ANNEXURE –C

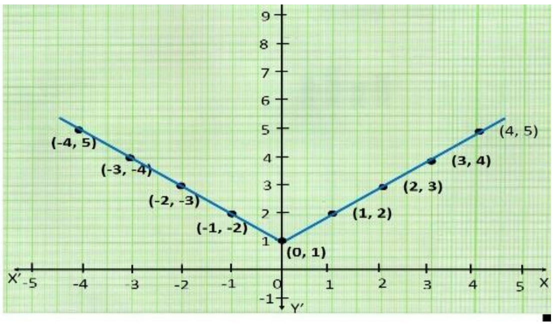
DAV PUBLIC SCHOOLS, ODISHA

Half-Yearly Exam., SUBJECT: MATHEMATICS, CLASS :XI(2023-24)

MARKING SCHEME

QSTN NO	Value Points	Marks Allotted	PAGE NO. OF NCERT /TEXT BOOK
1	b	1	NCERT(concept)
2	d	1	NCERT(concept)
3	d	1	NCERT(concept)
4	c	1	Exemplar,Page-11,example-15
5	d	1	NCERT, page-38 Q.no-2(ii)concept
6	c	1	Exemplar, Page-56, Q.no-35 concept
7	d	1	Exemplar, Page-55, Q.no-32
8	b	1	NCERT,page-47, Example-1
9	a	1	NCERT(concept)
10	c	1	NCERT, Page -86,Example-12
11	d	1	NCERT(concept)
12	a	1	NCERT(concept)
13	b	1	Exemplar, Page-109, Q.no-25
14	b	1	Exemplar, Page-105, Example-11
15	d	1	Exemplar, Page-123, Q.no-20
16	a	1	NCERT(concept)
17	c	1	Exemplar, Page -132, Example-3
18	c	1	NCERT (concept)
19	a	1	Exemplar, Page -28, Q.no-6(concept)

20	c	1	NCERT(concept)
21	Let $x \epsilon \mathrm{A}$ $\Rightarrow x\epsilon(A \cup \mathrm{B}) \Rightarrow x\epsilon\ (\mathrm{A} \cap \mathrm{B}) \Rightarrow\ x\epsilon \mathrm{B}$ $\mathrm{A} \subset \mathrm{B}$ Similarly we can show $\mathrm{B} \subset \mathrm{A}$ $\therefore \mathrm{A} = \mathrm{B}$ OR $\mathrm{R.H.S} = (\mathrm{A} \cap \mathrm{B}) \cup (\mathrm{A} - \mathrm{B}) = (\mathrm{A} \cap \mathrm{B}) \cup (\mathrm{A} \cap \mathrm{B}')$ $= \mathrm{A} \cap (\mathrm{B} \cup \mathrm{B}') = \mathrm{A} \cap \mathrm{U} = \mathrm{A} = \mathrm{L.H.S}$	1 1 1 1	NCERT, Page - 21, example -25 OR NCERT, Page - 21, Q. no-6(i)
22	$\mathrm{L.H.S} = A - (B \cup \mathrm{C})$ $= \{5,6,7,8,9\}$ $- [\{2,4,6,8,10,12\} \cup \{3,6,9.12\}]$ $= \{5,6,7,8,9\} - \{2,3,4,6,8,9,10,12\} = \{5,7\}$ $\mathrm{R.H.S} = (\mathrm{A} - \mathrm{B}) \cap (\mathrm{A} - \mathrm{C}) = [\{5,6,7,8,9\} - \{2,4,6,8,10,12\}] \cap$ $[\{5,6,7,8,9\} - \{3,6,9,12\}]$ $= \{5,7,9\} \cap \{5,7,8\} = \{5,7\}$ L.H.S=R.H.S	½ ½ ½ ½	Exemplar,page-13,Q no.-5
23	$\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$ Or, $\frac{3x-4}{2} \geq \frac{x-3}{4}$ Or, $2(3x-4) \geq (x-3)$ Or, $6x - 8 \geq x - 3$ Or, $5x \geq 5$ Or, $x \geq 1$  OR Let x be the smaller of the two consecutive even positive integers, so that the other one is $x+2$ Then we have $x > 5 \ldots\ldots\ldots\ldots\ldots\ldots (1)$ $x + (x+2) < 23 \ldots\ldots\ldots\ldots\ldots\ldots (2)$ Solving (1) and (2) we get $5 < x < 10.5$ Since x is the even positive integer, x can take the values 6, 8, 10. So , the required possible pairs will be $(6,8), (8,10), (10,12)$	½ ½ ½ ½ ½ ½ ½ ½	NCERT, Page-93, Example – 6 OR NCERT, Page-95, Q.no-24
24	$\sin 10^\circ . \sin 50^\circ . \sin 70^\circ = \frac{1}{4}\sin(3 \times 10^\circ) = \frac{1}{4}\sin 30^\circ$ $= \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ $[\sin A^\circ . \sin(60 - A)^\circ . \sin(60 + A)^\circ = \frac{1}{4}\sin 3A]$	1 1	NCERT(concept)

25	No of words$=5_{c_3}\times 4_{c_2}\times 5!$ $=10\times 6\times 120=7200$	1½ ½	NCERT, Page - 122,Q. no-1
26	$C = C\cup \phi = C\cup (D\cap X)$ $= (C\cup D)\cap (C\cup X)$ $= (C\cup D)\cap (D\cup X)$ $= (C\cup D)\cap (X\cup D)$ $= (C\cap X)\cup D$ $= \phi \cup D = D$	½ ½ ½ ½ ½ ½	NCERT, Page - 22,Q.no-9
27	L.H.S$=(A\cup B\cup C)\cap (A\cap B'\cap C')'\cap C'$ $= (A\cup B\cup C)\cap (A'\cup B\cup C)\cap C'$(Demorgan's law) $= [(A\cap A')\cup (B\cup C)]\cap C'$ $= [\phi\cup (B\cup C)]\cap C'$ $= (B\cup C)\cap C'$ $= (B\cap C')\cup (C\cap C')= (B\cap C')\cup \phi$ $= (B\cap C') =$ RHS	½ ½ ½ ½ ½ ½	Exemplar Pg-11 Example-14
28	In set builder form (i)$R = \{(x,y): x$ is the square of $y, x\in P, y\in Q\}$ In roster form (ii)$R = \{(9,3),(9,-3),(4,\ 2),(4,-2),(25,5),(25,-5)\}$ (iii) domain $R = \{4, 9, 25\}$ Range $R = \{-2,\ 2,-3,\ 3,-5,\ 5\}$ OR  Correct lines with point of intersection Correct Labelling	1 1 ½ ½ 2	NCERT, Page -29 Example-8 NCERT, Page -39 Example-22
29	A.T.Q, $m_{c_0} - 3m_{c_1} + 9m_{c_2} = 559$ $1-3m + \frac{9m(m-1)}{2} = 559$ On simplification, m= 12 Let T_{r+1} is containing x^3 Now $T_{r+1} = 12_{c_r}(-3)^r x^{12-3r}$ $12-3r = 3 \Rightarrow r = 3$ The req. term is $12_{c_3}(-3)^3x^3$ i,e $-5940x^3$ OR $\because$ 2n is even middle term of the expansion is $\left(\frac{2n}{2}+1\right)^{th}$ i.e $(n+1)^{th}$ term. $T_{n+1} = 2n_{C_n}(1)^{2n-n}(x)^n = 2n_{C_n}x^n = \frac{(2n)!}{n!\,n!}x^n$ $= \frac{1.2.3\ldots(2n-2)(2n-1)(2n)}{n!\,n!}x^n$	1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	NCERT(concept) OR NCERT(concept)

	$= \frac{[1.3.5 \ldots (2n-1)]2^n[1.2.3 \ldots n]}{n!\,n!} x^n$ $= \frac{[1.3.5 \ldots (2n-1)]n!}{n!\,n!} 2^n x^n$ $= \frac{[1.3.5 \ldots (2n-1)]}{n!} 2^n x^n$	1/2 1/2 ½	
30	$z = \frac{(3-2i)(2+3i)}{(1+2i)(2-i)} = \frac{6-4i+9i-6\,i^2}{2+4i-i-2\,i^2} = \frac{12+5i}{4+3i}$ $= \frac{12+5i}{4+3i} \cdot \frac{4-3i}{4-3i} = \frac{48+20i-36i-15\,i^2}{4^2-(3i)^2} = \frac{63-16i}{25} = \frac{63}{25} - i\,\frac{16}{25}$ $\bar{z} = \frac{63}{25} + i\,\frac{16}{25}$ OR a + $ib = \frac{(x+i)^2}{2x^2+1}$………(i) $\overline{a + \iota b} = \frac{\overline{(x+\iota)^2}}{2x^2+1}$(Taking conjugate of both sides) a – $ib = \frac{(x-i)^2}{2x^2+1}$…………(ii) Multiple (i) & (ii), we get (a+ib)(a–ib) = = $\frac{(x+i)^2}{2x^2+1} \cdot \frac{(x-i)^2}{2x^2+1}$ $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$	1 1 1 1 1 1	NCERT page-85 Example-7 OR NCERT page-86 Q. no-6
31	$\cos(\theta + \phi) = m\cos(\theta - \emptyset)$, $\frac{1}{m} = \frac{\cos(\theta-\emptyset)}{\cos(\theta+\emptyset)}$ By componendo and dividendo $\frac{1+m}{1-m} = \frac{\cos(\theta-\emptyset)+\cos(\theta+\emptyset)}{\cos(\theta-\emptyset)-\cos(\theta+\emptyset)} = \frac{2\cos\theta\cos\phi}{2\sin\theta\sin\phi} = \cot\theta\cot\phi$ $\tan\theta = \frac{1-m}{1+m}\cot\phi$	½ 1 + 1 ½	Exemplar, page-54,Q. no -21
32	(i)Given, f (x + 1) = $x^2 - 3x + 2$ Let x + 1 = y ⇒ $x = y - 1$ f (y) = $(y-1)^2 - 3(y-1) + 2$ $= y^2 - 2y + 1 - 3y + 3 + 2$ $= y^2 - 5y + 6$ f (x) = $x^2 - 5x + 6$ (ii) Since f is a linear function, f (x) = m$\boldsymbol{x}$ + c Also, since (1,1),(0, −1) ∈ R f(1) = m + c = 1 and f(0) = c = −1 m = 2 and f (x) = $2x - 1$	 ½ ½ 1 ½ ½ ½ ½ 1	NCERT(concept) NCERT, Page-39. Example – 20

33	LHS=$\sin 3x \sin^3 x + \cos 3x \cos^3 x$ $= \sin 3x \left(\frac{3sinx - sin3x}{4}\right) + \cos 3x \left(\frac{cos3x + 3cosx}{4}\right)$ $= \frac{1}{4}[3(cos3xcosx + sin3xsinx) + (cos^2 3x - sin^2 3x)]$ $= \frac{1}{4}(3cos2x + cos6x)$ $= \frac{1}{4}(3cos2x + cos3.2x)$ $= \cos^3 2x$=RHS OR LHS=$\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$ $= \left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\left(\pi-\frac{3\pi}{8}\right)\right)$ $\left(1+\cos\left(\pi-\frac{\pi}{8}\right)\right)$ $= \left(1-cos^2\frac{\pi}{8}\right)\left(1-cos^2\frac{3\pi}{8}\right) = sin^2\frac{\pi}{8}sin^2\frac{3\pi}{8}$ $= \frac{1}{4}\left(1-\cos\frac{\pi}{4}\right)\left(1-\cos\frac{3\pi}{4}\right)$ $= \frac{1}{4}\left(1-\cos\frac{\pi}{4}\right)\left(1+\cos\frac{\pi}{4}\right)$ $= \frac{1}{4}\left(1-cos^2\frac{\pi}{4}\right) = \frac{1}{4}\left(1-\frac{1}{2}\right) = \frac{1}{8}$	1 1 1 1 1 1 1 1 1 1	NCERT(concept) OR Exemplar, Page -43, Example – 9
34	If $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$ Since $\pi < x < \frac{3\pi}{2}$, $cosx$ is negative. Also $\frac{\pi}{2} < \frac{x}{2} < \frac{3\pi}{4}$ Therefore, $\sin\frac{x}{2}$ is positive and $\cos\frac{x}{2}$ is negative. By using identity, $cosx = -\frac{4}{5}$ $2sin^2\frac{x}{2} = 1 - cosx = 1 + \frac{4}{5} = \frac{9}{5}$ $\sin\frac{x}{2} = \frac{3}{\sqrt{10}}$ $\cos\frac{x}{2} = -\frac{1}{\sqrt{10}}$ $\tan\frac{x}{2} = -3$	1 1 1 1 1	NCERT, Page-70. Example – 21

35	Total number of words $= \frac{5!}{2!} = 60$ Words starting with A = $4! = 24$ Words starting with G = $\frac{4!}{2!} = 12$ Words starting with I = $\frac{4!}{2!} = 12$ Total words before starting with N = 24+12+12=48 49th word is NAAGI and 50th word is NAAIG OR (i)Exactly 3 girls: $4_{c_3} \times 9_{c_4} = 504$ (ii)At least 3 girls:$4_{c_3} \times 9_{c_4} + 4_{c_4} \times 9_{c_3}$ =588 (iii)At most 3 girls:$4_{c_0} \times 9_{c_7} + 4_{c_1} \times 9_{c_6} + 4_{c_2} \times 9_{c_5} + 4_{c_3} \times 9_{c_4} = 1632$	1 1/2 1/2 1/2 1/2 2 1 1+1 1+1	NCERT, Page - 121, Example – 22 OR NCERT, Page - 122, Q. no-3
36	(i)(G × B) = $\{(g_1, b_1), (g_1, b_2), (g_1, b_3), (g_2, b_1), (g_2, b_2), (g_2, b_3)\}$ (ii) 64 (iii) No, Correct justification OR ($2^9 - 1$)	1 1 1+1 2	NCERT concept
37	$\cos A = \frac{3}{5}$ and $\cos B = -\frac{12}{13}$, As $0 < A < \frac{\pi}{2}$, $\pi < B < \frac{3\pi}{2}$ sinA, tanA , cotA, tanB and cotB are positive and sinB is negative. $\sin A = \frac{4}{5}$, $\sin B = -\frac{5}{13}$, $\tan A = \frac{4}{3}$, $\tan B = \frac{5}{12}$, $\cot A = \frac{3}{4}$, $\cot B = \frac{12}{5}$ (i)$\sin A + \sin B = \frac{4}{5} - \frac{5}{13} = \frac{52-25}{65} = \frac{27}{65}$ (ii)$\sin 2A = 2\sin A.\cos A = 2.\frac{4}{5}.\frac{3}{5} = \frac{24}{25}$ (iii)$\tan(A-B) = \frac{\tan A - \tan B}{1+\tan A.\tan B} = \frac{\frac{4}{3}-\frac{5}{12}}{1+\frac{4}{3}.\frac{5}{12}} = \frac{\frac{33}{36}}{\frac{56}{36}} = \frac{33}{56}$ OR $\cot(A+B) = \frac{\cot A.\cot B - 1}{\cot B + \cot A} = \frac{\frac{3}{4}.\frac{12}{5}-1}{\frac{12}{5}+\frac{3}{4}} = \frac{\frac{16}{20}}{\frac{63}{20}} = \frac{16}{63}$	 1 1 1+1 1+1	NCERT, Page – 68,example-18 (concept)
38	(i) The number of ways in which at least7 men included in the committee = $8_{c_7}.9_{c_5} + 8_{c_8}.9_{c_4} = 8 \times 126 + 1 \times 126 = 9 \times 126 = 1134$ (ii)$9_{c_9} \times 8_{c_3} + 9_{c_8} \times 8_{c_4} + 9_{c_7} \times 8_{c_5} = 1 \times 56 + 9 \times 70 + 36 \times 56 = 56 + 630 + 2016 = 2702$	1+1 1+1	NCERT concept