Harmonic Analysis -F.S [discrete form] -periodic firs.

flx) = a0 + 2 (an conx + bn sinnx) => flx) = a0 + a1 cosx + b1 sin x + a2 cos2x + b2 sin 2x + ... 7-fundamental B

an= 2 3 f(x)

a, = 2 2 f(x) (05x;

b1 = 2 2 f(xi) smxi ...

-> degree

-> radians

- change of interval

1) Find the F.S. upto the 1 harmonic for y=fix) in (0,27) defined by the table of values given below. [Radians]

0 Ng 2Ng T 4N/3 5N/3 2X X 1 1.4 1.9 1.7 1.5 1.2 1.0

Note: Periodic fr. Omit the last value (ie 2)

Min nob.

Calculator change to radians.

 $a_0 = \frac{2}{h} \le f(x)$ $u_2 = \frac{2}{h} \le f(x_1)(6x_2)x_1$ a1=2 2 f(xi) cosxi b2=2 2 f(xi) sin 2x;

bi = = 2 5 f(xi) sinxi

fin)= ao + a1 (osx + b1 sinx + a2 (os2x + b2 sin2x.

	L	y=f(a)	Cos Ri	Sinki	Cos2x:	Sin 200;	flai) cosx;	$f(x_i)$ Sin x_i	f(xi)6s2xi	flx;) sin2x;
o	0	10-	1	0	1	O	1	Ó	t	6
60°	76	14 -	0.5	998-0	-0.5	0.866	6.7	1.2124	-0·7	1.2124
นถึ	21/3	1.9 -	-0.5	g28·0	-0.5	-0.866	-0.95	1.6454	-0.95	-1.6454
180	K 15	(-7 /	-1	D	1	0	-1.7	0	1-7	0
240	48/3	1.5 ^	-0.5	dd8·0-	-0.5	6.866	-0.75	-1.299	-0.75	1.299
300 •	-	1.2 -	0.5	-0.866	-0.5	-0866	0-6	-1.0392	-0.6	-1.0392
	ر.	•					6 to 2600' =	· · · · · · · · · · · · · · · · · · ·		Sflxi)-Sinxi
		5Hx1)=8.1						Zflaijsinai =	至f(ni)(oslai	= -0.1732
							- 11	0.5196	-0.3	

$$a_0 = \frac{2}{5}x8.7 = \frac{2.9}{6}$$

$$a_1 = \frac{2}{5}\left[-1.1\right] = -0.37$$
 $a_2 = \frac{2}{5}x - 0.3 = -0.1$

$$b_1 = \frac{2}{5} \times 0.5196 = 0.17$$
 $b_2 = \frac{2}{5} \times -0.1732 = -0.06$

flx = 2.9 -0.37 losx + 0.17 sinx -01 los2x -0.06 sin2x //.

2) The value of x and the cor. values of for) over a period T are given below

Show that f(x) = 0.75 + 0.37 (080 + 1.004 sind where 0 = 2xx "T" problem 0 T/L T/2 T/2 2T/2 5T/L T V INT

bw that	f(x) = 0.							
~		T 1.	т/.	T/ 2T/	m 1	T	7 problem	
(1.)	0	7/6	T/3	T/2 2T/3	57/6	1.98 X	(T ₁ 0)	
y=fh)	1.98	1.30	1.05	1.30 -0.88	-0.25		-()	
on: x	0 0 7	n)	Class	1-10	City o		=6)	
1	θ= 2 <u>M</u>	r L	flx)=y	(050)	Sin o:	fhiltere;	flxi)smo;	
0	0	o [*]	1.98	1	0	1.98	0	
7/2		60°	1.30	0.2	०.४७%	0.65	1.1258	
7/3	21/3	120°	1.05	-0.5	9.89.0	-0.525		
7/2		180	1.30	-1	0 283	-1.3	0	
2.7		240	-0.88	-0.5	-0.866	0.44	0.762	
57/		300	-0.25	0.5	حام 8·0 –	-0.125	0.2165	•
•				_	- 5,6			
		4	2f(xi)=4.	5		2f(xi)6s0;=1	1.12 Efta	\$.013
0								<u> </u>
νο:	= 2×45	- 1.5	\	b1= 2 × 3.013b	, = 1.0045	Albsentees!		
	=			v		th = 2 t(Marilia	
a ₁ >	2 × 1.12	= 0 5133	>			50, 53, 56	19,64,61	1
	· · · · · · · · · · · · · · · · · · ·	± 0.27	(nc A L	1.004 sind.		115 104	u ୧୯ . ໝ	
4	(2)= 0.15	7 0/51	w50 7	(.004 \$410		115, 100,	118 130	1//
								4
I						``		
3) Find	I the cond	tant ton	rn M	nd the w	self of the	first since	and whine	teens
3 Find	the cons	tant ter	m m	nd the w	seff of the	first sine	, and losine	teens
③ Find	the cons	tant ter ior expa	m an	nd the wo	very of the	first sine	, and wine	teens
3 Find in X	the cons the four	tant ter ior expo	rn an unsion a	of y as giv	ien in the fo	II. talde.		_
ŵ	the cons the four 0 1	ior expo	msion e	of y as giv	ven in the fo	II. talde.	e of insterv	al]
in X Y	Une four	ior expa 2 24	3 4 28 21	of y as giv 5 o 20	ven in the fo	II. talde.	e of insterv	al]
in X Y	the four	ior expa 2 24	3 4 28 21	of y as giv	in the following in the	II. talde.	e of insterv	al]
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Try!! 1) Find an empirical formula of the form flx)=a0+a1 cosx + b1 sinx for the foll. data such that flx) is periodic with period 21. x 0° 60° 120° 180° 240° 300° 360° N=6. y=f(x) 40.00 31.0 -13.7 20.0 3.7 -21.0 40.0