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

DAY & DATE: MONDAY- FEBRUARY 09, 2026
MAXIMUM MARKS: 80 **TIME ALLOTTED: 3 HOURS**
NAME: _____ **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. If $P(A) = 0.2$, $P(B) = 0.3$ and $P(A \cap B) = 0.1$, then $P(A \cup B)$ is equal to **(1)**

(a) $\frac{1}{10}$ (b) $\frac{2}{10}$ (c) $\frac{5}{10}$ (d) $\frac{4}{10}$

Q2. Find the derivative of (sin x. cos x) with respect to x. **(1)**

a) cos 2x (b) cos x (c) sin 2x (d) sin x

Q3. If the parabola $y^2 = 4ax$ passes through the point (3, 2), then the length of its latus rectum is **(1)**

a) 4 b) $\frac{2}{3}$ c) $\frac{4}{3}$ d) $\frac{1}{3}$

Q4. 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

Q5. If $\sin x + \cos x = \frac{1}{5}$ then tan 2x is **(1)**

(a) $\frac{25}{17}$ (b) $\frac{7}{25}$ (c) $\frac{25}{7}$ (d) $\frac{24}{7}$

Q6. Which relation is not a function? **(1)**

(A) $\mathbf{f(x) = \sqrt{x}}$ **(B)** $\mathbf{f(x) = -\sqrt{x}}$ **(C)** $\mathbf{f(x) = \pm\sqrt{x}}$ **(D)** $\mathbf{f(x) = \sqrt{x} - 1}$

Q7. Let A={x: x∈R, x>4} and B={x: x∈R, x<5}.Then $A \cap B$ = **(1)**

(a) (4,5] (b) (4,5) (c) [4,5) (d) [4,5]

Q8. 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

Q9. 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

Q10. The number of proper subsets of the set {a, {1,2},c} are **(1)**

(a) 7 (b) 15 (c) 8 (d) 16

Q11. If ${}^{n+1}C_3 = 2.{}^{n}C_2$ then n = ? **(1)**

(a) 3 (b) 4 (c) 5 (d) 6

Q12. 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

Q13. The number of non-empty subsets of a set, containing n elements, is **(1)**

(a) n (b) n^2 (c) 2^n (d) $2^n - 1$

Q14. The value of tan 1°.tan 2°.tan 3°…tan 89° is **(1)**

(a) 0 (b) 1 (c) ½ (d) not defined

Q15. The value of $\sin(\pi - \theta)\sin(\pi + \theta)\ cosec^2\theta =$ **(1)**

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

Q16. The large hand of a clock is 42 cm long. How much distance does its extremity move in 20 minutes? **(1)**

(a) 88 cm (b) 80 cm (c) 75 cm (d) 77 cm

Q17. 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

Q18. Evaluate: $\lim_{x\to 0} \frac{(1+x)^n - 1}{x}$ **(1)**

(a) 1 (b) n (c) – n (d) 0

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): 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 $\{2^{n(A).n(B)}\}$.

Q20. Assertion (A): The simplest form of i^{-2023} is i. **(1)**

Reason (R): $i^4 = 1$.

SECTION B

Q21. Draw appropriate Venn diagrams for each of the following: **(2)**

(i) A′UB′

(ii) $A' \cap B'$

Q22. Evaluate: $\lim_{x \to \frac{\pi}{2}} \left(\frac{\tan 2x}{x - \frac{\pi}{2}} \right)$ **(2)**

OR

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

Q23. If $\tan(A + B) = p$ and $\tan(A - B) = q$, then prove that $\tan 2A = \frac{p+q}{1-pq}$ **(2)**

Q24. Evaluate: $\left(\sqrt{2} + 1\right)^5 + \left(\sqrt{2} - 1\right)^5$ **(2)**

Q25. Find the third vertex of the triangle whose centroid is at origin and two vertices are $(2, 4, 6)$ and $(0, -2, -5)$. **(2)**

SECTION C

Q26. Find the Mean deviation about the median for the following data : **(3)**

x_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

Q27. 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 $\left(0, \pm\sqrt{10}\right)$ and passing through the point (2,3).

Q28. Find k so that for the function f defined by $f(x) = \begin{cases} \frac{1-cos4x}{8x^2}, & x \leq 0 \\ k, & x > 0 \end{cases}$, $\lim_{x \to 0} f(x)$ exists. **(3)**

Q29. If the conjugate of $\frac{x+iy}{1-2i}$ is 1+i, then find the value of x + y **(3)**

Q30. Solve the system of inequalities in R **(3)**

$\frac{7x-1}{2} < -3, \quad \frac{3x+8}{5} + 11 < 0$

and hence, represent its solution on the real number line.

Q31. Find domain and range of following real function $f(x) = \frac{1}{\sqrt{x^2-1}}$ **(3)**

OR

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

SECTION D

Q32. For the function f, given by f (x) =sin x, complete the following table: **(5)**

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

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

Q33. Find the derivative of $\sqrt{\sin x}$ using first principle. **(5)**

OR

Find the derivative of following functions with respect to x:

i). $f(x) = cos(\tan\sqrt{x+1})$ **(2)**

ii). If $y = log(x + \sqrt{x^2 + a})$, prove that $\frac{dy}{dx} = \frac{1}{\sqrt{x^2+a}}$ **(3)**

Q34. 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)**

Q35. 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

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

SECTION E

Q36. 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.

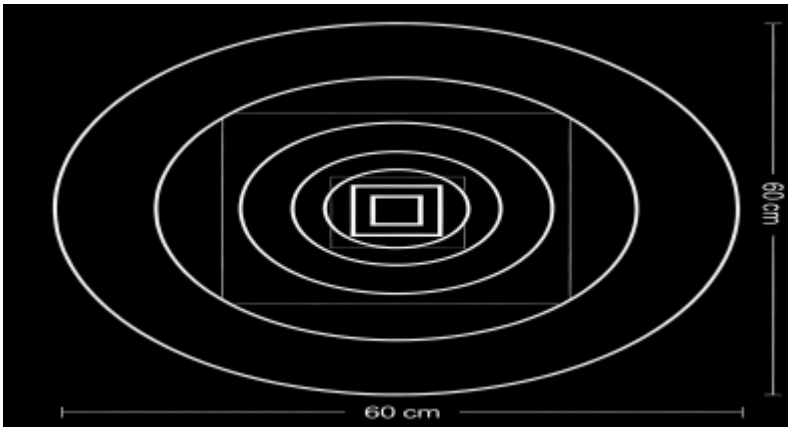
Based on the above information, answer the following questions:

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**

Q37. 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? **1**

ii). Find the area of the second inner circle. **1**

iii). (a) What is the perimeter of the tenth circle? **2**

OR

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

Q38. On her winter vacations, Ayesha visits four cities (Delhi, Mumbai, Goa and Bangalore) in random order.

On the basis of the information given above answer the following

(a)What is the probability that she visits Delhi before Goa and Goa before Mumbai? **2**

(b)(i) What is the probability that she visits Delhi First and Mumbai last?\ **2**

OR

(b)(ii)What is the probability that she visits Delhi just before Mumbai? **2**