Kalyani Kapoor
11C 12

CARMEL CONVENT SCHOOL, CHANDIGARH

TERM 1, 2024

MATHS

CLASS: 11

TOTAL MARKS: 80

DATE: 21.09.24

TIME: 3 HOURS

General Instructions:

(i) All questions are compulsory.
(ii) There are 38 questions in the paper.
(iii) The question paper has five sections: A, B, C, D and E.
Section–A has 20 questions (Q1 to 20) of 1 mark each.
Section–B has 5 questions (Q21 to 25) of 2 marks each.
Section–C has 6 questions (Q26 to 31) of 3 marks each.
Section D has 4 questions (Q32 and 35) of 5 marks each.
Section–E has 3 Case Study questions (Q36 to 38) of 4 marks each.
(iv) All questions are compulsory.
(v) Draw neat figures wherever required.

SECTION A

Q. No.	Question	Marks
1	What is the range of signum function? a) R b) Z c) { -1, 0, 1} d) Q	1
2	If $A \subseteq B$ then a) $n(A) > n(B)$ b) $n(A) \geq n(B)$ c) $n(A) < n(B)$ d) $n(A) \leq n(B)$	1
3	If ACB then a) $a \in A \Rightarrow a \in B$ b) $a \in A \Rightarrow a \notin B$ c) $a \in B \Rightarrow a \notin A$ d) $a \in B \Rightarrow a \in A$	1
4	If $z_1 = 2+3i$ and $z_2 = -5i +9$, find Re $(z_1 + z_2)$ a) 11 + 2i b) 19 c) 11 - 2i d) 11	1

5	Domain of $\sqrt{9-x^2}$ a) (-3, 3) b) [- 3, 3] c) [0, 3] d) (-3, 0]	1
6	If z = 2 + $\sqrt{3}i$, find the value of $z\bar{z}$. a) 11 b) 10 c) 12 d) 7.	1
7	Which term of the G.P 2,8,32..... is 131072? a) 9th b) 3rd c) 6th d) 5th	1
8	Find the value of k for which $\frac{-2}{7}, k, \frac{-7}{2}$ are in G P. a) ± 1 b) ± 3 c) ± 4 d) ± 2	1
9	The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ a) $2\cos\theta$ b) $2\sin\theta$ c) 1 d) 0	1
10	Value of $\tan\frac{\pi}{12}$ a) $2 - \sqrt{3}$ b) $2 + \sqrt{3}$ c) 1 d) -1	1
11	The value of $\cos\frac{19\pi}{3}$ a) $\frac{1}{2}$ b) $-\frac{1}{2}$ c) 1 d) -1	1
12	Find the number of terms of the sequence 5/2, 5, 10, ..., 640 a) 13 b) 10 c) 9 d) 14	1
13	Find n, if C (25, n+5) = C (25,2n-1)	1

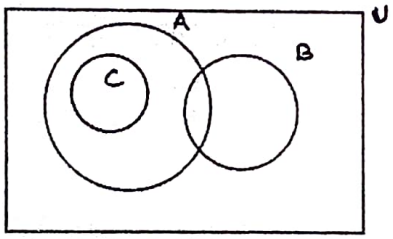
	a) 7 b) 14 c) 25 d) 1	
14	Binomial coefficient of 7^{th} term in the expansion of $(x+y)^7$ is a) C (7,7) b) C (7,6) c) C (7,1) d) C (7,5)	1
15 .	If P (15, r) =2730 then find P (5, r) a) 720 b) 60 c) 30 d) 120	1
16	Find the value of x; $-15 < \frac{3(x-2)}{5} < 0$ a) x ∈ (-23,2) b) x = -23,2 c) x ∈ [-23,2] d) x =-23 and -2	1
17	If $x > y$ *and* $z < 0$ *then* $-xz$ __ $-yz$, fill in the blank with correct option. a) < b) ≤ c) > d) ≥	1
18	Two finite sets have m and n elements. The total number of subsets of the first set is 112 more than the total number of subsets of the second set. The values of m and n are, respectively a) 4, 7 b) 7, 4 c) 4, 4 d) 7,7.	1
19	**Assertion -Reason question** (a) Both assertion and reason are true, and reason is the correct explanation of assertion. (b) Both assertion and reason are true, but reason is not the correct explanation of assertion. (c) Assertion is true, but reason is false. (d) Assertion is false but reason is true. **Assertion(A):** Total number of terms in the expansion of $(x^2+2x+1)^5$ is 11 **Reason(R):** Total number of terms in binomial expansion with exponent n are (n +1).	1

20	**Assertion:** $\tan(3\pi + \theta) = tan\theta$ **Reason(R):** $tan(\pi - \theta) = -tan\theta$	1

SECTION – B

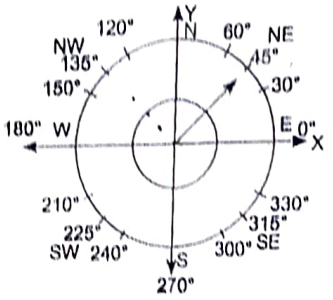
Q. No.	Question	Marks
21	If 4x + i(3x – y) is a conjugate if 3 + 6i for x, y ∈ R, find x and y	2
22	If the 5th term of a G.P is 16 and the 10th term is ½, find the G.P. Also find its 15th term.	2
23	Solve the system and express the solution on the number line $\frac{4x}{3} - \frac{9}{4} < x + \frac{3}{4}, \frac{7x-1}{3} - \frac{7x+2}{6} > x$	2
24	If sinx = $\frac{3}{5}$, cosy= $\frac{-12}{13}$ and x, y both lie in the second quadrant, find the value of tan(x+y)	2
25	If A = {a, b, c}; B = {d}, C = {e}, verify that A X (B U C) = (A X B) U (A X C)	2

SECTION – C

Q. No.	Question	Marks
26	 In the given Venn Diagram if n(U) = 100, n(A) = 60, n(B) = 48, n(A∩B) = 22 and n(A∩C) = 30, find the value of n(A∪B)	3
27	If Z_1 and Z_2 are 1 - i and -2 + 4i find imaginary part of $[\frac{Z_1 Z_2}{\overline{Z_1}}]$	3
28	A milk of 80% concentration is diluted at home by the seller by adding some water to it so that milk concentration is reduced between 65% and 70%. If 640 litres of milk of 80% concentration is available, how much water has been added?	3
29	Find the value of $(\sqrt{2}+1)^5 - (\sqrt{2}-1)^5$	3
30	Prove that $\frac{cos8Acos5A - cos12Acos9A}{sin8Acos5A + cos12Asin9A} = tan4A$	3

31	The AM of two positive numbers a and b (a greater than b) is twice their GM. Prove that $a : b = 2 + \sqrt{3} : 2 - \sqrt{3}$	3

SECTION – D

Q. No.	Question	Marks
32	By using binomial theorem show that $6^n - 5n - 1$ is divisible by 25, $n \in N$.	5
33	 The above figure shows a compass. The East direction is along the positive X-axis and North direction is along the positive Y-axis. Initially the pointer is pointing towards North-East direction. Pointer is deflected in a magnetic field by some angle. On the basis of above information, answer the following (i) If the pointer moves in anticlockwise direction by an angle of 90 degree, then what is the value of sine of the angle made by pointer from East direction? (ii) If the pointer moves an angle of 165 degree from its initial position in anticlockwise direction, then what is the value of cosine of the angle made by the pointer from East direction? (iii) How much angle will the pointer move in anticlockwise direction if tangent of the angle made by the pointer with X-axis is (-1)?	5
34	The product of three terms in a GP is 1000. If 6 and 7 are added to second and third term respectively, the terms form an AP, find the GP.	5
35	How many words can be made by using all letters of the word **MATHEMATICS** in which all vowels are never together?	5

Section E

Question number 36 to 38 are case based questions. Each question has sub parts.

Q. No.	Question	Marks
36	On the first day of the new year i.e 1 January, Ramesh helped 3 persons. When those persons thanked him, he advised them not to thank him but each one of them to help 3 more persons on the second day and instructed them to do the same on the third day. They move the chain similarly. Assuming the chain is not broken, answer the following questions: i) Find the total number of people helped in 5 days. ii) 6561 persons will be helped on which day? iii)To help 9840 persons in total, how many days will it take?	4
37	In a school, in every class a student is given a unique natural number, known as roll number of the student. We can consider the above situation in a relation from "students of a class" to the set of natural numbers. Considering that there are 38 students in a class, answer the following questions i) Is relation from "students of a class" to a set of natural numbers, a function? ii) How many elements are there in range of a relation? iii) For the above relation what is the domain? iv) Is range equal to set of natural numbers?	4
38	A child during free time was reading a novel. During reading she came across the word "DAUGHTER". Suddenly she started thinking of forming different words from the letters of the word "DAUGHTER". The word may or may not have a dictionary meaning. Now answer the following questions i) Find the number of words which can be made starting from the letter D. ii) Find the number of words so that all vowels are never together. iii) Find the number of words so that letters GH are together and in the middle.	4

'The End"'