TOP SCORER
POCKET MARKS PACKAGE
PUC I YEAR MATHEMATICS

AS PER NEW PATTERN 2023-2024

CHAPTERWISE
IMPORTANT QUESTIONS

QUESTIONS SELECTED FROM

- **DISTRICT LEVEL ALL QUESTION PAPERS**
- **ALL MODEL QUESTION PAPERS**
- **PRACTICE QUESTION PAPERS prepared by experts**
- **SAMPLE QUESTION PAPERS prepared by experts**
- **MOST LIKELY EXPECTED QUESTIONS**

PART-A : 1 MARK QUESTIONS (MCQ+FB)

PART-B : 2 MARKS QUESTIONS

PART-C : 3 MARKS QUESTIONS

PART-D : 5 MARKS QUESTIONS

PART-E : 6 MARKS QUESTIONS

PART-E : 4 MARKS QUESTIONS

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TOP SCORER

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SCORING PACKAGE AND PASSING PACKAGE

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QUESTION PAPER PATTERN

DESIGN OF QUESTION PAPER 2023-2024

PUC I YEAR MATHEMATICS (35)

Based on Part of Question Paper : Part-A, Part-B, Part-C, Part-D, Part-E

Part of Question paper	Type of Questions	Number of Questions to be set	Number of Questions to be answered	Remark	Marks
Part-A	1 Mark Questions	15 (MCQ) Questions (Q.01 to Q.15)	15	Answer All the Questions	$15 \times 1 = 15$
		5 (FB) Questions (Q.16 to Q.20)	5	Answer All the Questions	$5 \times 1 = 5$
Part-B	2 Marks Questions	11 Questions (Q.21 to Q.31)	6	Answer Any 6 out of 11 Question	$6 \times 2 = 12$
Part-C	3 Marks Questions	11 Questions (Q.32 to Q.42)	6	Answer Any 6 out of 11 Question	$6 \times 3 = 18$
Part-D	5 Marks Questions	8 Questions (Q.43 to Q.50)	4	Answer Any 4 out of 8 Question	$4 \times 5 = 20$
Part-E	6 Marks Questions	1 (a or b) Question (Q.51)	1 (a or b)	Answer Any 1 out of 2 Question (a or b)	$1 \times 6 = 6$
	4 Marks Questions	1 (a or b) Question (Q.52)	1(a or b)	Answer Any 1 out of 2 Question (a or b)	$1 \times 4 = 4$
	Total Questions	52	38		Total Marks 80

Based on R.U.A.H : R=Remember, U=Understand, A=Apply, H=Higher Order Skills

	Part-A		Part-B	Part-C	Part-D	Part-E		Total Questions	%
	1m(MCQ)	1m(FB)	2m(SA)	3m(SA)	5m(LA)	6m(LA)	4m(LA)		
Remember	7	3	3	3	4			20	38%
Understand	5	2	5	6	1		1(a or b)	20	38%
Apply			2	1	3			6	12%
Higher Order Thinking Skills	3		1	1		1(a or b)		6	12%
Total Number of Questions	15	5	11	11	8	1	1	52	
To Answer the Questions	15	5	6	6	4	1	1	38	

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PUC I YEARMATHEMATICS 2023-24

Time : 3hrs 15 min **Max Marks : 80**

Chapter Number and Chapter Name		Part-A		Part-B	Part-C	Part-D	Part-E		Total Marks
		1 mark (MCQ)	1 mark (FB)	2 mark (SA)	3 mark (SA)	5 mark (LA)	6 mark (LA)	4 mark (LA)	
1	Sets	1	-	2	1	-	-	-	8
2	Relations and Functions	1	1	-	1	1	-	-	10
3	Trigonometric Functions	1	1	1	2	1	1	-	21
4	Complex No and Quadratic Eq	1	-	2	1	-	-	-	8
5	Linear Inequality	1	-	1	1	-	-	-	6
6	Permutation and Combination	1	1	1	-	1	-	-	9
7	Binomial theorem	1	-	1	-	1	-	-	8
8	Sequence and Series	1	-	-	1	-	-	1	8
9	Straight Lines	1	1	1	1	1	-	-	12
10	Conic Section	2	-	-	1	-	1	-	11
11	Introduction to 3D Geometry	1	-	-	1	-	-	-	4
12	Limits and Derivatives	1	1	1	1	1	-	1	16
13	Statistics	1	-	-	-	1	-	-	6
14	Probability	1	-	1	-	1	-	-	8
	Total Number of Questions	15	5	11	11	8	2	2	Marks : 135 Questions : 52
	To Answer the Questions	15	5	6	6	4	1	1	Marks : 80 Questions : 38

How to score 80/80 Marks?

	Practice Question answers mentioned in this booklet	Marks
Part-A	All the Questions	20
Part-B	Choose atleast 6 questions out of 11 questions	12
Part-C	Choose atleast 6 questions out of 11 questions	18
Part-D	Choose atleast 4 questions out of 8 questions	20
Part-E	Both 51th question and 52th question	10
	Total Marks	80

How to score 50/80 Marks?

	Practice Question answers mentioned in this booklet	Marks
Part-A	Choose atleast 10 questions out of 20 questions	10
Part-B	Choose atleast 4 questions out of 11 questions	08
Part-C	Choose atleast 4 questions out of 11 questions	12
Part-D	Choose atleast 2 questions out of 8 questions	10
Part-E	Both 51th question and 52th question	10
	Total Marks	50

How to score 45/80 Marks?

	Practice Question answers mentioned in this booklet	Marks
Part-A	Choose atleast 5 questions out of 20 questions	05
Part-B	Choose atleast 2 questions out of 11 questions	04
Part-C	Choose atleast 2 questions out of 11 questions	06
Part-D	Choose atleast 2 questions out of 8 questions	10
Part-E	Both 51th question and 52th question	10
	Total Marks	35

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BLUE PRINT PUC I YEAR MATHEMATICS 2023-24

Based on **R**=Remember, **U**=Understand, **A**=Apply, **H**=Higher Order Thinking Skills

Time: 3hrs 15 min **Subject : Mathematics (35)** **Max Marks:80**

Chapter	Contents	Part-A		Part-B	Part-C	Part-D	Part-E		Total Marks
		1 mark (MCQ)	1 mark (FB)	2 mark (SA)	3 mark (SA)	5 mark (LA)	6 mark (LA)	4 mark (LA)	
1	Sets	1 (R) Q.1	-	1 (R) Q.21 1 (U) Q.22	1 (U) Q.32	-	-	-	8
2	Relations and Functions	1 (R) Q.2	1 (U) Q.16	-	1 (U) Q.33	1 (A) Q.43	-	-	10
3	Trigonometric Functions	1 (R) Q.3	1 (R) Q.17	1 (R) Q.23	1 (R) Q.34 1 (U) Q.35	1 (U) Q.44	1 (H) Q.51 (a or b)	-	21
4	Complex No and Quadratic Eq	1 (H) Q.4	-	1 (U) Q.24 1 (U) Q.25	1 (U) Q.36	-	-	-	8
5	Linear Inequality	1 (H) Q.5	-	1 (A) Q.26	1 (H) Q.37	-	-	-	6
6	Permutations and Combinations	1 (U) Q.6	1 (R) Q.18	1 (U) Q.27	-	1 (A) Q.45	-	-	9
7	Binomial theorem	1 (U) Q.7	-	1 (R) Q.28	-	1 (R) Q.46	-	-	8
8	Sequence and Series	1 (R) Q.8	-	-	1 (U) Q.38	-	-	1 (U) Q.52 (a or b)	8
9	Straight Lines	1 (R) Q.9	1 (R) Q.19	1 (H) Q.29	1 (R) Q.39	1 (R) Q.47	-	-	12
10	Conic Section	1 (R) Q.10 1 (U) Q.11	-	-	1 (A) Q.40	-	1 (H) Q.51 (a or b)	-	11
11	Introduction to 3D Geometry	1 (H) Q.12	-	-	1 (U) Q.41	-	-	-	4
12	Limits and Derivatives	1 (R) Q.13	1 (U) Q.20	1 (A) Q.30	1 (R) Q.42	1 (R) Q.48	-	1 (U) Q.52 (a or b)	16
13	Statistics	1 (U) Q.14	-	-	-	1 (R) Q.49	-	-	6
14	Probability	1 (U) Q.15	-	1 (U) Q.31	-	1 (A) Q.50	-	-	8
	Total Number of Questions	15	5	11	11	8	2	2	135
	To Answer the Questions	15	5	6	6	4	1	1	80

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

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Chapter-01

SETS

In every question paper, the question numbers on this chapter are Q1, Q.21, Q22, Q.32

Weightage of this Chapter								
Part of Question paper	**Part-A**		**Part-B**	**Part-C**	**Part-D**	**Part-E**		**Total**
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.1	-	(R) Q.21 (U) Q.22	(U) Q.32	-	-	-	**4 Questions**
Questions	1	-	2	1	-	-	-	**8 Marks**
Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills								

Q.1 (PART-A) One Mark Questions (MCQ)

Which of the following are sets:

1. The collection of all the months of a year beginning with the letter J. Is a Set? Justify
2. The collection of ten most talented writers of India. Is a Set? Justify
3. A team of eleven best-cricket batsmen of the world. Is a Set? Justify
4. The collection of all boys in your class. Is a Set? Justify
5. The collection of all natural numbers less than 100.Is a Set? Justify
6. A collection of novels written by the writer Munshi Prem Chand. Is a Set? Justify
7. The collection of all even integers. Is a Set? Justify
8. The collection of questions in this Chapter. Is a Set? Justify
9. A collection of most dangerous animals of the world. Is a Set? Justify

Which of the following are finite set, infinite set, null set

10. A = {x : x is a student of Class XI presently studying in a school}
11. B = {x : x is a student presently studying in both Classes X and XI}
12. A = {x : $1 < x < 2$, x is a natural number}
13. B = {x : $x^2 – 2 = 0$ and x is rational number}
14. C = {x : x is an even prime number greater than 2}
15. D = {x : $x^2 = 4$, x is odd }
16. C = {men living presently in different parts of the world}
17. Let W be the set of the days of the week
18. Let S be the set of solutions of the equation $x^2 – 16 = 0$
19. Let G be the set of points on a line
20. {x : $x \in N$ and $(x – 1)(x – 2) = 0$}
21. {x : $x \in N$ and $x^2 = 4$}
22. {x : $x \in N$ and $2x – 1 = 0$}
23. {x : $x \in N$ and x is prime}
24. {x : $x \in N$ and x is odd}
25. Set of odd natural numbers divisible by 2
26. Set of even prime numbers
27. { x : x is a natural numbers, $x < 5$ and $x > 7$ }
28. { y : y is a point common to any two parallel lines}
29. The set of months of a year
30. {1, 2, 3, . . .}

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31. {1, 2, 3, . . .99, 100}
32. The set of positive integers greater than 100
33. The set of prime numbers less than 99
34. The set of lines which are parallel to the x-axis
35. The set of letters in the English alphabet
36. The set of numbers which are multiple of 5
37. The set of animals living on the earth
38. The set of circles passing through the origin (0,0)

Write the given set in Roster form

39. Write the set $A = \{x : x \text{ is a natural number less than } 6\}$, in roster form.
40. Write the set $A = \{x : x \text{ is a odd natural number}\}$, in roster form.
41. Write the set $A = \{x : x \text{ is a odd natural number less than } 10\}$, in roster form.
42. Write the set $A = \{x : x \text{ is a natural number and divisor of } 6\}$, in roster form.
43. Write the set $A = \{x : x \text{ is a prime number and a divisor of } 6\}$, in roster form.
44. Write the set $A = \{x : x \text{ is a prime number and a divisor of } 60\}$, in roster form.
45. Write the set $\{x : x \text{ is a positive integer and is a divisar of } 18\}$ in roster form
46. Write the set $A = \{x : x \text{ is an integer} - 3 < x < 7\}$, in roster form.
47. Write the set $A = \{x : x \text{ is a two digit natural number such that the sum of two digit is } 8\}$ in roster form
48. Write the set $\{x : x \text{ is a positive integer and } x^2 < 40\}$ in roster form
49. Write the set $\{x : x \text{ is an integer and } x^2 - 9 = 0\}$ in roster form
50. Write the set $\{x : x \text{ is an integer and } x + 1 = 1\}$ in roster form
51. Write the set $A = \text{The set of all letters in the word } TRIGONOMETRY$, in roster form.
52. Write the set $A = \text{The set of all letters in the word } BETTER$, in roster form.
53. Write the set of all letters in the world MATHEMATICS in roster form
54. Write the solution set of the equation $x^2 + x - 2 = 0$ in roster form
55. List the all elements of the set $A = \left\{x : x \text{ is an integer}, -\frac{1}{2} < x < \frac{9}{2}\right\}$
56. List the all elements of the set $A = \{x : x \text{ is an odd natural mumber}\}$
57. List the all elements of the set $A = \{x : x \text{ is an integer}, \ x^2 \leq 4\}$
58. List the all elements of the set $A = \{x : x \text{ is a letter in the word } LOYAL\}$
59. List the all elements of the set $A = \{x : x \text{ is a letter in the word } PRINCIPAL\}$
60. List the all elements of the set $A = \{x : x \text{ is a month of a year not having } 31 \text{ days}\}$
61. Write all elements of $A = \{x : x \text{ is a consonant in the english alphabets which precedes } k\}$

Write the given set in Set builder form

62. Write the set {3,6,9,12} in set builder form
63. Write the set {2,4,8,16,32} in set builder form
64. Write the set {5,25,125,625} in set builder form
65. Write the set {2,4,6, ... } in set builder form
66. Write the set {1,4,9, ... ,100} in set builder form
67. Write the set $\left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}\right\}$ in set builder form
68. Write the intervals $(-3,0)$ in set builder form
69. Write the intervals $[6,12]$ in set builder form
70. Write the intervals $(6, 12]$ in set builder form
71. Write the intervals $[-23, 5)$ in set builder form

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Write the given set in Intervals

72. Write the set $A = \{x : x \in R \ and \ -4 < x \leq 6\}$ as an interval
73. Write the set $A = \{x : x \in R \ and \ -12 < x < -10\}$ as an interval
74. Write the set $A = \{x : x \in R \ and \ 0 \leq x < 7\}$ as an interval
75. Write the set $A = \{x : x \in R \ and \ 3 \leq x \leq 4\}$ as an interval

Definitions and examples on Empty set, Subsets

76. Define empty set
77. Define subset of a set
78. Define proper subset of a set
79. Define superset of a set
80. If a set A has 4 elements, how many subsets does A has?
81. Given that number of subsets of a set A is 16. Find the number of elements in A
82. If $n(A) = 3$, then find the number of subsets of A
83. Write down the all subsets of the set $\{a\}$
84. Write down the all subsets of the set $\{a, b\}$
85. Write down the all subsets of the set $\{1,2,3\}$
86. Write down the all subsets of the set $\{-1,0,1\}$
87. Write down the all subsets of the set $\emptyset$
88. If $A = \{a, e, i, o, u\}$, $B = \{a, b, c, d\}$. Is A is subset of B? Is B is subset of A?
89. If A is the set of all divisors of 56 and B the set of all prime divisors of 56. Is A is subset of B? Is B is subset of A?
90. If A = {1, 3, 5} and B = {x : x is an odd natural number less than 6}. Is A is subset of B? Is B is subset of A?
91. Consider the sets: φ, A = { 1, 3 }, B = {1, 5, 9}, C = {1, 3, 5, 7, 9} Insert the symbol $\subset$ or $\not\subset$ between each of the following pair of sets:
    (i) φ . . . B (ii) A . . . B (iii) A . . . C (iv) B . . . C

Some other Questions

92. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces
    (i) { 2, 3, 4 } . . . { 1, 2, 3, 4,5 }
    (ii) { a, b, c } . . . { b, c, d }
    (iii) {x : x is a student of Class XI of your school}. . .{x : x student of your school}
    (iv) {x : x is a circle in the plane} . . .{x : x is a circle in the same plane with radius 1 unit}
    (v) {x : x is a triangle in a plane} . . . {x : x is a rectangle in the plane}
    (vi) {x : x is an equilateral triangle in a plane} . . . {x : x is a triangle in the same plane}
    (vii) {x : x is an even natural number} . . . {x : x is an integer}
    (Viii) { a, b } . . . { b, c, a }
    (ix) { a, e } . . . { x : x is a vowel in the English alphabet}
    (x) { 1, 2, 3 } . . . { 1, 3, 5 }
    (xi) { a } . . . { a, b, c }
    (xii) { a } . . . { a, b, c }
    (xiii) { x : x is an even natural number less than 6} . . { x : x is a natural number which divides 36}
93. Let A = { 1, 2, { 3, 4 }, 5 }. Which of the following statements are incorrect and why?
    (i) {3, 4} $\subset$ A (ii) {3, 4} $\in$ A (iii) {{3, 4}} $\subset$ A (iv) 1 $\in$ A (v) 1 $\subset$ A (vi) {1, 2, 5} $\subset$ A
    (vii) {1, 2, 5} $\in$ A
    (viii) {1, 2, 3} $\subset$ A (ix) φ $\in$ A (x) φ $\subset$ A (xi) {φ} $\subset$ A

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94. Let A, B and C be three sets. If A ∈ B and B ⊂ C, is it true that A ⊂ C?. If not, give an example
95. Let A = {1, 2, 3, 4, 5, 6}. Insert the appropriate symbol ∈ or ∉ in the blank spaces:
    (i) 5. . .A (ii) 8 . . . A (iii) 0. . .A (iv) 4. . . A (v) 2. . .A (vi) 10. . .A
96. Fill in the blanks to make each of the following a true statement :
    (i) A ∪ A′ = . . . (ii) φ′ ∩ A = . . . (iii) A ∩ A′ = . . . (iv) U′ ∩ A = . . .

Q.21 and Q.22 (PART-B) Two Marks Questions

Union and Intersection of two Sets

1. If $A = \{2,4,6,8\}$, $B = \{1,2,4,8,16\}$ then Find $A \cup B$ and $A \cap B$
2. If $A = \{2,4,6,8\}$, $B = \{6,8,10,12\}$ then Find $A \cup B$ and $A \cap B$
3. If $A = \{a,e,i,o,u\}$, $B = \{a,i,u\}$ then Find $A \cup B$ and $A \cap B$ Prove $A \cup B = A$ and $A \cap B = B$
4. If $A = \{1,2,3,4,5,6,7,8,9,10\}$, $B = \{2,3,5,7\}$ then Find $A \cup B$ and $A \cap B$
5. If $A = \{x: x\ is\ a\ natural\ number\}$, $B = \{x: x\ is\ a\ even\ natural\ number\}$
   $C = \{x: x\ is\ an\ odd\ natural\ number\}$, $D = \{x: x\ is\ a\ prime\ number\}$
   Find $A \cap B$, $A \cap C$, $A \cap D$, $B \cap C$, $B \cap D$, $C \cap D$
6. If $A = \{x: x\ is\ a\ natural\ number\ and\ 1 < x \leq 6\}$
   $B = \{x: x\ is\ a\ natural\ number\ and\ 6 < x < 10\}$then Find $A \cup B$ and $A \cap B$
7. If $A = \{x : x\ is\ an\ natural\ number\ and\ multiple\ of\ 3\}$
   and$B = \{x\ \ x\ is\ an\ natural\ number\ less\ than\ 9\ \}$ Find $A \cap B$
8. Let $A = \{a,b\}$ and $B = \{a,b,c\}$is $\subset B$? what is $A \cup B$?
9. If $A = \{3,5,7,9,11\}$, $B = \{7,9,11,13\}$ and $C = \{11,13,15\}$
   Find i) $A \cap (B \cup C)$ ii) $(A \cap B) \cap (B \cup C)$
10. If $A = \{1,2,3,4\}$, $B = \{2,3,5\}$ and $C = \{3,5,6\}$
    Find i) $A \cup (B \cap C)$ ii) $(A \cup B) \cap (A \cup C)$
11. If $A = \{1,2,3,4\}$, $B = \{3,4,5,6\}$ and $C = \{5,6,7,8\}$
    Find i) $A \cup (B \cap C)$ ii) $(A \cup B) \cap (A \cup C)$
12. If $A = \{2,3,4,5,6\}$, $B = \{5,6,7,8\}$ and $C = \{4,6,8\}$
    Verify $A \cup (B \cup C) = (A \cup B) \cup C$
13. If $A = \{1,2,3,4\}$, $B = \{3,4,5,6\}$ and $C = \{5,6,7,8\}$
    Find $A \cup B$, $A \cup C$, $B \cup C$ and $A \cup B \cup C$

Difference of two Sets

14. If $A = \{3,6,9,12,15,18,21\}$, $B = \{4,8,12,16,20\}$ and
    $C = \{2,4,6,8,10,12,14,16\}$Find$(A - B)$, $(A - C)$, $(B - A)$, $(C - A)$ and$(A - B) \cup (C - A)$
15. If $A = \{5,10,15,20,25\}$, $B = \{3,6,9,12,15\}$Find $(A - B)$ and $(B - A)$
16. If $A = \{1,2,3,4,5,6\}$, $B = \{2,4,6,8\}$Find $(A - B)$ and $(B - A)$
17. If $A = \{a,e,i,o,u\}$, $B = \{a,i,k,u\}$Find $(A - B)$ and $(B - A)$
18. If $X = \{a,b,c,d\}$, $Y = \{f,b,d,g\}$Find $(X - Y)$ and $(Y - X)$ and $X \cap Y$

Disjoint Sets

19. Are the sets $A = \{1,2,3,4\}$ and $B = \{x: x\ is\ a\ natural\ number\ and\ 4 \leq x \leq 6\}$ are disjoint?
20. Are the sets $A = \{a,e,i,o,u\}$ and $B = \{c,d,e,f\}$ are disjoint?
21. Are the sets $A = \{x: x\ is\ an\ even\ natural\ number\}$ and $B = \{x: x\ is\ an\ odd\ natural\ number\}$ are disjoint?
22. Are the sets $A = \{2,3,4,5\}$ and $B = \{3,6\}$ are disjoint?
23. Are the sets $A = \{2,6,10,14\}$ and $B = \{3,7,11,15\}$ are disjoint?
24. Are the sets $A = \{2,6,10\}$ and $B = \{3,7,11\}$ are disjoint?

Venn diagram

25. Draw the appropriate Venn diagram for
    i) A' ii) $(A \cup B)'$ iii) $(A \cap B)'$iv)$A' \cup B'$ v)$A' \cap B'$ vi)$A - B$

Are the following pair of sets equal ? Give reasons

26. A = { a, b, c, d } and B = { d, c, b, a }
27. A = { 4, 8, 12, 16 } and B = { 8, 4, 16, 18}

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28. A = {2, 4, 6, 8, 10} and B = { x : x is positive even integer and x ≤ 10}
29. A = { x : x is a multiple of 10} and B = { 10, 15, 20, 25, 30, . . . }
30. A = {2, 3}, B = {x : x is solution of $x^2 + 5x + 6 = 0$}
31. A = { x : x is a letter in the word FOLLOW} and B = { y : y is a letter in the word WOLF}
32. A = { 2, 4, 8, 12} and B = { 1, 2, 3, 4}
33. B = { 1, 2, 3, 4} and D = { 3, 1, 4, 2}
34. E = {–1, 1} and G = {1, –1}
35. A= set of letters needed to spell CATARACT and B= set of letters needed to spell TRACT
36. A = {1, 2, 3, 4} and B = {3, 1, 4, 2}
37. A=set of prime numbers less than 6 and B=set of prime factors of 30
38. A = {0} and B = {x : x > 15 and x < 5}
39. C = {x : x – 5 = 0 } and D = {x: x 2 = 25}
40. A=set of letters in "ALLOY" and B=set of letters in "LOYAL"
41. A = {n : n ∈ Z and $n^2 \leq 4$} and B = {x : x ∈ R and $x^2 - 3x + 2 = 0$}

Q.32 (PART-C) Three Marks Questions

Complement of Sets

1. If $U = \{1,2,3,4,5,6\}$, $A = \{2,3\}$ and $B = \{3,4,5\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
2. If $U = \{1,2,3,4,5,6,7\}$, $A = \{1,2,5,7\}$ and $B = \{3,4,5,6\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
3. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{2,4,6,8\}$ and $B = \{2,3,5,7\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
4. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,4\}$ and $B = \{2,4,6,8\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
5. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,4\}$ and $B = \{3,4,5,6\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
6. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{2,4,6,8\}$ and $B = \{3,4,5,6\}$
   Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
7. Let U = { 1, 2, 3, 4, 5, 6, 7, 8, 9 }, A = { 1, 2, 3, 4}, B = { 2, 4, 6, 8 } and C = { 3, 4, 5, 6 }.
   Find (i) A′ (ii) B′ (iii) (A ∪ C)′ (iv) (A ∪ B)′ (v) (A′)′ (vi) (B – C)′
8. Taking the set of natural numbers as the universal set. If $A = \{x : x \in N \text{ and } 2x + 1 > 10\}$ and $B = \{x : x \in N \text{ and } 3x + 1 > 8\}$. Find A' and B'
9. Taking the set of natural numbers as the universal set. If $A = \{x :$ x is an even natural number$\}$ and $B = \{$ x : x is an odd natural number $\}$. Find A' and B'
10. Taking the set of natural numbers as the universal set. If $A = \{x :$ x is a positive multiple of 3$\}$ and $B = \{$ x : x is a prime number $\}$. Find A' and B'
11. Taking the set of natural numbers as the universal set. If $A = \{$ x : x is a perfect square $\}$ and $B = \{$ x : x is a perfect cube$\}$. Find A' and B'
12. Taking the set of natural numbers as the universal set. If $A = \{$ x : $x + 5 = 8 \}$ and $B = \{$ x : $2x + 5 = 9\}$. Find A' and B'
13. Taking the set of natural numbers as the universal set. If $A = \{x : x \in N \text{ and } 2x + 1 > 10\}$ and $B = \{x : x \in N \text{ and } 3x - 1 > 8\}$ find A' and B'
14. If $U = \{x : x \leq 10, x \in N\}$, $A = \{x : x \in N, x \text{ is prime}\}$ and $B = \{x : x \in N, x \text{ is even}\}$ write $A \cap B'$ in roster form
15. Let U be the set of all triangles in a plane. If A is the set of all triangles with at least one angle different from 60°, what is A′?

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Chapter-02
RELATIONS AND FUNCTIONS

In every question paper, the question numbers on this chapter are Q2, Q16, Q33, Q43

Weightage of this Chapter								
Part of Question paper	**Part-A**		**Part-B**	**Part-C**	**Part-D**	**Part-E**		**Total**
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.2	(U) Q.16	-	(U) Q.33	(A) Q.43	-	-	**4 Questions**
Questions	1	1	-	1	1	-	-	**10 Marks**

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.02 and Q.16 (PART-A) One Mark Questions (MCQ and FB)

1. If $\left(\frac{x+1}{2}, 7\right) = (6,7)$ find x
2. If $\left(\frac{x+3}{2}, 5\right) = (6,5)$ find x
3. If $(x + 5,2) = (3,2)$ find x
4. If $(x + 1,2) = (1,2)$ find x
5. If $(x + 1,1) = (3,1)$ find x
6. If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$ find x and y
7. If $(x + 1, y - 2) = (3,1)$ find x and y
8. If $(x + 1, y - 3) = (3, x + 4)$ find x and y
9. If $(3x + y, 5) = (4, x + 1)$ find x and y
10. If $f(x) = 2x - 5$, find $f(-3)$
11. If $f(x) = 2x - 5$, find $f(7)$
12. If $f(x) = 2x - 5$, find $f(0)$
13. If $f(x) = 2x - 5$, find $f\left(\frac{5}{2}\right)$
14. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$ then find $t(0)$
15. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$ then find $t(28)$
16. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$ then find $t(-10)$
17. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$, the value of $t(C) = 212$ then find C
18. If $A = \{1,3,5\}$ and $B = \{2,4,6\}$ Find $A \times B$
19. If $A = \{1,2\}$ and $B = \{x : x \in N \text{ and } x^2 - 9 = 0\}$ find $A \times B$
20. If a set A has 3 elements and set $B = \{1,2,3\}$ find the number of elements of $A \times B$
21. If a set A has 3 elements and set $B = \{3,4,5\}$ find the number of elements in $A \times B$
22. Write the relation $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$ in roster form

Q.33 (PART-C) Two Marks Questions

Examples on Algebra of Functions

1. If $f(x) = x^2$ and $g(x) = 2x - 1$ then find $f + g, f - g, fg, f/g,$
2. If $f(x) = x^2$ and $g(x) = 2x + 1$ then find $f + g, f - g, fg, f/g,$

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3. If $f(x) = x^2$ and $g(x) = 2x - 3$ then find $f + g, f - g, fg, f/g,$
4. If $f(x) = x^2$ and $g(x) = 2x + 3$ then find $f + g, f - g, fg, f/g,$
5. If $f(x) = x + 1$ and $g(x) = 2x - 3$ then find $f + g, f - g, fg, f/g,$
6. If $f(x) = x + 1$ and $g(x) = 2x + 3$ then find $f + g, f - g, fg, f/g,$
7. If $f(x) = \sqrt{x}$ and $g(x) = x$ then find $f + g, f - g, fg, f/g,$

Write the domain and range of following examples

8. If $f(x) = \sqrt{9 - x^2}$ then write domain and range
9. If $f(x) = \sqrt{x - 1}$ then write domain and range
10. If $f(x) = |x - 1|$ then write domain and range
11. If $f(x) = -|x|$ then write domain and range
12. If $f(x) = 2 - 3x, x \in R$, $x > 0$ then write range
13. If $f(x) = x^2 + 2$ where x is real number then write range
14. If $f(x) = x$ where x is real number then write range
15. Find the domain of the function $f(x) = \frac{x^2+3x+5}{x^2-5x+4}$
16. Find the domain of the function $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$
17. If $f(x) = x^2$ then find $\frac{f(1.1)-f(1)}{(1.1-1)}$

Examples on finding $A \times B$, $B \times A$ and $A \times A \times A$

18. If $A = \{2,4,6\}$ and $B = \{1,3\}$ then prove that $A \times B \neq B \times A$
19. If $G = \{7,8\}$ and $H = \{5,4,2\}$ Find $G \times H$ and $H \times G$
20. If $P = \{a, b, c\}$ and $Q = \{r\}$ then prove that $P \times Q \neq Q \times R$
21. If $A = \{1, -1\}$ then find $A \times A \times A$
22. If $A = \{1,2\}$ then find $A \times A \times A$
23. If $A = \{1,2\}$ and $B = \{3,4\}$ write $A \times B$, how many relation or subsets will have from A into B?
24. If $A = \{x, y, z\}$ and $B = \{1,2\}$ write $A \times B$, how many relation or subsets will have from A into B?
25. If $A \times B = \{(a,1), (a,2), (a,3), (b,1), (b,2), (b,3)\}$ find the sets A and B and hence find $B \times A$
26. If $A \times B = \{(a,x), (a,y), (b,x), (b,y)\}$ find the sets A and B
27. If $A \times B = \{(p,q), (p,r), (m,q), (m,r)\}$ find the sets A and B
28. Let $n(A) = 3$ and $n(B) = 2$ If $\{(5,a), (6,b), (7,a)\}$ are in $A \times B$ find the sets A and B
29. Let $n(A) = 3$ and $n(B) = 2$ If $\{(x,1), (y,2), (z,1)\}$ are in $A \times B$ find the sets A and B
30. If $A = \{1,2\}$ and $B = \{3,4\}$, then show that $A \times (B \cap \emptyset) = \emptyset$
31. If $A = \{1,2\}$, $B = \{3,4\}$ and $C = \{5,6\}$ then find $(A - B) \times C$

Examples on Finding $A \times (B \cap C)$,$(A \times B) \cap (A \times C)$

32. Let $A = \{1,2,3\}$, $B = \{3,4\}$ and $C = \{4,5,6\}$ then verify $A \times (B \cap C) = (A \times B) \cap (A \times C)$
33. Let $A = \{1,2,3\}$, $B = \{3,4\}$ and $C = \{4,5,6\}$ then verify $A \times (B \cup C) = (A \times B) \cup (A \times C)$
34. Let $A = \{1,2\}$, $B = \{1,2,3,4\}$ and $C = \{5,6\}$ then verify $A \times (B \cap C) = (A \times B) \cap (A \times C)$
35. Let $A = \{1,2\}$, $B = \{1,2,3,4\}$ and $C = \{5,6\}$ then verify $A \times B$ is a subset $A \times C$

Examples on Finding Domain, range and co-domain

36. Let $A = \{1,2,3, \ldots \ldots, 14\}$ define the relation R from A to A given by
$R = \{(x,y): 3x - y = 0, where\ x, y \in A\}$ write domain, co-domain and range
37. Write the relation $R = \{(x, x+5) : x \in \{0,1,2,3,4,5\}\}$ in roster form and write domain and range
38. Write the relation $R = \{(x,y) : y = x + 5,\ x\ is\ a\ natural\ number\ less\ than\ 4; x, y \in N\}$ in roster form and write domain and range
39. If $A = \{1,2,3,4,5,6\}$, define a relation R from A to A by $R = \{(x,y) : y = x + 1\ and\ x, y \in A\}$ write R in the roaster form. Write domain, co-domain and range
40. If $A = \{1,2,3,4,5,6\}$ and R is a relation on A defined by $R = \{(a,b) : a, b \in A,$
$b\ is\ exactly\ divisible\ by\ a\}$ then find domain and range
41. If $A = \{1,2,3,5\}$ and $B = \{4,6,9\}$ determine the relation R from A to B given by
$R = \{(x,y): difference\ between\ x\ and\ y\ is\ odd,\ x \in A, y \in B\}$ write domain and range

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42. A relation R is defined from a set $A = \{2,3,4,5\}$ to set $B = \{3,6,7,10\}$ as follows $R = \{(x, y): x\ divides\ y\ and\ \ x \in A, y \in B\}$ Determine domain and range of R
43. A relation R is defined from a set $A = \{2,3,4,5\}$ as follows $R = \{(x, y): x\ divides\ y, such\ that\ x, y \in A\}$ find R, determine domain and range of R
44. Let N be the set of natural numbers and the relation R be defined on N such that R = {(x, y) : y = 2x, x, y ∈ N}
45. The Cartesian product $A \times A$ has 9 elements among which are found (-1.0) and $(0,1)$. Find the set A and also find the remaining elements of $A \times A$
46. If $f: Z \to Z$ is a linear function defined by $f = \{(1,1), (2,3), (0,-1), (-1,-3)\}$ find $f(x)$
47. Let $f = \{(1,1), (2,3), (0,-1), (-1,-3)\}$ be a function from Z to Z defined as $f(x) = ax + b$ for some integers a and b. Determine a and b
48. Examine the relation R = {(2,1),(3,1), (4,2)} is a function or not?
49. Examine the relation R = {(2,2),(2,4),(3,3), (4,4)} is a function or not?
50. Examine the relation R = {(1,2),(2,3),(3,4), (4,5), (5,6), (6,7)} is a function or not?
51. Examine the relation R = {(2,1), (5,1), (8,1), (11,1), (14,1), (17,1)} is a function or not?
52. Examine the relation R = {(2,1), (4,2), (6,3), (8,4), (10,5), (12,6), (14,7)} is a function or not?
53. Examine the relation R = {(1,3), (1,5), (2,5)}is a function or not?
54. Let A ={1,2,3,4}, B = {1,5,9,11,15,16} and f = {(1,5), (2,9), (3,1), (4,5), (2,11)}. f is a relation from A to B?
55. Let A ={1,2,3,4}, B = {1,5,9,11,15,16} and f = {(1,5), (2,9), (3,1), (4,5), (2,11)}. f is a function from A to B?

Q.43 (PART-D) Five Marks Questions

1. Define modulus function. Draw the graph of modulus function, also write domain and rang
2. Define signum function. Draw the graph of signum function, also write its domain and range
3. Define greatest integer function. Draw the graph of greatest integer function, also write its domain and range
4. Define identity function. Draw the graph of identity function, also write its domain and range
5. Define constant function. Draw the graph of constant function, also write domain and range

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Chapter-03

TRIGONOMETRIC FUNCTIONS

In every question paper, the question numbers on this chapter are Q03, Q17,Q23, Q34, Q35, Q44 and Q.51(a) or (b)

Weightage of this Chapter								
Part of Question paper	**Part-A**		**Part-B**	**Part-C**	**Part-D**	**Part-E**		**Total**
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.3	(R) Q.17	(R) Q.23	(R) Q.34 (U) Q.35	(U) Q.44	(H) Q.51 (a or b)	-	**7 Questions**
Questions	1	1	1	2	1	1	-	**21 Marks**

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.03 and Q.17 (PART-A) One Mark Questions (MCQ and FB)

1. Define Radian
2. Convert $\frac{2\pi}{3}$ radians into degree measure
3. Convert $\frac{5\pi}{3}$ radians into degree measure
4. Convert $\frac{7\pi}{6}$ radians into degree measure
5. Convert $\frac{5\pi}{12}$ radians into degree measure
6. Convert $\frac{3\pi}{4}$ radians into degree measure
7. Convert 6 radians into degree measure
8. Convert -4 radians into degree measure
9. Convert $\frac{11}{16}$ radians into degree measure
10. Convert 25^0 into radian measure
11. Convert 520^0 into radian measure
12. Convert 240^0 into radian measure
13. Convert 720^0 into radian measure
14. Convert 315^0 into radian measure
15. Convert 210^0 into radian measure
16. Convert $40^0 20'$ into radian measure
17. Convert $-47^0 30'$ into radian measure
18. What is the value of $cos\left(\frac{\pi}{4}-x\right)cos\left(\frac{\pi}{4}-y\right)-sin\left(\frac{\pi}{4}-x\right)sin\left(\frac{\pi}{4}-y\right)$
19. What is the value of $sin(n+1)x \cdot sin(n+2)x + cos(n+1)x \cdot cos(n+2)x$

Q.23 (PART-B) and Q.34 and Q.35 (PART-C) Two And Three Marks Questions

Concept (I)

1. If $cosx = -\frac{3}{5}$, x lies in third quadrant, find other five trigonometric functions
2. If $cosx = -\frac{1}{2}$, x lies in third quadrant, find other five trigonometric functions
3. If $cotx = -\frac{5}{12}$, x lies in second quadrant, find other five trigonometric functions
4. If $cotx = \frac{3}{4}$, x lies in third quadrant, find other five trigonometric functions
5. If $tanx = -\frac{5}{12}$, x lies in second quadrant, find other five trigonometric functions

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6. If $sinx = \frac{3}{5}$, x lies in second quadrant, find other five trigonometric functions
7. If $secx = \frac{13}{5}$, x lies in fourth quadrant, find other five trigonometric functions

Concept (II)

8. Prove that $sin^2\frac{\pi}{6} + cos^2\frac{\pi}{3} - tan^2\frac{\pi}{4} = -\frac{1}{2}$
9. Prove that $2sin^2\frac{3\pi}{4} + 2cos^2\frac{\pi}{4} + 2sec^2\frac{\pi}{3} = 10$
10. Prove that $cot^2\frac{\pi}{6} + cosec\frac{5\pi}{6} + 3tan^2\frac{\pi}{6} = 6$
11. Prove that $3sin\frac{\pi}{6}sec\frac{\pi}{3} - 4sin\frac{5\pi}{6}cot\frac{\pi}{4} = 1$
12. Prove that $2sin^2\frac{\pi}{6} + cosec^2\frac{7\pi}{6}\cdot cos^2\frac{\pi}{3} = \frac{3}{2}$

Concept (III)

13. Prove that $cos2x = cos^2x - sin^2x$
14. Prove that $cos2x = 2cos^2x - 1$
15. Prove that $cos2x = 1 - 2sin^2x$
16. Prove that $cos2x = \frac{1-tan^2x}{1+tan^2x}$
17. Prove that $sin2x = 2sinxcosx$
18. Prove that $sin2x = \frac{2tanx}{1+tan^2x}$
19. Prove that $tan2x = \frac{2tanx}{1-tan^2x}$
20. Prove that $sin3x = 3sinx - 4sin^3x$
21. Prove that $cos3x = 4cos^3x - 3cosx$
22. Prove that $tan3x = \frac{3tanx-tan^3x}{1-3tan^2x}$
23. Prove that $tan(x+y) = \frac{tanx+tany}{1-tanx\cdot tany}$
24. Prove that $cot(x+y) = \frac{cotx\cdot coty-1}{coty+cotx}$

Concept (IV)

27. Prove that $cos\left(\frac{\pi}{4}+x\right) + cos\left(\frac{\pi}{4}-x\right) = \sqrt{2}cosx$
28. Prove that $cos\left(\frac{3\pi}{4}+x\right) - cos\left(\frac{3\pi}{4}-x\right) = -\sqrt{2}sinx$
29. Prove that $\frac{sin5x+sin3x}{cos5x+cos3x} = tan4x$
30. Prove that $\frac{cos7x+cos5x}{sin7x-sin5x} = cotx$
31. Prove that $\frac{sinx+sin3x}{cosx+cos3x} = tan2x$
32. Prove that $\frac{cos9x-cos5x}{sin17x-sin3x} = -\frac{sin2x}{cos10}$
33. Prove that $\frac{sinx-sin3x}{sin^2x-cos^2x} = 3sinx$
34. Prove that $(cosx+cosy)^2 + (sinx-siny)^2 = 4cos^2\left(\frac{x+y}{2}\right)$
35. Prove that $(cosx-cosy)^2 + (sinx-siny)^2 = 4sin^2\left(\frac{x-y}{2}\right)$
36. Prove that $\frac{tan\left(\frac{\pi}{4}+x\right)}{tan\left(\frac{\pi}{4}-x\right)} = \left(\frac{1+tanx}{1-tanx}\right)^2$
37. Prove that $\frac{cos(\pi+x)cos(-x)}{sin(\pi-x)cos\left(\frac{\pi}{2}+x\right)} = cot^2x$
38. Prove that $cos\left(\frac{3\pi}{2}+x\right)cos(2\pi+x)\left[cot\left(\frac{3\pi}{2}-x\right) + cot(2\pi+x)\right] = 1$
39. Prove that $sin^26x - sin^24x = sin2x\cdot sin10x$
40. Prove that $cos^22x - cos^26x = sin4x\cdot sin8x$
41. Prove that $sin2x + 2sin4x + sin6x = 4cos^2xsin4x$
42. Prove that $cot4x(sin5x + sin3x) = cotx(sin5x - sin3x)$

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43. Prove that $cos4x = 1 - 8sin^2xcos^2x$
44. Prove that $tan3x \cdot tan2x \cdot tanx = tan3x - tan2x - tanx$
45. Prove that $cotx \cdot cot2x - cot2x \cdot cot3x - cot3x \cdot cotx = 1$
46. Prove that $\frac{sin(x+y)}{sin(x-y)} = \frac{tanx+tany}{tanx-tany}$

Concept (VI)

47. If arcs of same length in two circles subtended angles 65^0 and 110^0 at the centre. Find the ratio of their radii
48. If arcs of same length in two circles subtended angles 60^0 and 75^0 at the centre. Find the ratio of their radii
49. Find the radius of the circle in which a central angle of 60^0 intercepts an arc of length 37.4 cm $\left(use\ \pi = \frac{22}{7}\right)$
50. The minute hand of a watch is 1.5 cm long. How far does its tip move in 40 mins? $(use\ \pi = 3.14)$
51. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?
52. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm $\left(use\ \pi = \frac{22}{7}\right)$
53. In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of minor arc of the chord.
54. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc length 10 cm
55. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc length 15 cm
56. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc length 21 cm

Concept (VII)

57. Find the value of $sin765^0$, $cosec(-1410^0)$, $cos(-1710^0)$,
58. Find the value of $sin\left(\frac{31\pi}{3}\right)$, $tan\left(\frac{19\pi}{3}\right)$,$sin\left(-\frac{11\pi}{3}\right)$, $cot\left(-\frac{15\pi}{4}\right)$, $tan\left(\frac{13\pi}{12}\right)$,
59. Find the value of $sin15^0$, $cos15^0$, $sin75^0$, $cos75^0$, $tan15^0$, $tan75^0$

Extra Questions

1. If $tanx = \frac{3}{4}$, x lies in third quadrant then find the value of $sin\frac{x}{2}$, $cos\frac{x}{2}$ and $tan\frac{x}{2}$
2. If $tanx = -\frac{4}{3}$, x lies in second quadrant then find the value of $sin\frac{x}{2}$, $cos\frac{x}{2}$ and $tan\frac{x}{2}$
3. If $cosx = -\frac{1}{3}$, x lies in third quadrant then find the value of $sin\frac{x}{2}$, $cos\frac{x}{2}$ and $tan\frac{x}{2}$
4. If $sinx = \frac{1}{4}$, x lies in second quadrant then find the value of $sin\frac{x}{2}$, $cos\frac{x}{2}$ and $tan\frac{x}{2}$
5. Prove that $\sqrt{3}cosec20^0 - sec20^0 = 4$
6. The difference between two acute angles of a right angled triangle is $\frac{3\pi}{10}$ radians. Express the angles in degree

Q.44 (PART-D) Five Marks Questions

1. Prove that $\frac{(sin7x+sin5x)+(sin9x+sin3x)}{(cos7x+cos5x)+(cos9x+cos3x)} = tan6x$
2. Prove that $\frac{cos4x+cos3x+cos2x}{sin4x+sin3x+sin2x} = cot3x$
3. Prove that $\frac{sin5x-2sin3x+sinx}{cos5x-cosx} = tanx$
4. Prove that $cos^2x + cos^2\left(x+\frac{\pi}{3}\right) + cos^2\left(x-\frac{\pi}{3}\right) = \frac{3}{2}$
5. Prove that $cos2xcos\frac{x}{2} - cos3xcos\frac{9x}{2} = sin5xsin\frac{5x}{2}$
6. Prove that $sin3x + sin2x - sinx = 4sinxcos\frac{x}{2}cos\frac{3x}{2}$

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7. Prove that $cos6x = 32cos^6x - 48cos^4x + 18cos^2x - 1$
8. If $sinx = \frac{3}{5}$ and $cosy = -\frac{12}{13}$, x and y lies in second quadrant. Find the value of $sin(x + y)$
9. Prove that $tan4x = \frac{4tanx(1-tan^2x)}{1-6tan^2x+tan^4x}$

Q.51 (a) or (b) (PART-E) Six Marks Question

1. Prove that geometrically $cos(x + y) = cosx \cdot cosy - sinx \cdot siny$
   And hence prove that $cos\left(\frac{\pi}{2} + x\right) = -sinx$, $cos2x = cos^2x - sin^2x$, $cos2x = 2cos^2x - 1$
   And hence Evaluate $cos75^0$, $cos15^0$, $cos(x - y)$

AS PER NEW PATTERN 2023-2024

TOP SCORER POCKET MARKS PACKAGE

FEATURES OF THE BOOK PUC II YEAR MATHEMATICS

- **Blue print** of the Question Paper and **Question Paper Pattern**
- Chapter wise detailed solutions of
  - **Multiple Choice Questions (MCQ)**
- Chapter wise detailed solutions of
  - **Fill in the Blanks (FB)**
- Chapter wise Question Papers (Test Papers)
  - **For FIRST UNIT TEST and SECOND UNIT TEST**
  - **PROJECTS and ASSIGNEMENT**
- **Passing Package and Scoring Package**
- Different Set of Question Papers (Prepared by experts)
  - **10 Set of SAMPLE QUESTION PAPER**
  - **10 Set of PRACTICE QUESTION PAPER**
- Chapter wise detailed solutions of All the Previous
  - **Annual Examination/ Supplementary Examination/**
  - **Preparatory Examination/ Expected questions**

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Chapter-04

COMPLEX NUMBER AND QUADRATIC EQUATION

In every question paper, the question numbers on this chapter are Q4, Q24, Q25, Q36

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(H) Q.4	-	(U) Q.24 (U) Q.25	(U) Q.36	-	-	-	4 Questions
Questions	1	-	2	1	-	-	-	8 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q,4 (PART-A) One Mark Questions (MCQ)

1. Express $i^{24} + \left(\frac{1}{i}\right)^{26}$ in $a + ib$ form
2. Express $\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]^3$ in $a + ib$ form
3. Express $(-5i)\left(-\frac{3}{5}i\right)$ in $a + ib$ form
4. Express $(-5i)\left(\frac{1}{8}i\right)$ in $a + ib$ form
5. Express $(5 - 3i)^3$ in $a + ib$ form
6. Express $\left(\frac{1}{3} + 3i\right)^3$ in $a + ib$ form
7. Express $\left(-2 - \frac{1}{3}i\right)^3$ in $a + ib$ form
8. Express $(1 - i)^4$ in $a + ib$ form
9. Express $i^9 + i^{19}$ in $a + ib$ form
10. Express i^{-39} in $a + ib$ form
11. Express i^{-35} in $a + ib$ form
12. Express $(1 - i) - (-1 + 6i)$ in $a + ib$ form
13. Express $3(7 + 7i) + i(7 + 7i)$ in $a + ib$ form
14. Express $\left(\frac{1}{5} + i\frac{2}{5}\right) - \left(4 + i\frac{5}{2}\right)$ in $a + ib$ form
15. Express $\left[\left(\frac{1}{3} + i\frac{7}{3}\right) + \left(4 + i\frac{1}{3}\right)\right] - \left(-\frac{4}{3} + i\right)$ in $a + ib$ form
16. If $z = 2 + i5$ then write $Re(z)$ and $Im(z)$
17. If $z = -1 + i\sqrt{3}$ then write $Re(z)$ and $Im(z)$
18. If $z = 4 + i\left(\frac{-1}{11}\right)$ then write $Re(z)$ and $Im(z)$

Q.24 and Q.25 (PART-B) Two Marks and Q.36 (PART-C) Three Marks Questions

Find modulus, Conjugate, multiplicative inverse of following complex number

1) $2 - 3i$, 2) $4 - 3i$, 3) $3 - 4i$

4) $\sqrt{5} + 3i$, 5) $-1 - i\sqrt{3}$, 6) $-\sqrt{3} + i$

7) $\sqrt{3}i - 1$, 8) $i + 1$, 9) $i - 1$,

10) $-1 + i$, 11) $4 + 3i$, 12) $-3i$

13) $2 - 5i$, 14) $3 + i$, 15) $-3i - 5$,

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Find the modulus

1) $\frac{1+i}{1-i}$, 2) $\frac{1}{1+i}$, 3) $\frac{1+2i}{1-3i}$,

4) $\frac{\sqrt{3}}{2}-\frac{1}{2}i$, 5) $\frac{1+i}{1-i}-\frac{1-i}{1+i}$,

Express following complex number in the form of $a+ib$

1) $\frac{5+i\sqrt{2}}{1-i\sqrt{2}}$, 2) $\frac{1+2i}{1-i}$, 3) $\frac{5+i\sqrt{2}}{2i}$,

4) $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+i\sqrt{2})-(\sqrt{3}-i\sqrt{2})}$, 5) $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$, 6) $\left(\frac{1}{1-4i}-\frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$,

Solve the following problems

1. If $x+iy=\frac{a+ib}{a-ib}$ then prove that $x^2+y^2=1$
2. If $x+iy=\frac{2+i}{2-i}$ then prove that $x^2+y^2=1$
3. If $a+ib=\frac{(x+i)^2}{2x^2+1}$ then prove that $a^2+b^2=\frac{(x^2+1)^2}{(2x^2+1)^2}$
4. If $x-iy=\sqrt{\frac{a-ib}{c-id}}$ then prove that $(x^2+y^2)^2=\frac{a^2+b^2}{c^2+d^2}$
5. If $(x+iy)^3=u+iv$ then show that $\frac{u}{x}+\frac{v}{y}=4(x^2-y^2)$
6. Find the least positive integral value of m if $\left(\frac{1+i}{1-i}\right)^m=1$
7. Find the least positive integral value of m if $\left(\frac{1+i}{1-i}\right)^{4m}=1$
8. Find the real number x if $(x-2i)(1+i)$ is purely imaginary
9. Find the value of x and y if $(x+2y)+i(2x-3y)$ is conjugate of $5+4i$
10. Find the value of x and y if $(x-iy)(3+5i)$ is conjugate of $-6-24i$
11. Find the value of x and y if $4x+i(3x-y)=3+i(-6)$
12. Express $\left(-\sqrt{3}+\sqrt{-2}\right)\left(2\sqrt{3}-i\right)$ in the form of $a+ib$
13. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$
14. If $z_1=2-i$ and $z_2=-2-i$ then find $Re\left(\frac{z_1z_2}{\overline{z_1}}\right)$ and $Im\left(\frac{1}{z_1\overline{z_1}}\right)$
15. If $z_1=2-i$ and $z_2=1+i$ then find $\left|\frac{z_1+z_2+1}{z_1-z_2+1}\right|$
16. If $z_1=6+3i$ and $z_2=2-i$ then find z_1+z_2, z_1-z_2, z_1z_2, $\frac{z_1}{z_2}$
17. If $z_1=2+i3$ and $z_2=-6+i5$ then find z_1+z_2, z_1-z_2, z_1z_2, $\frac{z_1}{z_2}$
18. If $z_1=3+i5$ and $z_2=2+i6$ then find z_1+z_2, z_1-z_2, z_1z_2, $\frac{z_1}{z_2}$

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Chapter-05

LINEAR INEQUALITIES

In every question paper, the question numbers on this chapter are Q5, Q26, Q37

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(H) Q.5	-	(A) Q.26	(H) Q.37	-	-	-	3 Questions
Questions	1	-	1	1	-	-	-	6 Marks
Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills								

Q.5 (PART-A) One marks questions (MCQ)

Solve for x if x is a natural number, x is an integer. x is real number

1. Solve $30x < 200$ when i) x is a natural number ii) x is an integer
2. Solve $24x < 100$ when i) x is a natural number ii) x is an integer
3. Solve $-12x > 30$ when i) x is a natural number ii) x is an integer
4. Solve $5x - 3 < 7$ when i) x is an integer ii) x is real number
5. Solve $3x + 8 > 2$ when i) x is an integer ii) x is real number
6. Solve $5x - 3 < 3x + 1$ when i) x is an integer ii) x is real number

Q.26 (PART-B) Two marks questions

Solve for x and Show the graph of solution in number line.

1. Solve $7x + 3 < 5x + 9$.Show the graph of solution in number line.
2. Solve $5x - 3 < 3x + 1$.Show the graph of solution in number line.
3. Solve $4x + 3 < 6x + 7$.Show the graph of solution in number line.
4. Solve $5x - 3 \geq 3x - 5$.Show the graph of solution in number line.
5. Solve $3x - 7 < 5x - 1$.Show the graph of solution in number line.
6. Solve $4x + 3 < 5x + 7$.Show the graph of solution in number line.
7. Solve $3x - 2 < 2x + 1$.Show the graph of solution in number line.
8. Solve $3(x - 1) \leq 2(x - 3)$.Show the graph of solution in number line.
9. Solve $3(1 - x) < 2(x + 4)$.Show the graph of solution in number line.
10. Solve $3(2 - x) \geq 2(1 - x)$.Show the graph of solution in number line.
11. Solve $\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$.Show the graph of solution in number line.
12. Solve $\frac{x}{2} \geq \frac{5x-2}{3} - \frac{7x-3}{5}$. Show the graph of solution in number line.
13. Solve $\frac{x}{4} < \frac{5x-2}{3} - \frac{7x-3}{5}$. Show the graph of solution in number line.
14. Solve $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$. Show the graph of solution in number line.
15. Solve $3\{(2x - 5) - 7\} \geq 9(x - 5)$.Show the graph of solution in number line.
16. Solve $\frac{2x-1}{3} \geq \frac{3x-2}{4} - \frac{2-x}{5}$
17. Solve $2(2x + 3) - 10 < 6(x - 2)$
18. Solve $37 - (3x + 5) \geq 9x - 8(x - 3)$
19. Solve $x + \frac{x}{2} + \frac{x}{3} < 11$
20. Solve $\frac{x}{3} > \frac{x}{2} + 1$
21. Solve $\frac{1}{2}\left(\frac{3x}{5} + 4\right) \geq \frac{1}{3}(x - 6)$
22. Solve $7x + 1 \geq 4x + 5$.
23. Solve $2x - 5 > 1 - 5x$.
24. Solve $-8 \leq 5x - 3 < 7$

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25. Solve $2 \leq 3x - 4 \leq 5$
26. Solve $6 \leq -3(2x - 4) < 12$
27. Solve $5x + 1 > -24$ and $5x - 1 < 24$. Show the graph of solution in number line.
28. Solve $3x - 7 < 5 + x$ and $11 - 5x \leq 1$. Show the graph of solution in number line.

Q.37 (PART-B) Two marks questions

Examples on pairs of consecutive odd natural numbers, average of at least marks

1. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.
2. Find all pairs of consecutive odd natural numbers, both of which are more than 50, such that their sum is less than 120.
3. Find all pairs of consecutive odd positive integers, both of which are smaller than 10, such that their sum is more than 11.
4. Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23.
5. The marks obtained by a student of class XI in first and second terminal examination are 62 and 48, respectively. Find the minimum marks he should get in the annual examination to have an average of at least 60 marks.
6. Ravi obtained 70 and 75 marks in first two unit test. Find the minimum marks he should get in the third test to have an average of at least 60 marks.
7. The longest side of a triangle is 3 times the shortest side and the third side is 2cm shorter than the longest side. If the perimeter of the triangle is at least 61cm, find the minimum length of the shortest side.
8. To receive Grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in first four examination are 87, 92, 94 and 95, find the minimum marks that Sunita's must obtain in fifth examination to get grade 'A' in the course.
9. A man wants to cut three lengths from a single piece of board of length 91cm. The second length is to be 3cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least 5cm longer than the second?

AS PER NEW PATTERN 2023-2024

TOP SCORER POCKET MARKS PACKAGE

- Chapter wise detailed solutions of
  - **Multiple Choice Questions (MCQ)**
- Chapter wise detailed solutions of
  - **Fill in the Blanks (FB)**
- Chapter wise Question Papers (Test Papers)
  - **For FIRST UNIT TEST and SECOND UNIT TEST**
  - **PROJECTS and ASSIGNEMENT**

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Chapter-06

PERMUTATIONS AND COMBINATIONS

In every question paper, the question numbers on this chapter are Q6, Q18, Q27, Q45

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(U) Q.6	(R) Q.18	(U) Q.27	-	(A) Q.45	-	-	4 Questions
Questions	1	1	1	-	1	-	-	9 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.06 and Q.18 (PART-A) One mark questions (MCQ and FB)

1. Find $5!$, $7!$, $8!$, $\frac{7!}{5!}$,
2. Compute i) $\frac{8!}{6!2!}$, ii) $\frac{12!}{10!2!}$
3. Evaluate i) $7! - 5!$ ii) $4! - 3!$ iii) Is $3! + 4! = 7!$
4. Evaluate $\frac{n!}{(n-r)!r!}$ when $n = 5$ and $r = 2$
5. Evaluate $\frac{n!}{(n-r)!}$ when $n = 6$ and $r = 2$
6. Evaluate $\frac{n!}{(n-r)!}$ when $n = 9$ and $r = 5$
7. If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$ then find the value of x
8. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$ then find the value of x
9. If ${}^{n}c_{8} = {}^{n}c_{2}$ then find n
10. If ${}^{n}c_{8} = {}^{n}c_{6}$ then find n
11. If ${}^{n}c_{7} = {}^{n}c_{6}$ then find n
12. If ${}^{n}c_{9} = {}^{n}c_{8}$ then find n and ${}^{n}c_{17}$

Q.27 (PART-B) Two marks questions

Fundamental Principle of Counting

1. How many 2 digit even numbers can be formed from the digits 1,2,3,4,5 if the digits can be repeated?
2. How many 3 digit numbers can be formed by using the digits 1 to 9 if no digit is repeated
3. How many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that repetition of the digits is allowed?
4. How many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that repetition of the digits is not allowed?
5. How many 3-digit even numbers can be formed from the digits 1,2,3,4,5,6 if the digits can be repeated?
6. How many 3-digit even numbers can be made using the digits 1,2,3,4,6,7 if no digit is repeated?
7. How many 4 digit numbers can be formed by using the digits 1,2,3,4,5 if no digit is repeated
8. How many 4-digit numbers are there with no digit repeated?
9. Find the number of 4-digit numbers that can be formed using the digits 1,2,3,4,5 if no digit is repeated. How many of these will be even?
10. How many 4 letter code can be formed using the first 10 letters of the English alphabet, if no letter can be repeated?
11. How many 5-digit telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67 and no digit appears more than once?

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12. How many 6-digit numbers can be formed from the digits 0,1,3,5,7 and 9 which are divisible by 10 and no digit is repeated?
13. How many words, with or without meaning, can be formed using all the letters of the word EQUATION, using each letter exactly once?
14. Find the number of 4 letter words, with or without meaning, which can be formed out of the letters of the word ROSE, where the repetition of the letters is not allowed.
15. Given 4 flags of different colours, how many different signals can be generated, if a signal requires the use of 2 flags one below the other?
16. Given 5 flags of different colours, how many different signals can be generated, if a signal requires the use of 2 flags one below the other?
17. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.

Permutations

1. Find n if ${}^{n}P_5 = 42\ {}^{n}P_3, n > 4$
2. Find n if $\frac{{}^{n}P_4}{{}^{n-1}P_4} = \frac{5}{3}, n > 4$
3. Find n if ${}^{n-1}P_3 : {}^{n}P_4 = 1:9$
4. Find r if $5\ {}^{4}P_r = 6\ {}^{5}P_{r-1}$
5. Find r if i) ${}^{5}P_r = 2\ {}^{6}P_{r-1}$ ii) ${}^{5}P_r = {}^{6}P_{r-1}$
6. Find the number of permutations of the letters in the word ALLAHABAD
7. In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?
8. In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?
9. In how many of the distinct permutations of the letters in the word MISSISSIPPI, do the four I's not come together
10. If the different permutations of all the letter of the word EXAMINATION are listed as in a dictionary, how many words are there in this list before the first word starting with E?
11. How many words, with or without meaning, can be formed using all the letters of the word EQUATION at a time so that the vowels and consonants occur together?
12. How many numbers greater than 1000000 can be formed by using the digits 1,2,0,2,4,2,4?
13. In how many ways can 5 girls and 3 boys be selected in a row so that no two boys are together.
14. From a committee of 8 persons, in how many ways can we choose a chairman and a vice chairman assuming one person can not hold more than one position?

Combinations

1. If ${}^{2n}C_3 : {}^{n}C_3 = 12:1$ then find n
2. If ${}^{2n}C_3 : {}^{n}C_3 = 11:1$ then find n
3. In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls?
4. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.
5. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.
6. In how many ways one can select a cricket team of 11 out of 17 players in which 5 are bowlers, if the team has to include exactly 4 bowlers
7. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.
8. Determine the number of 5 card combinations out of a deck of 52 cards if each selection of 5 cards has exactly one king.
9. How many chords can be drawn through 21 points on a circle?
10. In how many ways can a student choose a programme of 5 courses if 9 courses are available and 2 specific courses are compulsory for every student?
11. How many words, with or without meaning, each of 2 vowels and 3 consonants can be formed from the letters of the word DAUGHTER?
12. The English alphabet has 5 vowels and 21 consonants. How many words with two different vowels and 2 different consonants can be formed from the alphabet?

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13. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?
14. How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the world INVOLUTE

Q.45 (PART-D) Five marks questions

Permutations

1. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,
   (i) do the words start with P (ii) do all the vowels always occur together
   (iii) do the vowels never occur together (iv) do the words begin with I and end in P?
2. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if.
   (i) 4 letters are used at a time, (ii) all letters are used at a time,
   (iii) all letters are used but first letter is a vowel?
3. In how many ways can the letters of the word PERMUTATIONS be arranged if the
   (i) words start with P and end with S,
   (ii) vowels are all together,
   (iii) there are always 4 letters between P and S?
4. Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that
   (i) all vowels occur together (ii) all vowels do not occur together.
5. Find the number of arrangements of the letters of the word EXAMINATION. In how many of these arrangements,
   (i) do the words start with E (ii) do all the vowels always occur together

Combinations

6. Prove that ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$
7. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has
   (i) no girl ?
   (ii) at least one boy and one girl?
   (iii) at least 3 girls ?
8. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of
   (i) exactly 3 girls?
   (ii) atleast 3 girls?
   (iii) atmost 3 girls?
9. A group consists of 7 boys and 5 girls. Find the number of ways in which a team of 5 members can be selected if
   (i) no girl ?
   (ii) at least one boy and one girl?
   (iii) at least 3 girls?
10. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these
    (i) four cards are of the same suit,
    (ii) four cards belong to four different suits,
    (iii) are face cards,
    (iv) two are red cards and two are black cards,
    (v) cards are of the same colour?
11. In an examination, a question paper consists of 12 questions divided into two parts i.e., Part I and Part II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?

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Chapter-07

BINOMIAL THEOREM

In every question paper, the question numbers on this chapter are Q.7, Q.28, Q.46

Weightage of this Chapter								
Part of Question paper	**Part-A**		**Part-B**	**Part-C**	**Part-D**	**Part-E**		**Total**
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(U) Q.7	-	(R) Q.28	-	(R) Q.46	-	-	**3 Questions**
Questions	1	-	1	-	1	-	-	**8 Marks**

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.7 (PART-A) One marks questions (MCQ) ans Q.28 (Part-B) Two Marks Questions

Concept (I)

1. Expand $\left(x^2+\frac{3}{x}\right)^4$, $x \neq 0$ and also find the number of terms in this expansion
2. Expand $\left(x+\frac{1}{x}\right)^6$, $x \neq 0$ and also find the number of terms in this expansion
3. Expand $\left(\frac{x}{3}+\frac{1}{x}\right)^5$, $x \neq 0$ and also find the number of terms in this expansion
4. Expand $(x+2)^6$ and also find the number of terms in this expansion
5. Expand $(2x-3)^6$, and also find the number of terms in this expansion
6. Expand $(1-2x)^5$, and also find the number of terms in this expansion
7. Expand $\left(\frac{2}{x}-\frac{x}{2}\right)^5$, $x \neq 0$ and also find the number of terms in this expansion

Q.28 (Part-B) Two Marks Questions

Concept (III)

1. Compute $(101)^4$ by using binomial theorem.
2. Compute $(102)^5$ by using binomial theorem.
3. Compute $(96)^3$ by using binomial theorem.
4. Compute $(99)^5$ by using binomial theorem.
5. Compute $(98)^5$ by using binomial theorem.

Concept (IV)

1. Which is larger $(1.01)^{1000000}$ or 10000 by using binomial theorem
2. Which is larger $(1.1)^{10000}$ or 1000 by using binomial theorem

Concept (V) Extra Questions

1. Prove that there is no term involving x^4 in the expansion of $\left(\frac{x^2}{2}+\frac{1}{x}\right)^9$
2. Find $(a+b)^4-(a-b)^4$ and hence evaluate $\left(\sqrt{3}+\sqrt{2}\right)^4-\left(\sqrt{3}-\sqrt{2}\right)^4$
3. Find $(x+1)^6+(x-1)^6$ and hence evaluate $\left(\sqrt{2}+1\right)^6+\left(\sqrt{2}-1\right)^6$
4. Evaluate $\left(\sqrt{3}+\sqrt{2}\right)^6-\left(\sqrt{3}-\sqrt{2}\right)^6$
5. Evaluate $\left(a^2+\sqrt{a^2-1}\right)^4+\left(a^2-\sqrt{a^2-1}\right)^4$
6. Expand using Binomial Theorem $\left(1+\frac{x}{2}-\frac{2}{x}\right)^4$
7. Expand using Binomial Theorem $(3x^2-2ax+3a^2)^3$
8. Prove that $C_0+C_1+C_2+C_3+\cdots\ldots\ldots\ldots+C_n=2^n$
9. Prove that $C_0+C_2+C_4+C_6+\cdots\ldots\ldots\ldots=C_1+C_3+C_5+C_7+\cdots\ldots\ldots\ldots$
10. Using binomial theorem, prove that 6^n-5n always leaves remainder 1 when divided by 25

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11. Using binomial theorem, show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer

Q.46 (PART-D) Five marks questions

1. State and prove Binomial Theorem for all natural number Or
   For all a,b real numbers and n is a positive integer then prove that
   $(a+b)^n = {}^nC_0a^n + {}^nC_1a^{n-1}b + {}^nC_2a^{n-2}b^2 + \cdots \ldots \ldots \ldots + {}^nC_nb^n$

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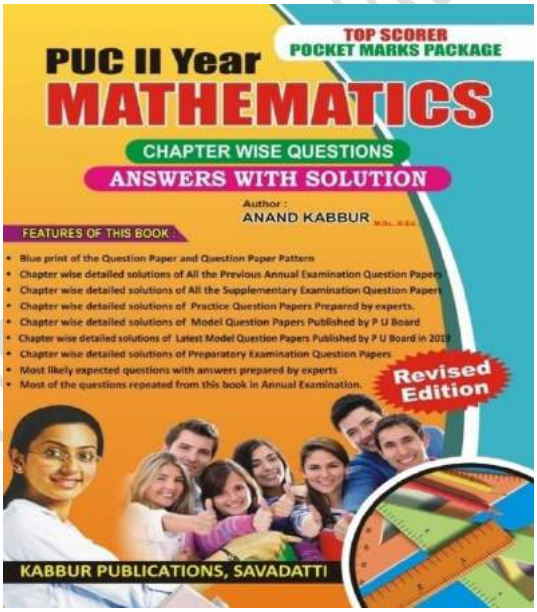

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Chapter-08

SEQUENCE AND SERIES

In every question paper, the question numbers on chapter are Q8, Q38, Q52 (a) or (b)

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.8	-	-	(U) Q.38	-	-	(U) Q.52 (a or b)	3 Questions
Questions	1	-	-	1	-	-	1	8 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.8 (PART-A) One Mark Questions (MCQ)

1. What is the 20th term of the sequence defined by $a_n = (n-1)(2-n)(3+n)$
2. Write the 2nd term of the sequence $a_n = (-1)^{n-1} \cdot 5^{n+1}$
3. Find the fifth term of the sequence $a_n = \frac{2n-3}{6}$
4. Find the second term of the sequence $a_n = \frac{2n+3}{6}$
5. Find the first term of the sequence $a_n = \frac{n}{n+1}$
6. Find the first five terms of the sequence $a_n = \frac{n}{n+1}$ and write corresponding series
7. Find the first five terms of the sequence $a_n = n\left(\frac{n^2+5}{4}\right)$ and write corresponding series
8. Find the first five terms of the sequence$a_n = (-1)^{n-1} \cdot 5^{n+1}$ and write corresponding series
9. Find the first five terms of the sequence $a_n = \frac{2n-3}{6}$ and write corresponding series
10. Find the first five terms of the sequence $a_n = n(n+1)$ and write corresponding series
11. Find the first five terms of the sequence $a_n = 2^n$ and write corresponding series
12. Find the 17th term of the sequence $a_n = 4n-3$
13. Find the 24th term of the sequence $a_n = 4n-3$
14. Find the 7th term of the sequence of$a_n = \frac{n^2}{2^n}$ and$a_n = \frac{n(n-2)}{n+3}$
15. Find the 20th term of the sequence $a_n = \frac{n(n-2)}{n+3}$
16. Find the 20th term of the sequence $a_n = (-1)^{n-1} \cdot n^3$
17. Find the first three terms of the sequence $a_n = \frac{n-3}{4}$ and write corresponding series
18. Find the first five terms of the sequence if$a_1 = 3$, $a_n = 3a_{n-1} + 2$ for all $n > 1$
19. Find the first five terms of the sequence if$a_1 = -1$, $a_n = \frac{a_{n-1}}{n}$ for all $n \geq 2$
20. Find the first five terms of the sequence if$a_1 = a_2 = 2$, $a_n = a_{n-1} - 2$ for all $n > 2$
21. Find the first five terms of the sequence if$a_1 = a_2 = 1$, $a_n = a_{n-1} + a_{n-2}$ for all $n > 2$ and also find$\frac{a_{n+1}}{a_n}$for $n = 1,2,3,4,5$
22. Find the first five terms of the sequence if$a_1 = 1$, $a_n = a_{n-1} + 2$ for $n \geq 2$
23. Find the first three terms of the sequence $a_n = 2n + 5$ and write corresponding series
24. If the arithmetic mean of 8 and x is 20 then find x
25. For what value of x, the numbers $-\frac{2}{7}$, x , $-\frac{7}{2}$ are in G.P
26. Which term of $2, 2\sqrt{2}, 4$ ... ... is 128
27. Find tenth term of G.P : 5,25,125,.....
28. Find tenth term of G.P : 3,9,27,.....
29. Find 17th, 20th term and common ratio of G.P : $\frac{5}{2}$, $\frac{5}{4}$, $\frac{5}{8}$, ...
30. Find the 12th term of G.P whose 8th term is 192 and whose common ratio is 2

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Q.38 (PART-C) Three Marks Questions

Insert the some numbers between two numbers

1. Insert 3 arithmetic mean between 8 and 24
2. Insert 5 numbers between 8 and 26 such that resulting sequence is an A.P
3. Insert 3 numbers between 8 and 20 such that resulting sequence is an A.P
4. Insert 6 numbers between 3 and 24 such that resulting sequence is an A.P
5. Insert 2 numbers between 3 and 24 such that resulting sequence is an A.P
6. Insert 5 numbers between 3 and 21 such that resulting sequence is an A.P
7. Insert 3 numbers between 1 and 256 such that resulting sequence is an G.P
8. Insert 2 numbers between 3 and 81 such that resulting sequence is an G.P

Arithmetic Progressions

9. Find the sum of odd integers from 1 to 2001
10. Find the sum of all natural numbers lying between 100 and 1000 which are multiple of 5
11. Find the sum of all numbers between 200 and 400 which are divisible by 7
12. Find the sum of all integars from 1 and 100 which are divisible by 2 or 5
13. How many terms of the A.P $-6, \frac{-11}{2}, -5$ ... ... are needed to give the sum -25
14. If the sum of a certain numbers of terms of the A.P 25,22,19,..... is 116 find the number of terms
15. In an A.P. if pth term is $\frac{1}{q}$ and qth term is $\frac{1}{p}$ prove that the sum of first pq terms is $\frac{1}{2}(pq+1), p \neq q$
16. In an A.P, if mth term is n and nth term is m, where $m \neq n$ find the pth term
17. Sum of three numbers in A.P is 24 and their product is 440 find the numbers
18. Find the sum of n terms of an A.P whose kth term is $(5k+1)$
19. If the sum of n terms of an A.P is $3n^2+5n$ and its mthterm is 164, find the value of m.
20. If $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is in A.M between a and b, find the value of n
21. Sum of three numbers in AP is 24 and their product is 440. Find the numbers
22. The arithmetic mean of 4 and another number is 10. Find the other number
23. The sum of n terms of two A.P are in the ratio $(3n+8):(7n+15)$. Find ratio of their 12th term
24. The sum of n terms of two A.P are in the ratio $(5n+4):(9n+6)$. Find the ratio of their 18th term
25. In an A.P, the first term is 2 and the sum of first five terms is one-fourth of the next five terms. Show that 20th term is -112
26. The ratio of the sums of m and n terms of an A.P is $m^2:n^2$. Then show that the ratio of mth and nth term is $(2m-1):(2n-1)$
27. The difference between any two consecutive interior angles of a polygon is 5^0. If the smallest angle is 120^0 find the number of sides of the polygon.

Geometric Progressions

28. How many terms of the G.P $3, \frac{3}{2}, \frac{3}{4}$ ... ... are needed to give the sum $\frac{3069}{512}$
29. How many terms of G.P $3, 3^2, 3^3$, ... are needed to give the sum 120
30. Which term of the G.P., 2,8,32,… up to n terms is 131072?
31. Which term of the G.P., $2, 2\sqrt{2}, 4$,… up to n terms is 128 ?
32. Which term of the G.P., $\sqrt{3}, 3, 3\sqrt{3}$,… up to n terms is 729 ?
33. Which term of the G.P., $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}$,… up to n terms is $\frac{1}{19683}$?
34. In a G.P., the 3rd term is 24 and the 6th term is 192. Find the 10th term
35. Find the 12th term of a G.P. whose 8th term is 192 and common ratio is 2
36. Sum of first three terms of a G.P is 13/12 and their product is -1 find the common ratio and terms
37. Sum of first three terms of a G.P is 39/10 and their product is 1 find the common ratio and terms
38. The Sum of some terms of a G.P is 315. First term and common ratio are 5 and 2 respectively. Find the number of terms
39. If pth, qth, rth terms of a G.P are a,b,c respectively. Prove that $a^{q-r}b^{r-p}c^{p-q}=1$
40. Find the value of n so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be G.M between a and b

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41. Given a G.P, with $a = 729$ and 7th term is 64 determine S_7 (sum to first 7 terms)
42. Find the sum of first n terms and sum of first 5 terms of the geometric progression $1 + \frac{2}{3} + \frac{4}{9} + \cdots$
43. The 4th term of a G.P is square of its second term and the first term is -3 then determine its 7th term
44. The 5th , 8th and 11th terms of a G.P are p,q and s respectively. Show that $q^2 = ps$
45. The sum of first three terms of a G.P is 16 and the sum of the next three terms is 128. Determine the first term, common ratio and the sum to n terms of the G.P
46. Find a G.P for which sum of the first two terms is -4 and the fifth term is 4 times the third term
47. If the 4th , 10th and 16th terms of a G.P are x,y and z respectively. Prove that x,y and z are in G.P.
48. If pth, qth, rth and sth terms of an A.P are in G.P, show that $(p-q)$,$(q-r)$, $(r-s)$ are also in G.P
49. If a,b,c are in G.P and $a^{1/x} = b^{1/y} = c^{1/z}$ then prove that x,y,z are in A.P

Relationship between A.M and G.M

50. If A.M and G.M of two positive numbers a and b are 10 and 8, respectively, find the numbers
51. If A.M and G.M of roots of quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.
52. The ratio of A.M and G.M of two positive numbers a and b, is $m:n$ then show that $a:b = \left(m+\sqrt{m^2-n^2}\right):\left(m-\sqrt{m^2-n^2}\right)$
53. If A and G be A.M and G.M , respectively between two positive numbers, prove that the numbers are $A \pm \sqrt{(A+G)(A-G)}$
54. The sum of two numbers is 6 times their geometric mean, show that the numbers are in the ratio $\left(3+2\sqrt{2}\right):\left(3-2\sqrt{2}\right)$

Some other Questions

55. A person has 2 parents, 4 grandparents, 8 great grandparents, and so on. Find the number of his ancestors during the ten generations preceding his own.
56. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2 nd hour, 4th hour and n th hour ?
57. What will Rs 500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of 10% compounded annually?
58. A farmer buys a used tractor for Rs 12000. He pays Rs 6000 cash and agrees to pay the balance in annual instalments of Rs 500 plus 12% interest on the unpaid amount. How much will the tractor cost him?
59. Shamshad Ali buys a scooter for Rs 22000. He pays Rs 4000 cash and agrees to pay the balance in annual instalment of Rs 1000 plus 10% interest on the unpaid amount. How much will the scooter cost him?
60. A person writes a letter to four of his friends. He asks each one of them to copy the letter and mail to four different persons with instruction that they move the chain similarly. Assuming that the chain is not broken and that it costs 50 paise to mail one letter. Find the amount spent on the postage when 8th set of letter is mailed
61. A man deposited Rs 10000 in a bank at the rate of 5% simple interest annually. Find the amount in 15th year since he deposited the amount and also calculate the total amount after 20 years.
62. A manufacturer reckons that the value of a machine, which costs him Rs. 15625, will depreciate each year by 20%. Find the estimated value at the end of 5 years.
63. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day, 4 more workers dropped out on third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed

Q.52 (a) or (b) PART-E Four Marks Questions: Find the sum of n terms of series

1. Find the sum of n terms of series : 8,88,888,8888, ...
2. Find the sum of n terms of series : 7,77,777,7777, ...
3. Find the sum of n terms of series : 5,55,555,5555, ...
4. Find the sum of n terms of series : 0.6,0.66,0.666,0.6666, ...
5. Find the 20th term of the series 2 × 4 + 4 × 6 + 6 × 8 + ... + n terms

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Chapter-09

STRAIGHT LINES

In every question paper, the question numbers on this chapter are Q9, Q19, Q29, Q39, Q47

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.9	(R) Q.19	(H) Q.29	(R) Q.39	(R) Q.47	-	-	5 Questions
Questions	1	1	1	1	1	-	-	12 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.09 and Q.19 (PART-A) One mark questions (MCQ and FB)

Find the Slope

1. Find the slope of the line Passing through the points $(3,-2)$ and $(-1,4)$.
2. Find the slope of the line Passing through the points $(3,-2)$ and $(7,-2)$
3. Find the slope of the line Passing through the points $(3,-2)$ and $(3,4)$,
4. Find the slope of the line Passing through the points $(3,2)$ and $(-3,4)$,
5. Find the slope of the line Passing through the points $(5,6)$ and $(-4,2)$,
6. Find the slope of the line Making inclination of 60^0 with the positive direction of *x*-axis.
7. Find the slope of the line, which makes an angle of 30^0 with the positive direction of *y*-axis measured anticlockwise.
8. Find the slope of the line $\frac{x}{4}+\frac{y}{6}=1$
9. Find the slope of a line, which passes through the origin and the mid-point of the line segment joining the points $(0,-4)$ and $(8,0)$,
10. Find a point on the x-axis, which is equidistant from the points $(7,6)$ and $(3,4)$,
11. Write the equations of x-axis and y-axis
12. State the condition for two lines are parallel and perpendicular.

Find Slope, and also find intercepts

13. Equation of a line is $3x-4y+10=0$.
    Find its (i) slope (slope - intercept form), (ii) x- and y- intercepts (Intercept form)
14. Equation of a line is $2x+3y-4=0$.
    Find its (i) slope (slope - intercept form), (ii) x- and y- intercepts (Intercept form)

Reduce the equation into slope - intercept form and intercept form

15. Reduce the equation $6x+3y-5=0$ into slope - intercept form, find slope and the y-intercept.
16. Reduce the equation $x+7y=0$ into slope - intercept form, find slope and the y-intercept.
17. Reduce the equation $y=0$ into slope - intercept form, find slope and the y-intercept.
18. Reduce the equation $3x+2y-12=0$ into intercept form and find x and y intercepts on the axes.
19. Reduce the equation $4x-3y=6$ into intercept form and find x and y intercepts on the axes.
20. Reduce the equation $3y+2=0$ into intercept form and find x and y intercepts on the axes.

Q.29 (PART-B) Two marks questions and Q.39 (PART-C) Three marks questions

Equation of the line Passing through the point $(x_1, y_1)$with slope m

1. Find the equation of the line Passing through the point $(-2,3)$ with slope -4.
2. Find the equation of the line Passing through the point $(-4,3)$ with slope $1/2$
3. Find the equation of the line Passing through the point $(-4,3)$ with slope $-1/2$
4. Find the equation of line passing through the point $(2,1)$ and the angle is 45^0
5. Find the equation of the line Passing through $(2,2\sqrt{3})$and inclined with the *x*-axis at angle of 75^0.
6. Find the equation of the line Intersecting the *x*-axis at a distance of 3 units to the left of origin with slope -2.

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7. Find the equation of the line Intersecting the *y*-axis at a distance of 2 units above the origin and making an angle of 30^0 with positive direction of the*x*-axis.
8. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point $(2,3)$.
9. Find equation of the line through the point (0, 2) making an angle $2\pi/3$ with the positive x-axis. Also, find the equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.

Equation of the line Passing through the points (x_1, y_1) and (x_2, y_2)

10. Find the equation of the line Passing through the points $(1,-1)$ and $(3,5)$.
11. Find the equation of the line Passing through the points $(-1,1)$ and $(2-4)$.
12. Find the equation of the line Passing through the points $(1,2)$ and $(3,4)$.

Slope-Intercept form and intercept form

13. Find the equation of line with slope $\frac{1}{2}$ and y-intercept $-\frac{3}{2}$
14. Find the equation of line with slope $\frac{1}{2}$ and x-intercept 4
15. Find the equation of the line, which makes intercepts -3 and 2 on the x- and *y*-axes respectively.
16. The perpendicular from the origin to the line y = mx + c meets it at the point (–1, 2). Find the values of m and c

Angle Between Two line

17. If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$, find slope of the other line.
18. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\frac{1}{3}$ find the slopes of the lines.
19. Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$
20. Find the angle between the lines $x + \sqrt{3}y = 1$ and $\sqrt{3}x + y = 1$
21. Find the angle between the lines $3x-4y+7=0$ and $3x-4y+5=0$
22. Find the slope of the line which makes angle $\pi/4$ with line $x - 2y + 5 = 0$
23. Find the angle between the x-axis and the line joining the points $(3,-1)$ and $(4,-2)$
24. Find the equation of the lines through the point $(3, 2)$ which make an angle of 45o with the line $x - 2y = 3$

Based on condition of slopes $m_1 = m_2$ and $m_1 \cdot m_2 = -1$

25. Line through the points $(-2,6)$ and $(4,8)$ is perpendicular to the line through the points $(8,12)$ and $(x, 24)$. Find the value of *x*.
26. Line through the points $(h, 3)$ and $(4,1)$ intersects the line $7x - 9y - 19 = 0$ at right angles. Find the value of *h*.
27. Without using distance formula, show thfat points $(-2,-1)$, $(4,0)$, $(3,3)$ and $(-3,2)$ are the vertices of a parallelogram.
28. Without using the Pythagoras theorem, show that the points $(4,4)$, $(3,5)$ and $(-1,-1)$ are the vertices of a right angled triangle
29. Show that the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ where $b_1, b_1 \neq 0$ are
    i) Parallel if $\frac{a_1}{b_1} = \frac{a_2}{b_2}$ ii) Perpendicular if $a_1a_2 + b_1b_2 = 0$

Equation of the line parallel or perpendicular to the line and passing through point

30. Find the equation of the line perpendicular to the line $x - 2y + 3 = 0$and passing through $(1,-2)$.
31. Find the equation of the line perpendicular to the line $x + y + 2 = 0$ and passing through $(-1,0)$.
32. Find the equation of the line perpendicular to the line $x-7y+5=0$ and having *x* intercept 3.
33. Find the equation of the line passing through $(-3,5)$ and perpendicular to the line through the points $(2,5)$ and $(-3,6)$.
34. Find equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2,3)$
35. Find equation of the line parallel to the line $4x - 2y + 7 = 0$ and passing through the point $(2,-4)$
36. In the triangle ABC with vertices $A(2,3)$, $B(4,-1)$ and $C(1,2)$, find the equation and length of altitude from the vertex A.
37. Find the equation of the right bisector of the line segment joining the points (3, 4) and (–1, 2)

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38. The line through the points (h, 3) and (4, 1) intersects the line 7x-9y-19=0 at right angle. Find the value of h
39. Prove that the line through the point (x_1, y_1) and parallel to the line $Ax + By + C = 0$ is
$$A(x - x_1) + B(y - y_1) = 0$$
40. The perpendicular from the origin to the line meets it at the point $(-2,9)$, find the equation of line
41. By using concept of equation of a line, prove that points $(3,0), (-2,-2)$ *and* $(8,2)$ are collinear.

Distance of a point from the line (x_1, y_1) from the line $Ax + By + C = 0$

42. Find the distance of the point $(3,-5)$ from the line $3x - 4y - 26 = 0$
43. Find the distance of the point $(-1,1)$ from the line $12(x + 6) = 5(y - 2)$.
44. Find the distance of the point $(3,-5)$ from the line $3x - 4y - 4 = 0$.
45. Find the points on the x-axis, whose distances from the line $\frac{x}{3} + \frac{y}{4} = 1$ are 4 units
46. Find the points on the y-axis, whose distances from the line $\frac{x}{3} + \frac{y}{4} = 1$ are 4 units

Distance between the parallel lines $Ax + By + C_1 = 0$ and $Ax + By + C_2 = 0$

47. Find the distance between the parallel lines $3x - 4y + 7 = 0$ *and* $3x - 4y + 5 = 0$
48. Find the distance between the parallel lines $15x + 8y - 34 = 0$ *and* $15x + 8y + 31 = 0$
49. Find the distance between the parallel lines $3x - 4y + 7 = 0$ *and* $9x - 12y + 15 = 0$
50. Find the distance between the parallel lines $3x - 4y + 5 = 0$ *and* $6x - 8y + 2 = 0$
51. Find the distance between the parallel lines $l(x + y) + p = 0$ *and* $l(x + y) - r = 0$.
52. Find the coordinates of the foot of the perpendicular from $(-1,3)$ to the line $3x - 4y - 16 = 0$

Point of concurrence

53. Find p, so that the three lines $3x + y - 2 = 0$, $px + 2y - 3 = 0$ and $2x - y - 3 = 0$ intersect at one point. Find the point of concurrence
54. If the lines $2x + y - 3 = 0$, $5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent, find k
55. Find the equation of line passing through the point of intersection of lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercept on the axis

Image of a point

56. Find the image of $(2,3)$ in the line $3x + 4y = 5$ assuming that the line to be a plane mirror
57. Find the image of $(1,2)$ in line $x - 3y + 4 = 0$ assuming that the line to be a plane mirror
58. Find the image of $(3,8)$ in line $x + 3y = 7$ assuming that the line to be a plane mirror

Q.45 (PART-D) Five marks questions

Important Theorems derivations

1. Derive the formula for the angle between two lines whose slopes are m_1 and m_2
2. Derive the formula to find the distance of a point from the line or
   Derive the formula for distance of a point (x_1, y_1) from the line $Ax + By + C = 0$ geometrically
3. Derive the distance between two parallel lines $y = mx + c_1$ and $y = mx + c_2$

Some other Theorems derivations

4. Derive the equation of line passing through the point (x_1, y_1) and slope m.
5. Derive the equation of line joining two points (x_1, y_1) and (x_2, y_2)
6. Derive the equation of line with slope m and y-intercept is c
7. Derive the equation of line having intercepts a and b on x and y axes respectively or
   Derive the equation of line in intercept form.
8. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point (2, 3)
9. Find equation of the line passing through the point (2, 2) and cutting off intercepts on the axes whose sum is 9
10. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and – 6, respectively

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11. If p is the length of perpendicular from origin whose intercepts on the axis are a and b then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$
12. $P(a, b)$ is the mid point of the line segment between axes. Show that the equation of line is $\frac{x}{a} + \frac{y}{b} = 2$
13. If p and q are length of perpendicular from origin to the lines $xcos\theta - ysin\theta = kcos2\theta$ and $xsec\theta + ycosec\theta = k$ then prove that $p^2 + 4q^2 = k^2$

AS PER NEW PATTERN 2023-2024

TOP SCORER POCKET MARKS PACKAGE

FEATURES OF THE BOOK PUC II YEAR MATHEMATICS

- **Blue print** of the Question Paper and **Question Paper Pattern**
- Chapter wise detailed solutions of
  - **Multiple Choice Questions (MCQ)**
- Chapter wise detailed solutions of
  - **Fill in the Blanks (FB)**
- Chapter wise Question Papers (Test Papers)
  - **For FIRST UNIT TEST and SECOND UNIT TEST**
  - **PROJECTS and ASSIGNEMENT**
- **Passing Package and Scoring Package**
- Different Set of Question Papers (Prepared by experts)
  - **10 Set of SAMPLE QUESTION PAPER**
  - **10 Set of PRACTICE QUESTION PAPER**
- Chapter wise detailed solutions of All the Previous
  - **Annual Examination/ Supplementary Examination/**
  - **Preparatory Examination/ Expected questions**

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Chapter-10

CONIC SECTIONS

In every question paper, question numbers on chapter are Q10, Q11, Q40, Q51(a) or (b)

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.10 (U) Q.11	-	-	(A) Q.40	-	(H) Q.51 (a or b)	-	4 Questions
Questions	2	-	-	1	-	1		11 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.10 and Q.11 (PART-A) One Marks (MCQ) Q.40 (PART-C) Three marks questions

Circles

1. Find the centre and radius of circle $x^2 + y^2 + 8x + 10y - 8 = 0$
2. Find the centre and radius of circle $x^2 + y^2 + 8x + 10y - 12 = 0$
3. Find the centre and radius of circle $2x^2 + 2y^2 + 8x + 10y - 8 = 0$
4. Find the centre and radius of circle $x^2 + y^2 - 4x - 8y - 45 = 0$
5. Find the centre and radius of circle $2x^2 + 2y^2 - x = 0$
6. Find the centre and radius of circle $(x + 5)^2 + (y - 3)^2 = 36$
7. Find the equation of circle with centre $(-2,3)$ and radius 4 units
8. Find the equation of circle with centre $(0,2)$ and radius 2 units
9. Find the equation of circle with centre $(1,1)$ and radius $\sqrt{2}$ units
10. Find the equation of circle with centre $\left(\frac{1}{2}, \frac{1}{4}\right)$ and radius $\frac{1}{12}$ units
11. Find the equation of circle with centre $(0,0)$ and radius r units
12. Find the equation of circle which passes through $(1,0)$ and $(0,-1)$ and whose centre lies on the line $x - y + 2 = 0$
13. Find the equation of circle which passes through (4.1) and $(6,5)$ and whose centre lies on the line $4x + y = 16$
14. Find the equation of circle which passes through $(2.-2)$ and $(3,4)$ and whose centre lies on the line $x + y = 2$
15. Find the equation of circle with centre $(2,2)$ and passing through the point $(4,5)$
16. Find the equation of circle with radius 5 units, whose centre lies on x axis and passes through the point $(2,3)$

Parabola

1. Find the coordinates of focus, axis, equation of directrix and length of latus rectum of the parabola
   i) $y^2 = 12x$ ii) $y^2 = 8x$ iii) $y^2 = 10x$ iv) $y^2 = -8x$
   v) $x^2 = 6y$ vi) $x^2 = -16y$ vii) $x^2 = -9y$
2. Find the equation of parabola with is symmetric about the y axis and passing through point $(2, -3)$
3. Find the equation of parabola with focus $(2,0)$ and directrix $x = -2$
4. Find the equation of parabola with focus $(6,0)$ and directrix $x = -6$
5. Find the equation of parabola with focus $(0, -3)$ and directrix $y = 3$
6. Find the equation of parabola with vertex $(0,0)$ and focus $(0,2)$
7. Find the equation of parabola with vertex $(0,0)$ and focus $(3,0)$
8. Find the equation of parabola with vertex $(0,0)$ and focus $(-2,0)$
9. Find the equation of parabola vertex $(0,0)$ passing through $(5,2)$ and symmetric with respect to y axis. also find its focus.

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10. Find the equation of parabola vertex $(0,0)$ passing through $(2,3)$ and symmetric with respect to x axis. also find its focus.
11. Find the equation of parabola vertex $(0,0)$ passing through $(2,3)$ and axis is along x axis

Ellipse

1. Find the coordinates of vertex, foci, length of major axis, length of minor axis, length of latus rectum and eccentricity of the ellipse

i) $\frac{x^2}{49}+\frac{y^2}{36}=1$ ii) $\frac{x^2}{36}+\frac{y^2}{16}=1$ iii) $\frac{x^2}{16}+\frac{y^2}{9}=1$

iv) $\frac{x^2}{4}+\frac{y^2}{25}=1$ v) $\frac{x^2}{25}+\frac{y^2}{100}=1$ vi) $\frac{x^2}{100}+\frac{y^2}{400}=1$

vii) $4x^2+9y^2=36$ viii) $36x^2+4y^2=144,$ ix) $16x^2+y^2=16$

v) $\frac{x^2}{25}+\frac{y^2}{9}=1$ iv) $9x^2+4y^2=36$

2. Find the equation of ellipse with vertices $(\pm5,0)$ and foci $(\pm4,0)$
3. Find the equation of ellipse with vertices $(\pm6,0)$ and foci $(\pm4,0)$
4. Find the equation of ellipse with vertices $(\pm13,0)$ and foci $(\pm5,0)$
5. Find the equation of ellipse with vertices $(0,\pm13)$ and foci $(0,\pm5)$
6. Find the equation of ellipse, whose length of the major axis is 20 and foci $(0,\pm5)$
7. Find the equation of ellipse, whose length of the major axis is 26 and foci $(\pm5,0)$
8. Find the equation of ellipse, whose length of the minor axis is 16 and foci $(0,\pm6)$
9. Find the equation of ellipse, with ends of major axis $(\pm3,0)$ and ends of minor axis $(0,\pm2)$
10. Find the equation of ellipse whose centre at origin, major axis on the x axis and passing through the point $(4,3)$ and $(6,2)$
11. Find the equation of ellipse whose centre at origin, major axis on the x axis and passing through the point $(4,3)$ and $(-1,4)$
12. Find the equation of ellipse whose centre at origin, major axis on the y axis and passing through the point $(3,2)$ and $(1,6)$

Hyperbola

1. Find the co-ordinates of foci, vertices, length of the latus rectum and eccentricity of hyperbola

i) $\frac{x^2}{16}-\frac{y^2}{9}=1$ i) $\frac{x^2}{9}-\frac{y^2}{16}=1$ i) $\frac{y^2}{9}-\frac{x^2}{27}=1$

i) $3x^2-y^2=3$ i) $9x^2-4y^2=36$ i) $16x^2-9y^2=576$

i) $5x^2-9y^2=36$ i) $49x^2-16y^2=784$ i) $x^2-16y^2=16$

2. Find the equation of hyperbola where vertices $(\pm2,0)$ and foci $(\pm3,0)$
3. Find the equation of hyperbola where vertices $(0,\pm5)$ and foci $(0,\pm8)$
4. Find the equation of hyperbola where vertices $(0,\pm3)$ and foci $(0,\pm5)$
5. Find the equation of hyperbola where foci $(0,\pm13)$ and length of conjugate axis is 24 units
6. Find the equation of hyperbola where foci $(\pm5,0)$ and length of transverse axis is 8 units
7. Find the equation of hyperbola where foci are $(0,\pm12)$ and length of the latus rectum is 36 units.
8. Find the equation of hyperbola where foci are $(\pm4,0)$ and length of the latus rectum is 12 units.
9. Find the equation of hyperbola where foci are $(\pm7,0)$ and eccentricity $e=\frac{4}{3}$

Q.52 (a) or (b) (PART-E) Six marks questions

1. Define Parabola as a set of all points in a plane and derive its equation in form of $y^2=4ax$
2. Define Ellipse as a set of all points in a plane and derive its equation in the form of $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
3. Define Hyperbola as a set of all points in a plane and derive its equation in the form of $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$

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Chapter-11

INTRODUCTION TO THREE DIMENTIONAL GEOMETRY

In every question paper, the question numbers on this chapter are Q12, Q41

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(H) Q.12	-	-	(U) Q.41	-	-	-	2 Questions
Questions	1	-	-	1	-	-	-	4 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.12 (PART-A) One marks questions (MCQ)

Distance Formula

1. Find the distance between the pair of points $(1,-3,4)$ and $(-4,1,2)$
2. Find the distance between the pair of points $(2,-1,3)$ and $(-2,1,3)$
3. Find the distance between the pair of points $(2,3,5)$ and $(4,3,1)$
4. Find the distance between the pair of points $(-3,7,2)$ and $(2,4,-1)$

Points on the coordinate axis

5. Name the plane, which is x axis and y axis taken together
6. Write the point which is lies in XY plane
7. Name the plane which is y axis and z axis taken together
8. Write the point which is lies in YZ plane
9. Name the plane which is x axis and z axis taken together
10. Write the point which is lies in XZ plane
11. Write the point which is lies in X axis
12. If a point is on x axis then what are the y coordinate and z coordinate
13. Write the point which is lies in Y axis
14. If a point is on y axis then what are the x coordinate and z coordinate
15. Write the point which is lies in Z axis
16. If a point is on z axis then what are the x coordinate and y coordinate

Octants

17. Name the Octant the points $(1,2,3)$ is lies
18. Name the Octant the points $(4,-2,3)$ is lies
19. Name the Octant the points $(4,-2,-5)$ is lies
20. Name the Octant the points $(4,2,-5)$ is lies
21. Name the Octant the points $(-4,2,-5)$ is lies
22. Name the Octant the points $(-4,2,5)$ is lies

Q.41 (PART-B) Two marks questions

Using Distance formula, Verifying Collinear points, Triangles, Parallelogram

1. Using distance formula, Show that the points $(-2,3,5)$, $(1,2,3)$ and $(7,0,-1)$ are collinear
2. Using distance formula, Show that the points $(0,7,-10)$, $(1,6,-6)$ and $(4,9,-6)$ are the vertices of isosceles triangle
3. Using distance formula, Show that the points $(0,7,10)$, $(-1,6,6)$ and $(-4,9,6)$ are the vertices of right angle triangle
4. Show that the points $(-1,2,1)$, $(1,-2,5)$, $(4,-7,8)$ and $(2,-3,4)$ are the vertices of parallelogram
5. Show that the points $(1,2,3)$, $(-1,-2,-1)$, $(2,3,2)$ and $(4,7,6)$ are the vertices of parallelogram

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Set of equation of points which are equidistance

6. Find the set of equation of points which are equidistance from the points $(1,2,3)$ and $(3,2,-1)$.
7. Find the set of equation of points which are equidistance from the points $(3,4,-5)$ and $(-2,1,4)$.
8. Find the equation of the set of points P, the sum of whose distances from A (4, 0, 0) and B (– 4, 0, 0) is equal to 10
9. If A and B be the points (3, 4, 5) and (–1, 3, –7), respectively, find the equation of the set of points P such that $PA^2 + PB^2 = k^2$, where k is a constant

Centroid of the triangle and other Questions

10. If origin is the Centroid of the triangle PQR with vertices $P(2a, 2,6)$, $Q(-4,3b,-10)$ and $R(8,14,2c)$ then find the values of a, b, c
11. The Centroid of a triangle ABC is at point $(1,1,1)$. If the coordinates of A and B are $(3,-5,7)$ and $(-1,7,-6)$ respectively. Find the coordinates of the point C
12. Three vertices of a parallelogram ABCD are $(3,-1,2),(1,2,-4)$ and $(-1,1,2)$. Then find the coordinates of the fourth vertex
13. Find the lengths of the medians of the triangle with vertices A (0, 0, 6), B (0,4, 0) and (6, 0, 0)

AS PER NEW PATTERN 2023-2024

TOP SCORER POCKET MARKS PACKAGE

- Chapter wise detailed solutions of
  - **Multiple Choice Questions (MCQ)**
- Chapter wise detailed solutions of
  - **Fill in the Blanks (FB)**
- Chapter wise Question Papers (Test Papers)
  - **For FIRST UNIT TEST and SECOND UNIT TEST**
  - **PROJECTS and ASSIGNEMENT**

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Chapter-12

LIMITS AND DERIVATIVES

In every question paper, the question numbers on this chapter are Q13, Q20, Q30, Q42, Q48 and Q52 (a) or (b)

Weightage of this Chapter								
Part of Question paper	**Part-A**		**Part-B**	**Part-C**	**Part-D**	**Part-E**		**Total**
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(R) Q.13	(U) Q.20	(A) Q.30	(R) Q.42	(R) Q.48	-	(U) Q.52 (a or b)	**6 Questions**
Questions	1	1	1	1	1	-	1	**16 Marks**

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.13 and Q.20 (PART-A) One mark questions (MCQ and FB)

Find the Limit of following

1. Find $\lim_{x\to 3}(x+3)$
2. Find $\lim_{x\to 3}[x(x+1)]$
3. Find $\lim_{x\to 4}\left(\frac{4x+3}{x-2}\right)$,
4. Find$\lim_{x\to 1}\left(\frac{x^2+1}{x+100}\right)$,
5. Find $\lim_{x\to -1}\left(\frac{x^{10}+x^5+1}{x-1}\right)$,
6. Find $\lim_{x\to -1}[1+x+x^2+x^3+\cdots+x^{10}]$
7. Find $\lim_{x\to -1}[x^3-x^2+1]$
8. Find $\lim_{x\to 1}\left(\frac{ax^2+bx+c}{cx^2+bx+c}\right)$
9. Find $\lim_{x\to 0}\left(\frac{ax+b}{cx+1}\right)$
10. $\lim_{x\to 1}\left(\frac{ax^2+bx+c}{cx^2+bx+a}\right)$
11. Find $\lim_{x\to 0}\frac{cosx}{\pi-x}$
12. Find $\lim_{x\to 0} xsecx$
13. Find $\lim_{x\to 5}(|x|-5)$
14. Find $\lim_{x\to \pi}\left(x-\frac{22}{7}\right)$
15. Find $\lim_{r\to 1}\pi r^2$
16. Find$\lim_{x\to 1}(x^3-x^2+1)$

Find the Derivative of following

17. Find the derivative of $y = cosecx$
18. Find the derivative of $y = secx$
19. Find the derivative of $y = 5secx + 4cosx$
20. Find the derivative of $y = 3cotx + 5cosecx$
21. Find the derivative of $y = 5sinx - 6cosx + 7$
22. Find the derivative of $y = 2tanx - 7secx$

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23. Find the derivative of $f(x) = sin^2x$ w.r.t x
24. Find the derivative of$4\sqrt{x} - 2$
25. Find the derivative of$sin(x + a)$
26. Find the derivative of $x^2 - 2$ at $x = 2$
27. Find the derivative of $x^2 - 2$ at $x = 10$
28. Find the derivative of $99x$ at $x = 100$
29. Find the derivative of x at $x = 1$
30. Find the derivative of$x^3 - 27$
31. Find the derivative of $2x - \frac{3}{4}$ w.r.t x
32. Find the derivative of $(ax^2 + b)^2$ w.r.t x
33. Find the derivative of$\frac{a}{x^4} - \frac{b}{x^2} + cosx$
34. Find the derivative of $6x^{100} - x^{55} + x$ w.r.t x
35. Find the derivative of $f(x) = 1 + x + x^2 + x^3 + \cdots + x^{50}$ at $x = 1$

Q.30 (PART-B) and Q.42 (PART-C) Two And Three marks questions

Evaluate the following : Using $\lim_{x\to a} \frac{x^n - a^n}{x-a} = na^{n-1}$

1) $\lim_{x\to 0}\left(\frac{\sqrt{1+x}-1}{x}\right)$, 2) $\lim_{x\to 0}\left(\frac{(x+1)^5-1}{x}\right)$, 3) $\lim_{x\to 1}\left(\frac{x^{15}-1}{x^{10}-1}\right)$, 4) $\lim_{z\to 1}\left(\frac{z^{1/3}-1}{z^{1/6}-1}\right)$,
5) $\lim_{x\to 1}\left(\frac{x^5-1}{x-1}\right)$, 6)$\lim_{x\to 2}\left(\frac{x^4-16}{x-2}\right)$, 7) $\lim_{x\to -3}\left(\frac{x^3+27}{x+3}\right)$

Evaluate the following : if this is in the form of $\frac{0}{0}$ then go to factorisation method

1) $\lim_{x\to 3}\left(\frac{x-3}{x^2-5x+6}\right)$, 2) $\lim_{x\to 2}\left(\frac{3x^2-x-10}{x^2-4}\right)$, 3) $\lim_{x\to 2}\left(\frac{x^3-2x^2}{x^2-5x+6}\right)$,
4) $\lim_{x\to 2}\left(\frac{x^3-4x^2+4x}{x^2-4}\right)$, 5) $\lim_{x\to 2}\left(\frac{x^2-4}{x^3-4x^2+4x}\right)$, 6) $\lim_{x\to 3}\left(\frac{x^4-81}{2x^2-5x-3}\right)$
7) $\lim_{x\to 1}\left(\frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x}\right)$ 8) $\lim_{x\to -2} \frac{\frac{1}{x}+\frac{1}{2}}{x+2}$

Evaluate the following : Using $\lim_{x\to 0} \frac{sinx}{x} = 1$

1)$\lim_{x\to 0} \frac{sin5x}{x}$ 2) $\lim_{x\to 0} \frac{sinax}{bx}$ 3) $\lim_{x\to 0} \frac{sin4x}{sin2x}$ 4) $\lim_{x\to 0} \frac{sinax}{sinbx}$
5) $\lim_{x\to 0} \frac{tanx}{x}$ 6) $\lim_{x\to 0} \frac{1-cosx}{x}$ 7) $\lim_{x\to \pi} \frac{sin(\pi-x)}{\pi(\pi-x)}$, 8) $\lim_{x\to 0}\left(\frac{cos2x-1}{cosx-1}\right)$
9) $\lim_{x\to 0}\left(\frac{ax+xcosx}{bsinx}\right)$, 10) $\lim_{x\to 0} \frac{sinax+bx}{ax+sinbx}$, 11)$\lim_{x\to \frac{\pi}{2}}\left(\frac{tan2x}{x-\frac{\pi}{2}}\right)$, 12) $\lim_{x\to 0}(cosecx - cotx)$

Evaluate the following : Using $\lim_{x\to 0} \frac{e^x - 1}{x} = 1$

1) $\lim_{x\to 0} \frac{e^{3x}-1}{x}$, 2) $\lim_{x\to 0} \frac{e^{4x}-1}{x}$, 3) $\lim_{x\to 0} \frac{log(1+x)}{x}$, 4) $\lim_{x\to 0} \frac{log(1+2x)}{x}$,

Differentiate By first principle : Using $\frac{dy}{dx} = f'(x) = \lim_{x\to 0} \frac{f(x+h)-f(x)}{h}$

1. Find the derivative of $sinx$with respect to x from first principle
2. Find the derivative of $cosx$with respect to x from first principle
3. Find the derivative of $tanx$with respect to x from first principle
4. Find the derivative of $cosecx$with respect to x from first principle

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5. Find the derivative of $secx$with respect to x from first principle
6. Find the derivative of $cotx$with respect to x from first principle
7. Find the derivative of $-x$with respect to x from first principle
8. Find the derivative of $\frac{1}{x}$ with respect to x from first principle
9. Find the derivative of $x^n$with respect to x from first principle
10. Find the derivative of $x^2$with respect to x from first principle
11. Find the derivative of$\frac{1}{x^2}$with respect to x from first principle
12. Find the derivative of$\frac{x+1}{x-1}$with respect to x from first principle
13. Find the derivative of $\left(x+\frac{1}{x}\right)$with respect to x from first principle
14. Find the derivative of $\left(\frac{x+1}{x}\right)$with respect to x from first principle
15. Find the derivative of $sin^2x$with respect to x from first principle

Find the derivative of function :

Using $(uv)' = uv' + vu'$ or $\frac{d}{dx}\big(f(x)\cdot g(x)\big) = f(x)\frac{d}{dx}\big(g(x)\big) + g(x)\frac{d}{dx}\big(f(x)\big)$

16. Find the derivative of $y = x^4(5sinx - 3cosx)$
17. Find the derivative of $y = (x^2+1)cosx$
18. Find the derivative of $y = (ax^2 + sinx)(p + qcosx)$
19. Find the derivative of $y = (x + cosx)(x - tanx)$
20. Find the derivative of $y = (x + secx)(x - tanx)$
21. Find the derivative of $y = (ax + b)(cx + d)^2$
22. Find the derivative of $y = (5x^2 + 3x - 1)(x - 1)$
23. Find the derivative of $y = x^5(3 - 6x^{-9})$
24. Find the derivative of $y = x^{-4}(3 - 4x^{-5})$
25. Find the derivative of $y = x^{-3}(5 + 3x)$
26. Find the derivative of $(x-1)(x-2)$ w.r.t x
27. Find the derivative of $(x-a)(x-b)$ w.r.t x
28. Find the derivative of $y = sinxcosx$
29. Find the derivative of $y = xsinx$
30. Find the derivative of $cosecxcotx$
31. Find the derivative of $y = sin2x$

Evaluate the following : Using definition of Limit $\big(LHL = RHL = f(a)\big)$

32. Given $f(x) = \begin{cases} 2x+3, & if\ x \le 0 \\ 3(x+1), & if\ x > 0 \end{cases}$ find $\lim\limits_{x\to 0} f(x)$
33. Given $f(x) = \begin{cases} x^2 - 1, & if\ x \le 1 \\ -x^2 - 1, & if\ x > 1 \end{cases}$ find $\lim\limits_{x\to 1} f(x)$
34. Given $f(x) = \begin{cases} \frac{x}{|x|}, & if\ x \ne 0 \\ 0, & if\ x = 0 \end{cases}$ find $\lim\limits_{x\to 0} f(x)$
35. Given $f(x) = \begin{cases} \frac{|x|}{x}, & if\ x \ne 0 \\ 0, & if\ x = 0 \end{cases}$ find $\lim\limits_{x\to 0} f(x)$
36. If $f(x) = \begin{cases} a+bx, & x < 1 \\ 4, & x = 1 \\ b-ax, & x > 1 \end{cases}$ and $\lim\limits_{x\to 1} f(x) = f(1)$ what are the possible values of a and b

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37. If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \le x \le 1 \\ nx^3 + m, & x > 1 \end{cases}$ for what integers m and n does both $\lim_{x\to 0} f(x)$ and $\lim_{x\to 1} f(x)$ exists?

Q.48 (PART-D) Five marks questions

1. Prove that geometrically $\lim_{x\to 0} \frac{sinx}{x} = 1$ where x being measured in radian, hence evaluate
   Example: i) $\lim_{x\to 0} \frac{sin5x}{x}$ ii) $\lim_{x\to 0} \frac{sinax}{bx}$ iii) $\lim_{x\to 0} \frac{sin4x}{sin2x}$ iv) $\lim_{x\to 0} \frac{sinax}{sinbx}$ v) $\lim_{x\to 0} \frac{tanx}{x}$ vi) $\lim_{x\to 0} \frac{1-cosx}{x}$ $\lim_{x\to \pi} \frac{sin(\pi - x)}{\pi(\pi - x)}$
2. Prove that $\lim_{x\to a} \frac{x^n - a^n}{x-a} = na^{n-1}$ for any positive integer, hence evaluate
   Example: i) $\lim_{x\to 1} \frac{x^{15}-1}{x^{10}-1}$ ii) $\lim_{z\to 1} \frac{z^{1/3}-1}{z^{1/6}-1}$

Q.52 (a) or (b) (PART-E) Four marks questions

Find the derivative of function :

Using $\left(\frac{u}{v}\right)' = \frac{vu' - uv'}{v^2}$ **or** $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)\frac{d}{dx}(f(x)) - f(x)\frac{d}{dx}(g(x))}{(g(x))^2}$

1. Find the derivative of $\frac{2}{x+1} - \frac{x^2}{3x-1}$ w.r.t x
2. Find the derivative of $\frac{3sinx - x^5}{4cosx+1}$ w.r.t x
3. Find the derivative of $\frac{x^5 - cosx}{sinx}$ w.r.t x
4. Find the derivative of $\frac{x+cosx}{tanx}$ w.r.t x
5. Find the derivative of $\frac{cosx}{1+sinx}$ w.r.t x
6. Find the derivative of $\frac{sinx+cosx}{sinx-cosx}$ w.r.t x
7. Find the derivative of $\frac{secx-1}{secx+1}$ w.r.t x
8. Find the derivative of $\frac{4x+5sinx}{3x+7cosx}$ w.r.t x
9. Find the derivative of $\frac{a+bsinx}{c+dcosx}$ w.r.t x
10. Find the derivative of $\frac{x}{1+tanx}$ w.r.t x
11. Find the derivative of $f(x) = \frac{x+1}{x}$ w.r.t x
12. Find the derivative of $\frac{x-a}{x-b}$ w.r.t x
13. Find the derivative of $\frac{ax+b}{cx+d}$ w.r.t x
14. Find the derivative of $\frac{1+\frac{1}{x}}{1-\frac{1}{x}}$ w.r.t x
15. Find the derivative of $\frac{ax+b}{px^2+qx+r}$
16. Find the derivative of $\frac{px^2+qx+r}{ax+b}$
17. Find the derivative of $f(x) = \frac{sin(x+a)}{cosx}$ w.r.t x

Find the derivative of function by using some other method :

18. If $f(x) = 2x^2 + 3x - 5$ find $f'(x)$ at $x = -1$ also prove that $f'(0) + 3f'(-1) = 0$
19. If $f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \frac{x^{98}}{98} + \cdots + \frac{x^2}{2} + x + 1$ then prove that $f'(1) = 100f'(0)$

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Chapter-13

STATISTICS

In every question paper, the question numbers on this chapter are Q14, Q49

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(U) Q.14	-	-	-	(R) Q.49	-	-	2 Questions
Questions	1	-	-	-	1	-	-	6 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.14 (PART-A) One marks questions (MCQ)

1. Find the mean of the data 6,7,10,12,13,4,8,12
2. Find the mean of the data 4,7,8,9,10,12,13,17
3. Find the mean deviation about the mean for the data 6,7,10,12,13,4,8,12
4. Find the mean deviation about the mean for the data 4,7,8,9,10,12,13,17
5. Find the mean deviation about the mean for the data 38,70,48,40,42,55,63,46,54,44
6. Find the mean deviation about the mean for the data 12,3,18,17,4,9,17,19,20,15,8,17,2,3,16,11,3,1,0,5
7. Find the mean deviation about the median for the data 13,17,16,14,11,13,10,16,11,18,12,17
8. Find the mean deviation about the median for the data 36,72,46,42,60,45,53,46,51,49
9. Find the mean deviation about the median for the data 3,9,5,3,12,10,18,4,7,19,21
10. Find the mean and variance of first 10 multiple of 3
11. Find the mean and variance of first n natural numbers
12. Write the mean and variance of the given data 6,7,10,12,13,4,8,12

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Q.49 (PART-D) Five marks questions :

Find the mean deviation about mean

1. Find the mean deviation about mean for 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

2. Find the mean deviation about mean for the following data

Height in cm	95-105	105-115	115-125	125-135	135-145	145-155
No of Boys	9	13	26	30	12	10

3. Find the mean deviation about mean for the following data

Income per day in Rs	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800
Number of persons	4	8	9	10	7	5	4	3

4. Find the mean deviation about mean for the following data

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	5

5. Find the mean deviation about mean for the following data

x_i	5	10	15	20	25
f_i	7	4	6	3	5

6. Find the mean deviation about mean for the following data

x_i	10	30	50	70	90
f_i	4	24	28	16	8

Find the mean deviation about median

1. Find the mean deviation about median for the following data

Class	00-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

2. Find the mean deviation about median for the following data

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

3. Find the mean deviation about median for the following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No of Girls	6	8	14	16	4	2

4. Find the mean deviation about median for the following data

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

5. Find the mean deviation about median for the following data

x_i	15	21	27	30	35
f_i	3	5	6	7	8

6. Find the mean deviation about median for the following data

x_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

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Chapter-14

PROBABILITY

In every question paper, the question numbers on this chapter are Q15, Q31, Q50

Weightage of this Chapter								
Part of Question paper	Part-A		Part-B	Part-C	Part-D	Part-E		Total
	(1 Marks) MCQ	(1 Marks) FB	(2 Marks) SA	(3 Marks) SA	(5 Marks) LA	(6 Marks) LA	(4 Marks) LA	
Question Number	(U) Q.15	-	(U) Q.31	-	(A) Q.50	-	-	3 Questions
Questions	1	-	1	-	1	-	-	8 Marks

Note : MCQ= Multiple Choice Questions, FB= Fill in the Blanks Questions, SA=Short Answer Questions, LA=Long Answer Questions, R=Remember, U=Understand, A=Apply, H=Higher Order Thinking Skills

Q.15 (PART-A) One mark questions (MCQ)

1. Define event
2. Define Impossible event and Sure event.
3. Define simple event
4. Define compound event
5. Define exhaustive events
6. Define mutually exclusive events

Q.15 (PART-A) One mark questions (MCQ)
Q.31 (PART-B) and Q.50 (PART-D) Two and Five marks questions
Events: not A, not B, A or B, A and B, not A and not B

1. A die is thrown. Describe the following events:
   A: a number less than 7,
   B: a number greater than 7,
   C: a multiple of 3,
   D: a number less than 4
   E: an even number greater than 4,
   F: a number not less than 3,
   Also find $A \cap B, A \cup B, B \cup C, E \cap F, D \cap E, A - C, D - E$
2. Consider the experiment of rolling a die. Let
   A be the event 'getting a prime number',
   B be the event 'getting an odd number'.
   Write the sets representing the events (i) A or B (ii) A and B (iii) A but not B (iv) 'not A'.
3. Two dice are thrown. The events A, B and C are follows:
   A:getting an even number on the first die.
   B: getting an odd number on the first die.
   C: getting the sum of the numbers on the dice ≤ 5.
   Describe the events (i) A'(ii) not B (iii) A or B (iv) A and B(v) A but not C
   (vi) B or C (vii) B and C (viii) $A \cup B' \cup C'$
4. Two dice are thrown and the sum of the numbers which come up on the dice is noted. Let us consider the following events associated with this experiment.
   A: 'the sum is even'
   B: 'the sum is a multiple of 3'.
   C: 'the sum is less than 4'.
   D: 'the sum is greater than 11'.
   Which pairs of these events are mutually exclusive?

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5. A coin is tossed three times, consider the following events.
   A: 'No head appears',
   B: 'Exactly one head appears'
   C: 'Atleast two heads appear'.
   Do they form a set of mutually exclusive and exhaustive events?
6. An experiment involves rolling a pair of dice and recording the numbers that come up. Describe the followingevents:
   A: the sum is greater than 8,
   C: the sum is at least 7 and a multiple of 3
   B: 2 occurs on either die.
   Which pairs of these events are mutually exclusive?
7. Three coins are tossed once. Let
   A : denote the event 'three heads show",
   B : denote the event "two heads and one tail show",
   C : denote the event "three tails show"
   D : denote the event "a head shows on the first coin".
   Which events are (i) mutually exclusive? (ii) simple? (iii) Compound?
8. A die is rolled. Let
   E : be the event "die shows 4"
   F : be the event "die shows even number"
   Are E and F mutually exclusive?

Q.50 (PART-D) Five mark questions

Finding the probability of an event

1. A die is thrown, find the probability of following events: (i) A prime number will appear, (ii) A number greater than or equal to 3 will appear, (iii) A number more than 6 will appear, (iv) A number less than 6 will appear (v) A number less than or equal to one will appear,
2. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will (i) red, (ii) yellow, (iii) blue, (iv) not blue, (v) either red or blue.
3. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that letter is (i) a vowel (ii) a consonant
4. A coin is tossed twice, what is the probability that atleast one tail occurs?
5. Dies is through. Find the probability of getting prime number
6. Three coins are tossed once. Find the probability of getting (i) 3 heads, (ii) 2 heads, (iii) 3 tails, (iv) no head, (v) no tail,(vi) exactly two tails,(vii) atleast 2 heads,(viii) atmost 2 heads,(ix) atmost two tails
7. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is (i)3(ii)12
8. One card is drawn from a well shuffled deck of 52cards. If each out come is equally likely, calculate the probability that the card will be (i) a diamond (ii) not an ace (iii) a black card (i.e., a club or, a spade) (iv) not a diamond (v) not a black card.
9. A card is selected from a pack of 52cards.
   (a)How many points are there in the sample space? (b) Calculate the probability that the card is an ace of spades. (c) Calculate the probability that the card is (i) an ace (ii) black card.
10. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examinationis 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probabilitythat (a) Both Anil and Ashima will not qualify the examination. (b) Atleast one of them will not qualify the examination and (c) Only one

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of them will qualify the examination.

11. In Class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.
12. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that
    (a)The student opted for NCC or NSS.(b)The student has opted neither NCC nor NSS.
    (c)The student has opted NSS but not NCC.
13. The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English examination is 0.75, what is the probability of passing the Hindi examination?
14. The number lock of a suitcase has 4 wheels, each labelled with ten digits i.e., from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?
15. There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that it is a woman?

Finding the probability of an event, based on combination concept

16. In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy (a) one ticket (b) two tickets (c) 10 tickets.
17. Out of 100 students, two section of 40 and 60 are formed. If you and your friend are among the 100 students, what is the probability that (i) you both enter the same section? (ii) you both enter the different sections?
18. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all Kings (ii) 3 Kings (iii) atleast 3 Kings.
19. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man? (b) one man? (c) two men?
20. A box contains10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box, what is the probability that (i) all will be blue? (ii) atleast one will be green?
21. 4 cards are drawn from a well shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one spade?

Finding the probability of an event,

P(not A), P(not B), P(A or B), P(A and B), P(not A and not B)

22. If A and B are events such that P(A) = 0.42, P(B) = 0.48 and P(A and B) = 0.16.
    Determine (i) P(not A), (ii) P(not B) and (iii) P(A orB)
23. If A and B are events such that P(A) = 0.54, P(B) = 0.69 and P(A and B) = 0.35.
    Determine (i) P(not A), (ii) P(not B) and (iii) P(A orB)(iv) P(not A and not B)
    (v) P(A and not B), (vi) P(not A and B)
24. If E and F are two events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(EandF) = \frac{1}{8}$
    Then find $P(EorF)$ and $P(not\ E\ and\ not\ F)$
25. If $P(A) = \frac{2}{11}$ is the probability of an event A, what is the probability of the event not A
26. A die has two faces each with number 1, three faces each with number 2, and one face with number 3, if a die is rolled once. Determine i) $P(2)$, ii) $P(1\ or\ 3)$, iii) $P(not\ 3)$,
27. Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$ find $P(AorB)$, if A and B are mutually exclusive events
28. If E and F are two events such that$P(notEandnotF) = 0.25$, state whether E and F are mutually exclusive.

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PUC I YEAR MATHEMATICS

PASSING PACKAGE

PART-D (FIVE MARKS QUESTIONS)

Chapter-02 : RELATIONS AND FUNCTIONS

Q.43 (PART-D) Five Marks Questions

1. Define modulus function. Draw the graph of modulus function, also write domain and rang
2. Define signum function. Draw the graph of signum function, also write its domain and range
3. Define greatest integer function. Draw graph of greatest integer function, write domain and range

Chapter-03 : TRIGONOMETRIC FUNCTIONS

Q.44 (PART-D) Five Marks Questions

1. Prove that $\frac{(sin7x+sin5x)+(sin9x+sin3x)}{(cos7x+cos5x)+(cos9x+cos3x)} = tan6x$
2. Prove that $\frac{cos4x+cos3x+cos2x}{sin4x+sin3x+sin2x} = cot3x$
3. Prove that $\frac{sin5x-2sin3x+sinx}{cos5x-cosx} = tanx$

Chapter-06 : PERMUTATIONS AND COMBINATIONS

Q.45 (PART-D) Five marks questions

1. Find the number of arrangements of the letters of the word INDEPENDENCE.
   In how many of these arrangements,
   (i) do the words start with P (ii) do all the vowels always occur together
   (iii) do the vowels never occur together (iv) do the words begin with I and end in P?
2. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if.
   (i) 4 letters are used at a time, (ii) all letters are used at a time,
   (iii) all letters are used but first letter is a vowel?
3. In how many ways can the letters of the word PERMUTATIONS be arranged if the
   (i) words start with P and end with S, (ii) vowels are all together,
   (iii) there are always 4 letters between P and S?
4. Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together (ii) all vowels do not occur together.
5. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girl ? (ii) at least one boy and one girl? (iii) at least 3 girls ?
6. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of (i) exactly 3 girls? (ii) atleast 3 girls? (iii) atmost 3 girls?
7. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?
8. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (i) four cards are of the same suit, (ii) four cards belong to four different suits,
   (iii) are face cards, (iv) two are red cards and two are black cards, (v) are of the same colour?

Chapter-07 : BINOMIAL THEOREM

Q.46 (PART-D) Five marks questions

1. State and prove Binomial Theorem for all natural number Or
   For all a,b real numbers and n is a positive integer then prove that
   $(a+b)^n = {}^nC_0a^n + {}^nC_1a^{n-1}b + {}^nC_2a^{n-2}b^2 + \cdots \ldots \ldots \ldots + {}^nC_nb^n$

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Chapter-09 : STRAIGHT LINES

Q.45 (PART-D) Five marks questions

1. Derive the formula for the angle between two lines whose slopes are m_1 and m_2
2. Derive the formula to find the distance of a point from the line or
   Derive the formula for distance of a point (x_1, y_1) from the line $Ax + By + C = 0$ geometrically
3. Derive the distance between two parallel lines $y = mx + c_1$ and $y = mx + c_2$

Chapter-12 : LIMITS AND DERIVATIVES

Q.48 (PART-D) Five marks questions

1. Prove that geometrically $\lim_{x\to 0} \frac{sinx}{x} = 1$ where x being measured in radian.

Chapter-13 : STATISTICS

Q.49 (PART-D) Five marks questions :

1. Find the mean deviation about mean for 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

2. Find the mean deviation about mean for the following data

Height in cm	95-105	105-115	115-125	125-135	135-145	145-155
No of Boys	9	13	26	30	12	10

3. Find the mean deviation about mean for the following data

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	5

4. Find the mean deviation about mean for the following data

x_i	5	10	15	20	25
f_i	7	4	6	3	5

5. Find the mean deviation about median for the following data

Class	00-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

6. Find the mean deviation about median for the following data

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

7. Find the mean deviation about median for the following data

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

8. Find the mean deviation about median for the following data

x_i	15	21	27	30	35
f_i	3	5	6	7	8

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PART-E (SIX MARKS QUESTIONS)

Chapter-03 : TRIGONOMETRIC FUNCTIONS
Q.51 (a) or (b) (PART-E) Six Marks Question

1. Prove that geometrically $cos(x+y) = cosx \cdot cosy - sinx \cdot siny$

Chapter-10 : CONIC SECTIONS
Q.51 (a) or (b) (PART-E) Six Marks Question

1. Define Ellipse as a set of all points in a plane and derive its equation in the form of $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
2. Define Hyperbola as a set of all points in a plane and derive its equation in the form of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$
3. Define Parabola as a set of all points in a plane and derive its equation in form of $y^2 = 4ax$

PART-E (FOUR MARKS QUESTIONS)

Chapter-12 : LIMITS AND DERIVATIVES
Q.52 (a) or (b) (PART-E) Four Marks Question

1. Find the derivative of $\frac{2}{x+1} - \frac{x^2}{3x-1}$ w.r.t x
2. Find the derivative of $\frac{3sinx - x^5}{4cosx+1}$ w.r.t x
3. Find the derivative of $\frac{x^5 - cosx}{sinx}$ w.r.t x
4. Find the derivative of $\frac{x+cosx}{tanx}$ w.r.t x
5. Find the derivative of $\frac{cosx}{1+sinx}$ w.r.t x
6. Find the derivative of $\frac{sinx+cosx}{sinx-cosx}$ w.r.t x

Chapter-08 : SEQUENCE AND SERIES
Q.52 (a) or (b) (PART-E) Four marks questions

1. Find the sum of n terms of series : 8,88,888,8888, ...
2. Find the sum of n terms of series : 7,77,777,7777, ...
3. Find the sum of n terms of series : 5,55,555,5555, ...
4. Find the sum of n terms of series : 0.6,0.66,0.666,0.6666, ...
5. Find the 20th term of the series 2 × 4 + 4 × 6 + 6 × 8 + ... + n terms

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PART-B AND PART-C (TWO AND THREE MARKS QUESTIONS)

Chapter-01 : SETS

Q.21 and Q.22 (PART-B) and Q.32 (PART-C) Two and Three Marks Questions

1. If $A = \{2,4,6,8\}$, $B = \{1,2,4,8,16\}$ then Find $A \cup B$ and $A \cap B$
2. If $A = \{2,4,6,8\}$, $B = \{6,8,10,12\}$ then Find $A \cup B$ and $A \cap B$
3. If $A = \{a,e,i,o,u\}$, $B = \{a,i,u\}$ then Find $A \cup B$ and $A \cap B$
4. If $A = \{1,2,3,4,5,6,7,8,9,10\}$, $B = \{2,3,5,7\}$ then Find $A \cup B$ and $A \cap B$
5. If $A = \{3,5,7,9,11\}$, $B = \{7,9,11,13\}$ and $C = \{11,13,15\}$
   Find i) $A \cap (B \cup C)$ ii) $(A \cap B) \cap (B \cup C)$
6. If $A = \{1,2,3,4\}$, $B = \{2,3,5\}$ and $C = \{3,5,6\}$
   Find i) $A \cup (B \cap C)$ ii) $(A \cup B) \cap (A \cup C)$
7. If $A = \{1,2,3,4,5,6\}$, $B = \{2,4,6,8\}$Find $(A - B)$ and $(B - A)$
8. If $A = \{a,e,i,o,u\}$, $B = \{a,i,k,u\}$Find $(A - B)$ and $(B - A)$
9. If $X = \{a,b,c,d\}$, $Y = \{f,b,d,g\}$Find $(X - Y)$ and $(Y - X)$ and $X \cap Y$
10. Are the sets $A = \{2,3,4,5\}$ and $B = \{3,6\}$ are disjoint?
11. Are the sets $A = \{2,6,10,14\}$ and $B = \{3,7,11,15\}$ are disjoint?
12. Are the sets $A = \{2,6,10\}$ and $B = \{3,7,11\}$ are disjoint?
13. If $U = \{1,2,3,4,5,6\}$, $A = \{2,3\}$ and $B = \{3,4,5\}$
    Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
14. If $U = \{1,2,3,4,5,6,7\}$, $A = \{1,2,5,7\}$ and $B = \{3,4,5,6\}$
    Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
15. If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{2,4,6,8\}$ and $B = \{2,3,5,7\}$
    Verify i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$

Chapter-02 : RELATIONS AND FUNCTIONS

Q.33 (PART-C) Two Marks Questions

1. If $A = \{2,4,6\}$ and $B = \{1,3\}$ then prove that $A \times B \neq B \times A$
2. If $G = \{7,8\}$ and $H = \{5,4,2\}$ Find $G \times H$ and $H \times G$
3. If $P = \{a,b,c\}$ and $Q = \{r\}$ then prove that $P \times Q \neq Q \times R$
4. If $A = \{1,-1\}$ then find $A \times A \times A$
5. If $A = \{1,2\}$ then find $A \times A \times A$
6. If $f(x) = x^2$ and $g(x) = 2x - 3$ then find $f + g$, $f - g$, fg, f/g,
7. If $f(x) = x + 1$ and $g(x) = 2x + 3$ then find $f + g$, $f - g$, fg, f/g,
8. If $f(x) = \sqrt{x}$ and $g(x) = x$ then find $f + g$, $f - g$, fg, f/g,
9. Let $A = \{1,2,3, \ldots \ldots, 14\}$ define the relation R from A to A given by
   $R = \{(x,y): 3x - y = 0, where\ x,y \in A\}$ write domain, co-domain and range
10. Write the relation $R = \{(x, x+5) : x \in \{0,1,2,3,4,5\}\}$ in roster form and write domain and range

Chapter-03 : TRIGONOMETRIC FUNCTIONS

Q.23 (PART-B) and Q.34, Q.35 (PART-C) Two And Three Marks Questions

1. If $cosx = -\frac{3}{5}$, x lies in third quadrant, find other five trigonometric functions
2. If $cosx = -\frac{1}{2}$, x lies in third quadrant, find other five trigonometric functions
3. If $sinx = \frac{3}{5}$, x lies in second quadrant, find other five trigonometric functions
4. If $cotx = -\frac{5}{12}$, x lies in second quadrant, find other five trigonometric functions
5. If $secx = \frac{13}{5}$, x lies in fourth quadrant, find other five trigonometric functions

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6. Prove that $sin^2\frac{\pi}{6}+cos^2\frac{\pi}{3}-tan^2\frac{\pi}{4}=-\frac{1}{2}$
7. Prove that $2sin^2\frac{3\pi}{4}+2cos^2\frac{\pi}{4}+2sec^2\frac{\pi}{3}=10$
8. Prove that $cot^2\frac{\pi}{6}+cosec\frac{5\pi}{6}+3tan^2\frac{\pi}{6}=6$
9. Prove that $3sin\frac{\pi}{6}sec\frac{\pi}{3}-4sin\frac{5\pi}{6}cot\frac{\pi}{4}=1$
10. Prove that $2sin^2\frac{\pi}{6}+cosec^2\frac{7\pi}{6}\cdot cos^2\frac{\pi}{3}=\frac{3}{2}$
11. Prove that $sin3x=3sinx-4sin^3x$
12. Prove that $cos3x=4cos^3x-3cosx$
13. Prove that $tan3x=\frac{3tanx-tan^3x}{1-3tan^2x}$
14. Prove that $cos\left(\frac{\pi}{4}+x\right)+cos\left(\frac{\pi}{4}-x\right)=\sqrt{2}cosx$
15. Prove that $cos\left(\frac{3\pi}{4}+x\right)-cos\left(\frac{3\pi}{4}-x\right)=-\sqrt{2}sinx$
16. If arcs of same length in two circles subtended angles 65^0 and 110^0 at the centre. Find the ratio of their radii
17. If arcs of same length in two circles subtended angles 60^0 and 75^0 at the centre. Find the ratio of their radii
18. Find the radius of the circle in which a central angle of 60^0 intercepts an arc of length 37.4 cm $\left(use\ \pi=\frac{22}{7}\right)$
19. The minute hand of a watch is 1.5 cm long. How far does its tip move in 40 mins? $(use\ \pi=3.14)$
20. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

Chapter-04 : COMPLEX NUMBER AND QUADRATIC EQUATION

Q.24 and Q.25 (PART-B) and Q.36 (PART-C) Two and Three Marks Questions

1. Find modulus, Conjugate, multiplicative inverse of following complex number
   1) $2-3i$, 2) $4-3i$, 3) $3-4i$
2. Find the modulus
   1) $\frac{1+i}{1-i}$, 2) $\frac{1}{1+i}$, 3) $\frac{1+2i}{1-3i}$,
3. Express following complex number in the form of $a+ib$
   1) $\frac{5+i\sqrt{2}}{1-i\sqrt{2}}$, 2) $\frac{1+2i}{1-i}$, 3) $\frac{5+i\sqrt{2}}{2i}$,
4. If $x+iy=\frac{a+ib}{a-ib}$ then prove that $x^2+y^2=1$
5. If $x+iy=\frac{2+i}{2-i}$ then prove that $x^2+y^2=1$
6. If $a+ib=\frac{(x+i)^2}{2x^2+1}$ then prove that $a^2+b^2=\frac{\left(x^2+1\right)^2}{(2x^2+1)^2}$
7. If $x-iy=\sqrt{\frac{a-ib}{c-id}}$ then prove that $(x^2+y^2)^2=\frac{a^2+b^2}{c^2+d^2}$

Chapter-05 : LINEAR INEQUALITIES

Q.26 (PART-B) and Q.37 (PART-C) Two and Three marks questions

1. Solve $7x+3<5x+9$.Show the graph of solution in number line.
2. Solve $5x-3\geq 3x-5$.Show the graph of solution in number line.
3. Solve $3x-7<5x-1$.Show the graph of solution in number line.
4. Solve $3(2-x)\geq 2(1-x)$.Show the graph of solution in number line.
5. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.

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6. Find all pairs of consecutive odd natural numbers, both of which are more than 50, such that their sum is less than 120.
7. Find all pairs of consecutive odd positive integers, both of which are smaller than 10, such that their sum is more than 11.
8. Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23.
9. The marks obtained by a student of class XI in first and second terminal examination are 62 and 48, respectively. Find the minimum marks he should get in the annual examination to have an average of at least 60 marks.
10. Ravi obtained 70 and 75 marks in first two unit test. Find the minimum marks he should get in the third test to have an average of at least 60 marks.

Chapter-06 : PERMUTATIONS AND COMBINATIONS

Q.27 (PART-B) Two marks questions

1. How many 2 digit even numbers can be formed from the digits 1,2,3,4,5 if the digits can be repeated?
2. How many 3 digit numbers can be formed by using the digits 1 to 9 if no digit is repeated
3. How many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that repetition of the digits is allowed?
4. How many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that repetition of the digits is not allowed?
5. How many 3-digit even numbers can be formed from the digits 1,2,3,4,5,6 if the digits can be repeated?
6. Find n if ${}^{n}P_5 = 42\,{}^{n}P_3,\ n > 4$
7. Find n if $\frac{{}^{n}P_4}{{}^{n-1}P_4} = \frac{5}{3},\ n > 4$
8. Find n if ${}^{n-1}P_3 :\ {}^{n}P_4 = 1:9$
9. If ${}^{2n}c_3 :\ {}^{n}c_3 = 12:1$ then find n
10. If ${}^{2n}c_3 :\ {}^{n}c_3 = 11:1$ then find n
11. In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls?
12. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.
13. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.
14. In how many ways one can select a cricket team of 11 out of 17 players in which 5 are bowlers, if the team has to include exactly 4 bowlers
15. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

Chapter-07 : BINOMIAL THEOREM

Q.28 (Part-B) Two Marks Questions

1. Expand $\left(x^2 + \frac{3}{x}\right)^4,\ x \neq 0$
2. Expand $\left(x + \frac{1}{x}\right)^6,\ x \neq 0$
3. Expand $\left(\frac{x}{3} + \frac{1}{x}\right)^5,\ x \neq 0$
4. Expand $(x+2)^6$
5. Expand $(2x-3)^6$

Chapter-09 : STRAIGHT LINES

Q.29 (PART-B) and Q.39 (PART-C) Two and Three marks questions

1. Derive the equation of line passing through the point (x_1, y_1) and slope m.
2. Derive the equation of line joining two points (x_1, y_1) and (x_2, y_2)
3. Derive the equation of line with slope m and y-intercept is c

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4. Derive the equation of line having intercepts a and b on x and y axes respectively or
5. Derive the equation of line in intercept form.
6. Find the equation of the line Passing through the point $(-2,3)$ with slope -4.
7. Find the equation of the line Passing through the point $(-4,3)$ with slope $1/2$
8. Find the equation of the line Passing through the point $(-4,3)$ with slope $-1/2$
9. Find the equation of line passing through the point $(2,1)$ and the angle is 45^0
10. Find the equation of the line Intersecting the *x*-axis at a distance of 3 units to the left of origin with slope -2.
11. Find the equation of the line Intersecting the *y*-axis at a distance of 2 units above the origin and making an angle of 30^0 with positive direction of the*x*-axis.
12. Find the equation of the line Passing through the points $(1,-1)\ and\ (3,5)$.
13. Find the equation of the line Passing through the points $(-1,1)\ and\ (2-4)$.
14. Find the equation of the line Passing through the points $(1,2)\ and\ (3,4)$.
15. Find the equation of line with slope $\frac{1}{2}$ and y-intercept $-\frac{3}{2}$
16. Find the equation of line with slope $\frac{1}{2}$ and x-intercept 4
17. Find the equation of the line perpendicular to the line $x-2y+3=0$and passing through $(1,-2)$.
18. Find the equation of the line perpendicular to the line $x+y+2=0$ and passing through $(-1,0)$.
19. Find equation of the line parallel to the line $3x-4y+2=0$ and passing through the point $(-2,3)$
20. Find equation of the line parallel to the line $4x-2y+7=0$ and passing through the point $(2,-4)$

Chapter-12 : LIMITS AND DERIVATIVES

Q.30 (PART-B) and Q.42 (PART-C) Two And Three marks questions

1. Evaluate 1) $\lim_{x\to 0}\left(\frac{\sqrt{1+x}-1}{x}\right)$, 2) $\lim_{x\to 0}\left(\frac{(x+1)^5-1}{x}\right)$, 3) $\lim_{x\to 1}\left(\frac{x^{15}-1}{x^{10}-1}\right)$, 4) $\lim_{z\to 1}\left(\frac{z^{1/3}-1}{z^{1/6}-1}\right)$,
2. Evaluate 1) $\lim_{x\to 3}\left(\frac{x-3}{x^2-5x+6}\right)$, 2) $\lim_{x\to 2}\left(\frac{3x^2-x-10}{x^2-4}\right)$, 3) $\lim_{x\to 2}\left(\frac{x^3-2x^2}{x^2-5x+6}\right)$, 4) $\lim_{x\to 2}\left(\frac{x^3-4x^2+4x}{x^2-4}\right)$
3. Evaluate 1)$\lim_{x\to 0}\frac{tanx}{x}$ 2) $\lim_{x\to 0}\frac{sinax}{bx}$ 3) $\lim_{x\to 0}\frac{sin4x}{sin2x}$ 4) $\lim_{x\to 0}\frac{1-cosx}{x}$
4. Find the derivative of $sinx$with respect to x from first principle
5. Find the derivative of $cosx$with respect to x from first principle
6. Find the derivative of $tanx$with respect to x from first principle
7. Find the derivative of $-x$with respect to x from first principle
8. Find the derivative of $\frac{1}{x}$ with respect to x from first principle

Chapter-14 : PROBABILITY

Q.31 (PART-B) Two marks questions

1. die is thrown. Describe the following events:
   A: a number less than 7,
   B: a number greater than 7,
   C: a multiple of 3,
   D: a number less than 4
   E: an even number greater than 4,
   F: a number not less than 3,
   Also find $A\cap B, A\cup B, B\cup C, E\cap F, D\cap E, A-C, D-E$
2. Consider the experiment of rolling a die. Let
   A be the event 'getting a prime number',
   B be the event 'getting an odd number'.
   Write the sets representing the events (i) A or B (ii) A and B (iii) A but not B (iv) 'not A'.
3. Two dice are thrown. The events A, B and C are follows:
   A:getting an even number on the first die.
   B: getting an odd number on the first die.
   C: getting the sum of the numbers on the dice ≤ 5.
   Describe the events (i) A'(ii) not B (iii) A or B (iv) A and B(v) A but not C

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FIRST PUC MODEL QUESTION PAPER 2023-24

MATHEMATICS (35)

TIME : 3 Hours 15 Minutes **[Total Questions : 52]** **Max Marks : 80**

Instructions : ***1. The question paper has five parts namely A, B, C, D and E. Answer all the Parts.***

2. Part A has 15 multiple choice questions, 5 fill in the blank questions

PART -A

I. Answer all the multiple choice questions : 15 x 1 = 15

1. The interval form of $\{ x : x \in R , -4 < x \leq 6 \}$ is
a) $[-4, 6]$ b) $(-4, 6]$ c) $(-4 , 6)$ d) $[-4, 6)$

2. If $(x + 1, y - 2) = (3, 1)$ then
a) $x = 2 , y = 3$ b) $x = 2, y = -3$ c) $x = -2 , y = 3$ d) $x = 2, y = -1$

3. The degree measure of $\frac{5\pi}{3}$ radians is equal to
a) 225^0 b) 300^0 c) 420^0 d) 135^0

4. The conjugate of $i - 2$ is
a) $i + 2$ b) $-2 + i$ c) $-2 - i$ d) $-i + 2$

5. $a > b$ implies
a) $-a < -b$ b) $-a > b$ c) $-a < b$ d) $a < -b$

6. If $n_{c_9} = n_{c_8}$, then $n_{c_{17}}$ is
a) 1 b) 17 c) 7 d) 10

7. The number of terms in the expansion of $(a + b)^6$ is
a) 6 b) 5 c) 7 d) 8

8. If a sequence is defined as $a_n = 2n + 5$, then the first term is
a) 5 b) 6 c) 7 d) 8

9. The equation of x – axis is
a) $x = 0$ b) $y = 0$ c) $xy = 0$ d) $x = y$

10. The centre of the circle $(x + 2)^2 + (x - 3)^2 = 16$ is
a) $(2, 3)$ b) $(-2, 3)$
c) $(-2, -3)$ d) $(2, -3)$

11. The length of transverse axis of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ is
a) 4 b) 6 c) 9 d) 16

12. The octant in which the point $(-3, 1, 2)$ lies is
a) First b) second c) third d) fourth

13. The derivative of $2x - \frac{3}{4}$ with respect to x is
a) 2 b) $-\frac{3}{4}$ c) -2 d) 0

14. The Median of the data 3, 9,5,3,12,10,18,4,7,19,21 is
a) 18 b) 9 c) 12 d) 10

15. The probability of drawing a diamond card from a well shuffled deck of 52 cards is
a) $\frac{1}{4}$ b) $\frac{1}{52}$ c) $\frac{1}{13}$ d) $\frac{1}{2}$

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket

(–1, 16, 0 , 20, 42 , 1) **5 x 1= 5**

16. If A = { 1, 2 } and B = { 3, 4 }, then the number of relations from A to B is _____

17. The value of cos3π is _____

18. The value of $\frac{7!}{5!}$ is _____

19. The slope of the line passing through the points (3, –2) and (7, –2) is _____

20. The derivative of $x^2 - 2$ at x = 10 is _____

PART –B

Answer any six questions **6 x 2 =12**

21. Let A = { 1, 2, 3, 4, 5, 6 } , B = { 2, 4, 6, 8 } . Find A – B and B – A

22. List all the the subsets of the set { a, b }

23. Prove that $3 \sin\frac{\pi}{6} . \sec\frac{\pi}{3} - 4 \sin\frac{5\pi}{6} . \cot\frac{\pi}{4} = 1$

24. Find the multiplicative inverse of 2 – 3i

25. If $x + iy = \frac{a + ib}{a - ib}$, prove that $x^2 + y^2 = 1$

26. Solve inequality 5x –3 < 3x + 1 and show the graph of the solutions on number line.

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

28. Expand $(1 - 2x)^5$, using Binomial theorem

29. Find the equation of the line intersecting the x– axis at a distance of 3 units to the left of origin with slope -2.

30. Evaluate $\lim_{x \to 1} \frac{x^{15}-1}{x^{10}-1}$

31. A die is thrown. Describe the following events

1) a number less than 4 2) a number not less than 3

PART – C

Answer any six questions **6 x 3 =18**

32. Let U = { 1, 2, 3, 4, 5, 6 } , A = {2, 3 } and B = { 3, 4, 5 } prove that $(A \cup B)^1 = A^1 \cap B^1$

33. Let f(x) = x^2 and g(x) = 2x +1 be two real functions .
Find (f +g) (x) , (f – g) (x) , (f g) (x)

34. Prove that cos3x = 4 $cos^3 x$ – 3 cosx

35. If cosx = $-\frac{1}{2}$, x lies in third quadrant , find the values of other five trigonometric functions.

36. Express $\frac{5 + \sqrt{2}\, i}{1 - \sqrt{2}\, i}$ in the form a + ib

37. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

38. The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is –1.
Find the common ratio and the terms.

39. Derive the equation a line with x-intercept ‘a’ and y-intercept ‘b’ in the form $\frac{x}{a} + \frac{y}{b} = 1$

40. Find the equation of the Parabola with vertex (0,0), passing through the point (2,–3) and symmetric about y – axis.

41. show that the points (0, 7, 10) , (–1, 6, 6) and (– 4, 9, 6) are the vertices of a right angled triangle.

42. Find the derivative of sinx with respect to x form first principle.

PART – D

Answer any four questions **4 x 5 =20**

43. Define Greatest integer function, draw the graph . write the domain and range

44. Prove that $\frac{sin5x - 2\sin 3x + sinx}{cos5x - cosx} = \tan x$

45. Find the number of arrangements of the letters of the word INDEPENDENCE.
In how many of these arrangements,
1) do the words start with P ? 2) do the words begin with I and end in P ?

46. Prove that for every positive integer n
$(a+b)^n = n_{c_0}\, a^n + n_{c_1}\, a^{n-1}b + n_{c_2}\, a^{n-2}\, b^2 + - - - - - + n_{c_{n-1}}\, a\, b^{n-1} + n_{c_n}\, b^n$

47. Derive the formula to find the distance of a point P (x_1, y_1) from the line Ax + By + C = 0

48. Prove geometrically that $\lim_{x \to 0} \frac{\sin x}{x} = 1$, x being measured in radians

49. Find mean deviation about the mean for the following data

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	5

50. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be i) red, ii) yellow , iii) blue, iv) not blue,

PART –E

Answer the following questions

51. Prove geometrically that cos (x + y) = cosx cosy – sinx siny **6**

OR

Derive the equation of ellipse in the standard form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

52. Find the sum of the sequence 7, 77, 777, 7777, - - - - - - - to n terms **4**

OR

Find the derivative of $\frac{x^5 - cosx}{sinx}$ with respect to x

**********@**********