the breadth. If the minimum perimeter of the rectangle is 160 cm, then what can you say about the breadth?

30. Using binomial theorem evaluate: $(99)^4$

31. Calculate the mean deviation from the median of the following data:

| | | | | | |
|-----------|-------|--------|---------|---------|---------|
| Classes | 0 - 6 | 6 - 12 | 12 - 18 | 18 - 24 | 24 - 30 |
| Frequency | 8 | 10 | 12 | 9 | 5 |

OR

Find the mean deviation about the mean of the following data:

| | | | | | | | |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| Marks | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| No of students | 2 | 3 | 8 | 14 | 8 | 3 | 2 |

SECTION D

This section comprises of long answer-type questions (LA) of 5 marks each

32. In a group of 100 people 65 like to play Cricket ,40 like to play Tennis and 55 like to play Volley ball. All of them like to play at least one of the three games. If 25 like to play both Cricket and Tennis ,24 like to play both Tennis and Volley ball and 22 like to play both Cricket and Volley ball, then
- how many likes to play all three games?
 - how many likes to play Cricket only?
 - how many likes to play Tennis only?
 - how many likes to play Volley ball only?
 - Represent the above information in a Venn diagram.

33. Prove that: $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

OR

Prove that: $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\sin 4x \cos 2x \cos x$

34. Using binomial theorem, expand $[(x + y)^5 + (x - y)^5]$ and hence find the value of $[(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5]$

35. Calculate mean, variance and standard deviation for the following frequency distribution.

| | | | | | | | |
|-----------|------|-------|-------|--------|---------|---------|---------|
| Class | 0-30 | 30-60 | 60-90 | 90-120 | 120-150 | 150-180 | 180-210 |
| Frequency | 2 | 3 | 5 | 10 | 3 | 5 | 2 |

OR

The mean and standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking it was found that an observation 8 was incorrect. Find the correct mean, variance and standard deviation when the wrong item is replaced by 12.

SECTION E

This section comprises of 3 case study/passage – based questions of 4 marks each with two sub parts. First two case study questions have 3 sub – parts (i), (ii), (iii) of marks 1,1, 2 respectively. The third case study has two sub - parts of 2 marks each.

36. Two friends Ajay and Rahul are playing cards. Ajay asks Rahul to choose any four cards from a pack of 52 cards.

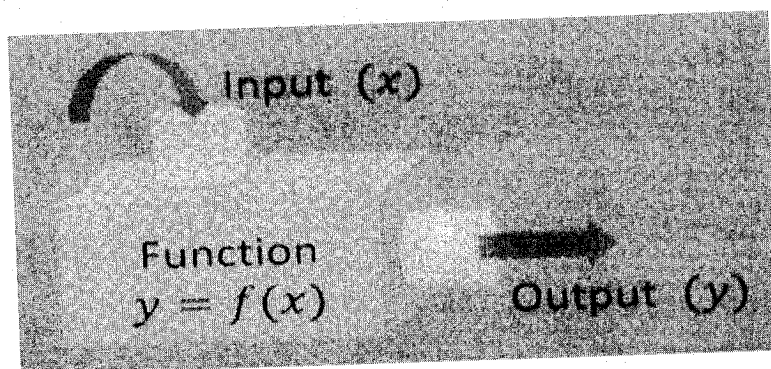


- (i) In how many ways can he select all face cards?
- (ii) In how many ways can he select 2 red and 2 black cards?
- (iii) In how many ways Rahul can select all 4 cards from the same suit?

OR

- (iii) In how many ways can he select all 4 cards from different suits?

37. We can easily visualize a function as a machine, which produces a new element $y = f(x)$, if an element x was put in it.

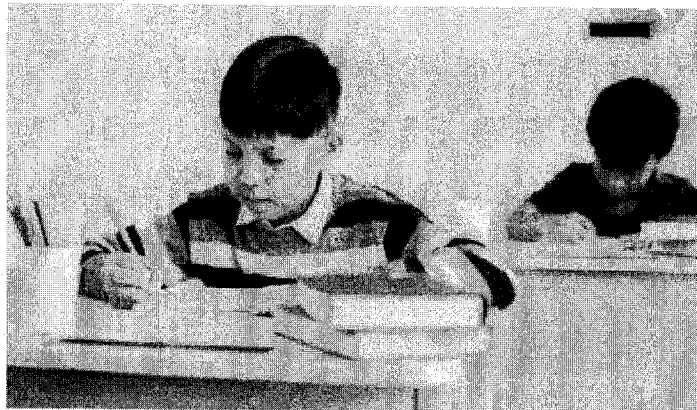


- (i) What will be the output of 3.5, if the function in the machine is $f(x) = [x]$?
- (ii) What will be the input, if output for the function $f(x) = \sqrt{x}$ in the machine is 2.5?
- (iii) If ordered pairs in a relation are (1,2), (1,3), (2,3), (3,4), can we say that these belong to any such machine? Justify your answer.

OR

- (iii) If $x \in \mathbb{R}$, and function in the machine is $f(x) = |x|$, then what would be range of the function?

38. Two students Anil and Akshay appeared in an examination. The probability that Anil qualify the examination is 0.05 and that Akshay will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Based on the information answer the following questions.



- (i) Find the probability that at least one of them will qualify the examination.
- (ii) Find the probability that only one of them will qualify the examination.

*****END OF THE QUESTION PAPER*****

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| ROLL NUMBER | | | | |
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| SET | B |
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SECTION A (Multiple Choice Questions)

Each question carries 1 mark

1. If $-8 \leq 5x - 3 < 7$, then $x \in$ -----
(a) $(-1, 2)$ (b) $[-1, 2)$ (c) $[-2, \infty)$ (d) $[-2, 0)$
2. The number of six-digit numbers, whose all digits are odd is-----
(a) 6^5 (b) 5^6 (c) $\frac{6!}{2!}$ (d) None of these
3. A coin is tossed twice. If the second throw results in a tail, a die is thrown. Then, the total number of possible outcomes of this experiment is
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5. If A and B be any two sets, then $A \cap (A \cup B)'$ is equal to
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6. Find the value of $\sin(40^\circ + \theta) \cos(10^\circ + \theta) - \cos(40^\circ + \theta) \sin(10^\circ + \theta)$.
(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) 1 (d) 0

7. A positive value of m for which the coefficient of x^2 in the expansion $(1 + x)^m$ is 6, is
 (a) 3 (b) 4 (c) 0 (d) None of these
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15. If mean of the n observations $x_1, x_2, x_3, \dots, x_n$ be \bar{x} , then the mean of n observations $2x_1 + 3, 2x_2 + 3, 2x_3 + 3, \dots, 2x_n + 3$ is
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18. Domain of $\sqrt{4^2 - x^2}$, is
 (a) $(-4, 4)$ (b) $[-4, 4]$ (c) $[0, 4]$ (d) $(-4, 0]$

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In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

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19. **Assertion:** If sample space of an experiment is $S = \{1, 2, 3, 4, 5, 6\}$ and the events A and B are defined as

A: "a number less than or equal to 3 appears".

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Reason: Number of non-empty subsets of a set having n elements are $2^n - 1$

SECTION B

This section comprises of very short answer type-questions (VSA) of 2 marks each

21. How many 3-digits even numbers can be formed from the digits 1, 2, 3, 4, 5, 6, if the digits can be repeated?

OR

How many words, each of 3 vowels and 2 consonants can be formed from the letters of the word 'INVOLUTE'?

22. Find the value of $\cos 55^\circ + \cos 125^\circ + \cos 300^\circ$

OR

If $5 \sin x = 3$, x lies in 1st quadrant, then find the value of $\frac{\sec x + \tan x}{\sec x - \tan x}$

23. Solve for the real x : $\frac{4+2x}{3} \geq \frac{x}{2} - 3$

24. If $z = 2 - i$, then evaluate $(z-1)(\bar{z}-5) + (\bar{z}-1)(z-5)$

25. Everybody in a room shakes hands with everybody else. The total number of handshakes is 66. Find the total number of persons in the room.

SECTION C

This section comprises of short answer type questions (SA) of 3 marks each

26. Using binomial theorem expand: $\left(2x - \frac{3}{x}\right)^6$

27. Calculate the mean deviation from the median of the following data:

| Classes | 0 - 6 | 6 - 12 | 12 - 18 | 18 - 24 | 24 - 30 |
|-----------|-------|--------|---------|---------|---------|
| Frequency | 8 | 10 | 12 | 9 | 5 |

OR

Find the mean deviation about the mean of the following data:

| Marks | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| No of students | 2 | 3 | 8 | 14 | 8 | 3 | 2 |

28. A solution is to be kept between 40°C and 45°C . What is the range of temperature in Fahrenheit, if the conversion formula is $F = \frac{9}{5}C + 32$?

29. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$ and $\cos B = -\frac{12}{13}$, $\pi < B < \frac{3\pi}{2}$ then find $\sin(A - B)$.

OR

Prove that: $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$

30. Find the conjugate of $\frac{2-i}{(1-2i)^2}$

OR

Solve the quadratic equation: $9x^2 - 4x + 20 = 0$

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SECTION D

This section comprises of long answer-type questions (LA) of 5 marks each

32. Using binomial theorem, expand $[(x + y)^5 + (x - y)^5]$ and hence find the value of $[(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5]$
33. Calculate mean, variance and standard deviation for the following frequency distribution.

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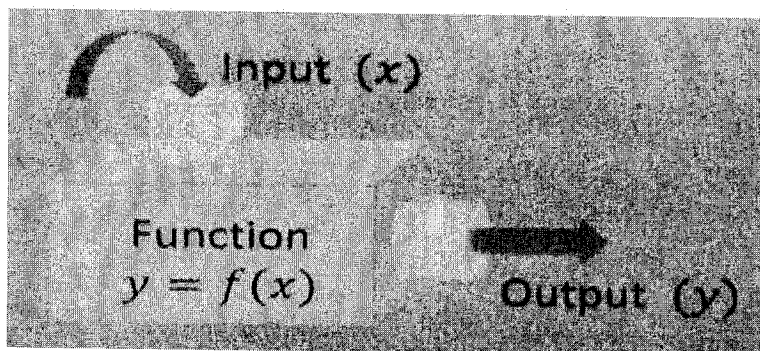
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Prove that: $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

SECTION E

This section comprises of 3 case study/passage – based questions of 4 marks each with two sub parts. First two case study questions have 3 sub – parts (i), (ii), (iii) of marks 1,1,2 respectively. The third case study has two sub - parts of 2 marks each.

36. We can easily visualize a function as a machine, which produces a new element $y = f(x)$, if an element x was put in it.



- (i) What will be the output of 2.8, if the function in the machine is $f(x) = [x]$?
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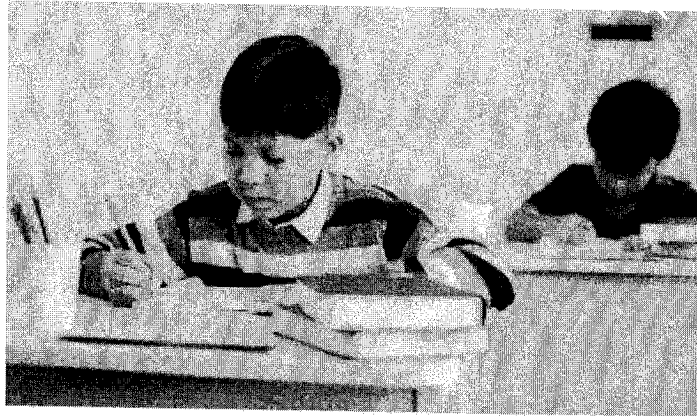
- (i) In how many ways can he select all face cards?
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| | | | | |
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| ROLL NUMBER | | | | |
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| | |
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| SET | C |
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 (a) $\{0\}$ (b) $\{x: x > 0 \text{ or } x < 0\}$ (c) $\{x: x^2 = 4 \text{ or } x = 3\}$ (d) $\{x: x^2 + 1 = 0, x \in \mathbb{R}\}$
8. If $A = \{a, b, c\}$, $B = \{b, c, d\}$ and $C = \{a, d, c\}$, then $(A - B) \times (B \cap C) =$ -----
 (a) $\{(a, c), (a, d)\}$ (b) $\{(a, b), (c, d)\}$ (c) $\{(c, a), (a, d)\}$ (d) $\{(a, c), (a, d), (b, d)\}$
9. Let $A = \{x, y, z\}$ and $B = \{a, b, c, d\}$. Then, which one of the following is not a relation from A to B?
 (a) $\{(x, a), (x, c)\}$ (b) $\{(y, c), (y, d)\}$ (c) $\{(z, a), (z, d)\}$ (d) $\{(z, b), (y, b), (a, d)\}$
10. If $z = 1 + i$, then the multiplicative inverse of z^2 is (where, $i = \sqrt{-1}$)
 (a) $2i$ (b) $1 - i$ (c) $\frac{-i}{2}$ (d) $\frac{i}{2}$
11. If ${}^nC_7 = {}^nC_8$, then find ${}^nC_{15}$
 (a) 1 (b) 2 (c) 0 (d) 3
12. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$ then find the value of x.
 (a) 90 (b) 100 (c) 80 (d) 9
13. If mean of the n observations $x_1, x_2, x_3, \dots, x_n$ be \bar{x} , then the mean of n observations $2x_1 + 3, 2x_2 + 3, 2x_3 + 3, \dots, 2x_n + 3$ is
 (a) $3\bar{x} + 2$ (b) $2\bar{x} + 3$ (c) $\bar{x} + 3$ (d) $2\bar{x}$
14. The value of $\sec^2\theta + \operatorname{cosec}^2\theta$ is equal to
 (a) $\tan^2\theta + \cot^2\theta$ (b) $\sec^2\theta \operatorname{cosec}^2\theta$ (c) $\sec \theta \operatorname{cosec} \theta$ (d) $\sin^2\theta \cos^2\theta$
15. If $-8 \leq 5x - 3 < 7$, then $x \in$ -----
 (a) $(-1, 2)$ (b) $[-1, 2)$ (c) $[-2, \infty)$ (d) $[-2, 0)$
16. If $A + B = \frac{\pi}{4}$, then value of $(1 + \tan A)(1 + \tan B)$ equals
 (a) 1 (b) 2 (c) -2 (d) -1
17. Find the value of $\sin(40^\circ + \theta) \cos(10^\circ + \theta) - \cos(40^\circ + \theta) \sin(10^\circ + \theta)$.
 (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) 1 (d) 0
18. A positive value of **m** for which the coefficient of x^2 in the expansion $(1 + x)^m$ is 6, is
 (a) 3 (b) 4 (c) 0 (d) None of these

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

19. **Assertion:** If sample space of an experiment is $S = \{1, 2, 3, 4, 5, 6\}$ and the events A and B are defined as
A: "a number less than or equal to 3 appears".
B: "a number greater than or equal to 3 appears", then A and B are exhaustive events.
Reason: Events are exhaustive if at least one of them necessarily occurs whenever the experiment is performed.

20. **Assertion:** The number of non-empty subsets of the set $\{a, b, c, d\}$ are 15.
Reason: Number of non-empty subsets of a set having n elements are $2^n - 1$

SECTION B

This section comprises of very short answer type-questions (VSA) of 2 marks each

21. If $5 \sin x = 3$, x lies in 1st quadrant, then find the value of $\frac{\sec x + \tan x}{\sec x - \tan x}$
OR
Find the value of $\sin \frac{31\pi}{3}$
22. If $z = 2 + i$, then evaluate $(z-1)(\bar{z}-5) + (\bar{z}-1)(z-5)$
23. A convex polygon has 65 diagonals. Find the number of sides of the polygon.
24. Solve: $7x + 3 < 5x + 9$. Represent the solution on a number line.
25. How many 3-digits even numbers can be formed from the digits 1, 2, 3, 4, 5, 6, if the digits can be repeated?

OR

How many words, each of 3 vowels and 2 consonants can be formed from the letters of the word 'INVOLUTE'?

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

26. Find the conjugate of $\frac{2-i}{(1-2i)^2}$
OR
Solve the quadratic equation: $9x^2 - 4x + 20 = 0$
27. Convert into radian measures: $5^\circ 37' 30''$
28. Using binomial theorem expand: $(99)^4$

29. In drilling world's deepest hole, it was found that the temperature T in degree Celsius, x km below the surface of Earth, was given by
 $T = 30 + 25(x - 3)$, $3 \leq x \leq 15$.
 If the required temperature lies between 200°C and 300°C , then the depth, ' x ' will lie between what limits.

30. Calculate the mean deviation from the median of the following data:

| | | | | | |
|-----------|-------|--------|---------|---------|---------|
| Classes | 0 - 6 | 6 - 12 | 12 - 18 | 18 - 24 | 24 - 30 |
| Frequency | 8 | 10 | 12 | 9 | 5 |

OR

Find the mean deviation about the mean of the following data:

| | | | | | | | |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| Marks | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| No of students | 2 | 3 | 8 | 14 | 8 | 3 | 2 |

31. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$ and $\cos B = -\frac{12}{13}$, $\pi < B < \frac{3\pi}{2}$ then find $\sin(A - B)$.

OR

Prove that: $\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = \sqrt{2} \cos x$

SECTION D

This section comprises of long answer-type questions (LA) of 5 marks each

32. Using binomial theorem, expand $[(x + y)^5 + (x - y)^5]$ and hence find the value of $[(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5]$

33.

| | | | | | | | |
|-----------|------|-------|-------|--------|---------|---------|---------|
| Class | 0-30 | 30-60 | 60-90 | 90-120 | 120-150 | 150-180 | 180-210 |
| Frequency | 2 | 3 | 5 | 10 | 3 | 5 | 2 |

OR

The mean and standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking it was found that an observation 8 was incorrect. Find the correct mean, variance and standard deviation when the wrong item is replaced by 12.

34. In a group of 100 people 65 like to play Cricket, 40 like to play Tennis and 55 like to play Volley ball. All of them like to play at least one of the three games. If 25 likes to play both Cricket and Tennis, 24 like to play both Tennis and Volley ball and 22 like to play both Cricket and Volley ball, then
 (i) how many likes to play all three games?
 (ii) how many likes to play Cricket only?
 (iii) how many likes to play Tennis only?
 (iv) how many likes to play Volley ball only?
 (v) Represent the above information in a Venn diagram.

35. Prove that: $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \sin 4x \cos 2x \cos x$

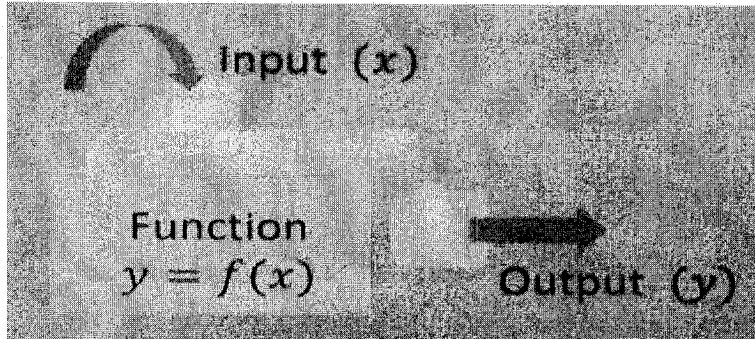
OR

If $\cos x = -\frac{12}{13}$ and $\pi < x < \frac{3\pi}{2}$, find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

SECTION E

This section comprises of 3 case study/passage – based questions of 4 marks each with two sub parts. First two case study questions have 3 sub – parts (i), (ii), (iii) of marks 1,1,2 respectively. The third case study has two sub - parts of 2 marks each.

36. We can easily visualize a function as a machine, which produces a new element $y = f(x)$, if an element x was put in it.



- (i) What will be the output of 4.6, if the function in the machine is $f(x) = [x]$?
- (ii) What will be the input, if output for the function $f(x) = \sqrt{x}$ in the machine is 2.2?
- (iii) If ordered pairs in a relation are (1,2), (1,3), (2,3), (3,4), can we say that these belongs to any such machine? Justify your answer.

OR

- (iii) If $x \in \mathbb{R}$, and function in the machine is $f(x) = |x|$, then what would be range of the function?

37. Two friends Ajay and Rahul are playing cards. Ajay asks Rahul to choose any four cards from a pack of 52 cards.

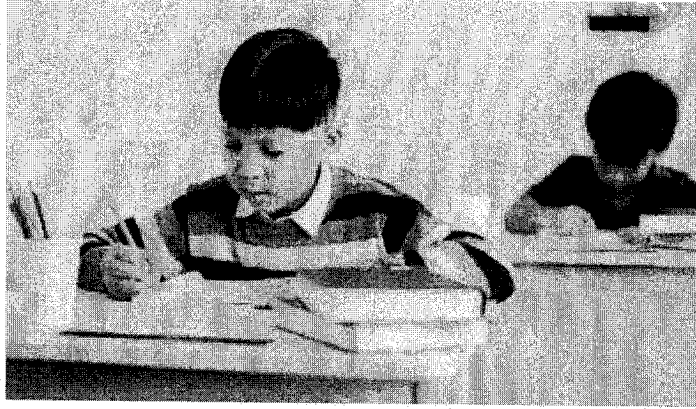


- (i) In how many ways can he select all face cards?
- (ii) In how many ways can he select 2 red and 2 black cards?
- (iii) In how many ways Rahul can select all 4 cards from the same suit?

OR

- (iii) In how many ways can he select all 4 cards from different suits?

38. Two students Anil and Akshay appeared in an examination. The probability that Anil qualify the examination is 0.05 and that Akshay will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Based on the information answer the following questions.



- (i) Find the probability that at least one of them will qualify the examination.
- (ii) Find the probability that only one of them will qualify the examination.

******END OF THE QUESTION PAPER******