INDIAN SCHOOL AL WADI AL KABIR

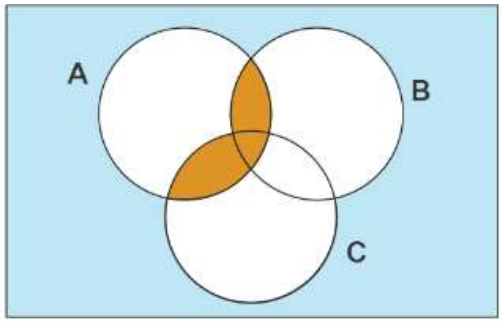
Assessment- I (2022-2023)

Class: XI | Sub: MATHEMATICS(041) | Max Marks: 80

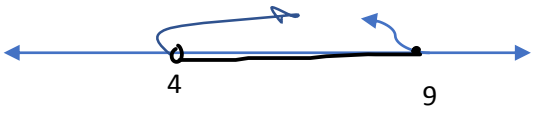
Date: 20.09.2022 | MARKING SCHME | Time: 03 hrs.

Q1.	$A = \{-2, -1, 0, 1, 2\}$	1
Q2.	12 Or 170	1
Q3	$\{\{1,2\}, \{1\}, \{2\}, \{\ \}\}$.	1
Q4.	$A = \{\ x: x\ is\ an\ even\ natural\ number\ below\ 10\}$ OR $(A - B) U (B - A) = \{1, 2, 4, 5\}$	1
Q5.	$2^6 = 64$	1
Q6	$R - \{3, -3\}$	
Q7	$B\ X\ A = \{(6,5), (6\ 6), (8,5), (8,6), (10,5), (10,6)\}$	1
Q8	R= $\{(0,\ -1)\ (1,1), (2,3), (3,5)\}$	
Q9.	$\cos 480^0 = -\frac{1}{2}$ OR 2.2 radians= 126^0	1
Q10	$cot\left(\frac{19\pi}{4}\right)$= -1	1
Q11.	$If\ \cos A = -\frac{4}{5},\quad then\ sinA = \frac{3}{5}$ OR If sin A= $-\frac{1}{\sqrt{2}}$, $\frac{2tanA}{1+tan^2A} = 1$.	1
Q12	$2cos\frac{7\pi}{3} + x\ sin\frac{5\pi}{6} = 0 \quad x = -2.$ OR Convert $47^0\ 30'$ =$\frac{19\pi}{72}$ radian	1
Q13	$x < 5 \quad x \in \{1, 2, 3, 4\}$	1
Q14	$x \leq 3\ \ on\ number\ line$	1
Q15	$2400 + 30x < 42x$ $x > 2000\ .\ More\ than\ 2000\ casettes.$	1
Q16	$1 \leq \frac{x}{2} - 1 \leq 3.$	1

	$2 \leq \frac{x}{2} \leq 4.$ $4 \leq x \leq 8.$ $\quad x \in [4, 8]$	
Q17	B (0)	1
Q18	C (1/5)	1
Q19	A $(2 - \sqrt{3})$	1
Q20	D (12π)	1
Q21	A $\quad x = 4, y = -2$	1
Q22	A i and ii	1
Q23	C $\quad [0, 1)$	1
Q24	B Domain: [-3, 3] Range: [0, 3]	1
Q25	i) A. 20 ii) C. 6 iii) D 18 Any 4 x 1 =4 iv) B. 30 v) D 9	4
Q26	a) R= $\{(1,,1)\ (1,2), (1,3), (1,4), (1,5), (1,6),$ $(2,2), (2,4), (2,6), (3,3), (3,6), (4,4), (6,6)\}$ b) No. x elements have more than one image.	2 2
Q27	$2^m - 2^n = 120$ $2^7 - 2^3 = 120$ m=7 n= 3	1 1
Q28.	$x - 2 \leq 3$ and $x - 2 \geq -3$ $-1 \leq x \leq 5$ $x \in [-1, 5]$ OR` $\frac{x}{3} + \frac{x}{4} + x < 19$ $\frac{19x}{12} < 19$ $x < 12 \quad x \in (-\infty, 19)$	1 1
Q29	$R = \{(x, y): x, y \in A, x + y > 7\}$ R= $\{(3,5)\ (4,4), (4,5), (5,3), (5,4)\}$ Domain = {3, 4, 5} Range= {3, 4, 5}	1 1
Q30	$8.2 < \frac{8.3 + 8.4 + x}{3} < 8.5$ $7.9 < x < 8.8$	1 1

Q31	 $A \cap (B \cup C)$ —	The maximum number of elements in AUB =9 The minimum number of elements in AUB = 6	2
Q32	Domain = R Range= [2, ∞)		1+1
Q33	$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$ and $(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$ $\text{L.H.S.} = \frac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \frac{\left(\frac{\tan\frac{\pi}{4} + \tan x}{1 - \tan\frac{\pi}{4}\tan x}\right)}{\frac{\tan\frac{\pi}{4} - \tan x}{1 + \tan\frac{\pi}{4}\tan x}} = \frac{\left(\frac{1+\tan x}{1-\tan x}\right)}{\left(\frac{1-\tan x}{1+\tan x}\right)} = \left(\frac{1+\tan x}{1-\tan x}\right)^2 =$ R.H.S.		1 1
OR	We know that $3x = 2x + x$ $\tan 3x = \tan(2x + x)$ $\tan 3x = \frac{\tan 2x + \tan x}{1 - \tan 2x \tan x}$ $\tan 3x - \tan 3x \tan 2x \tan x = \tan 2x + \tan x$ $\tan 3x - \tan 2x - \tan x = \tan 3x \tan 2x \tan x$ $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$		1 1
Q34	$x > 10, \quad x + 2 > 10, \quad x + x + 2 < 29$ $x > 10 \; and \; 2x < 27$ Ans: 11 and 13 Or 13 and 15		1 1
Q35	$A = \{2, -3\}, B = \{2, 3\} \; and \; C = \{2, 3\}.$ B= C		2 1

Q36	LHS= $cos\left(\frac{3\pi}{2}+x\right)\cos(2\pi-x)\,[tanx+cotx]$ $= \sin x \cos x[\tan x + \cot x]$ $= \sin x \cos x\left(\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}\right)$ $= (\sin x \cos x)\left[\frac{\sin^2 x+\cos^2 x}{\sin x \cos x}\right]$ $= 1 = \text{R.H.S.}$	1 1 1
OR	$\tan\left(\frac{\pi}{8}\right)=\tan\left(\frac{180}{8}\right)$ $\tan\left(\frac{45}{2}\right)$ $\tan\frac{A}{2}=\frac{1-\cos A}{\sin A}$ So, Now $\tan\frac{45}{2}=\frac{1-\cos 45}{\sin 45}$ $=\frac{1-\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $=\frac{\frac{(\sqrt{2}-1)}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $\tan\left(\frac{\pi}{8}\right)=\sqrt{2}-1$	1 1 1
Q37	$\boldsymbol{\cos x + \cos y = 2\cos\frac{x+y}{2}\cos\frac{x-y}{2}}$ LHS= $2cos\frac{\pi}{13}cos\frac{9\pi}{13}+2cos\frac{4\pi}{13}cos\frac{\pi}{13}$ $=2cos\frac{\pi}{13}\left(cos\frac{9\pi}{13}+cos\frac{4\pi}{13}\right)$ $2cos\frac{\pi}{13}\left(2cos\frac{\pi}{2}cos\frac{5\pi}{26}\right)=0$ as $cos\frac{\pi}{2}=0$	1 1 1

OR	$tanA = \frac{4}{3}$ $\quad cosA = -\frac{3}{5}$ $sin\frac{A}{2} = \sqrt{\frac{1-cosA}{2}}$, $\frac{A}{2}$ *in second quadrant* $sin\frac{A}{2} = \frac{3}{\sqrt{10}}$	1 1 1
Q38	Given: $30° C < 35°$ $\Rightarrow 30 < \frac{5}{9}(F-32) < 35$ $\Rightarrow 30 \times \frac{9}{5} < F-32 < 35 \times \frac{9}{5}$ $\Rightarrow 54 < F-32 < 63$ $\Rightarrow 86 < F < 95$ Thus, the required range of temperature is between 86° F and 95°F.	1 1 1
Q39	$2(2x+3) - 10 < 6(x-2)$ $\Rightarrow 4x + 6 - 10 < 6x - 12$ $\Rightarrow 4x - 6x < -12 + 4$ $\Rightarrow -2x < -8$ $\Rightarrow x > 4$ $\Rightarrow x \in (4, \infty)$	$\left(\frac{x-7}{2}\right) \leq 10 - x$ $x - 7 \leq 20 - 2x$ $x \leq 9$  	2 1 2
Q40	i) {0,1,2,4,6,7,8,8,9,10} ii) {2,4} iii) Verify LHS = RHS ={2,3,4,5,7,9}	1.5 1.5 2
Q41	i) 6 ii) 11 iii) 26 iv) 0 v) t+1	1 1 1 1 1

Q42	Solution $L.H.S = \dfrac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A}$ $= \dfrac{(\sin 7A + \sin A) + (\sin 5A + \sin 3A)}{(\cos 7A + \cos A) + (\cos 5A + \cos 3A)}$ $= \dfrac{(2\sin 4A \cos 3A) + (2\sin 4A \cos A)}{(2\cos 4A \cos 3A + 2\cos 4A \cos A)}$ $= \dfrac{2\sin 4A}{2\cos 4A}\left[\dfrac{\cos 3A + \cos A}{\cos 3A + \cos A}\right]$ $= \tan 4A = R.H.S.$	1 1 2 1
OR	$LHS = \cos^2 x + \cos^2\left(x + \dfrac{\pi}{3}\right) + \cos^2\left(x - \dfrac{\pi}{3}\right)$ $= \dfrac{1 + \cos 2x}{2} + \dfrac{1 + \cos\left(2x + \frac{2\pi}{3}\right)}{2} + \dfrac{1 + \cos\left(2x - \frac{2\pi}{3}\right)}{2}$ $= \dfrac{1}{2}\left[3 + \cos 2x + \cos\left(2x + \dfrac{2\pi}{3}\right) + \cos\left(2x - \dfrac{2\pi}{3}\right)\right]$ $= \dfrac{1}{2}\left[3 + \cos 2x + 2\cos 2x \cos\dfrac{2\pi}{3}\right]$ $= \dfrac{1}{2}\left[3 + \cos 2x + 2\cos 2x \cos\left(\pi - \dfrac{\pi}{3}\right)\right]$ $= \dfrac{1}{2}\left[3 + \cos 2x - 2\cos 2x \cos\dfrac{\pi}{3}\right]$ $= \dfrac{1}{2}[3 + \cos 2x - \cos 2x]$ $= \dfrac{3}{2}$ RHS	3 1 1
