Directorate of Education, GNCT of Delhi

PRACTICE PAPER (MID TERM)

(2025-26)

Class – XI

Mathematics (Code: 041)

Time: 3 hours **Maximum Marks: 80**

General Instructions :

1. This Question paper contains - **five sections A,B,C,D,E**. Each section is compulsory. However, there are internal choices in some questions.
2. **Section A** has 18 **MCQ's and 02** Assertion-Reason based questions of 1 mark each.(20 Marks)
3. **Section B**has 5 **Very Short Answer (VSA)-type** questions of 2 marks each.(10 Marks)
4. **Section C** has 6 **Short Answer (SA)-type** questions of 3 marks each.(18 Marks)
5. **Section D** has 4 **Long Answer (LA)-type** questions of 5 marks each.(20 Marks)
6. **Section E has 3 Source based/Case based/passage based/integrated units of assessment (4 marks each) with sub parts.(12 Marks)**

	Section – A	
	Question Number 1-18 are of MCQ type question one mark each.	
Q. No.	**Question**	**Marks**
1.	If there are 4 elements in set A , then proper subsets it can have is: (a) 16 (b) 15 (c) 17 (d) 18	**1**
2	If A={1,2,3,4,5}, B={3,4,5,6,7} and C=A-B, then which of the following is true? (a) C={1,2} (b) C={1,2,6,7} (c) C={3,4,5} (d) C={6,7}	**1**

3	Let X= {x:x is an integer and X^2<10} which of the following correctly list all the elements of set X? (a) {0,1,2,3} (b){0,1,2,3,4} (c) {-3,-2,-1,1,2,3} (d) {-3,-2,-1,0, 1,2,3}	**1**
4	Let R be the set of points inside a rectangle of sides a and b (a,b>0) with two sides along the positive direction of x- axis and y-axis. Then (a) $R=\{(x,y):0\le x\le a,0\le y\le b\}$ (b)$R=\{(x,y):0\le x<a,0\le y\le b\}$ (c) $R=\{(x,y):0\le x\le a,0<y<b\}$ (d) $R=\{(x,y):0<x<a,0<y<b\}$	**1**
5	Let n(A)=m and n(B)=n then number of non empty relations that can be defined from A to B is : (a) m^n (b)n^m-1 (c) $mn-1$ (d) $2^{mn}-1$	**1**
6	Which of the following relation is not a function ? (a) {(1,1) , (2,1), (3,1)} (b) {(1,1) , (1,2), (1,3)} (c) {(1,2) , (2,3), (3,4)} (d) {(1,5) , (2,4), (3,5)}	**1**
7	Domain of $\sqrt{a^2-x^2}$(a>0) is : (a) (-a,a) (b [-a,a] (c) [0,a] (d) (-a,0]	**1**
8	If $f(x)=\frac{9}{5}x+32$, the value of f(-10) is : (a) 15 (b)=14 (c) -15 (d) -14	**1**

9	If [.] denote the greatest integer function , then which of the following statement is true ? (a) [x]=x for all real x (b) [x]=x , only when x is an integer (c) [x]=x+1, if x is not an integer (d) [x]=x-1, if x is an integer	**1**
10	If $i+i^2+i^3+.....+i^{2025}=a+ib$, then (a-b) = (a) -1 (b)0 (c) 1 (d) 2	**1**
11	Which of the following complex number is equal to $Z=i^{1+2+3+.....+2025}$ (a) 1+0i (b) -1+0i (c) 0-i (d) 0+i	**1**
12	If $f(z)=\frac{7-z}{1-z^2}$, where $z=1+2i$, then $\lvert f(z)\rvert$ is : (a) $\frac{\lvert z\rvert}{2}$ (b)$\lvert z\rvert$ (c)$2\lvert z\rvert$ (d) None of these	1
13	Which of the following complex number is <u>not</u> purely imaginary ? (a) i^{2025} (b) i^{-2025} (c) $(1+i)^4$ (d) $(1+i)^2$	1

14 $3\cos 15^0 - 4\cos^3 15^0 =$ 1

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

15 Maximum value of sinx.cosx. Is : 1

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

16 If A=2B then $\frac{2\tan B}{1+\tan^2 B}$- sin A = 1

(a) $\tan 2A$	(b) sin2A
(c) cos 2A	(d) 0

17 $\sin\left(\frac{4\pi}{6}\right)+\cos\left(\frac{5\pi}{3}\right)=$ 1

(a) -1	(b) 0.25
(c) 1	(d) 0

18 If f(x)=p(x)+q, where p and q are integers ,
f(-1)=5, and f(3)=3 then p and q are equals to : 1

(a)p=-3, q=-1	(b)p=2, q=-3
(c)p=0, q=-2	(d)p=2, q=3

	(ASSERTION-REASONING BASED QUESTIONS) **In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.** **(a) Both A and R are true and R is the correct explanation of A.** **(b) Both A and R are true but R is not the correct explanation of A.** **(c) A is true but R is false.** **(d) A is false but R is true.**	
19	**Assertion (A) : The inequality** $-4x+3 \geqslant 7$ **is equivalent to** $x \leqslant -1$ **Reason (R) : When we divide or multiply an inequality by a negative number , the inequality sign reverses .**	1
20	**Assertion (A) :**If sin +sin b +sin c =-3 then cos a +cos b +cos c =0 **Reason (R)** : The sine of any real angle lies from -1 to 1	1
	Section B **This Section contains 5 Very Short Answer (VSA)-type questions of 2 marks each.**	
21	For any two sets A and B prove that $(A \cap B) \cup (A - B) = A$ **OR** If $A=\{x : x \in N\} B=\{x : x=2n, n \in N\} C=\{x : x=2n-1, n \in N\}$ $D=\{x : is\ a\ prime\ natural\ number\}$ Find (a) $(A \cap B)$ (b)$(B \cap C)$	2
22	Evaluate $(1+i)^4+(1-i)^4$ **OR** If $x+iy=\frac{a+ib}{a-ib}$ Prove that $x^2+y^2=1$	2
23	Prove that $\tan(60^0+\theta).\tan(60^0-\theta)=\frac{2\cos 2\theta+1}{2\cos 2\theta-1}$	2
24	Prove that sin(n+1)x.sin (n+2)x+ cos(n+1)x.cos (n+2)x =cosx	2
25	Prove that 1x1!+2x 2!+3x3! +.....+nxn! =(n+1)!-1	2
	Section C **This section contains Six Short Answer (SA)-type questions of 3 marks each.**	
26	If A= {3,6 ,12 ,15, 18,21}, B={4,8,12,16,20} C={2,4,6,8,10,12,14,16} and D={5,10,15,20} Find (a)A-B (b)B-C (c) B-D	3
27	Let $A=\{1,2,3,4,5,.....20\}$. Define a relation R from A to A by $R=\{(a,b) : a-2b=0, a,b \in A\}$ Depict the relation using roaster form . Write domain and range of the relation.	3

28	If $cotx=\frac{5}{12}$, x lies in the second quadrant. Find the values of other five trigonometric functions **OR** Show that $\left(\frac{1+\sin\theta}{1-\sin\theta}\right)=\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)$	3
29	If $a+ib=\frac{x^2+1}{2x^2+1}$ prove that $a^2+b^2=\frac{\left(x^2+1\right)^2}{\left(2x^2+1\right)^2}$ **OR** Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$	3
30	Solve for real x : $\frac{(2x-1)}{3}\geqslant\frac{(3x-2)}{4}-\frac{(2-x)}{5}$	3
31	In how many ways 7 positive and 5 negative signs can be arranged in a row so that no two negative signs occur together?	3
	SECTION D **This section contains four Long Answer (LA)-type questions of 5 marks each.**	
32	Find domain and range of real function $f(x)=\sqrt{x^2-16}$ **OR** Find the domain and range of the function $f(x)=\frac{x^2}{1+x^2}$	5
33	Prove that $\sin^4\frac{\pi}{8}+\sin^4\frac{3\pi}{8}+\sin^4\frac{5\pi}{8}+\sin^4\frac{7\pi}{8}=\frac{3}{2}$ **OR** If $\frac{\cos(A-B)}{\cos(A+B)}+\frac{\cos(C+D)}{\cos(C-D)}=0$, Prove that tanA. tanB . tanC . tanD =-1	5
34	Three balls are drawn from a bag containing 5 Red , 4 White , and 3 Black balls .Find the number of ways in which this can be done if atleast 2 balls are Red .	5
35	If $(x+iy)^3=u+iv$ then show that $\frac{u}{x}+\frac{v}{y}=4\left(x^2-y^2\right)$	5
	SECTION E **Source based/Case based/passage based/integrated units of assessment Questions**	
36	A college is organizing a project fair and needs to form 5-member teams from a pool of 8 boys and 5 girls. The project fair has different segments, and each segment has specific team formation rules: **1. Innovation Segment:** The team must consist of at least 2 boys and 2 girls. **2. Technology Segment:** The team must have exactly 3 boys. **3. Sustainability Segment:** The team must have at least 3 girls.	

Based on the information given above answer any four questions :

1. How many ways can a team of 5-member be formed for **Innovation Segment** with at least 2 boys and 2 girls?

2. How many ways can a team of 5-member be formed for **Technology Segment** with exactly 3 boys? 1

3. (a)How many ways can a a team of 5-member be formed for **Sustainability Segment** with at least 3 girls? 1

or

(b)If the team size is increased to 6 members in how many ways can a team be formed with exactly 3 boys . 2

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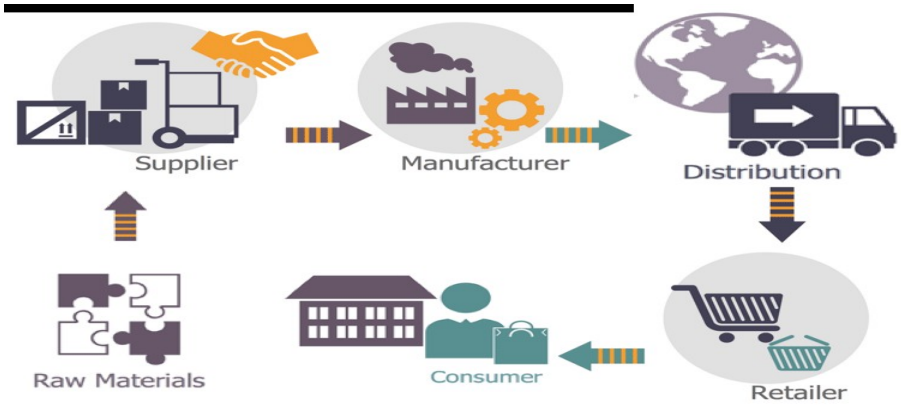
A small box contains coins of paisa denomination from 1 paisa to 20 paisa. Consider two sets:
Set X = {1, 5, 10, 15} (coins of denominations 1 paisa, 5 paise, 10 paise, and 15 paise)
Set Y = {5, 10, 15, 20} (coins of denominations 5 paise, 10 paise, 15 paise, and 20 paise)

Based on situation given above answer the following questions :

1. Find the union of Set X and Set Y (X ∪ Y). **1**
2. Find the intersection of Set X and Set Y (X ∩ Y). **1**
3. Determine the subset of coins that are common to both sets. **2**

OR

4. write the smallest and largest subset of xUy

38	A company produces certain items : Manager in the company used to make a data record on daily basis about the cost and revenue of those items separately . The cost and revenue function of the product are given by .C(x)=20X+4000 and R(x) =60x +2000 respectively where X is the number of Items produced and sold . The company manager has few questions in mind , help him to solve them.  (I) How many items must be sold to realize some profit?	2
	(ii) If the cost and revenue functions of the product are given by C(X)=2x+400 R(X)=6x+20 respectively , Where X is the number of items produced by the manufacturer. Calculate the Minimum numbers of items that the manufacturer must sell to realize some profit .	2