INDIAN SCHOOL AL WADI AL KABIR

Assessment – 1 (2024 – 2025)

Class: XI	Sub: MATHEMATICS (041)	Max Marks: 80
Date: 19.09.2024	Answer key-set 2	Time: 3 hrs

SECTION A

1	b) 3	6	d) $\frac{\sqrt{3}}{2}$	11	d) $2\bar{x}+3$	16	d) 120
2	a) {2, 5, 10, 17, 26}	7	c) $(10\pi)^c$	12	b) $a=4, b=-1$	17	c) 64
3	c) 1	8	a) $\sqrt{3}$	13	c) x< 10	18	d) 4! x 3!
4	c) {-1, 1}	9	b) 1	14	b) 70	19	d
5	d) 60 and 36.	10	b) 1	15	a) 66	20	a

SECTION B

21 (a)

$$LHS = \frac{sin5x-2sin3x+sinx}{cos5x-cosx}$$

$$= \frac{sin5x+sinx-2sin3x}{cos5x-cosx}$$

$$= \frac{2sin3xcos2x-2sin3x}{-2sin3xsin2x}$$ (1/2 m)

$$= \frac{sin3x(cos2x-1)}{sin3xsin2x}$$ (½ m)

$$= \frac{1-cos2x}{sin2x}$$ (1/2 m)

$$= \frac{2sin^2x}{2sinxcosx} = tanx$$ (1/2 m)

(b) Given A+B+C=π

A+B= π-C

$$tan(A+B) = tan(\pi - C)$$ (1/2 m)

$$\frac{tanA+tanB}{1-tanAtanB} = -\frac{tanC}{1}$$ (1/2m)

$$tanA + tanB = -tanC + tanAtanBtanC$$ (1/2 m)

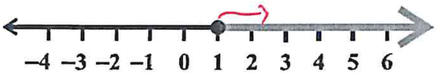
$$tanA + tanB + tanC = tanAtanBtanC$$ (1/2 m)

22

$$Z^{-1} = \frac{1}{2-3i}$$ (1/2 m)

$$= \frac{1}{2-3i} \times \frac{2+3i}{2+3i}$$ (1/2 m)

$$= \frac{2+3i}{2^2-(3i)^2}$$ (1/2 m)

	$=\frac{2+3i}{13}$	(1/2 m)
23	$\frac{3x-4}{2}\geq\frac{x+1}{4}-1$	
	$\frac{3x-4}{2}\geq\frac{x-3}{4}$	(1/2 m)
	$2(3x-4))\geq x-3$	(1/2 m)
	$6x-8\geq x-3$	
	$5x\geq 5\ or\ x\geq 1$	(1/2 m)
		(1/2 m)
24	(a) No of 5 digit integers + (Number > 7000) =120+(3 X 4P3=72) =192 (1 m +1 m)	(b) 6435+5005-5005-6435=0 (1/2 m X 4=2 m)
25	Mean=16 (1 m) , M.D= 3.6 (1 m)	
	SECTION - C	
26	$(i)B\cup C=\{3,4,5,6,7,8\}$	(1/2 m)
	$(ii)A\cup B\cup D=\{1,2,3,4,5,6,7,8,9,10\}$	(1/2 m)
	$(iii)B\cup(C\cap D)=\{3,4,5,6,7,8\}$	(1 m)
	$(iv)A-(B\cup C)=\{1,2\}$	(1 m)
27	(i) t (28)=412/5	$(1\frac{1}{2}\ m)$
	(ii) C=100	$(1\frac{1}{2}\ m)$
28 (a)	$sin^2 6x-sin^2 4x=(sin6x+sin4x)(sin6x-sin4x)$	(1/2 m)
	$=2sin\left(\frac{6x+4x}{2}\right)cos\left(\frac{6x-4x}{2}\right)2cos\left(\frac{6x+4x}{2}\right)sin\left(\frac{6x-4x}{2}\right)$	(1 m)
	$=2sin\left(\frac{10x}{2}\right)cos\left(\frac{2x}{2}\right)2cos\left(\frac{10x}{2}\right)sin\left(\frac{2x}{2}\right)$ Formula : ½	(1/2 m)
	$=2sin5xcosx\ 2cos5xsinx$	(1/2m)
	$=sin10xsin2x$	(1/2 m)
(b)	$LHS=(cosx-cosy)^2+(sinx-siny)^2$	
	$=cos^2x+cos^2y-2cosxcosy+sin^2x+sin^2y-2sinxsiny$	(1 m)
	$=(cos^2x+sin^2x)+(cos^2y+sin^2y)-2(cosxcosy+sinxsiny)$	(1/2 m)
	$=2(1-cos(x-y))$ Formula - ½	(1 m)
	$=4sin^2\left(\frac{x-y}{2}\right)$=RHS	(1/2 m)
29 (a)	$Conj(x+2xi-iy-2i^2y)=8-i$	
	$conj((x+2y)+i(2x-y))=8-i$	(1 m)
	$x+2y=8\ and\ -(2x-y)=-1$	(1 m)
	$\therefore x=2\ and\ y=3$	(1 m)

(b)

$$= \frac{6+9i-4i+6}{2-i+4i+2} = \frac{12+5i}{4+3i} \times \frac{4-3i}{4-3i}$$ (1 ½ m)

$$= \frac{48-36i+20i+15}{16+9} = \frac{63-16i}{25} = \frac{63}{25} - \frac{16}{25}i$$ (1 ½ m)

30 (a)

(i) Drawing 4 marbles of any colour:

Required number of ways 11C4 =330 (½ +½) (1 m)

(ii) Drawing 2 white and 2 red marbles:

$(6C_2 \text{ X } 5C_2)$=150 (½ + ½) (1 m)

(iii)Drawing same colour:

$(6C_4 + 5C_4)$=20 (½ +½) (1 m)

(b)

We have $5\ {}^4P_r = 6\ {}^5P_{r-1}$

$$5 \times \frac{4!}{(4-r)!} = 6 \times \frac{5!}{(5-r+1)!}$$ (1 m)

$$\frac{5!}{(4-r)!} = \frac{6 \times 5!}{(5-r+1)(5-r)(5-r-1)!}$$

$(6-r)(5-r) = 6$

$r^2 - 11r + 24 = 0$ (1m)

$r^2 - 8r - 3r + 24 = 0$

$(r-8)(r-3) = 0$

$r = 8$ or $r = 3.$ $\underline{r = 3}$ $(r \neq 8)$ $(-½)$ (1m)

31

x	3	5	7	9	11	13
f	2	4	5	6	5	3
c.f	2	6	11	17	22	25
$f_i\lvert x_i - M\rvert$	12	16	10	0	10	12

(1 m)
(1 m)

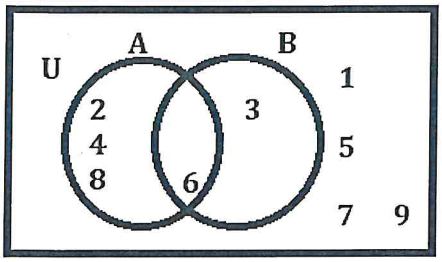
Median = 9 M.D=60/25= 2.4 Formula - ½ (1 m)

SECTION D

32

$(i) U = \{1,2,3,..9\}$ (1) $A = \{2,4,6,8\}, B = \{3,6\}$ (1 m)

$(ii)(A \cup B)' = \{1,5,7,9\}$ (1 m)



(iii) (1 m)

$(iv) A-(A\cap B)=\{0,2,4,8\}=A-B$ (1 m)

33 (a)

Using $\sin x+\sin y=2\sin\frac{x+y}{2}\cos\frac{x-y}{2}$

$=2\sin\left(\frac{7x+5x}{2}\right)\cos\left(\frac{7x-5x}{2}\right)+2\sin\left(\frac{9x+3x}{2}\right)\cos\left(\frac{9x-3x}{2}\right)$ Formula (½+½) (1m)

$=2\sin\left(\frac{12x}{2}\right).\cos\left(\frac{2x}{2}\right)+2\sin\left(\frac{12x}{2}\right)\cos\left(\frac{6x}{2}\right)$

= 2 sin 6x . cos x + 2 sin 6x . cos 3x

= 2 sin 6x (cos x + cos 3x)

Now solving Denominator

(cos 7x + cos 5x) + (cos 9x + cos 3x)

Using $\cos x+\cos y=2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ (1m)

We get $2\cos 6x(\cos x+\cos 3x)$

$$\frac{(\sin 7x+\sin 5x)+(\sin 9x+\sin 3x)}{(\cos 7x+\cos 5x)+(\cos 9x+\cos 3x)}$$ (1m)

$$=\frac{2\sin 6x(\cos x+\cos 3x)}{2\cos 6x(\cos x+\cos 3x)}$$ (1 m)

$$=\frac{\sin 6x}{\cos 6x}$$

= tan 6x (~~2~~ m)

Hence Proved.

(b)

$$\text{L.H.S.} = \frac{1+\cos 2x}{2} + \frac{1+\cos\left(2x+\frac{2\pi}{3}\right)}{2} + \frac{1+\cos\left(2x-\frac{2\pi}{3}\right)}{2}$$ (2 m)

$$= \frac{1}{2}\left[3+\cos 2x+\cos\left(2x+\frac{2\pi}{3}\right)+\cos\left(2x-\frac{2\pi}{3}\right)\right]$$ (1 m)

Formula -1/2

$$= \frac{1}{2}\left[3+\cos 2x+2\cos 2x\cos\frac{2\pi}{3}\right]$$ (1/2 m)

$$= \frac{1}{2}\left[3+\cos 2x+2\cos 2x\cos\left(\pi-\frac{\pi}{3}\right)\right]$$

$$= \frac{1}{2}\left[3+\cos 2x-2\cos 2x\cos\frac{\pi}{3}\right]$$ (1/2 m)

$$= \frac{1}{2}\left[3+\cos 2x-\cos 2x\right] = \frac{3}{2} = \text{R.H.S.}$$ (1 m)

34(a)

(i) 11 players can be selected out of 15 in 15C11 ways =1365 (½ + ½) (1 m)

(ii) 14C10 = (14.13.12.11)/(1.2.3.4) = 1001 ways (1 m)

(iii) Since a particular player must be always excluded, we have to choose 11 players out of remaining 14.
This can be done in14C11 ways = (14.13.12)/(1.2.3) = 364 ways (½ + ½) (1 m)

(iv) One leg spinner can be chosen out of 2 in² C1 = 2 ways. Then we have to select 10 more players out of 13 (because second leg spinner can't be included). This can be done in13C10 ways =286 ways. (1 + 1)
Thus required number of combinations = 2×286 = 572 (2 m)

(b)

(i) starts and ends with s = $\frac{8!}{3!2!1!1!}$ = 3360 1 + ½ ($1\frac{1}{2}$ m)

(ii) vowels come together= $\frac{8!}{3!3!} \times \frac{3!}{2!}$ = 3360 1 + ½ ($1\frac{1}{2}$ m)

(iii)Number of ways in which these letters can be arranged such that no vowel come together
= Total number of ways -Number of words in which vowels come together
=50400-3360=47040. 1 + 1 (2 m)

35
(a)

Class	Frequency f_i	Mid-point x_i	$y_i=\frac{x_i-65}{10}$	y_i^2	$f_i y_i$	$f_i y_i^2$
30-40	3	35	−3	9	−9	27
40-50	7	45	−2	4	−14	28
50-60	12	55	−1	1	−12	12
60-70	15	65	0	0	0	0
70-80	8	75	1	1	8	8
80-90	3	85	2	4	6	12
90-100	2	95	3	9	6	18
	N=50				−15	105

Assumed Mean=65 ; h=1 (1) (1)

$\bar{x} = A + \frac{\sum f_i y_i}{50} \times h = 65 - \frac{15}{50} \times 10 = 62$

OR DIRECT METHOD

(2 m)

Variance $\sigma^2 = \frac{h^2}{N^2}\left[N\Sigma f_i y_i^2 - (\Sigma f_i y_i)^2\right]$

$= \frac{(10)^2}{(50)^2}\left[50 \times 105 - (-15)^2\right]$

$= \frac{1}{25}[5250 - 225] = 201$ (2 m)

standard deviation $(\sigma) = \sqrt{201} = 14.18$ (1 m)

SECTION E

36 (i) A= {I, L, O, V, E, M, A, T, H, C, S}; B= {I, L, O, V, E, S, T, A, C} (1 m)

(ii) False, False (1 m)

(iii) (a) $(A-B)U(B-A) = \{M, H\} = (AUB) - (A \cap B)$ (2 m)

(OR)

(a) $n(AUB) = 11$ (1 m)

$n(A) + n(B) - n(A \cap B) = 11 + 9 - 9$=11 (1 m)

37 (i)a $g(x)$ (1 m)

(ii)$g\left(\frac{3\pi}{4}\right) + h(2\sqrt{2}) = -1 + \sqrt{9 - (2\sqrt{2})^2} = -1 + 1 = 0$ (1 m)

(iii) (a) Domain= (-∞,∞) Range= [0,1) (2 m)

(OR)

(b)Domain={1,2,3,4,5,6,7} (1 m)

No. It has mapped with more than one element. (1 m)

38 (i) Profit= Cost<Revenue (OR) Revenue > Cost

2x > 200+1.5x (1 m)

0.5x > 200

Hence greater than 400 lamps (1 m)

	(ii)	Profit= Revenue –Cost	
		$900< 2 (2x-(200+1.5x)) <1200$	(1 m)
		$900<x-400< 1200$	
		$1300< x$ (no of lamps)< 1600	(1 m)

19/9/24