

**KOTHARI INTERNATIONAL SCHOOL, NOIDA**  
**ANNUAL EXAMINATION, SESSION: 2025-26**  
**GRADE: 11 SUBJECT: MATHEMATICS (041)**  
**SET B**

**DAY & DATE: MONDAY- FEBRUARY 09, 2026**

**MAXIMUM MARKS: 80**

**NAME: \_\_\_\_\_**

**TIME ALLOTTED: 3 HOURS**

**ROLL NO: \_\_\_\_\_**

**GENERAL INSTRUCTIONS:**

- i). This is objective & Subjective Question Paper containing 38 questions.
- ii). This paper contains 20 questions of 1 marks each, 5 questions of 2 marks each and 6 questions of 3 marks each 4 questions of 5 marks each and 3 case based question of 4 marks
- iii). 1 marks questions are MCQs.
- iv). 2 marks questions are Short Answer Type Questions and are to be answered in 50-80 words.
- v). 5 marks questions are Long Answer Type Questions and are to be answered in 80-120 words.
- vi). This question paper contains Case/Source Based Questions.

**SECTION – A**

- Q1.** Three coins are tossed once, then probability of getting at least two heads is given by (1)
- (a)  $\frac{2}{3}$  (b)  $\frac{1}{2}$  (c)  $\frac{3}{8}$  (d)  $\frac{1}{3}$
- Q2.** The number of tangents that can be drawn from (1,2) to  $x^2 + y^2 = 5$  is (1)
- a) 0 b) 1 c) 2 d) more than 2
- Q3.**  $1 + \cos 2x + \cos 4x + \cos 6x =$  (1)
- (a)  $2 \cos x \cos 2x \cos 3x$  (b)  $4 \sin x \cos 2x \cos 3x$
- (c)  $4 \cos x \cos 2x \cos 3x$  (d) None of these
- Q4.** Which relation is not a function? (1)
- (A)  $f(x) = \sqrt{x}$  (B)  $f(x) = -\sqrt{x}$  (C)  $f(x) = \pm\sqrt{x}$  (D)  $f(x) = \sqrt{x} - 1$
- Q5.** The set builder notation of set  $S = \{\dots, -2, -1, 0, 1, 2, 3, 4, 5\}$  is (1)
- (A)  $S = \{x \in \mathbf{Z} : -5 \leq x \leq 5\}$  (B)  $S = \{x \in \mathbf{Z} : x \leq 5\}$
- (C)  $S = \{x \in \mathbf{Z} : x < 5\}$  (D)  $S = \{x \in \mathbf{R} : x \leq 5\}$
- Q6.** Let R be a relation in N defined by  $R = \{(x, y) : x + 2y = 8\}$ . The range of R is (1)
- (a)  $\{2, 4, 6\}$  (b)  $\{1, 2, 3\}$  (c)  $\{1, 2, 3, 4, 6\}$  (d) None of these
- Q7.** If  $A = \{3, \{4, 5\}, 6\}$ , then which of the following statements is true? (1)
- (a)  $\{4, 5\} \subseteq A$  (b)  $\{4, 5\} \in A$  (c)  $4 \in A$  (d)  $\{3, 4, 5\} \subseteq A$
- Q8.** If  ${}^{n+1}C_3 = 2 \cdot {}^nC_2$  then  $n = ?$  (1)
- (a) 3 (b) 4 (c) 5 (d) 6
- Q9.** The number of non-empty subsets of a set, containing n elements, is (1)
- (a) n (b)  $n^2$  (c)  $2^n$  (d)  $2^n - 1$

- Q10. If in two circles, arcs of the same length subtend angles  $45^\circ$  and  $60^\circ$  at Centre, then the ratio of their radii is (1)  
 (a) 2:3 (b) 2:5 (c) 3:4 (d) 4:3
- Q11. The value of  $\sin(\pi - \theta) \sin(\pi + \theta) \operatorname{cosec}^2 \theta =$  (1)  
 (a) 0 (b) 1 (c) -1 (d)  $\frac{1}{2}$
- Q12. If arithmetic means between a and b, p and q are equal then (1)  
 (a)  $ab = pq$  (b)  $aq = bp$  (c)  $a+p = b+q$  (d)  $a-q = p-b$
- Q13. Evaluate:  $\lim_{x \rightarrow 0} \frac{(1+x)^n - 1}{x}$  (1)  
 (a) 1 (b) n (c) -n (d) 0
- Q14. If  $\sin x = \frac{-1}{2}$  and x lies in fourth quadrant then value of  $\cos 2x$  is (1)  
 (a) -2 (b)  $\frac{-1}{2}$  (c) 2 (d)  $\frac{1}{2}$
- Q15. If  $f(x) = x^3 - \frac{1}{x^3}$ , then  $f(x) + f\left(\frac{1}{x}\right)$  is equal to (1)  
 (a)  $2x^3$  (b)  $\frac{2}{x^3}$  (c) 0 (d) 1
- Q16. Sunita went to market with her friend Divya, on walking in the market Sunita see the Banner where it is written as 'LOGARITHMS'. Divya asked Sunita can you guess how many words with or without meaning can be formed out of the letters of the word 'LOGARITHMS'. If each letter is used once? (1)  
 (a) 10! (b)  $10!/2$  (c) 9! (d)  $9!/2$
- Q17. The equation of a line passing through (1,2) and perpendicular to the line  $x+y+1=0$  is (1)  
 (a)  $y-x+1=0$  (b)  $y-x-1=0$  (c)  $y-x+2=0$  (d)  $x+y=3$
- Q18. Find the derivative of  $(\sin x \cdot \cos x)$  with respect to x. (1)  
 (a)  $\cos 2x$  (b)  $\cos x$  (c)  $\sin 2x$  (d)  $\sin x$

#### Assertion – Reason based questions

In questions 8 and 9, a statement of assertion (A) is followed by a statement of Reason (R) is given. 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 and R is not the correct explanation of A.  
 (c) A is true but R is false.  
 (d) A is false but R is true.
- Q19. Assertion (A): The simplest form of  $i^{-2023}$  is  $i$ . (1)  
 Reason (R):  $i^4 = 1$ .
- Q20. Assertion (A): If  $A = \{1, 2, 3\}$ ,  $B = \{2, 4\}$ , then the number of relation from A to B is equal to 32. (1)  
 Reason (R): The total number of relation from set A to set B is equal to  $\{2^{n(A) \cdot n(B)}\}$ .

### SECTION B

Q21. Evaluate :  $\lim_{x \rightarrow \pi/2} \frac{1 - \sin x}{(\frac{\pi}{2} - x) \cos x}$  (2)

OR

Evaluate:  $\lim_{x \rightarrow 0} \left( \frac{\sin ax + bx}{ax + \sin bx} \right)$

Q22. Draw appropriate Venn diagrams for each of the following: (2)

(i)  $(A \cup B)'$

(ii)  $A' \cap B'$

Q23. Find the third vertex of the triangle whose centroid is at origin and two vertices are (2, 4, 6) and (0, -2, -5). (2)

Q24. Find an approximation of  $(0.99)^5$  using the first three terms of its expansion (2)

Q25. If  $\tan(A + B) = p$  and  $\tan(A - B) = q$ , then prove that  $\tan 2A = \frac{p+q}{1-pq}$  (2)

### SECTION C

Q26. Find  $k$  so that for the function  $f$  defined by  $f(x) = \begin{cases} \frac{1 - \cos 4x}{8x^2}, & x \leq 0 \\ k, & x > 0 \end{cases}$ ,  $\lim_{x \rightarrow 0} f(x)$  exists. (3)

Q27. Find the mean deviation about mean. (3)

Heights ( in cm)	95-105	105-115	115-125	125-135	135-145	145-155
Number of boys	9	13	26	30	12	10

Q28. Find domain and range of following real function  $f(x) = \frac{1}{\sqrt{x^2 - 1}}$  (3)

OR

Find the Domain of  $F(x) = \frac{1}{\sqrt{x + |x|}}$

Q29. Solve the system of inequalities: (3)

$$5(2x - 7) - 3(2x + 3) \leq 0, 2x + 19 \leq 6x + 47$$

Q30. If the conjugate of  $\frac{x+iy}{1-2i}$  is  $1+i$ , then find the value of  $x + y$  (3)

Q31. Find the equation of the ellipse whose centre is at the origin, length of major axis is  $9/2$  and  $e = \frac{1}{\sqrt{3}}$ , where the major axis is the horizontal axis. (3)

OR

Find the equation of hyperbola having the foci  $(0, \pm\sqrt{10})$  and passing through the point (2,3).

**SECTION D**

- Q32.** 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 G.P. Prove that  $(q + p) : (q - p) = 17 : 15$  (5)

**OR**

The ratio of A.M. and G.M. of two positive numbers a and b is m:n. show that

$$a : b = \left( m + \sqrt{m^2 - n^2} \right) : \left( m - \sqrt{m^2 - n^2} \right)$$

- Q33.** For the function f, given by  $f(x) = \sin x$ , complete the following table: (5)

x	$-2\pi$	$-\frac{3\pi}{2}$	$-\pi$	$-\frac{\pi}{2}$	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
f(x)			0		0	1			

Hence, draw the graph using appropriate scale. Also find the maximum and minimum value of f(x).

- Q34.** Find the derivative of  $\sqrt{\sin x}$  using first principle. (5)

**OR**

Find the derivative of following functions with respect to x:

i).  $f(x) = \cos(\tan \sqrt{x+1})$

ii) If  $y = \log(x + \sqrt{x^2 + a})$ , prove that  $\frac{dy}{dx} = \frac{1}{\sqrt{x^2 + a}}$

- Q35.** Find the equation of one of the sides of an isosceles right angled triangle whose hypotenuse is given by  $3x + 4y + 4 = 0$  and the opposite vertex of the hypotenuse is (2, 2). (5)

**SECTION E**

- Q36.** On her winter vacations, Ayesha visits four cities (Delhi, Mumbai, Goa and Bangalore ) in random order.



2

2

On the basis of the information given above answer the following

2

(a) What is the probability that she visits Delhi before Goa and Goa before Mumbai?

(b)(i) What is the probability that she visits Delhi First and Mumbai last?

**OR**

(b)(ii) What is the probability that she visits Delhi just before Mumbai?

- Q37.** A student has 4 library tickets and, in the library, there are 2 language books, 4 subject specific books and 3 fictional books of his interest. Of these 9 books, he chooses exactly 2 subject specific books and 2 other books.



Based on the above information, answer the following questions:

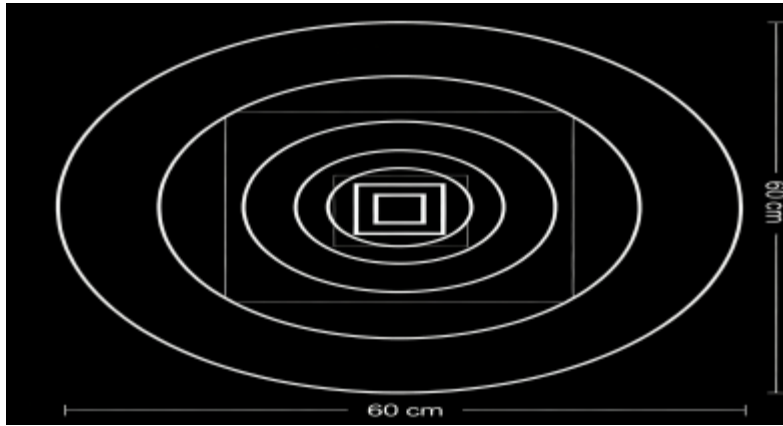
**i).** In how many ways can he borrow the four books?

2

**ii).** Once selected, in how many ways, can he now arrange the borrowed books in his bookshelf so that the subject specific books are always kept together?

2

- Q38.** 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.



1  
1  
2

Answer the following:

- i). What is the radius of the third circle?
- ii). Find the area of the second inner circle.
- iii). (a) What is the perimeter of the tenth circle?

**OR**

- iii). (b) Find the total sum of areas of all circles if the process continues infinitely.