bina Co

FOURIER SERIES

PERIODIC FUNCTION: A function f(x) is said to be periodic if and only if & (x+p) = f(x) is tome for some values of t and every value of x. The smallest value of P 1e called tresiodic of that function.

INGLE VALUED FUNCTION 5 1) g(x) = sin x \$ [a+2] = Sin(21+2) $= \sin x = f(x)$

2) f(n) = cos n f (x+2+) = cos (27+21) = cos x = f(x)

3) of (a) = tance $f(x+\pi) = \tan(\pi+x) = \tan x = f(x)$

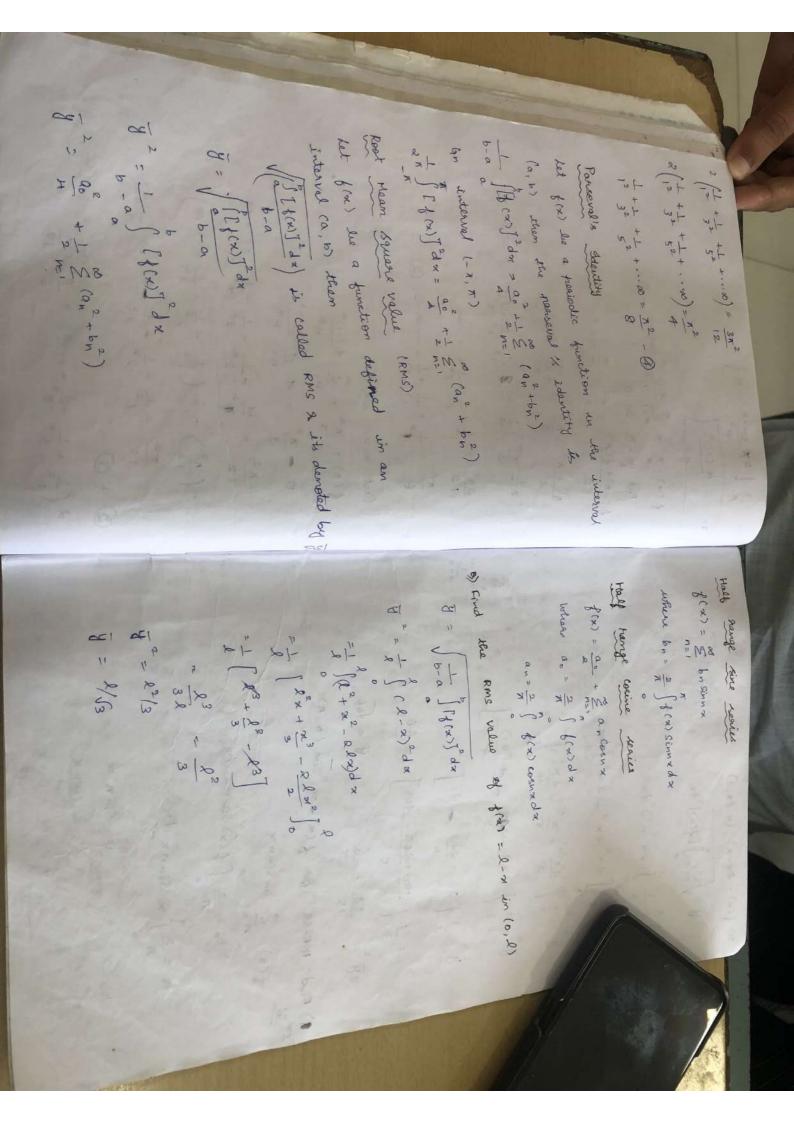
CONTINUOUS FUNCTION:

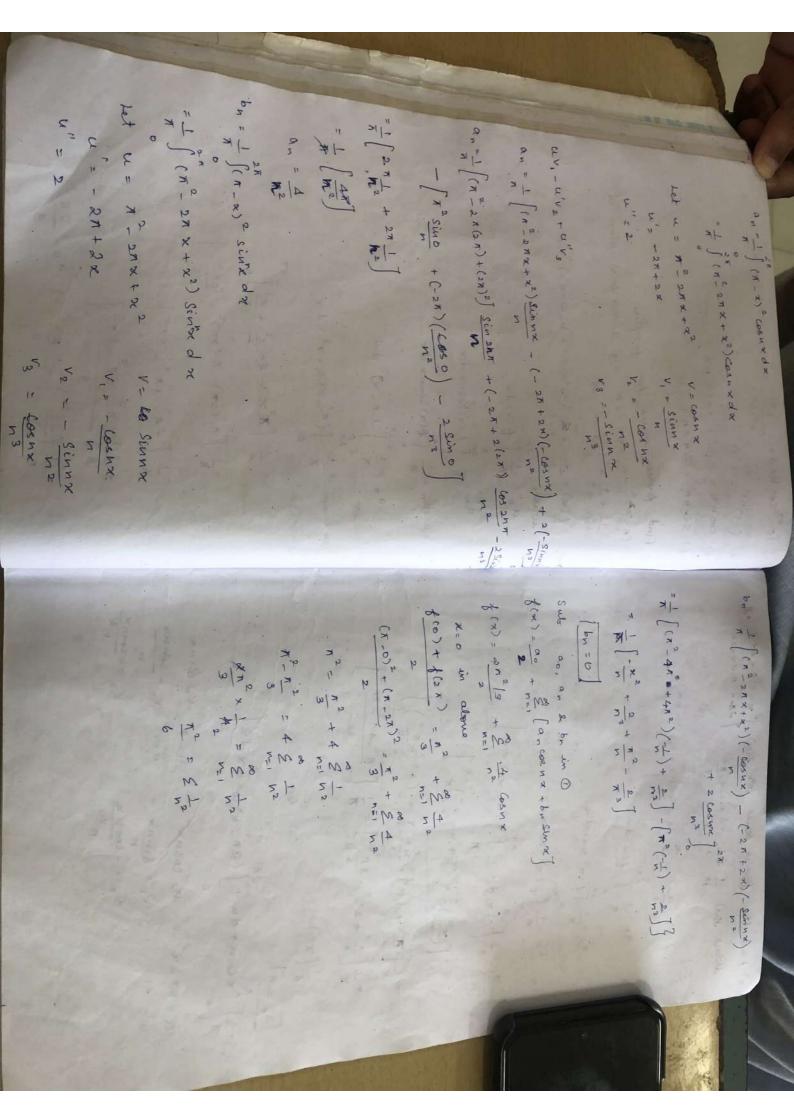
A function f(a) is said to be continuous at $\alpha = \alpha$, if limit $\lim_{x \to a} f(x) = f(a)$

f(x) is continuous in an interval (a, b), if NOTE: it is continuous at every point of that interval.

DIS CONTINUOUS FUNCTION;

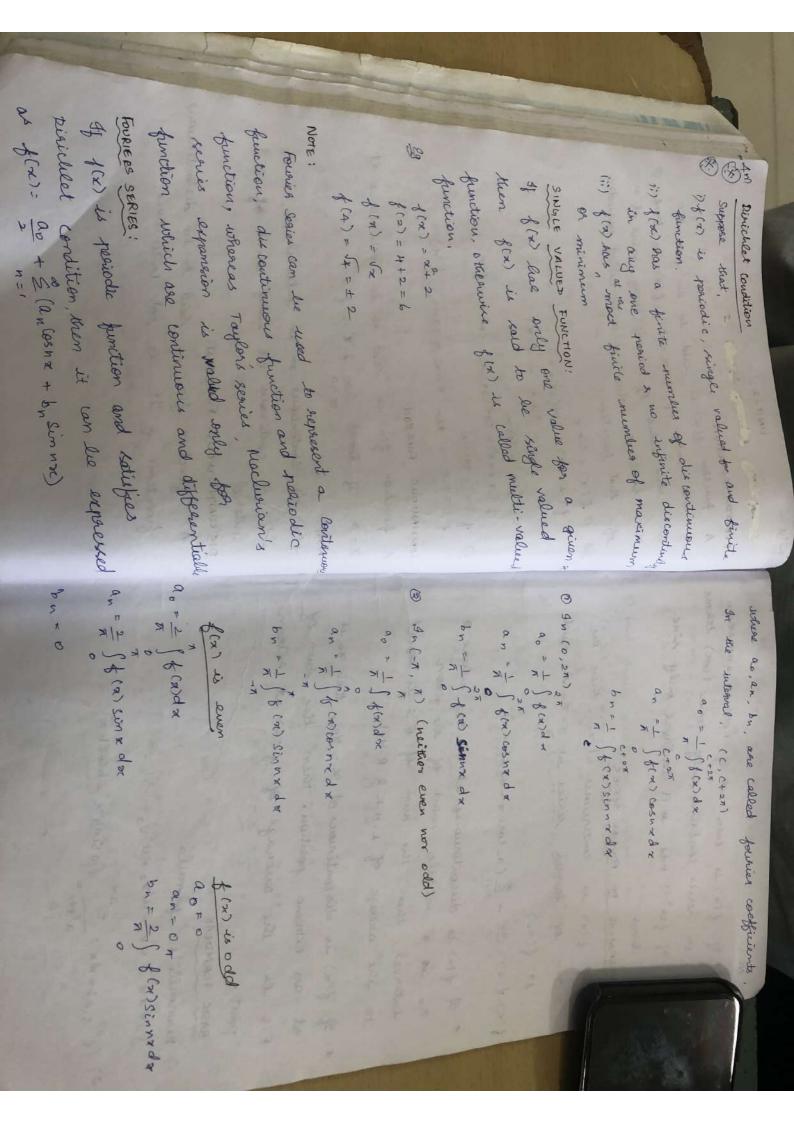
A function f(2) is said to be distontinuous function is it is not continuous. Fouriers SERVES ((x) is periodic function and satisfied



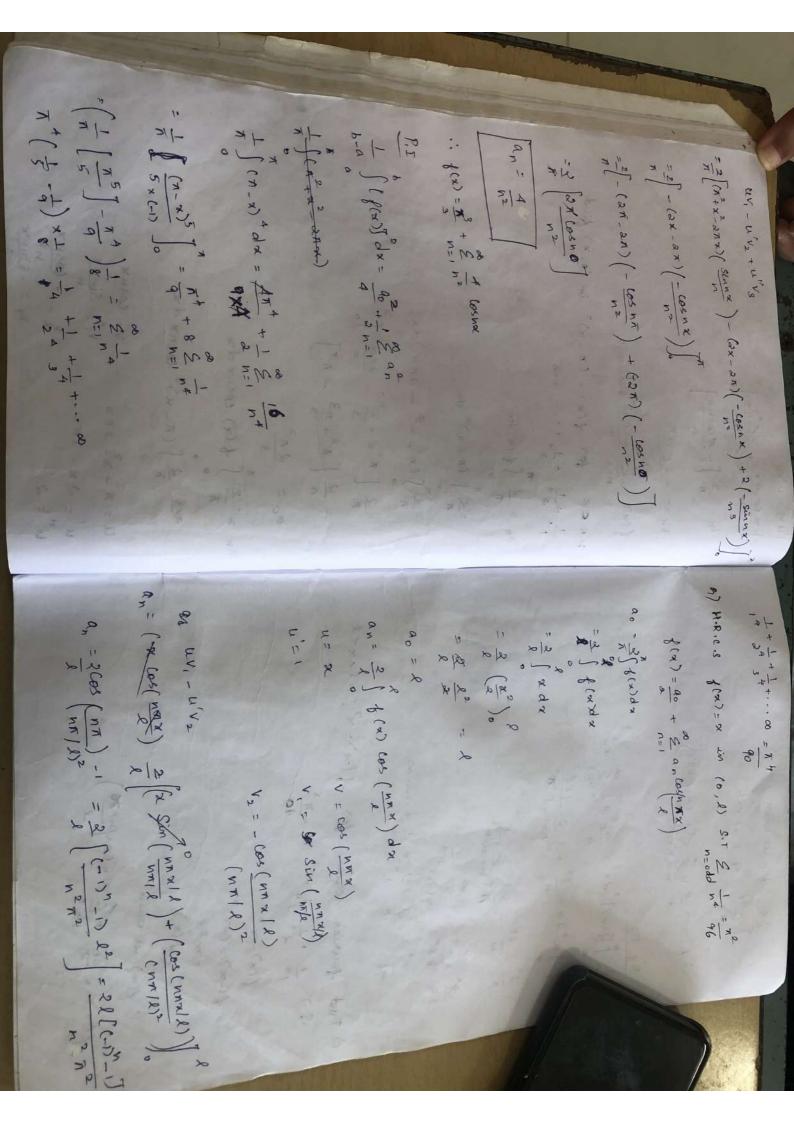


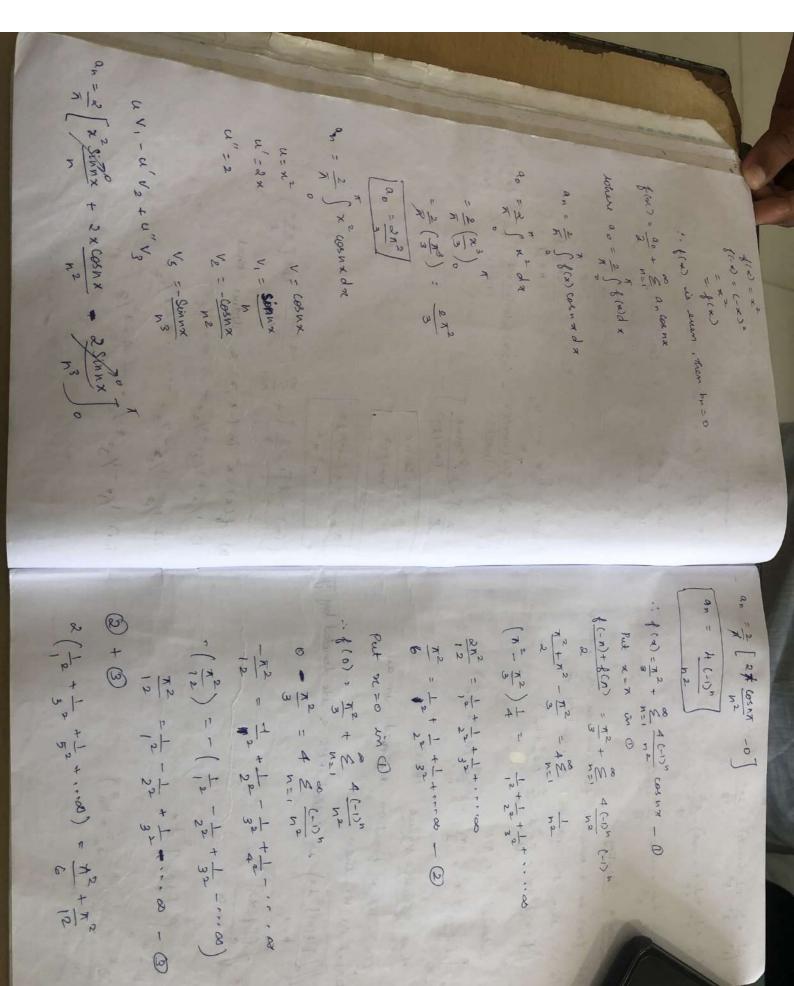
2) se sinbrax = tax (asimbx - blasbr) 1) Bermoulli's formula Surdx = uv, -u'v2 + u"v3.... \$ (x_)= \$ (x) = a0 + & (an losn a + bu simux) F.s is the average of f(n) at attendent BASIC FORMULAE + of flas is discontinuous at x=x0 where of f(x) is discontinuous at x=x0, then x0 is at an extreme position, town the sum of , philad to the average of L.H.L & R.H.L. the in a middle point of the given interval, then the sum of the six sound * & f cas is continuous at no, then the CONVERGENCE OF FOURIER SERIES form of forester peries at x= do is equal of feeries odd, on it contains well sin on review contains only cosine (cos) teams If f(x) is even see it Fourier enperence 8) find fourier series for function 3) Se ar cos bada = eax (a ces bat b sin bac)

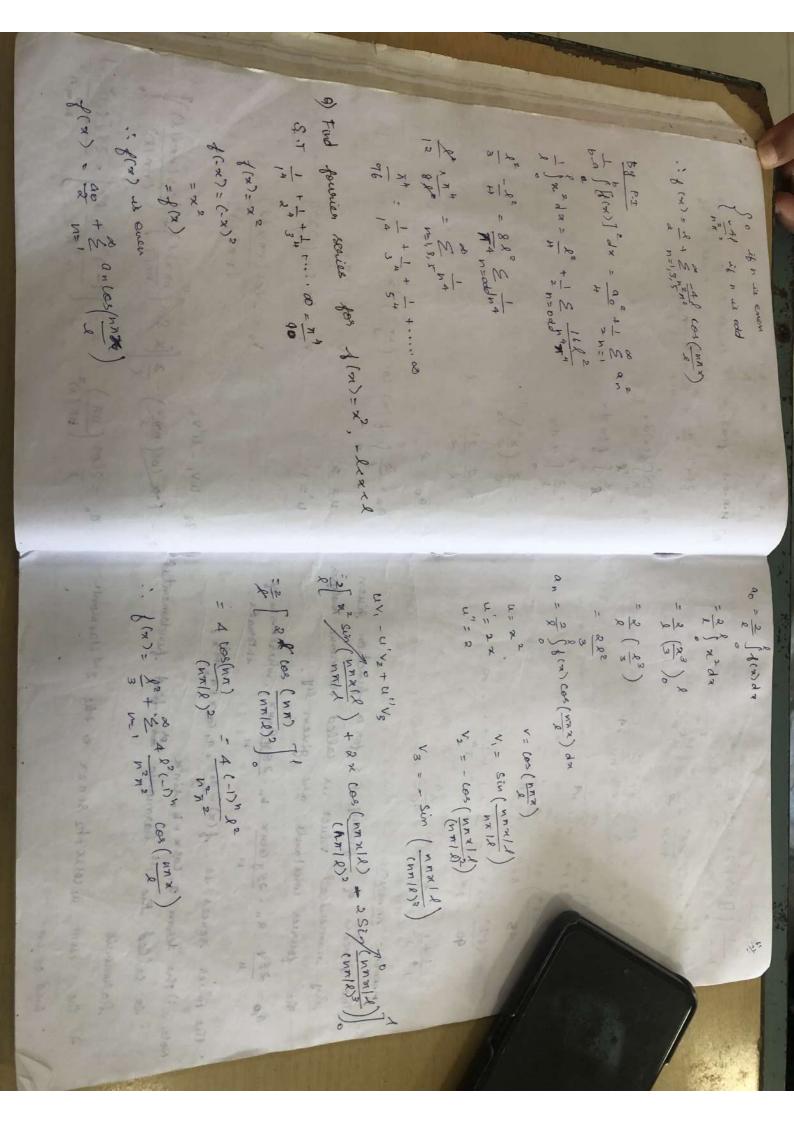
4) (-1)n+1 = (-1)n-1 6) Sinnt = Sinant = 0 8) Cosna = (-1) 2 Cas 2 th = (-1) 2 = 1 on = 1 2 / ((2) cosnx d 2 (7-x) in oix 127 and also find value of 8(x) = 90 + 1 (ances nx + bh sim nx) -0 10+1+ + + + + · · · · 8 aber 27 (x) dx a = - (7- x)2 dx A [& 18 4 8 73] · 1 673 127 + 873 7 T X X - X + X 2 + X 3 J 0 7 (1 - 2 x 7 + x2) d x 7 [7 (2m) - 7 (2n) 2 + (2n) 3 $\frac{1}{3} \left(\frac{2\pi^{3}}{3} \right) = \frac{2\pi^{2}}{3} = \frac{2\pi^{2}}{3}$

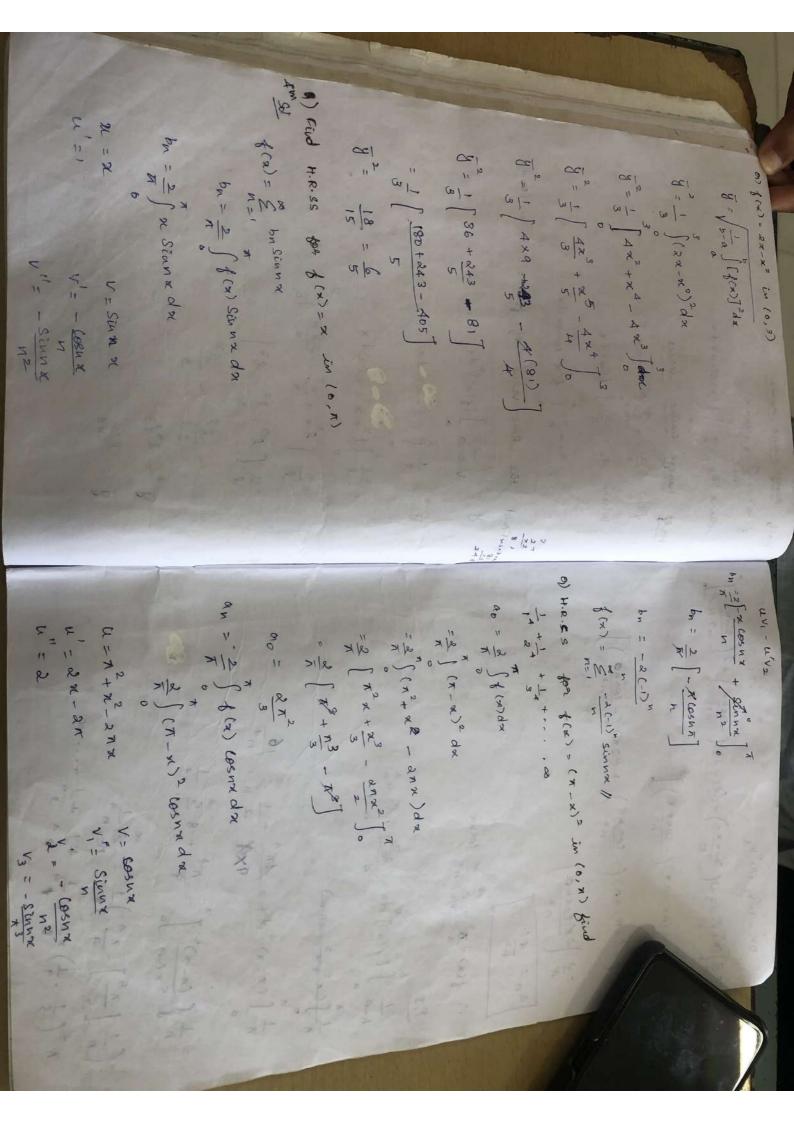


x 0=2xx y coso y coso sino y sino coso 21/8/18 9 0 0 0 0 9 0.8660 15.588 - 0.5 1 25/6 60 18 0.5 1 25/6 60 18 classificatio 2 25/3 100 24 -0.5 -12 -0.5 General A 3 A 180 28 -1 -28 -0.8660 -22.516 4 4 1/3 240 26 -0.5 -13 -0.8660 -17.32 founties PDE TAI3 290 26 -0.5 -13 -0.8660 -17.32 -0.8 10 5 10 -12.124 form of std A PDE sin 20 y sin 20 0 y cos 20 50.29 - 9 0.8660 i) find the -12 -0.8660 20, 28 0.8660 solu H -0.8660 -8.66 -13 -10 -2 Q0 = 228 = 38.3333 Q2 = 2240850 = -0.6607 = -10 $6_1 = 224 sin0 = -4.0413$ A 1 = 2 & y co80 == 10 n some of many of the classif n p2 = -2.8867 Sol A get over. 1/x42 - a bridge ha 29.836 wave 1+ 35 30 + 0, 65 5 , 6, 5 50 + 00 = (r) MARCE B ERRY







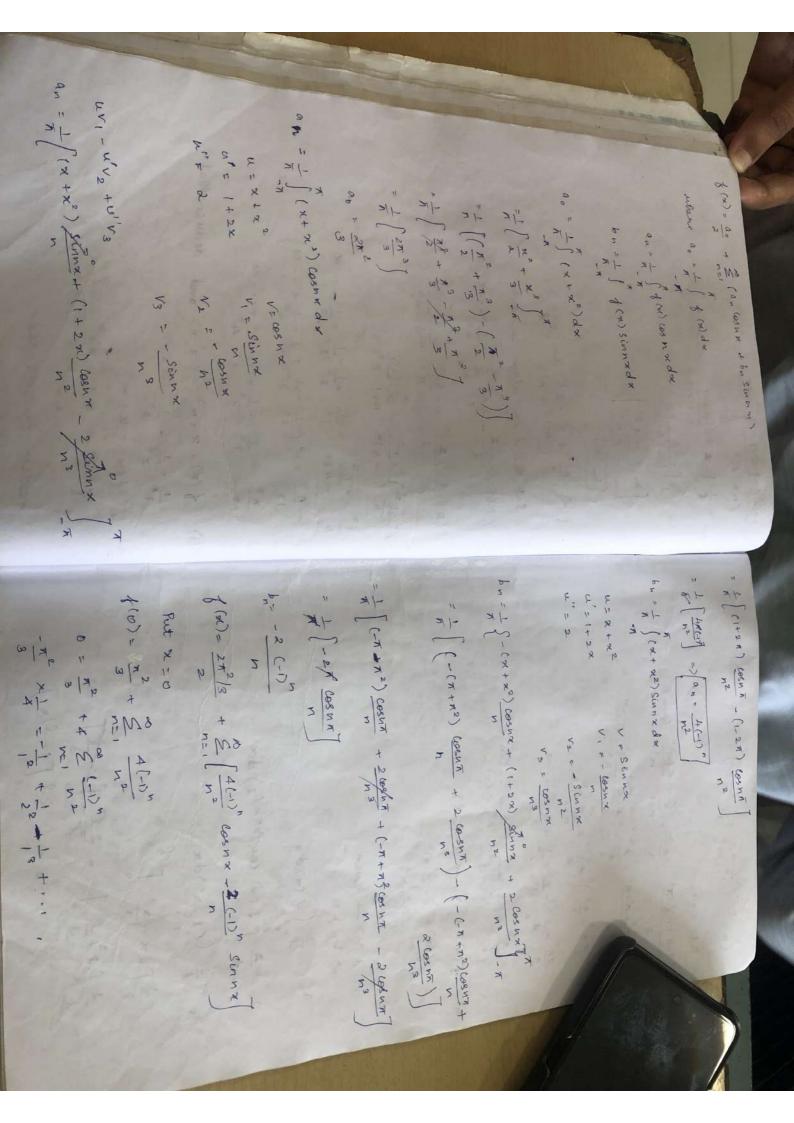


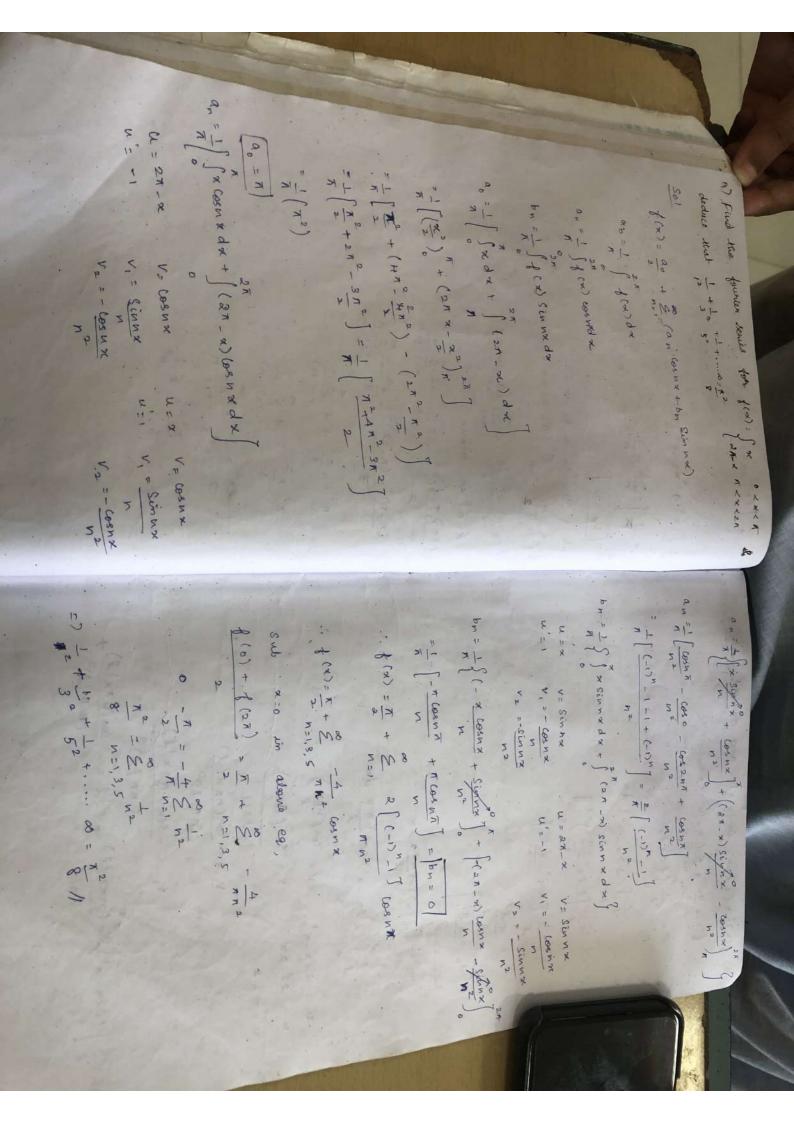
| Ison 2:0 to 1. | (a) The values of or and corresponding for over a period T are given below. Show that show that f(x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t(x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 272) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 2722) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 2722) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 2722) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 2722) + t (x) = 0.75 + 0.37 coso + 1.00 f Sin & when & = 2722 + t (x) | $a_{2} = -0.1$ $a_{3} = -0.03$ $b_{3} = -0.06$ | 25 H 05 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 2 0 0 5 2 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 |
|--|---|---|---|---|
| $f(x) = \frac{a_0}{a^2} + a_1 \cos \theta + b_1 x$ $udicou \theta = a \pi x / \lambda$ | 3) Find 1st two diasometric for f(x)=8 in (0,6) x: 0 1 2 3 4 5 y: 9 18 24 28 26 20 y: 9 18 24 28 26 20 y: 10 1 2 20 20 1=6 | $a_1 = 224 = 1.5$ $a_1 = 224 \text{ GeV} = 0.3723$ $b_1 = 224 \text{ Simb}$ $b_1 = 224 Sim$ | 0 0 1 0 | 3 0 " |

: The Folice series is, f(x) = 40 + 9, 601 x + 9, 605 x + ... Note: i) the tesom a, cosx+b, singe The term as coset be sinex to the 2nd Harmonic 300 511/3 hasmonie. ap = 254 an = 254 Gesnx bn = 254 Smnx, where his not is called the 1st harmonic at find fundamental 1800 of and so on. by numerical values is called Harmonic Avalysis The fourier constants are given by The process of finding F.s for a function given HARMONIC ANALYSIS; b-a [B(x)] dx = do + 1 & an (924-524) 74 = 2 1 45 824 = 12, 114 20 5xtd x = 2+ + 82 + 80 -8 px 14 = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 24 34 170: 21/3 2404× 3 HARMONIC ANALYSIS (11) Given dalas are in of form - radius in binen datas are in degree from a degree) Find the F.S upto 3rd hasmonic for 4=f(x) in iv) Given datas are in I form - radius (x) = 00 + (a, los x+b, Sin x) + (a 2 cos 2 x + b 2 Sin 2x) + i) biven datas are in in form - nachius The f.s upto 3rd larmonic is 10,277. Define by the value given diebon: a: 0 1/3 en/s n an/3 6, = 2 & y Sin x , 62 = 2 & Sim 2 x , 63 = 2 & y Sim 3 x , W: 1.0 1.4 1.9 1.1 1.5 (03 los 3 x + b3 Sin 3x) (00) fundamental -----1.2 1.0 5 × 3 2 A 1.9 -0.5 -0.95 -0.5 -0.95 8.4 1.2 0.5 0.6 -0.5 0.6 -1 Mal 54.0- 5.0- 54.0- 4.0- 5.1 L.G. 5.0- L.0 5.0 -----10-

as = 1 Sex-x2)dx DE LANGE OF X x [22 13] = 22x [1-1] an = 2 f f (x) cos (nxx/2) dx · 6 (m) is even. + (x) = 2 - x in (-2, 2) A CKI & S CKI A A - H + H + X + M 2 - M 2 \$(-A)+64) = A + 10 A(-) = 6247 3 Ap 12 20 30 + ... 8 10 = (t -t +t - ...) =) bu = 0 1 X (2 K) - X (fex)= 1-c-x)2 1 2-x2 ao = - 22 [1-2/3]

an = 2 [-2 P cosum
[an | 2)2
] an =2 (2-x2) (seu (mn x/2)) -9) {(x)=x2 in (-x, x) & deduce that 8 (m) = 8 [1-8] + 8 -4 (-0) 22 (85 (MTX 11 1) 1/10+1/32+1/52+1000 = 7/8 1) 1/12+1/22+1/32+··· 0=x2/6 はい, しは、マナロ、マム an = 2 ((2 - 22) 65 (unn 12) dn 4m = 2 [\$(2) cos (non/1) da an > -4 (-17)22 2 1 1 2 2 P (WT/2)2 VI - Sin (NT N/2) N= Cos (NAX) 2) V2 = - 605 (WT 12/2) (+2n) (+68(MXX/8)) +2 86 (NX/8) V3 = - Sin (NT oc la) (41/2)2 CHT ILYS





an = 1 (222 - x2) 8h (nxx/2) + (22-20) (05 (N7x)2) + u = 2/x-x2 an = 1 St (w) cos mand x 100 = 4 Pe 6) f(x)=x(2,2-x) in (0,2,2) and deduce 10 +1 +1 = 1 5 (2 12 - x2) (85 47 x don ao = 1 ffexida 2 [4 p3 8 23] \$(x) = 00 + 8 (an cosnx + bx sin (x)) = 1 [(2 2 - x3) 22] 2 Scaln-no) da 13 = - Sin (nnx/1) V2 = - (03 (nn x/1) · v, = Sin (1/2) V= Cos (n/34) na/2 (n#/2)2 (nx/2)3

: 1 (x) = 22 + 2 -42 cos (MAX) (2-222) x = 2 (-0) + 25 2 1 2 LU Just 2 24 an = \$ [-2 & cossum 1(21-1) - 212 = - 412 E (-1)n On = 1 [-42] 2 × × 2 = -1 +1 -1 +1 + 1 + 8 \$11) = a12 - 412 & 1 cosna CUN (1)2 Sub n= 1 in alone equation 12 = + (1 -1 + 1 -1 + ... w) f(x)= x+x2 (-7, +) and deduce that meither even nor odd. an = -422 人(-x) ローメナ (-x) 2 と(水) こメナルア p = 0 227 Curillia -リノメナスト