

Directorate of Education, GNCT of Delhi

Practice Paper

(2024-25)

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						
Q.	Question Number 1-18 are of MCQ type question one mark each.					
1.	$\cos 40^\circ + \cos 80^\circ + \cos 160^\circ + \cos 240^\circ =$ <table border="1"><tr><td>(a) $\frac{1}{2}$</td><td>(b) $-\frac{1}{2}$</td></tr><tr><td>(c) 1</td><td>(d) 0</td></tr></table>	(a) $\frac{1}{2}$	(b) $-\frac{1}{2}$	(c) 1	(d) 0	1
(a) $\frac{1}{2}$	(b) $-\frac{1}{2}$					
(c) 1	(d) 0					
2.	Which of the following is <u>not</u> equal to $\cos 2x$? <table border="1"><tr><td>(a) $\cos^2 x - \sin^2 x$</td><td>(b) $1 - 2\sin^2 x$</td></tr><tr><td>(c) $1 - 2\cos^2 x$</td><td>(d) $\frac{1 - \tan^2 x}{1 + \tan^2 x}$</td></tr></table>	(a) $\cos^2 x - \sin^2 x$	(b) $1 - 2\sin^2 x$	(c) $1 - 2\cos^2 x$	(d) $\frac{1 - \tan^2 x}{1 + \tan^2 x}$	1
(a) $\cos^2 x - \sin^2 x$	(b) $1 - 2\sin^2 x$					
(c) $1 - 2\cos^2 x$	(d) $\frac{1 - \tan^2 x}{1 + \tan^2 x}$					
3.	Greatest value of $\sin x \cos x$ is : <table border="1"><tr><td>(a) 0</td><td>(b) -1</td></tr><tr><td>(c) 1</td><td>(d) 0.5</td></tr></table>	(a) 0	(b) -1	(c) 1	(d) 0.5	1
(a) 0	(b) -1					
(c) 1	(d) 0.5					
4.	The domain of the function f given by $f(x) = \frac{x-4}{x^2-16}$ is equal to : <table border="1"><tr><td>(a) $R - \{4\}$</td><td>(b) $R - \{-4\}$</td></tr><tr><td>(c) R</td><td>(d) $R - \{4, -4\}$</td></tr></table>	(a) $R - \{4\}$	(b) $R - \{-4\}$	(c) R	(d) $R - \{4, -4\}$	1
(a) $R - \{4\}$	(b) $R - \{-4\}$					
(c) R	(d) $R - \{4, -4\}$					

<p>5.</p>	<p>If $[x]^2 - 5[x] + 6 = 0$ where $[.]$ denotes the greatest integer function, then.</p> <table border="1" data-bbox="207 223 1395 397"> <tbody> <tr> <td data-bbox="207 223 802 306">(a) $x \in [3, 4]$</td> <td data-bbox="802 223 1395 306">(b) $x \in (2, 3]$</td> </tr> <tr> <td data-bbox="207 306 802 397">(c) $x \in [2, 3]$</td> <td data-bbox="802 306 1395 397">(d) $x \in [2, 4)$</td> </tr> </tbody> </table>	(a) $x \in [3, 4]$	(b) $x \in (2, 3]$	(c) $x \in [2, 3]$	(d) $x \in [2, 4)$	<p>1</p>
(a) $x \in [3, 4]$	(b) $x \in (2, 3]$					
(c) $x \in [2, 3]$	(d) $x \in [2, 4)$					
<p>6.</p>	<p>If $\theta = 135^\circ = \frac{a\pi}{b}$ (In Radian) where a and b are coprime numbers , then a+b=</p> <table border="1" data-bbox="207 607 1395 774"> <tbody> <tr> <td data-bbox="207 607 802 690">(a) 4</td> <td data-bbox="802 607 1395 690">(b) 5</td> </tr> <tr> <td data-bbox="207 690 802 774">(c) 6</td> <td data-bbox="802 690 1395 774">(d) 7</td> </tr> </tbody> </table>	(a) 4	(b) 5	(c) 6	(d) 7	<p>1</p>
(a) 4	(b) 5					
(c) 6	(d) 7					
<p>7.</p>	<p>$(1+i)^4 = p+iq$ then (p^2+q^2) equals to :</p> <table border="1" data-bbox="207 862 1395 1032"> <tbody> <tr> <td data-bbox="207 862 802 946">(a) 2</td> <td data-bbox="802 862 1395 946">(b) 4</td> </tr> <tr> <td data-bbox="207 946 802 1032">(c) 8</td> <td data-bbox="802 946 1395 1032">(d) 16</td> </tr> </tbody> </table>	(a) 2	(b) 4	(c) 8	(d) 16	<p>1</p>
(a) 2	(b) 4					
(c) 8	(d) 16					
<p>8.</p>	<p>If $z = (3 + \sqrt{2}i)$ then $z \times z$ equals:</p> <table border="1" data-bbox="207 1077 1395 1247"> <tbody> <tr> <td data-bbox="207 1077 802 1161">(a) 11</td> <td data-bbox="802 1077 1395 1161">(b) 7</td> </tr> <tr> <td data-bbox="207 1161 802 1247">(c) $\sqrt{11}$</td> <td data-bbox="802 1161 1395 1247">(d) 5</td> </tr> </tbody> </table>	(a) 11	(b) 7	(c) $\sqrt{11}$	(d) 5	<p>1</p>
(a) 11	(b) 7					
(c) $\sqrt{11}$	(d) 5					
<p>9.</p>	<p>If $z = \frac{(2+3i)(3+4i)}{4+5i}$, then $\text{Im}(z \cdot \bar{z})$ equals to :</p> <table border="1" data-bbox="207 1400 1395 1661"> <tbody> <tr> <td data-bbox="207 1400 802 1526">(a) 0</td> <td data-bbox="802 1400 1395 1526">(b) $\frac{5\sqrt{13}}{\sqrt{41}}$</td> </tr> <tr> <td data-bbox="207 1526 802 1661">(c) $\frac{\sqrt{13}}{\sqrt{41}}$</td> <td data-bbox="802 1526 1395 1661">(d) $\frac{5}{\sqrt{41}}$</td> </tr> </tbody> </table>	(a) 0	(b) $\frac{5\sqrt{13}}{\sqrt{41}}$	(c) $\frac{\sqrt{13}}{\sqrt{41}}$	(d) $\frac{5}{\sqrt{41}}$	<p>1</p>
(a) 0	(b) $\frac{5\sqrt{13}}{\sqrt{41}}$					
(c) $\frac{\sqrt{13}}{\sqrt{41}}$	(d) $\frac{5}{\sqrt{41}}$					
<p>10.</p>	<p>If $\frac{-2}{x-3} > 0$ then x belongs to :</p> <table border="1" data-bbox="207 1811 1395 2026"> <tbody> <tr> <td data-bbox="207 1811 802 1895">(a) $(3, \infty)$</td> <td data-bbox="802 1811 1395 1895">(b) $[-\infty, \infty)$</td> </tr> <tr> <td data-bbox="207 1895 802 2026">(c) $(-\infty, 3)$</td> <td data-bbox="802 1895 1395 2026">(d) $(-\infty, 3]$</td> </tr> </tbody> </table>	(a) $(3, \infty)$	(b) $[-\infty, \infty)$	(c) $(-\infty, 3)$	(d) $(-\infty, 3]$	<p>1</p>
(a) $(3, \infty)$	(b) $[-\infty, \infty)$					
(c) $(-\infty, 3)$	(d) $(-\infty, 3]$					
<p>11.</p>	<p>If $x-2 \geq -3$ then $x \in$:</p> <table border="1" data-bbox="207 2134 1354 2333"> <tbody> <tr> <td data-bbox="207 2134 789 2217">(a) $\{ \}$</td> <td data-bbox="789 2134 1354 2217">(b) $(-\infty, \infty)$</td> </tr> <tr> <td data-bbox="207 2217 789 2333">(c) $[-1, 5]$ only</td> <td data-bbox="789 2217 1354 2333">(d) $(-1, 5)$ only</td> </tr> </tbody> </table>	(a) $\{ \}$	(b) $(-\infty, \infty)$	(c) $[-1, 5]$ only	(d) $(-1, 5)$ only	<p>1</p>
(a) $\{ \}$	(b) $(-\infty, \infty)$					
(c) $[-1, 5]$ only	(d) $(-1, 5)$ only					

12.	<p>If the focus of the parabola is (0,-3) and its directrix is y=3 then its equation is :</p> <table border="1" data-bbox="207 163 1395 344"> <tbody> <tr> <td data-bbox="207 163 802 252">(a) $x^2=12y$</td> <td data-bbox="802 163 1395 252">(b) $x^2=-12y$</td> </tr> <tr> <td data-bbox="207 252 802 344">(c) $y^2=12x$</td> <td data-bbox="802 252 1395 344">(d) $y^2=-12x$</td> </tr> </tbody> </table>	(a) $x^2=12y$	(b) $x^2=-12y$	(c) $y^2=12x$	(d) $y^2=-12x$	1
(a) $x^2=12y$	(b) $x^2=-12y$					
(c) $y^2=12x$	(d) $y^2=-12x$					
13.	<p>The reflection of the point (α, β, γ) in xy -plane is :</p> <table border="1" data-bbox="207 397 1395 585"> <tbody> <tr> <td data-bbox="207 397 802 486">(a) $(\alpha, \beta, -\gamma)$</td> <td data-bbox="802 397 1395 486">(b) $(0, 0, \gamma)$</td> </tr> <tr> <td data-bbox="207 486 802 585">(c) $(\alpha, \beta, 0)$</td> <td data-bbox="802 486 1395 585">(d) $(-\alpha, -\beta, \gamma)$</td> </tr> </tbody> </table>	(a) $(\alpha, \beta, -\gamma)$	(b) $(0, 0, \gamma)$	(c) $(\alpha, \beta, 0)$	(d) $(-\alpha, -\beta, \gamma)$	1
(a) $(\alpha, \beta, -\gamma)$	(b) $(0, 0, \gamma)$					
(c) $(\alpha, \beta, 0)$	(d) $(-\alpha, -\beta, \gamma)$					
14.	<p>If $P = \lim_{x \rightarrow 0} \frac{\sin 5x}{\tan 7x}$, then (7P-2) equals :</p> <table border="1" data-bbox="207 666 1395 854"> <tbody> <tr> <td data-bbox="207 666 802 755">(a) 0</td> <td data-bbox="802 666 1395 755">(b) 1</td> </tr> <tr> <td data-bbox="207 755 802 854">(c) 3</td> <td data-bbox="802 755 1395 854">(d) 5</td> </tr> </tbody> </table>	(a) 0	(b) 1	(c) 3	(d) 5	1
(a) 0	(b) 1					
(c) 3	(d) 5					
15.	<p>Value of $\lim_{x \rightarrow 0} \left(\frac{x^3 + x^2 + x - 3}{x - 1} \right)$ is equal to :</p> <table border="1" data-bbox="207 956 1395 1137"> <tbody> <tr> <td data-bbox="207 956 802 1045">(a) 0</td> <td data-bbox="802 956 1395 1045">(b) 3</td> </tr> <tr> <td data-bbox="207 1045 802 1137">(c) 5</td> <td data-bbox="802 1045 1395 1137">(d) 6</td> </tr> </tbody> </table>	(a) 0	(b) 3	(c) 5	(d) 6	1
(a) 0	(b) 3					
(c) 5	(d) 6					
16.	<p>If $P(A)=0.2$, $P(B)=0.3$ and $P(A \cap B)=0.1$ Then $P(A \cup B)$ equal to :</p> <table border="1" data-bbox="207 1239 1395 1486"> <tbody> <tr> <td data-bbox="207 1239 802 1360">(a) $\frac{1}{11}$</td> <td data-bbox="802 1239 1395 1360">(b) $\frac{2}{11}$</td> </tr> <tr> <td data-bbox="207 1360 802 1486">(c) $\frac{5}{11}$</td> <td data-bbox="802 1360 1395 1486">(d) $\frac{6}{11}$</td> </tr> </tbody> </table>	(a) $\frac{1}{11}$	(b) $\frac{2}{11}$	(c) $\frac{5}{11}$	(d) $\frac{6}{11}$	1
(a) $\frac{1}{11}$	(b) $\frac{2}{11}$					
(c) $\frac{5}{11}$	(d) $\frac{6}{11}$					
17.	<p>If A and B three mutually exclusive and exhaustive events of an experiment such that $3P(A)=2P(B)=P(C)$ then $P(A)$ equals to :</p> <table border="1" data-bbox="207 1588 1395 1835"> <tbody> <tr> <td data-bbox="207 1588 802 1709">(a) $\frac{4}{15}$</td> <td data-bbox="802 1588 1395 1709">(b) $\frac{8}{15}$</td> </tr> <tr> <td data-bbox="207 1709 802 1835">(c) $\frac{1}{3}$</td> <td data-bbox="802 1709 1395 1835">(d) $\frac{2}{9}$</td> </tr> </tbody> </table>	(a) $\frac{4}{15}$	(b) $\frac{8}{15}$	(c) $\frac{1}{3}$	(d) $\frac{2}{9}$	1
(a) $\frac{4}{15}$	(b) $\frac{8}{15}$					
(c) $\frac{1}{3}$	(d) $\frac{2}{9}$					
18.	<p>Mean and standard deviation of 1, 2, 3, 4, 5, 6 is :</p> <table border="1" data-bbox="207 1889 1395 2145"> <tbody> <tr> <td data-bbox="207 1889 802 2010">(a) $3, \frac{35}{12}$</td> <td data-bbox="802 1889 1395 2010">(b) 3, 3</td> </tr> <tr> <td data-bbox="207 2010 802 2145">(c) $\frac{7}{2}, \sqrt{\frac{35}{12}}$</td> <td data-bbox="802 2010 1395 2145">(d) $\frac{7}{2}, \sqrt{3}$</td> </tr> </tbody> </table>	(a) $3, \frac{35}{12}$	(b) 3, 3	(c) $\frac{7}{2}, \sqrt{\frac{35}{12}}$	(d) $\frac{7}{2}, \sqrt{3}$	1
(a) $3, \frac{35}{12}$	(b) 3, 3					
(c) $\frac{7}{2}, \sqrt{\frac{35}{12}}$	(d) $\frac{7}{2}, \sqrt{3}$					
<p style="text-align: center;">(ASSERTION-REASON BASED QUESTIONS)</p> <p>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.</p> <p style="padding-left: 40px;">(a) Both A and R are true and R is the correct explanation of A.</p> <p style="padding-left: 40px;">(b) Both A and R are true but R is not the correct explanation of A.</p> <p style="padding-left: 40px;">(c) A is true but R is false.</p>						

	(d) A is false but R is true.	
19.	<p>Assertion(A) : If ${}^{2023}C_{2x-2} = {}^{2023}C_x$ then sum of all positive values of x is 677.</p> <p>Reason (R) : If ${}^nC_x = {}^nC_y$ then $x=y$ or $x+y=n$</p>	1
20.	<p>Assertion(A) : The range of function $f(x)=\sin x +\cos x$ is $(-\sqrt{2},\sqrt{2})$</p> <p>Reason (R) : For all $\theta \in R, -1 \leq \sin \theta \leq 1$</p>	1
	(Section B) This section contains 5 Very Short Answer (VSA)-type questions of 2 marks each.	
21.	How many cords can be drawn through 21 points on a circle ?	2
22.	Find the number of different 8 letter arrangement that can be made from the letter of the word "Daughter" so that vowels do not occur together.	2
23.	If $(x+iy)^3 = u+iv$ then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$.	2
24.	<p>Find the derivative of $\frac{\sin^2 x}{1+\cos x}$ w. r. t. x.</p> <p>OR</p> <p>Find the value of $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$.</p>	2
25.	<p>Prove that :</p> $\tan 2023x - \tan 2022x - \tan x = \tan 2023x \cdot \tan 2022x \cdot \tan x$ <p>OR</p> <p>If $\tan (A+B)=p$ and $\tan (A-B)=q$ then Prove that $\tan 2 A = \frac{p+q}{1-pq}$</p>	2
Section C		
This section contains 6 Short Answer (SA)-type questions of 3 marks each.		
26.	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
27.	Solve for x : if $ x - 2 \leq p$ when (a) $p=2$ (b) $p=-3$ (c) $p=0$	3
28.	<p>If $\tan x = 3/4, \pi < x < \frac{3\pi}{4}$ then find the value of $\sin \frac{x}{2}, \cos \frac{x}{2}, \tan \frac{x}{2}$</p> <p>OR</p> <p>Find the value of $\tan \tan 22^\circ 30'$</p>	3
29.	<p>If $A = \{x : x \in N, 2 < x \leq 6\}$ and</p> $B = \{x : x \in N, 4 \leq x < 8\}$ <p>then find the value of (a) $A \cup B$ (b) $A \cap B$</p>	3
30.	<p>Find the equation of the circle which passes through the point (1,1) and centre lies at the point of intersection of lines $x+y=4$ and $x-y=0$</p> <p>OR</p> <p>If the eccentricity of the ellipse is $\frac{5}{8}$ and distance between its foci is 10 . Find the equation of ellipse .</p>	3

31.	<p>If $y = (x-1)(x+1)(x^2+1)(x^4+1)(x^8+1)\sin x + 1$ then find $\frac{dy}{dx}$.</p> <p>OR</p> <p>Find the value of $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$</p>	3
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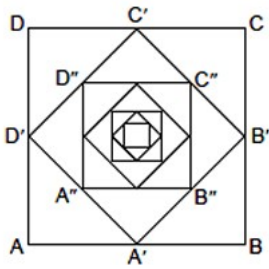
(SECTION D)

This section contains **four Long Answer (LA)-type** questions of 5marks each.

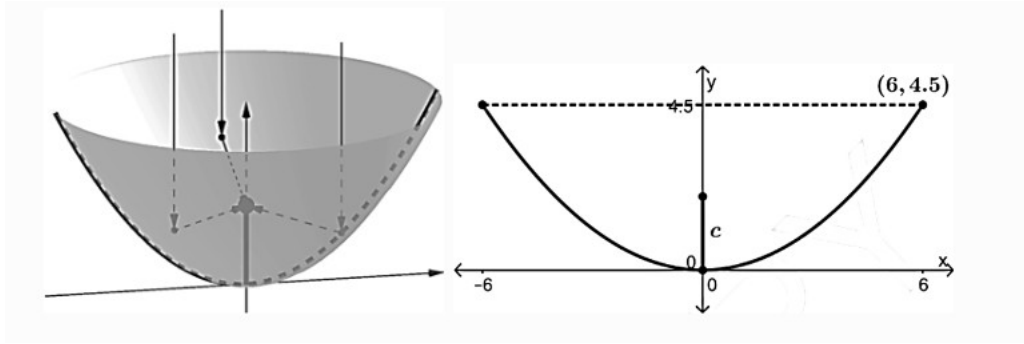
32.	<p>Find the coefficient of a^4 in the product of $(1-2a)^4(2-a)^5$ using binomial theorem.</p> <p>OR</p> <p>Find $(x+1)^6 + (x-1)^6$ hence or otherwise evaluate $(\sqrt{2}+1)^6 + (\sqrt{2}-1)^6$</p>	5																
33.	<p>Find the domain and Range of $f(x) = \frac{x^2}{1+x^2}$ and $g(x) = \frac{4-x}{x-4}$</p>	5																
34.	<p>(a) Find the sum of n terms of the following series $7+77+777+\dots$.</p> <p>(b) Find the value of $\left(6^1 \cdot 6^{\frac{1}{2}} \cdot 6^{\frac{1}{4}} \dots \dots \dots \infty\right)$</p> <p>OR</p> <p>If a and b are roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$ where a, b, c, d form a GP</p> <p>Prove that $\frac{q+p}{q-p} = \frac{17}{15}$</p>	5																
35.	<p>Find the mean, variance and standard deviation for the following distribution :</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">Class</td> <td style="width: 10%;">30-40</td> <td style="width: 10%;">40-50</td> <td style="width: 10%;">50-60</td> <td style="width: 10%;">60-70</td> <td style="width: 10%;">70-80</td> <td style="width: 10%;">80-90</td> <td style="width: 10%;">90-100</td> </tr> <tr> <td>Frequency</td> <td>3</td> <td>7</td> <td>12</td> <td>15</td> <td>8</td> <td>3</td> <td>2</td> </tr> </table>	Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Frequency	3	7	12	15	8	3	2	5
Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100											
Frequency	3	7	12	15	8	3	2											

Section E

Source based/Case based/passage based/integrated units of assessment Questions

36.	<p>Geometrical mathematics has helped in art integration in the formation of designs of different patterns. Let us consider a square pattern. The mid points of whose sides are again joined to form another square, the mid points of whose sides are again joined to form another square and the process continues infinity. The pattern looks like.</p> <div style="text-align: center;">  </div> <p>If side of original square is 100 cm.</p> <p>Answer the following:</p> <p>(i) What is the side of square A'B'C'D'?</p> <p>ii) Find the area of square A''B''C''D''.</p> <p>(iii) Find the Perimeter of square A'B'C'D'</p> <p style="text-align: center;">OR</p> <p>(iii) Find the Sum of areas of squares if process continuous infinity</p>	1 1 2
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37. 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.



i. (i)
Na

me the type of curve given in the above paragraph and find the equation of curve?

- ii. Find the equation of parabola whose vertex is (3, 4) and focus is (5, 4).
- iii. Find the equation of parabola Vertex (0, 0) passing through (2, 3) and axis is along x-axis. and also find the length of latus rectum.

OR

Find focus, length of latus rectum and equation of directrix of the parabola $x^2 = 8y$.

1
1
2

38. Khushali is writing examination. She is reading question paper during reading time. She reads instructions carefully. While reading instructions, she observed that the question paper consists of 15 questions divided in to two parts – part I containing 8 questions and part II containing 7 questions.



- (i) If Khushali is required to attempt 8 questions in all selecting at least 3 from each part, then in how many ways can she select these questions?
- (ii) If Khushali is required to attempt 8 questions in all selecting 3 from I part, then in how many ways can she select these questions?

2+2