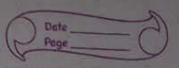
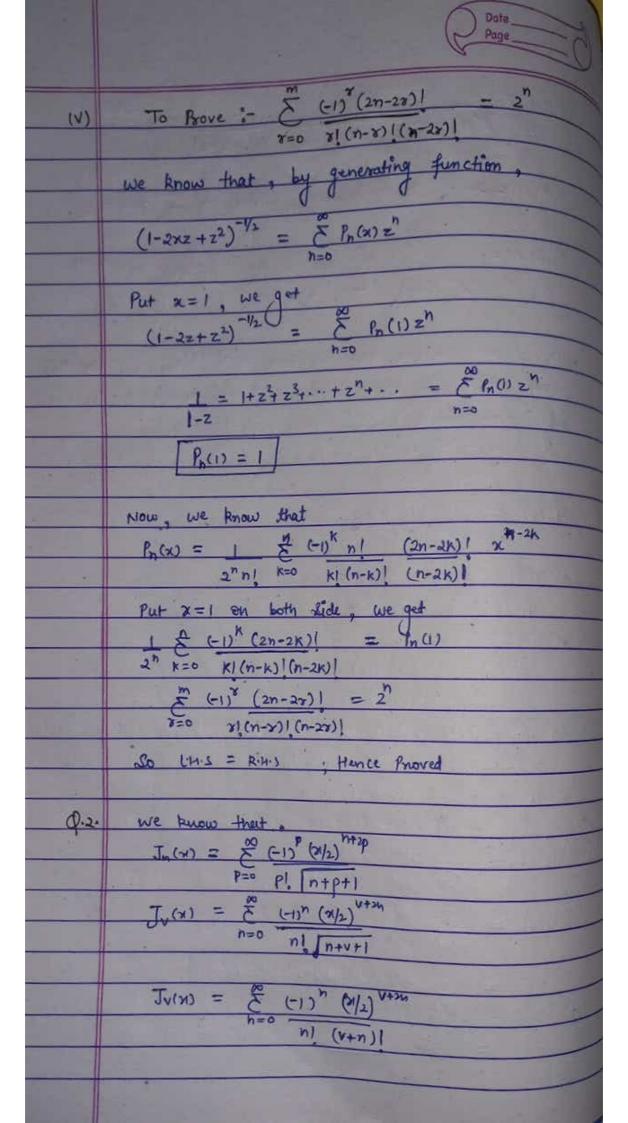
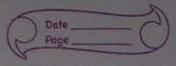
	NAME : Himanshu Dixie
	ENROLL NO. : 21103262
	BATCH : B10
	Mathematics - II (ISBIIMAZII)
	Tutorial 6
1.	(i)   x2m Pndx =0 when n in odd
L·H·	$\int_{-1}^{1} x^{2m} P_n dx = \int_{-1}^{1} x^{2m} \int_{-1}^{1} d(x^2 - 1)^m dx$
	J. 2" h   dx
	$= \int_{-\infty}^{\infty} x^{2m} d^{n} (x^{2}-1)^{n} dx$
	Z'ni T dan
	The state of the s
	[x2mAndx = 1 [ x2m dn+ (x12-1) " ] - [2mx2m-1 dx1 (x12)]
	1-1 2 n1 1 dn 1-1 dn
10 1	= 0 - 2m   x2m-1 dn-1 (x2-1) h dx
	2"n1 dx"-1
	$= -[(-1) 2m(2m-1)] x^{2m-2} d^{n-2} (x^{2}-1)^{n} dx$
	$\frac{1}{2^{n}n!} \int_{-1}^{1} \frac{d}{dx^{n+1}} dx$
7.1	
	indegrating (2m-2) times, we get,
	$= (-1)^{2m} 2m(2m-1) \dots \left[ d^{n-2m} (x^2-1)^n dx \right]$
	2" NI- dx"-2m
	$= (-1)^{2m} (2m) \left[ \int_{-2m}^{1} d^{n-2m} (x^2 - 1)^n dx \right]$
	4" n1 J-1 dx n-2m
	$= (-1)^{2m}  m                                   $
	$\frac{2^n n!}{2^n n!} \frac{d}{dx^{n-2m-1}}$
	IOHOS = ROHOS
(ii)	$P_n(x) = \int \frac{d^n}{(x^2-1)^n}$
(1)	2"n! da"
	$(x^2-)^n = \sum_{k=0}^{n} (-1)^k + 1 + 2n-2k$
	K=0 K! (n-N!



 $P_n(x) = \frac{1}{2^n n!} \frac{\sum_{k=0}^{N} (-1)^k n!}{k! (n-k)!} \frac{(2n-2k)!}{(n-2k)!} x^{n-2k}$ Put n= 2m , As n is even , N = in - N=m  $P_{2m}(x) = \int_{-\infty}^{\infty} \frac{m}{(2m)!} \frac{(4m-2k)!}{(2m-k)!} \frac{\chi^2(m-k)}{\chi^2(m-k)!} \frac{m}{(2m-2k)!}$ Here, we can osee that we have x2(m-k) ferms, so this means that only even terms will come thence but has only even degree terms. Hence proved (iii)  $f_n(x) = \frac{1}{n! 2^n} \frac{d^n}{dx^n} (x^2-1)^n$ at n=1 PICHO = X at n = 3 B(x) = 1 (5x3-3x) so we can see that when n is odd, Pin (11) always has 'n' common, so x=0 is always a root of ln(x) when n is odd, Hence Broveel  $\frac{P_n(x)}{x^n} = \frac{1}{x^n} \frac{d^n}{dx^n} (x^2 - 1)^n$  $R_{y}(x) = 1 d^{y} (x^{2}-1)^{4}$  $= 1 d^{4} (x^{8} - 4x^{6} + 6x^{4} - 4x^{2} + 1)$ 384  $dx^{4}$ = 35x4-30x2+3 . Aence Proved





	To Brove :- IV(x) converges for all value of x.
	$n^{th} + exm \neq J_{\nu}(x) \left(U_{n}(x)\right) = (-1)^{n} \left(\frac{n}{2}\right)^{\sqrt{\nu+2n}}$ $n! (\sqrt{\nu+n})!$
	D. D' Marshenk's Partin Test
	$\frac{(v+n)!}{(v+n)!} = \frac{(-1)^{n+1}}{2^{n+2n+2}} \times \frac{(v+n)!}{(v+n)!} = \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} = \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2n+2}} = \frac{(v+n)!}{2^{n+2n+2}} \times \frac{(v+n)!}{2^{n+2$
	$\frac{U_{n+1}}{U_n} = x^2$ $\frac{U_n}{U_n} = (n+1)(v+n+1)4$
	July Convergence for all x ; hence proved
	To Brove :- $d(x^n J_n(x)) = x^n J_{n-1}(x)$ $dx$
t	$\frac{d(x^{n} J_{n}(x))}{dx} = \frac{d(x^{n} J_{n}(x))$
	$= \mathcal{E}_{(2n+2n)}^{(2n+2n)} \propto^{2n+2p-1}$
	$= \underbrace{\xi^{0}}_{p=0} (-1)^{p} (2n+2p) \times 2n+2p-1$ $= \underbrace{\xi^{0}}_{p=0} (-1)^{p} (2n+2p) \times 2n+2p-1$
	$= \sum_{k=0}^{\infty} (1)^{k} 2(n+p) \qquad 2n+2p-1$
	P=0 p! (n+p) 1 2 n+2p
	$= \chi^{n} \sum_{p=0}^{\infty} (-1)^{p} (\chi)^{n-1+2p} = \chi^{n} J_{n-1}(\chi)$
	P=0 p! (n+p-1)! (+)
	R.H.S
	Jn-1(m)
	, hence Proved
	THE PARTY OF THE RESTRICT
(ii)	To Prove :- Jyz(x) = 2 sinx
	$\int \pi x$
	$J_{1/2}(x) = \mathcal{E} \in \mathbb{N}^{p} (x/2)^{1/2+2p}$
- BA	P=0 P! (P+1)!
	$- (x/2)^{1/2} - (x/2)^{1/2+2} + (x)^{1/2+2} - \cdots$
	13/2 11   5/2 21   7/2

