Half Yearly Maths **MIND CURVE** Practice Paper Series 2023-24

By Deepika Bhati Teaching Mathematics Passionately since 2009

XI
Term 1

Practice Paper 01

S no	Syllabus Covered	Chapters(In Half Yearly)	Marking Scheme
1.	Unit 1 Sets & Functions	Sets Relations and Functions Trigonometric Function	26
2.	Unit 2 Algebra	Complex Numbers Linear Inequalities Binomial Theorem Permutation and Combination	30
3.	Unit 4 Calculus	Limits and Derivatives	16
4.	Unit 5 Statistics and Probability	Statistics	8

Note: Students/Teachers can refer to this Sample Paper for practice purpose. However, students may find or experience different exam pattern as syllabus or marking scheme may vary school to school.

MM:80	**GENERAL INSTRUCTIONS**	TIME:3 Hrs

READ CAREFULLY ALL INSTRUCTIONS

1. **This Question Paper has 5 Sections A, B, C, D and E.**
2. **Section A has 20 MCQs carrying 1 mark each**
3. **Section B has 5 questions carrying 02 marks each.**
4. **Section C has 6 questions carrying 03 marks each.**
5. **Section D has 4 questions carrying 05 marks each.**
6. **Section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.**
7. **All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E**
8. **Draw neat figures wherever required. Take π =22/7 wherever required if not stated.**
9. **This paper consists of 38 questions.**

   a. **Write your answers neatly and legibly.**
   b. **Ensure you have not left any question unanswered**

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<div align="center">**Section A (1 Marker)**</div>

1. If a set is denoted as A = ϕ, then number of elements in A is

    (a) 0   (b) 1   (c) 2   (d) 3

2. If $|x - 7|/(x - 7) \geq 0$, then

    (a) $x \in [7, \infty)$ (b) $x \in (7, \infty)$ (c) $x \in (-\infty, 7)$ (d) $x \in (-\infty, 7]$

3. The value of $1 + i^2 + i^4 + i^6 + \ldots + i^{2n}$ is

    (a) positive   (b) negative   (c) 0   (d) cannot be evaluated

4. Total number of elements in the power set of A containing 15 elements is

    (a) 2^{15} (b) 15^2 (c) 2^{15-1} (d) $2^{15} - 1$

5. If a relation R is defined on the set Z of integers as follows ; $(a, b) \in R \Longleftrightarrow a^2 + b^2 = 25$, then domain (R) is equal to

    (a) (3,4 ,5)   (b) {0,3 ,4 ,5}   (c){ 0,±3 ,±4 ,±5 }   (d) none of these

6. The number of ways in which 8 students can be seated in a line is

    (a) 5040   (b) 50400   (c) 40230   (d) 40320

7. If $1 - i$, is a root of the equation $x^2 + ax + b = 0$, where a, b ∈ R, then the value of a − b is

    (a) - 4   (b)0   (c) 2   (d)1

8. Let A = {a ,b ,c ,d } and B = {x , y, z}. What is the number of elements in A × B?

    (a)6   (b) 7   (c) 12   (d) 64

9. Let A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} and B = {2, 3, 5, 7}. Then, which of following is true?

    (a)A∩B = A   (b) A∩ B= B   (c) A∩B ⊄ B   (d) None of these

10. Domain of $\sqrt{a^2 - x^2}$ (a> 0)is

    (a) (-a, a)   (b) [-a, a]   (c)[0 ,a]   (d) (-a, 0)

11. The value of sin 50° − sin 70° + sin 10° is equal to

    (a)1   (b) 0   (c) $\frac{1}{2}$ (d) 2

12. If $[(1 + i)/(1 - i)]x = 1$, then

    (a) x = 2n + 1, where n ∈ N   (b) x = 4n, where n ∈ N

    (c) x = 2n, where n ∈ N   (d) x = 4n + 1, where n ∈ N

13. Find $\lim\limits_{x \to 0} \dfrac{\sin^2 4x}{x^2}$

(a)10 (b) 4 (c)2 (d)16

14. For 38, 70, 48, 40, 42, 55, 63, 46, 54, 44.The mean deviation about the mean for the given data is
    (a) 8.4 (b) 7.4 (c) 6.3 (d) 4

15. If $1 - i$, is a root of the equation $x^2 + ax + b = 0$, where a, b $\in$ R, then the value of a $-$ b is
    (a) -4 (b) 0 (c) 2 (d) 1

16. If $\alpha + \beta = \pi/4$, then the value of (1 + tan α) (1 + tan β) is
    (a)1 (b)2 (c)-2 (d)not defined

17.If f(x) = x²sinx, then f(π) is
    (a) π (b) π^2 (c)- π^2 (d)0

18. The fourth term in the expansion of (x-2y)^{12} is:
    (a) -1760 x⁹ × y³ (b) -1670 x⁹ × y³ (c) -7160 x⁹ × y³ (d) -1607 x⁹ × y³

19. Let R be a relation defined by; $R = \{(x, x + 5): x \in (0,1,2,3,4,5)\}$,then consider the following .
    Assertion(A) : the domain of R is $\{0,1,2,3,4,5\}$.
    Reason (R): the range of R is $\{0,1,2,3,4,5\}$
    a) both Assertion and reason are correct and reason is correct explanation for Assertion
    b) both Assertion and reason are correct but reason is not correct explanation for Assertion
    c) Assertion is true but reason is false.
    d) both Assertion and reason are false.

20. Reason: If Z=a +ib then $|z| = \sqrt{a^2 + b^2}$

    Assertion : If $z = \frac{1+2i}{1-3i}$ then $|z| = \frac{1}{\sqrt{2}}$

    a) Both Assertion and reason are correct and reason is correct explanation for Assertion
    b) Both Assertion and reason are correct but reason is not correct explanation for Assertion
    c) Assertion is true but reason is false.
    d) Both Assertion and reason are false.

Section B (2 Marker)

21. In function f = $\{(1,1), (0, -2), (3,0), (2,4)\}$ be a linear function defined by formula, f(x) =ax + b.
    then find 'a' and 'b'.

22. Find the value of tan 22°30'
            Or
    Convert following radian measure into degree measures $-\frac{2}{9}$

23. solve the inequality $x + \frac{x}{2} + \frac{x}{3} < 11$

24. Define a relation R on the set N of natural numbers by
R=$\{(x, y); y = x + 3, x$ is a prime number less than 8: $x, y \in N\}$ in roster form.Also find Domain and Range.

25. Find $\lim\limits_{x \to 0} \frac{1-\cos 4x}{x^2}$

Or

Find derivative of f(x)= $\frac{x}{\sin x}$

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Section C(3 Marker)

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26. Let A = $\{1, 2, 3, 4, 5, 6\}$. Define a relation R from A to A by R =$\{(x, y): y = x - 1\}$. Write down the domain , co-domain and range of R.

27. Prove that : $\frac{tanA+tanB}{tanA-tanB} = \frac{sin(A+B)}{sin(A-B)}$

Or

Find the value of $\sqrt{3}$ cosec 20° $-$ sec 20°.

28. If $a + ib = \frac{c+i}{c-i}$ where a,b,c are real numbers,prove that a² +b² = 1 and $\frac{b}{a} = \frac{2c}{c^2-1}$

29. Find k if limit exist at x=1 for f(x)=$\begin{cases} x^2 - 1, x < 1 \\ kx - 4, x \geq 1 \end{cases}$

30. A and B are two sets such that n(A-B) = 14+x , n(B-A)=3x and n(A∩B)= x,find x if n(A)=n(B).

Or

Draw Venn diagram to represent D'morgan laws.

31. In the expression (2x-3)⁶ using the binomial theorem,find the sum of coeffiecient of all terms

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Section D (5 Marker)

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32. find the value of cot 105° and cot 15°

Or

Prove that $cos\theta cos\frac{\theta}{2} - cos3\theta cos\frac{9\theta}{2} = cos4\theta cos\frac{7\theta}{2}$

33. If x $-$ iy = $\frac{(a+7)^2}{2a+i}$, then find the value of $x^2 + y^2$.

34. Given below are the diameters of circles (in mm) drawn in a design.

| Diameter	33-36	37-40	41-44	45-48	49-52
Number of circles	15	17	21	22	25

Calculate the mean diameter of the circles, variance and standard deviation

35. A sol of 10% acid is to be diluted by adding a 2% acid solution to it. The resulting mixture should be more than 4% and less than 6% of acid.If we have 700 litres of 10% solutions. How much litre of the 2% solution should be used.

Section E (4 Marker)

36. Sumit works at a book shop. While arranging some books on the book shelf, he observed that there are 5 history books ,3 mathematics books and 4 science books, which are to be arranged on the shelf.

   (i) In how many ways can he select either a history or a maths book?

   (ii) If he select 2 history books, 1 maths book and 1 science book to arrange them, then find the number of ways in which selection can be made.

   (iii) Find the number of ways , if the books of the same are put together.
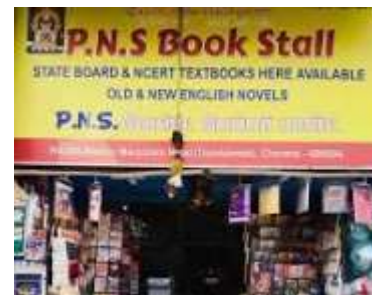
OR

   If we are given the number of selection of books are $5p_1 \times 3p_2 \times 4p_2$, then in which manner the arrangement is ?

37. Throughout history, trigonometry has been applied in areas such as geodesy, surveying, celestial mechanics, navigation and many other fields. Based on the concept of trigonometry answer the below given questions-

   (i)The minute hand of a clock is 2 cm long. How far does its tip move in 20 minutes?

   (ii)The angles subtended at the centre by the equal arcs of two wipers of the car as shown below are 65°and 110°, the ratio of their radii will be ?

   (iii)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 (Use π = 22/7).
   Or
   Find the angle in radian through which a pendulum swings if its length is 75 cm and the tip describes an arc of length 10 cm.

38. Seven regular hexagonal plates of same size are given in the figure below forms TESSELLATIONS
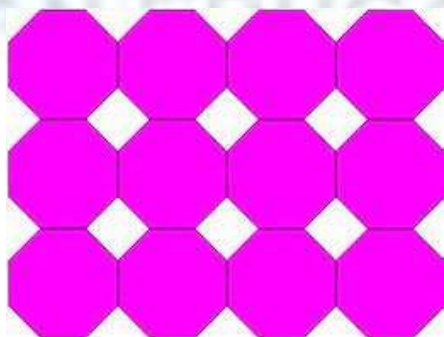
   (i)   The number of ways in which six corners of regular hexagon can be painted with six different colours will be?
   (ii)   The number of diagonals in a hexagon are
   (iii)   The number of ways in which the word HEXAGON be permuted if vowels not occur together?
                        Or
   The number of ways in which the word TESSELLATIONS be permuted if repeated letters occur together?

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