KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION
CUMULATIVE EXAMINATION
Session-(2023-24)
Class:-XI (MATHS-041) SET-1

Time: 3 hours M. M.: 80

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment of 4 marks each with sub-parts.

SECTION-A

Q. No.	Question	Marks
1	For the set A = {1, 2, {3, 4}, 5}, which of the following statement, is not correct (a)$\phi \subset A$ (b)$3 \in A$ (c)$\{3, 4\} \in A$ (d)$\{1, 2\} \subset A$	1
2	For any two sets A and B, (A-B)∪(B-A) = (a)(A-B)∪A (b)(B-A)∪B (c)(A∪B)∩(A∩B) (d)(A∪B)-(A∩B)	1
3	The range of the Signum Function is (a){-1, 0, 1} (b)(-1, 1) (c)[-1, 1] (d)**R**	1
4	The domain of the real function $f(x) = \frac{1}{\sqrt{x-1}}$ is (a)(1, ∞) (b)**R** (c) **R**-{1} (d)[1, ∞)	1
5	If tan $tan\ x = \frac{5}{12}$, x lies in the third quadrant, then the value of cos $cos\ x$ is (a) – 5/13 (b) 12/13 (c) – 12/13 (d) 5/13	1
6	If in the two circles , arc of the same lengths subtends angles 60^o and 75^o at the centre, the ratio of their radii (a) 5:4 (b) 4:5 (c) 3:2 (d) 2:3	1
7	The value of sin 720^o is (a) 0 (b) 1 (c) -1/2 (d) ½	1
8	The value of $\frac{cos\,cos\ 3x}{2cos\,cos\ 2x-1}$ is equal to (a)tan $tan\ x$ (b) cot $cot\ x$ (c)sin $sin\ x$ (d)cos $cos\ x$	1
9	The value of i^{-999} (a) 1 (b) -1	1

(c) i (d) $-i$

Q. No.	Question	Marks
10	If $z = \frac{1}{(2+3i)^2}$ then |z| =	1
	(a) $\frac{1}{\sqrt{13}}$ (b) 1/13	
	(c) $\sqrt{13}$ (d) 13	
11	The solution of $5 - x \leq 3x + 1$ is	1
	(a) (-∞, 1] (b) (-∞, -1]	
	(c) [1, ∞) (d) [-1, ∞)	
12	Solve 30x < 200 when 'x' is a natural no., then value of x	1
	(a) {0,1,2,3,4,5,6 } (b) {1,2,3,4,5,6 }	
	(c) {0,2,3,4,5,6 } (d) {1,2,3,4,5, }	
13	If |x −1| > 5, then	1
	(a) $x \in (-4, 6)$ (b) $x \in [-4, 6]$	
	(c) $x \in (-\infty, -4)\ U\ (6, \infty)$ (d) none of these	
14	If ${}^nC_{12} = {}^nC_8$, then n is equal to	1
	(a) 20 (b) 12	
	(c) 6 (d) 30	
15	Number of terms in the expansion of $(1 + x^2)^6$	1
	(a) 7 (b) 8	
	(c) 6 (d) 5	
16	Positive value of m, for which the coefficient of x^2 in the expansion of $(1+x)^m$ is 6, is	1
	(a) 10 (b) 8	
	(c) 6 (d) 4	
17	If 6 is the geometric mean of 2 and x the value of x is	1
	(a) 6 (b) 7	
	(c) 18 (d) 12	
18	2, x,1/2 are in GP the value of x is	1
	(a) -1 (b) 1	
	(c) both - 1 & 1 (d) none of these	

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.

Q. No.	Question	Marks
19	Assertion (A): If A = {1, 2, 3}, B = {2, 4}, then the number of relation from A to B is equal to 32. Reason (R): The total number of relation from set A to set B is equal to $\{2^{n(A).n(B)}\}$.	1
20	Assertion (A): The simplest form of i^{-2023} is i. Reason (R): $i^4 = 1$.	1

SECTION-B

Q. No.	Question	Marks
21	If A and B are two sets such that A⊂B, then show that A∩B = A	2
22	Prove that $\sin^2 6x - \sin^2 4x = \sin 2x \cdot \sin 10x$	2
23	If $\cos cos\, x = -\frac{4}{5}$, x lies in second quadrant, find the value of $cos\frac{x}{2}$	2
	OR	
	If sinx + cosx = 1, than find the value of sin2x.	
24	Solve: $\frac{x}{5} < \frac{(3x-2)}{4} - \frac{(5x-3)}{5}$	2
25	Expand $\left(\frac{2}{x} - \frac{x}{2}\right)^4$ by using binomial theorem.	2
	OR	
	Using binomial theorem, evaluate $(101)^4$.	

SECTION-C

Q. No.	Question	Marks
26	Let A, B and C be the sets such that A∪B = A∪C and A∩B = A∩C. Show that B = C.	3
	OR	
	Draw appropriate Venn diagrams for each of the following: (i) A′∪B′ (ii) A′∩B′ (iii) (A – B) ∪ (B – A)	
27	Let A = {1, 2, 3, …, 14}. Define a relation R from A to A by R = {(x, y): 3x – y = 0; where x, y ∈ A}. Write the relation R in roster form. Also write its domain and range.	3
28	Find the value of $\tan tan\, \frac{\pi}{8}$	3
29	If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$	3
30	A solution of 9% acid is to be diluted by adding a 2% acid solution to it. The resulting mixture should be more than 4% and less than 6% of acid. If we have 700 liters of 9% solutions. How much liters of the 2% solution should be used?	3
31	Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.	3
	OR	
	Using binomial theorem, find the value of $\left(a^2 + \sqrt{a^2 - 1}\right)^4 + \left(a^2 - \sqrt{a^2 - 1}\right)^4$	

SECTION-D

Q. No.	Question	Marks
32	Find domain and range of following real function $f(x) = \frac{1}{\sqrt{x^2-1}}$	5
33	Prove that: (i) $\tan tan\, 4x = \frac{4\, tanx\left(1-tan^2 x\right)}{1-6tan^2 x+tan^4 x}$	5

(ii) $cos^2 x + cos^2\left(x + \frac{\pi}{3}\right) + cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

Q. No.	Question	Marks
34	In how many ways can the letters of the word PERMUTATIONS be arranged if the (i) Words start with P and end with S, (ii) Vowels are all together (iii) There are always 4 letters between P and S?	5
	OR	
	What are the number of ways of choosing 4 cards from a pack of 52 playing cards according to following conditions: (i) Four cards one of the same suit (ii) Four cards belong to four different suits (iii) Are face cards. (iv) Two are red cards & two are black cards. (v) Cards are of the same colour?	
35	The ratio of A.M. and G.M. of two positive numbers a and b is m:n. show that $a : b = \left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$	5
	OR	
	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	

SECTION-E

Q. No.	Question	Marks
36	A, B and C are three sets whereas U is the universal set given as follows A={1,3,5,7,9} B={2,4,6,8} and C={2,3,5,7} U={1,2,3, …. ,10} Based on the above information, answer the following questions:	
	(i) represent above sets in the form of a Venn diagram	1
	(ii) find (A∪C) – (A∩C)	1
	(iii) show that (A∪B)′ = (A′∩B′)	2
37	Ravi is playing by making different words, with or without meaning, by arranging the letters of the word INDIA in different orders. Based on the above information, answer the following questions:	
	(i) How many different words will be formed in all?	1
	(ii) In how many words all the vowels will be together?	1
	(iii) If these words are written as in a dictionary, what will be the 13^{th} word?	2
38	Chessboard is the type of game board used for the game of chess, on which the chess pawns and pieces are placed. A chessboard is usually square in shape, with an alternating pattern of squares in two colours, with its side being divided into eight parts, resulting in a total of 64 squares. The inventor of the chess board suggested a reward of one grain of wheat for the first square,2 grains for the second,4 grains for the third and so on doubling the number of grains for subsequent squares .	
	Based on the above information answer the questions given below:	
	(i) How many grains would have to be given to the inventor for 30^{th} square?	2
	(ii) How many grains would have to be given to the inventor in all?	2

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