

7. $\cos 1^0 . \cos 2^0 . \cos 3^0 \dots \cos 179^0 . \cos 180^0 =$ 1
A -1 **B** 1 **C** 0 **D** ∞
8. Simplified form of $i^4 + i^3 + i^2 + i + 1$ 1
A i **B** 1 **C** -1 **D** 0
9. The multiplicative inverse of $3 + 4i$ 1
A $3 - 4i$ **B** $\frac{3}{25} + \frac{4i}{25}$ **C** $\frac{3}{25} - \frac{4i}{25}$ **D** $\frac{25}{3} + \frac{25i}{4}$
10. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least positive value of m 1
A 2 **B** 4 **C** 6 **D** 8
11. The length of latus rectum of parabola whose equation is $x^2 = -4ay$ and passing through $(6, -3)$ 1
A 6 **B** 4 **C** 12 **D** 20
12. If $\frac{1}{7!} + \frac{1}{8!} = \frac{x}{9!}$, then $x =$ 1
A 225 **B** 49 **C** 64 **D** 81
13. The radius of the circle whose equation is $x^2 + y^2 - 6x = 16$ 1
A 3 **B** 4 **C** 5 **D** 6
14. If the coefficient of x^2 in the expansion of $(1+x)^m$ is 6, then the value of m 1
A 1 **B** 6 **C** 4 **D** 2
15. The mean of first n natural numbers is 1
A n **B** $\frac{n+1}{2}$ **C** $\frac{n(n+1)}{2}$ **D** $n(n-1)$
16. The mean and variance of six observations are 8 and 4, respectively. If each observation is multiplied by 3, then the new mean and new variance of the resulting observations are
A 24 and 36 **B** 24 and 12 **C** 8 and 12 **D** 8 and 6
17. $1 + 2 + 4 + \dots + 256 =$ 1
A 1023 **B** 511 **C** 514 **D** 300
18. If AM and GM of two numbers are 7.5 and 6 respectively, then the numbers are 1
A 15 and 36 **B** 10 and 5 **C** 6 and 6 **D** 12 and 3

ASSERTION-REASON BASED QUESTIONS

In the following questions (19 and 20), a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- A) Both A and R are true and R is the correct explanation of A.
 B) Both A and R are true but R is not the correct explanation of A.
 C) A is true but R is false.
 D) A is false but R is true.

19. (A) The 5th, 8th, and 11th terms of a GP are p, q and s respectively then p, q and s are consecutive terms of another GP. 1
 (R) If p, q and s are in GP, then $q^2 = ps$.

20. (A) If A is the set of even natural numbers less than 8 and B is the set of odd natural numbers less than 5, then the number of relations from A to B is 64. 1
 (R) If a set A has m elements and set B has n elements then the number of relations from A to B is mn .

SECTION B

21. Write the relation $R = \{(x, y) : 2x + y = 8, x \text{ and } y \text{ are whole numbers}\}$ in roster form. 2
 22. If $(x - 3i)(3 + i)$ is equal to the conjugate of $9 + 7i$, find the real value of x . 2
 23. Find r if $5P_r = 2 \cdot 6P_{r-1}$ 2

OR

Find the number of sides of a convex polygon if it has 35 diagonals.

24. How many terms of the GP 3, 6, 12, ... to be added to get a sum 765? 2
OR
 If a, b and c are in GP and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$, then prove that x, y and z are in AP. 2
 25. If $(1 + i)^3 = x + iy$, then find $x^2 + y^2$. 2

SECTION C

26. Evaluate: $\tan \frac{\pi}{8}$ **OR** 3
 If $\tan A = \frac{4}{3}, A \in III \text{ quadrant}$, then evaluate $\cos \frac{A}{2}$.
 27. Solve the following linear inequalities and represent the solution on a number line: 3
 $5(2x - 7) - 3(2x + 3) \leq 0; 2x + 19 \leq 6x + 47$.
 28. How many words can be formed with or without meaning using all letters of the word 'INDIA'? If all these words are arranged in the dictionary order, what will be the rank of the word 'NADII' 3

OR

If sum of two positive numbers is equal to 6 times their geometric mean, then prove that the numbers are in the ratio $3 + 2\sqrt{2} : 3 - 2\sqrt{2}$

29. Find mean deviation about mean: 3

x	5	10	15	20	25
f	7	4	6	3	5

30. Expand and simplify: $(\sqrt{2} + \sqrt{3})^4 + (\sqrt{2} - \sqrt{3})^4$ 3

31. If $A = \{x: x \text{ is a prime number less than } 8\}$, $B = \{y: y^2 \leq 17, y \in N\}$ then write the following in roster form. a) $A \cup B$ b) $A \cap B$ 3

SECTION D

32. Find the total number of words which can be formed using all letters of the word 'ELEMENTS'. How many of these words:
a) Start with E and end with E.
b) All vowels not together. 5

33. Prove: $(1 + \cos \frac{\pi}{8})(1 + \cos \frac{3\pi}{8})(1 + \cos \frac{5\pi}{8})(1 + \cos \frac{7\pi}{8}) = \frac{1}{8}$ 5

OR

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

34. Find mean, variance and standard deviation for the following frequency distribution: 5

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
f	3	7	12	15	8	3	2

35. The coefficients of three consecutive terms of the expansion $(1 + x)^n$ are in the ratio 1: 3: 5. Find n. 5

OR

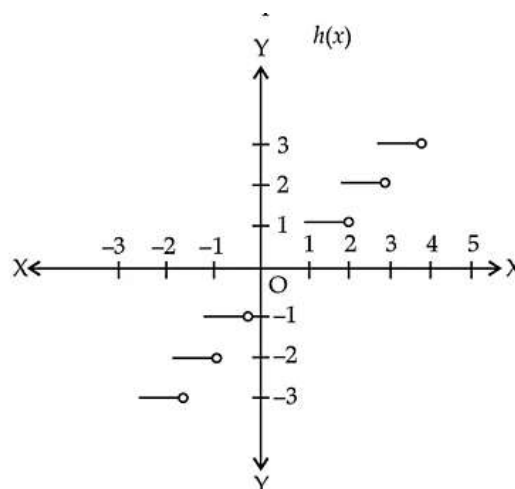
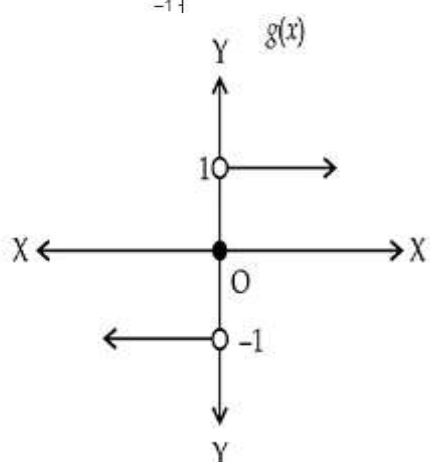
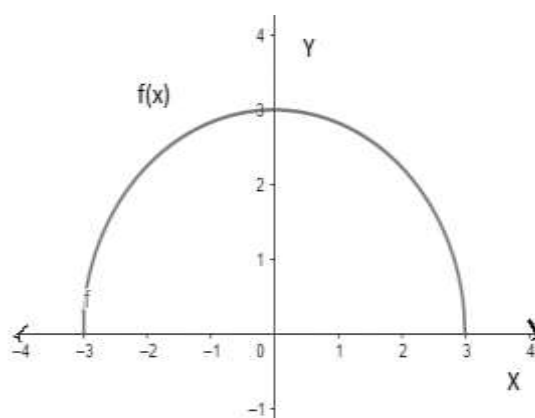
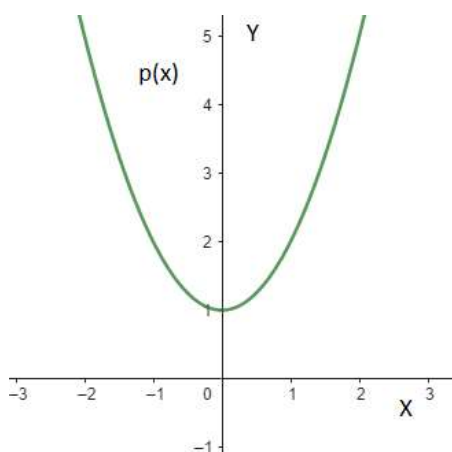
Expand and simplify $(1 + x)^5 + (1 - x)^5$.

Hence evaluate $(1 + \sqrt{2})^5 + (1 - \sqrt{2})^5$

SECTION D Case study-based Questions

36. There are four graphs $p(x)$, $f(x)$, $g(x)$ and $h(x)$ given below
Based on the graph, answer the following questions:

4



- If $p(x) = x^2 + 1$, evaluate of $p(-1) + p(1)$.
- If $f(x) = \sqrt{9 - x^2}$ write domain and range of $f(x)$.
- Write domain and range of $g(x)$.

OR

Evaluate $h(1.5) + h(-1.5) + h(2)$ where $h(x) = [x]$.

37. Hari appears in an examination. While reading the instructions he observed that the question paper consists of 12 questions divided into two parts I and II, containing 5 questions and 7 questions respectively. Based on the information given answer the following:

4



- a) If Hari is required to attempt 8 questions in all by selecting exactly 4 questions from section I, then in how many ways can he select the questions?
- b) If Hari is required to attempt 10 questions in all by selecting equal number of questions from each section, then in how many ways can he select the questions?
- c) If Hari is required to attempt 8 questions in all by selecting at least 4 questions from section I, then in how many ways can he select the questions? OR
- If Hari is required to attempt 8 questions in all by selecting at most 3 questions from section I, then in how many ways can he select the questions?

38. A and B are trying to answer the questions related on Sequences and Series. 4
Consider the following sequences:

- a) $(2 \times 3), (3 \times 4), (4 \times 5), \dots$
- b) Fourth, fifth and sixth terms of a sequence are 40, 80 and 160.
Based on the above information answer the following:
- i) Write 20th term of the sequence given in (a)
- ii) Find the sum of first 10 terms of the sequence given in (b)

ANSWER KEY

Q1	D	Q2	C	Q3	B	Q4	A	Q5	C	
Q6	A	Q7	C	Q8	B	Q9	C	Q10	B	
Q11	C	Q12	D	Q13	C	Q14	C	Q15	B	
Q16	A	Q17	B	Q18	D	Q19	A	Q20	C	
Q21	{(0,8), (1, 6), (2, 4), (3, 2),(4, 0)}			Q22	x=2	Q23	r=3 OR No of sides=10		Q24	n=8
Q25	8		Q26		$\sqrt{2} - 1$ OR $\frac{2}{\sqrt{5}}$			Q27	$7 \leq x \leq 11$	
Q28	120 and 49			Q29	6.32		Q30		98	
Q31	{1, 2, 3, 4, 7}&{2, 3,}				Q32		6720 720 6000		Q34	62 201 14.18
Q35	82		Q36		i) 4 ii) [-3, 3] iii) $R \rightarrow \{-1, 0, 1\}$ OR 1			Q38	a) $5_{C_4} \times 7_{C_4}$ b) $5_{C_5} \times 7_{C_5}$ c) $5_{C_4} \times 7_{C_4}$ + $5_{C_5} \times 7_{C_3}$ OR $5_{C_3} \times 7_{C_5}$ + $5_{C_2} \times 7_{C_6}$ + $5_{C_1} \times 7_{C_7}$	