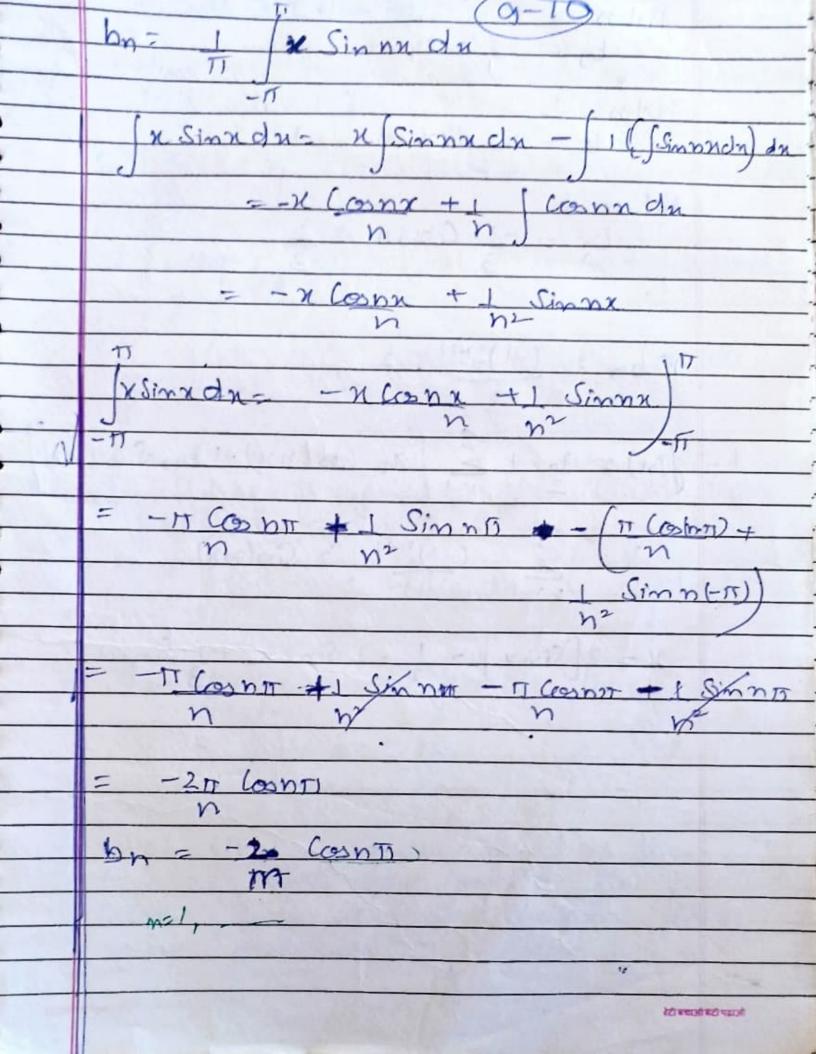
Unit-14. Fourier Peries Periodic: of function for is said to be periodic, if for some non zero constant p such that, f(n+p) = f(n) YnER Ex Vinn and Cosn are periodic with fourier Series: Let for be a ferriodic function with period 21, (170) defined on [-l, l] such that 1(x)= ao + & (an cos (nox) + bn sin hax where a, an and by are called fourier coefficients and defined by $q_0 = \frac{1}{L} \iint (x) dx$ an = 1 ff(n) cos (ntrx) du bn = 1 / f(w) sin(nIIx) dx This is called Euler formula

Inderdhanush Page : Date: NOTE - When I = TT, then f(x) is periodic with poriod 271 and defined on [-17, 17] by - I f f(x) din(nx) dx Find the Fourier series of the funct f(x)=x, -T < x < TI [-T] 1 Jan Cos(ny) dr. IT J' 11 connot conn de रेटी बच्चाउसे पेटी प्रदाजी

Sin (-0) = - Sinco (co(-0) = C00 Integration by parts: Juvan - Judu - Judu Judu = 10 -1 x cos nx dx x con ndx = x conndn - (1. sus rady)dy = +x Sinnx +1 Conx reconsider - I Tr Sinns --32 + (cosnx / -17) On = [Cos nti - [cos (-nt)] L (cosn) - Cosn)



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Put n=1 $b_1 = -2\cos n = 2$

Put n = 2 by = -2 (cos 27) = -1

 $\frac{P_{i}+n=3}{b_3-2}\frac{(cos_3\pi)=2}{3}$

Pbn = (-1)n+1). 2

J(n) = 90 + 2 [an (os (nn) + bn Sin (nn)]

 $\frac{\chi}{n} = \frac{(-1)^{n+1}}{n} \cdot \frac{2 \cdot \operatorname{Gn}(n\chi)}{n}$

x=2[Sinx] - 1 - 2 Sin2x +2 Sin3n

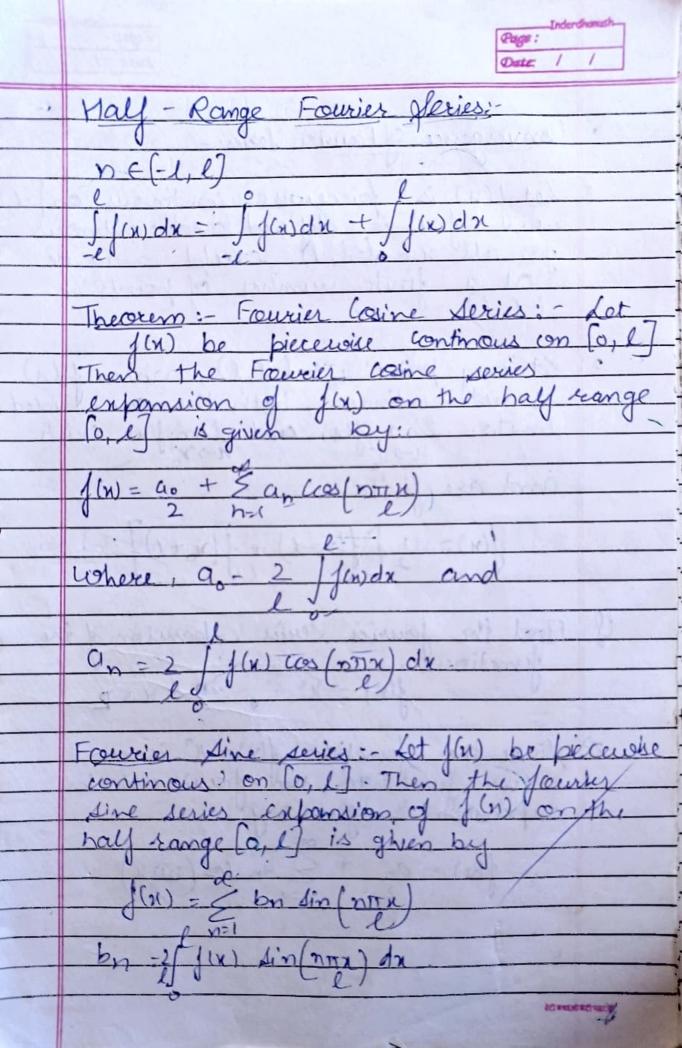
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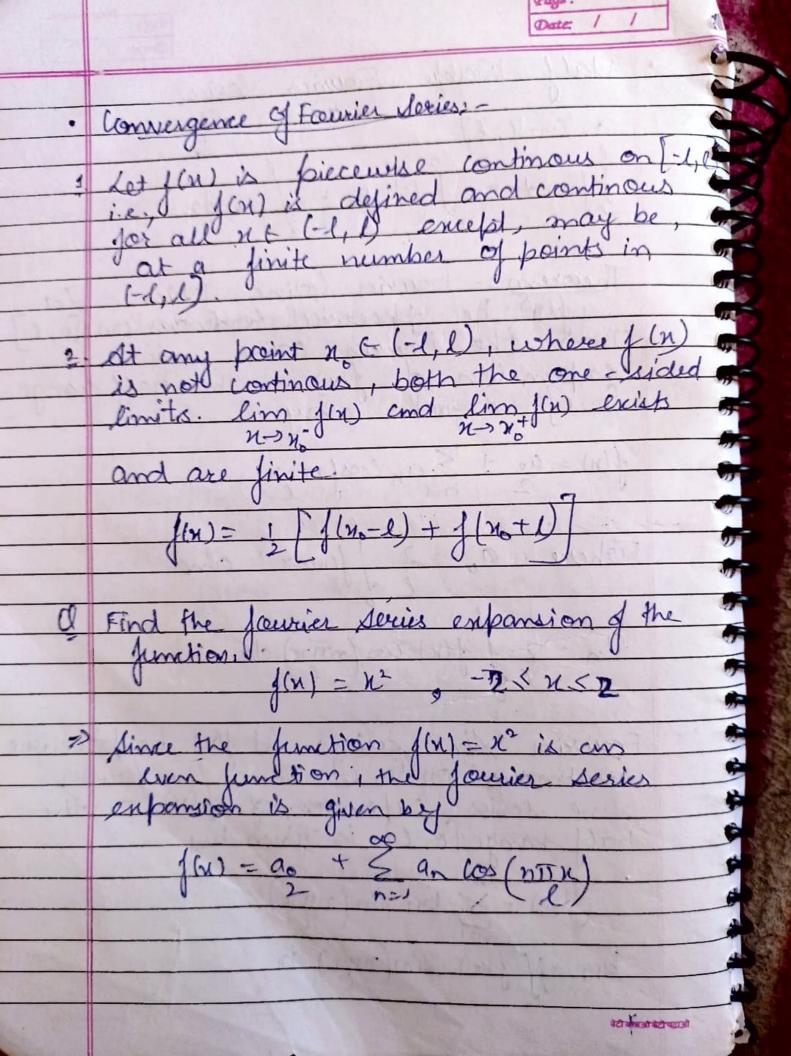
Dete: / / · Even and Odd function: denotion for is said to be even function Su. $f(x) = x^{2n}$ and Gos(nTix) are even function, 2. A function f(x) is said to be odd function

if f(-x) = -f(x) + x. Sec. f(n) = x2n+1 and sin(nTr) are dd

function, n=1, 2, 3, --Remark: 1) When the function for is an even function then Jewan = 2 Jewan, xt[-6e] 2) When Jow is an add function then [](w)dn=0, x ∈ [-e,e] Fourier series of the function then coine fourier socies and the coine fourier series and the coine fourier series is expansion is given by:

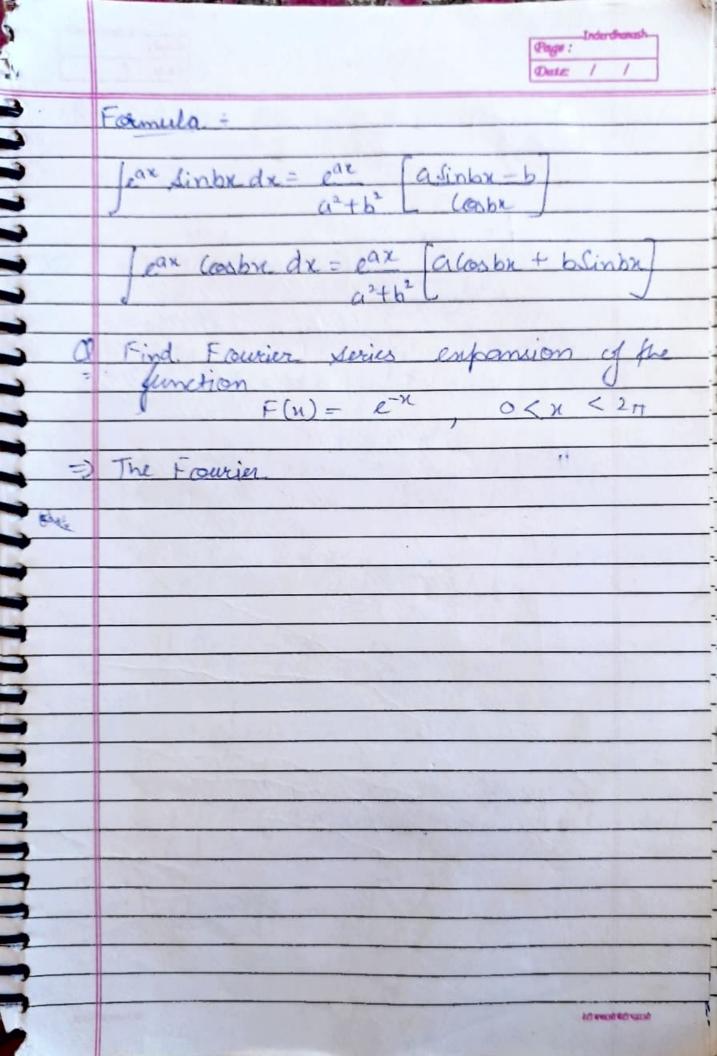
Dute: 1600 = 90 + € an cos(norus) 2 € [-1,1 where, as= = flow du and J(x) = 90 + & (an Con (nTx) + bn SinfnTx envion K given (x) = & bn Sin(nox) on = 2 f for sin (mm) dx





Date: where $a_0 = 2 \iint (w) dx = 2 = \int x^2 dx = \int x^2 dx$ -> Juv.dn= Ujvdn - John Jvdn) dn -> Sinndu - - Cosn) woundn = Stone => [xndu = xn+1 > sin(-0) = -Sino Sin (no) = 0 Cos(nr) = 11, where nie even? =1, where nie odd

Date: an = In2 cos(noru)du = $\left[n^2\left\{\sin\left(n\pi u\right)\left(\frac{2}{n\pi}\right)^2 - \int_{2\pi}^{2\pi}\sin\left(n\pi v\right)\cdot\frac{2}{n\pi}dv\right]$ = 2 .4 Sm (ntt) -0 - (4 x (-cos(ntt) -2) + 1 4 2. Cos (n71) the - [-8 (2(cos(nn)-0) + 16 (sin (nnu)
n2112 $= 16 \quad \text{Contr} = 16 \quad (-1)^n$ $h^2 \Pi^2 \qquad h^2 \eta^2$ n2 = 8 + 2 16 (-1)n



Date: Q Find the fourier enpansion of the following. $\int \Pi + x$, $-\Pi < x < 0$ as = 1 fr(n) dx = 1 ff(n) dx # JE(n) dn + JE(n)dn I S(H+K) du + sodx [tr. x + x2] = 1 [0-(17-17)+772] an = I F(N) Cos (nTX) dx = 1 f f (TI +x) (co(nx)dx + f co. los (nx)dx) TI (THX) [Sinnx] - [1. Sinnx dx] +0 रेटी सच्छाने केटी पद्धातती

1 0 + cos (nx) 11-losni where n is odd wheren nis even 0

