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

SECTION – A

Q. No.	Answer	Marks
1	(b)3$\in A$	1
2	(d)(A$\cup$B)-(A$\cap$B)	1
3	(a){-1, 0, 1}	1
4	(a)(1, ∞)	1
5	(c) – 12/13	1
6	(a) 5:4	1
7	(a) 0	1
8	(d)$\cos x$	1
9	(c) i	1
10	(b) 1/13	1
11	(c) [1, ∞)	1
12	(b) {1,2,3,4,5,6 }	1
13	(c) $x \in (-\infty, -4)\ U\ (6, \infty)$	1
14	(a) 20	1
15	(a) 7	1
16	(d) 4	1
17	(c) 18	1
18	(c) both - 1 & 1	1
19	(d)(A) is false but(R) is true	1
20	(a) Both (A) and (R) are true and (R) is the correct explanation of (A).	1

SECTION – B

Q. No.	Answer	Marks
21	To write A$\cap$B $\subset$ A To prove A $\subset$ A$\cap$B So A$\cap$B = A	½ 1 ½
22	$\sin^2 6x - \sin^2 4x$ =(sin 6x + sin 4x) (sin 6x - sin 4x) =2 sin 5x. cos x. 2cos 5x. sin x =2 sin x. cos x. 2 sin 5x. cos 5x = sin2 x. sin 10 x	 1 ½ ½
23	$\cos x = 2cos^2\frac{x}{2} - 1$ $cos^2\frac{x}{2} = \frac{1}{10}$ $\cos\frac{x}{2} = \frac{1}{\sqrt{10}}$ ($\frac{x}{2}$ lies in fiest quadrant) **OR**	½ 1 ½

Q. No.	Answer	Marks
	$(\sin x + \cos x)^2 = 1$	½
	$1 + \sin 2x = 1$	1
	$\sin 2x = 0$	½
24	$\frac{x}{5} < \frac{(3x-2)}{4} - \frac{(5x-3)}{5}$	
	$\frac{x}{5} < \frac{2-5x}{20}$	
	$20x < 10 - 25x$	1
	$x < 2/9$	½
	$x \in (-\infty, 2/9)$	½
25	${}^4C_0(2/x)^4 - {}^4C_1(2/x)^3(x/2) + {}^4C_2(2/x)^2(x/2)^2 - {}^4C_3(2/x)(x/2)^3 + {}^4C_4(x/2)^4$	1
	$= 16/x^4 - 16/x^2 + 6 - x^2 + x^4/16$	1
	OR	
	$(101)^4$	
	$= (1 + 100)^4$	½
	$= {}^4C_0 + {}^4C_1(100) + {}^4C_2(100)^2 + {}^4C_3(100)^3 + {}^4C_4(100)^4$	1
	=104060401	½

SECTION – C

Q. No.	Answer	Marks
26	$(A \cup B) \cap B = (A \cup C) \cap B$	
	$B = (A \cap B) \cup (C \cap B)$ ………..(i)	1
	$(A \cup B) \cap C = (A \cup C) \cap C$	
	$(A \cap C) \cup (B \cap C) = C$	
	$(A \cap B) \cup (B \cap C) = C$ ………..(ii)	1½
	By (i) and (ii) $B = C$	½
	OR	
	(i) Correct diagram	1
	(ii) Correct diagram	1
	(iii) Correct diagram	1
27	R = { (1, 3), (2, 6), (3, 9), (4, 12) }	1
	Domain = {1, 2, 3,4}	1
	Range = {3, 6, 9, 12}	1
28	$\tan\frac{\pi}{4} = \frac{2\tan(\frac{\pi}{8})}{1-\tan^2(\frac{\pi}{8})}$	1
	$x^2 + 2x - 1 = 0 \quad (x = \tan \pi/8)$	1
	$x = \tan \pi/8 = \sqrt{2} - 1$	1
29	$x^3 - iy^3 + 3x^2iy - 3xy^2 = u + iv$	1
	$(x^3 - 3xy^2) + i(3x^2y - y^3) = u + iv$	
	$u = x^3 - 3xy^2$, $v = 3x^2y - y^3$	1
	$u/x + v/y = x^2 - 3y^2 + 3x^2 - y^2$	
	$= 4(x^2 - y^2)$	1
30	4% of (700 + x) < 9% of 700 + 2% of x < 6% of (700 + x)	1
	$2800 + 4x < 6300 + 2x < 4200 + 6x$	½
	$x < 1750$, $x > 525$	1
	$525 < x < 1750$	½

Q. No.	Answer	Marks
31	$9^{n+1} - 8n - 9$ $= (1 + 8)^{n+1} - 8n - 9$ $=[\,^{n+1}C_0 + \,^{n+1}C_1.8 + \,^{n+1}C_2.8^2 + \,^{n+1}C_3.8^3 + \dots\dots] - 8n - 9$ $=[1 + 8(n+1) + \,^{n+1}C_2.8^2 + \,^{n+1}C_3.8^3 + \dots\dots] - 8n - 9$ $= \,^{n+1}C_2.8^2 + \,^{n+1}C_3.8^3 + \dots\dots$ $=64\,[\,^{n+1}C_2 + \,^{n+1}C_3.8 + \dots\dots]$ So divisible by 64 **OR** $\left(a^2 + \sqrt{a^2-1}\right)^4 + \left(a^2 - \sqrt{a^2-1}\right)^4$ $= [\,^4C_0(a^2)^4 + \,^4C_1\,(a^2)^3(\sqrt{a^2-1}) + \,^4C_2(a^2)^2\,(\sqrt{a^2-1})^2 + \,^4C_3(a^2)\,(\sqrt{a^2-1})^3 + \,^4C_4$ $(\sqrt{a^2-1})^4\,] + [\,^4C_0(a^2)^4 - \,^4C_1\,(a^2)^3(\sqrt{a^2-1}) + \,^4C_2(a^2)^2\,(\sqrt{a^2-1})^2 - \,^4C_3(a^2)$ $(\sqrt{a^2-1})^3 + \,^4C_4\,(\sqrt{a^2-1})^4\,]$ $= 2\,[\,^4C_0(a^2)^4 + \,^4C_2(a^2)^2\,(\sqrt{a^2-1})^2 + \,^4C_4\,(\sqrt{a^2-1})^4]$ $=2\,[a^8 + 6\,a^6 - 5\,a^4 - 2\,a^2 + 1]$	 1 1 1 1½ ½ 1

SECTION – D

Q. No.	Answer	Marks
32	$x^2 - 1 > 0$ $x^2 > 1$ $x < -1$ or $x > 1$ Domain = $(-\infty, -1) \cup (1, \infty)$ $y = \frac{1}{\sqrt{x^2-1}}$, (y>0) $x = \pm\frac{\sqrt{y^2+1}}{y}$ $y \neq 0$ Range = $(0, \infty)$	½ 1 ½ 1 1 ½ ½
33	(i) $\tan 4x = \frac{2\tan 2x}{1-tan^2 2x}$ $= \frac{2\left(\frac{2\tan x}{1-tan^2 x}\right)}{1-\left(\frac{2\tan}{1-tan^2 x}\right)^2}$ $= \frac{4\,tanx\,(1-tan^2x)}{(1-tan^2x)^2-(2\tan x)^2}$ $= \frac{4\,tanx\,(1-tan^2x)}{1-6tan^2x+tan^4x}$	 1½ 1

Q. No.	Answer	Marks
	(ii) L.H.S. $= \frac{1+\cos 2x}{2} + \frac{1+\cos\left(2x+\frac{2\pi}{3}\right)}{2} + \frac{1+\cos\left(2x-\frac{2\pi}{3}\right)}{2}$. $= \frac{1}{2}\left[3+\cos 2x+\cos\left(2x+\frac{2\pi}{3}\right)+\cos\left(2x-\frac{2\pi}{3}\right)\right]$ $= \frac{1}{2}\left[3+\cos 2x+2\cos 2x\cos\frac{2\pi}{3}\right]$ $= \frac{1}{2}\left[3+\cos 2x+2\cos 2x\cos\left(\pi-\frac{\pi}{3}\right)\right]$ $= \frac{1}{2}\left[3+\cos 2x-2\cos 2x\cos\frac{\pi}{3}\right]$ $= \frac{1}{2}\left[3+\cos 2x-\cos 2x\right] = \frac{3}{2}$ = R.H.S.	1 ½ ½ ½
34	(i) $\frac{10!}{2!} = 1814400$ (ii) $\frac{8!}{2!} \times 5! = 2419200$ (iii) $\frac{10!}{2!} \times 7 \times 2 = 25401600$ **OR** (i) The required number of ways $= {}^{13}C_4 + {}^{13}C_4 + {}^{13}C_4 + {}^{13}C_4$. $= 4 \times \frac{13!}{4!\ 9!} = 2860$ (ii) ${}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1 = 13^4$ (iii) the required number of ways $= \frac{12!}{4!\ 8!} = 495$. (iv) ${}^{26}C_2 \times {}^{26}C_2$ $= \left(\frac{26!}{2!\ 24!}\right)^2 = (325)^2 = 105625$ (v) the required number of ways $= {}^{26}C_4 + {}^{26}C_4$ $= 2 \times \frac{26!}{4!\ 22!} = 29900$.	1 2 2 1 1 1 1 1

Q. No.	Answer	Marks
35	$\frac{a+b}{2\sqrt{ab}} = \frac{m}{n}$	1
	$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}} = \frac{m+n}{m-n}$	1
	$\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}} = \frac{\sqrt{m+n}}{\sqrt{m-n}}$	1
	$\frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{m+n}+\sqrt{m-n}}{\sqrt{m+n}-\sqrt{m-n}}$	1
	$\frac{a}{b} = \frac{m+\sqrt{m^2-n^2}}{m-\sqrt{m^2-n^2}}$	1
	OR	
	a + b = 3, ab = p	
	c + d = 12, cd = q	1
	a, b = ar, c = ar^2, d = ar^3	1
	a + b = 3 => a + ar = 3 , c + d = 12 => $ar^2 + ar^3 = 12$	
	so $r^2 = 4$	1
	p = ab = a^2r, q = cd = a^2r^5	1
	$\frac{q+p}{q-p} = \frac{r^4+1}{r^4-1} = \frac{17}{15}$	1

SECTION – E

Q. No.	Answer	Marks
36	(i) Correct Diagram	1
	(ii) (A∪C) – (A∩C)	
	= {1, 2, 3, 5, 7, 9} – {3, 5, 7}	½
	= {1, 2, 9}	½
	(iii) A∪B = {1, 2, 3, … …,9}	
	(A∪B)’ = {10} ………………..(i)	1
	A’ = {2, 4, 6, 8, 10}	
	B’ = {1, 3, 5, 7, 9, 10}	
	A’∩B’ = {10} ………………….(ii)	
	by (i) and (ii) (A∪B)’ = (A’ ∩B’)	1
37	(i) $\frac{5!}{2!} = 60$	1
	(ii) $3! \times \frac{3!}{2!} = 18$	1
	(iii) Number of words starting with ‘A’ = $\frac{4!}{2!}$ = 12	1
	13^{th} word = DAIIN	1
38	(i)1, 2, 4, 8, 16, …… a=1, r=2	1
	$a_{30} = a.r^{29} = 2^{29}$	1
	(ii) $S_n = \frac{a(r^n-1)}{r-1}$, n=64	1
	$S_{64} = \frac{1(2^{64}-1)}{2-1} = 2^{64} - 1$	1

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