Directorate of Education, GNCT of Delhi

Practice Paper

(2025-26)

Class – XI

Mathematics (Code: 041)

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

1. This Question paper contains 38 questions divided into **five sections A,B,C,D,E**. Each section is compulsory. However, there are internal choices in some questions.
2. **Section A** has question number (1-18) as **MCQ's and Question number (19-20)** Assertion-Reason based questions of 1 mark each.
3. **Section B** has Question number (21-25) of **Very Short Answer (VSA)-type** questions of 2 marks each.
4. **Section C** has Question number (26-31) of **Short Answer (SA)-type** questions of 3 marks each.
5. **Section D** has Question number (32-35) of **Long Answer (LA)-type** questions of 5 marks each.
6. **Section E** has Question number (36-38) **of Source based/Case based/passage based/integrated units of assessment questions** (4 marks each) with sub parts.
7. **There is no overall choice however an internal choice have been provided in 2 questions in Section -B , 3 questions in Section- C and 2 questions in Section- D**

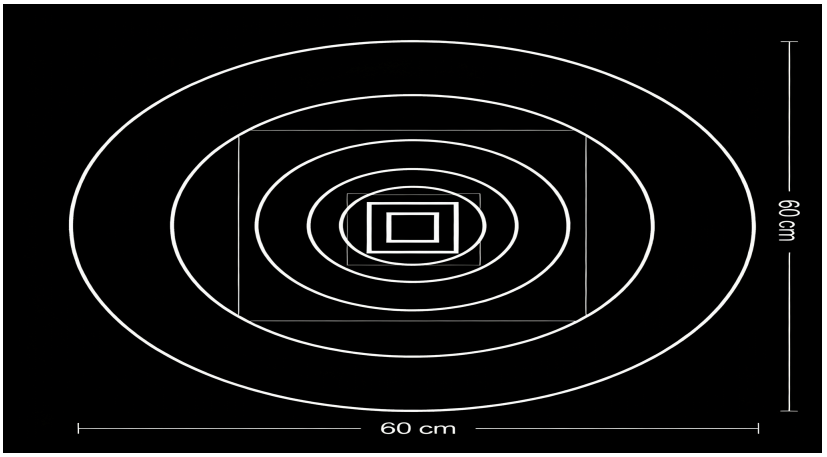
	Section – A	
	Question Number 1-18 are of MCQ type question one mark each.	
1.	$cos30^\circ + cos90^\circ + cos150^\circ + cos210^\circ =$	**1**
	(a) 1 / (b) 0 / (c) $\frac{-\sqrt{3}}{2}$ / (d) $\frac{1}{2}$	
2	Which of the following is <u>not</u> equal to cos 2x ?	**1**
	(a) $cos^2x - sin^2x$ / (b) $1 - 2sin^2x$ / (c) $1 - 2cos^2x$ / (d) $\frac{1-tan^2x}{1+tan^2x}$	

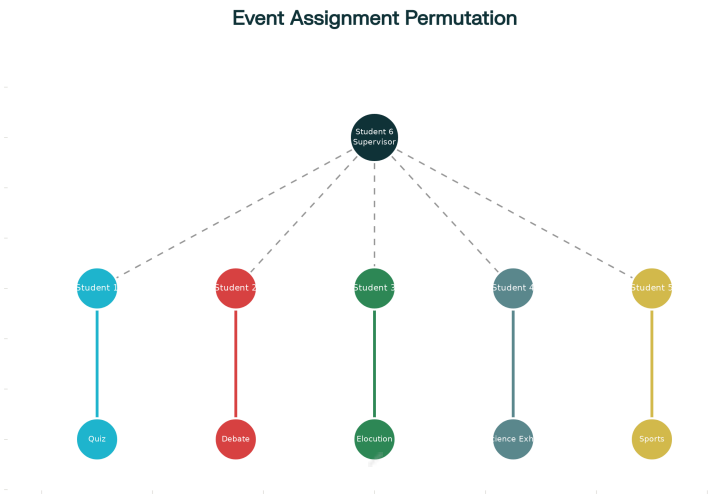
3	Let X= {x: x is an integer and $x^2 < 10$} which of the following correctly list all the elements of set X? (a) $\{1, 2, 3\}$ (b) $\{0, 1, 2, 3\}$ (c) $\{-1, -2, -3, 1, 2, 3\}$ (d) $\{-1, -2, -3, 0, 1, 2, 3\}$	**1**
4	The domain of the function f given by f(x)=$\frac{x-4}{x^2-16}$ is equal to : (a) R-{4} (b) R-{-4} (c) R (d) R - {4,-4}	**1**
5.	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**
6	Let $cosx = \frac{1}{2}$, where x is in radians & lies in third quadrant. If x = $\frac{a\pi}{b}$ with a and b coprime positive integers, then a+b= ? (a) 2 (b) 3 (c) 5 (d) 7	**1**
7	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**
8	Total number of terms in the expansion of $\left(x - 2\sqrt{x} + 1\right)^{10}$ is (a) 10 (b) 11 (c) 20 (d) 21	**1**

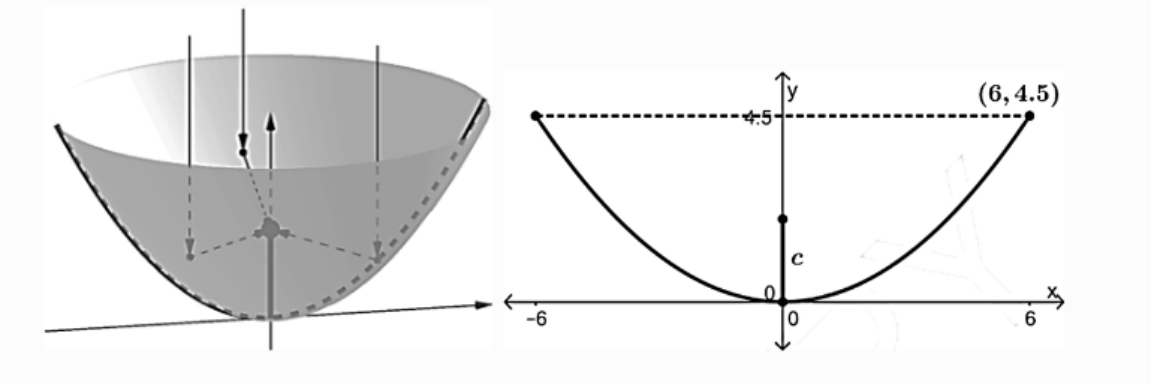
9	If $z = \frac{(5+2i)(4-i)}{1+3i}$, then Im $(z.\bar{z})$equals to : (a) 0 (b) 2 (c) 4 (d) 6	**1**
10	If $\frac{4}{x+2} < 0$ then x belongs to : (a) $(-\infty, -2)$ (b) $(-2, \infty)$ (c) $(-\infty, -2) \cup (-2, \infty)$ (d) $x \neq -2$	**1**
11	If $f(z) = \frac{7-z}{1-z^2}$, where $z = 1 + 2i$, then $\lvert f(z)\rvert$ is : (a) $\frac{\lvert z\rvert}{2}$ (b)$\lvert z\rvert$ (c)$2\lvert z\rvert$ (d) None of these	**1**
12	If the focus of the parabola is (4,0) and its directrix is x=3 then its equation is : (a) $y^2 = 16x$ (b) $y^2 = -16x$ (c) $x^2 = 16y$ (d) $x^2 = -16y$	**1**
13	The reflection of the point $(2, -5, 3)$ in xz -plane is : (a) $(2, 5, 3)$ (b) $(2, -5, 3)$ (c) $(-2, -5, 3)$ (d) $(2, -5, 3)$	**1**
14	If $Q = \frac{cos4x}{cos2x}$, then (5Q+2) equals : (a) 5cot2x+3 (b) 5tan2x+3 (c) 3−5tan2x (d) 3+5sec2x	**1**

15	Equation of the line passing through the point (1,2) and perpendicular to the line x+y+1=0 is : (a) y-x+1=0 (b) y-x-1=0 (c) y-x+2=0 (d) y-x-2=0	**1**
16	If P(C)=0.4 , P(D)=0.5 and P($C \cap D$)=0.2 Then P($C \cup D$) equal to : (a) 0.7 (b) 0.8 (c) 0.9 (d) 1.1	**1**
17	If A ,B and C are three mutually exclusive and exhaustive events of an experiment such that $P(A) = 0.2, P(B) = 0.3$ then $P(C)$ equals to : (a) 0.2 (b) 0.3 (c) 0.5 (d) 0.7	**1**
18	Mean and standard deviation of the numbers 2,4,6,8,10 are : (a) Mean = 6, Standard deviation = 2.83 (b) Mean = 5, Standard deviation = 2 (c) Mean = 6, Standard deviation = 3.16 (d Mean = 5, Standard deviation = 2.24	**1**
	(ASSERTION-REASON BASED QUESTIONS) **In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.** **(a) Both A and R are true and R is the correct explanation of A.** **(b) Both A and R are true but R is not the correct explanation of A.** **(c) A is true but R is false.** **(d) A is false but R is true.**	
19	**Assertion (A):** The inequality $-2x>6$ is equivalent to $x<-3$ **Reason (R):** When both sides of an inequality are divided or multiplied by a negative number, the inequality sign reverses.	**1**
20	**Assertion (A) :**If cos a +cos b +cos c =3 then sin a +sin b +sin c =0 **Reason (R) :** The cosine of any real angle lies between -1 and 1	**1**

	(Section B) **This section contains 5 Very Short Answer (VSA) type questions of 2 marks each.**	
Q 21	**How many chords can be drawn through 21 points on a circle?**	**2**
Q 22	Prove that: 1 x 1! + 2 x 2! +3 x 3! +……...+n x n! = (n+1)! – 1	**2**
Q 23	If$(x + iy)^3 = u + iv$ then show that $\frac{u}{x} + \frac{v}{y} = 4\left(x^2 - y^2\right)$. OR Evaluate $(1 + i)^4 + (1 - i)^4$	**2**
Q 24	Find the derivative of $\frac{cos^2 x}{1+sinx}$ w. r. t. x.	**2**
Q 25	Prove that: sin(n+1)x.sin (n+2)x+ cos(n+1)x.cos (n+2)x =cosx **OR** If tan x + tan y = a and tan x tan y=b, then prove that $tan(x + y) = \frac{a}{1-b}$	**2**
	Section C	
	This section contains 6 Short Answer (SA)-type questions of 3 marks each.	
Q26	In what ratio is the line joining the points (2, 3) and (4, -5) divided by the line passing through the points (6, 8) and (-3, -2).	**3**
Q27	Solve for real x : $\frac{(2x-1)}{3} \geqslant \frac{(3x-2)}{4} - \frac{(2-x)}{5}$	**3**
Q28	If tany =2, $\frac{\pi}{2} < y < \pi$ then find the value of $sin\frac{y}{2}$, $cos\frac{y}{2}$& $tan\frac{y}{2}$ OR Find the value of $sin22\frac{1}{2}°$	**3**
Q29	If A=$\{x: x \epsilon N, 1 < x \leq 5\}$ and B=$\{x: x \epsilon N, 3 \leq x < 7\}$ then find the value of (a)$A \cup B$ (b)$A \cap B$	**3**
Q30	Find the equation of the circle which passes through the point (2,3) and whose center lies at the point of intersection of the lines x−y=1 and x+y=5 OR If the length of the major axis of an ellipse is 20 and the length of the minor axis is 16, find the equation of the ellipse with center at the origin and major axis along the x-axis.	**3**

Q. 31	If $y = \frac{sinx+cosx}{sinx-cosx}$ then find $\frac{dy}{dx}$ at x=0 **OR** Find the value of $\frac{1-cosmx}{1-cosnx}$	**3**
	(SECTION D) This section contains **four Long Answer (LA)-type** questions of 5marks each.	
Q 32	Find the coefficient of x^3 in the product of $(2 - 3x)^5(1 + x)^4$ using binomial theorem. • OR Find $(x + 2)^8 + (x - 2)^8$ hence or otherwise evaluate $\left(\sqrt{5} + 2\right)^8 + \left(\sqrt{5} - 2\right)^8$	**5**
Q 33	If the first term of AP is 2 and the sum of first five terms is equal to one fourth of the sum of next five terms , then show that 20 th term is -112.	**5**
Q 34	(a) Find the sum of the series 4+44+444+-------+n terms -. (b) Prove that $2^{\frac{1}{2}}.4^{\frac{1}{8}}.8^{\frac{1}{24}}.16^{\frac{1}{64}} \text{----------} \infty = 2$ OR If p and q are roots of $x^2 - 4x + a = 0$ and r,s are roots of $x^2 - 8x + b = 0$ where p,q,r ,s form a Geometrical Progression Prove that $\frac{a+b}{b-a} = \frac{10}{6}$	**5**
Q35	The mean and variance of eight observations are 9 and 9.25 respectively . If six of observations are 6,7,10,12,12 and 13, then find the remaining two observations .	**5**
	Section E **Source based/Case based/passage based/integrated units of assessment Questions**	
Q36	Geometric mathematics is deeply intertwined with art, particularly in patterns involving circles such as mandalas, rangoli, and ancient mosaic designs. Consider a pattern formed by drawing a circle of radius 60 cm. Inside this circle, another circle is drawn whose radius is half that of the previous circle, and this process continues infinitely so that each new circle has half the radius of the previous one. Such recursive, concentric circle patterns are widely used in traditional and modern art forms. Suppose the radius of the first (outermost) circle is 60 cm.  	

	Answer the following: (i) What is the radius of the third circle? (ii) Find the area of the second inner circle. (iii) What is the perimeter (circumference) of the fourth circle? **OR** (iii) Find the total sum of areas of all circles if the process continues infinitely.	**1** **1** **2**
Q37	A school is organizing an inter-school event where 5 different competitions (Quiz, Debate, Elocution, Science Exhibition, and Sports) will take place on the same day. There are 6 student organizers selected from Class XI. Each competition requires a unique student organizer to lead it; no student can lead more than one event.  During the planning, the following sub-questions arise: (i) In how many different ways can the 6 organizers be assigned so that 5 of them are selected to lead the 5 competitions, while the sixth organizer acts as a supervisor? (ii) If two of the competitions (Quiz and Science Exhibition) must be led by female students and among the 6 organizers, only 2 are females, in how many ways can the assignments for all competitions be made? (iii) Suppose the organizers have to be seated in a row for a photo and the supervisor must be seated at one end. In how many ways can they be arranged? OR (iii) If the event is conducted annually and the 6 organizers are to be assigned to the 5 events and supervisor role in such a way that no student repeats the same role in two consecutive years, what is the minimum number of years before all possible assignments are exhausted without any repetition for any individual in any given role?	**1** **1** **2**

Q 38	A satellite dish has a shape called a paraboloid, where each cross section is parabola. Since radio signals (parallel to axis) will bounce off the surface of the dish to the focus, the receiver should be placed at the focus. The dish is 12 ft across, and 4.5 ft deep at the vertex. Based on above situation answer the following: (I)Write the equation of the parabola representing the cross section of the dish with the vertex at the origin. (ii)In the parabola representing the satellite dish, find the distance from the vertex to the focus where the receiver should be placed. 	**2+2**