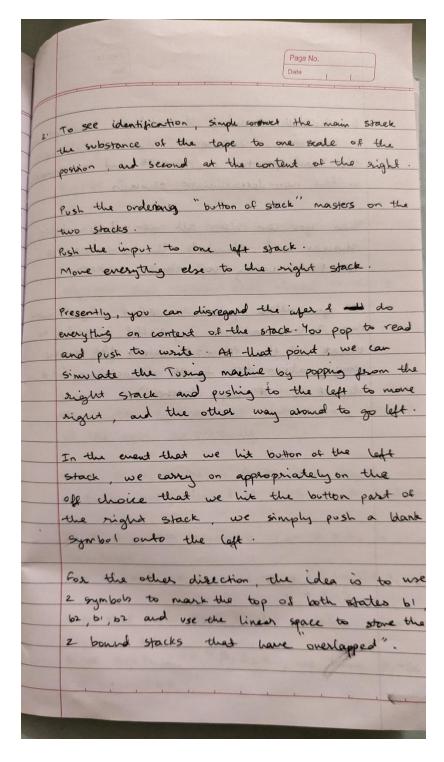
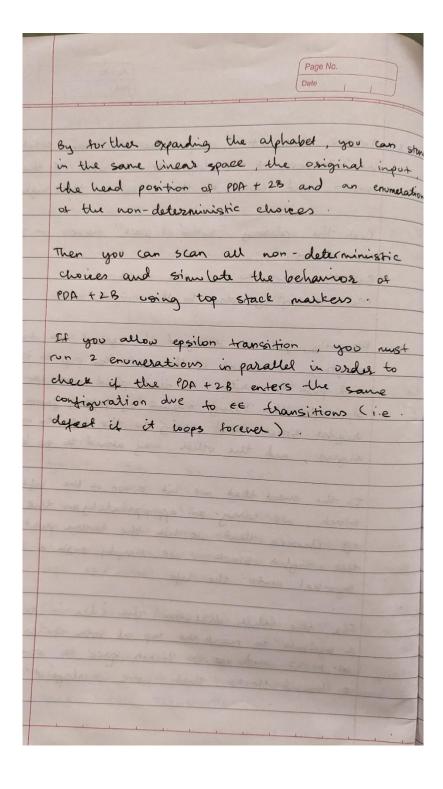
1. Give a formal definition of a Turing machine that on each move can either change the tape symbol or move the read/write head, but not both. Then describe how it can be simulated by a standard Turing machine.

	Page No.						
	Date						
	· · · · · · · · · · · · · · · · · · ·						
1:	A universal turing machine is a one that gets						
	simulated by other turing machines. It is known						
2000	to be automatic function system which has some						
	finite & infinite value.						
-							
	It has a head which is all to read and write						
	symbols & can move left and right, but only in						
	one at a time.						
	169 119 119						
	M = (Q, 5, T, 8, Qo, B, F)						
	Here, M is known as turing machine						
F . P .	& set of symbols on which turing machine is						
	working . contains all alpha # 8 .						
	T is known as dape, it also includes Bon it.						
	8 is transaction function, it works on a						
	formula QXT = QXT X £ L, RB.						
	ADT MUICA CAN THE CONTRACT OF						
	- and an						
	This shows read head on tape will change the						
2000	state of turing machine 20, then writes a						
100.00	symbol on tape and can move left or right.						
	which who should not have shall						
	It stores product have multiplication sign represent						
4 6	that all symbols are used in machine.						
	B - represents blank symbol						
-	90 7 represents initial state						
Zane	F 7 final state						
	criticipand was vaid						
	a = { A, B, C, Hall (set of final state)}						
1							
1 To 1 1 To 1							

(Bulger)		1	Page No.				
The second second		t	Date	1	7		
7 = 20,13			-			1	
8 = 2 0 3	Sandania and the	Seats A				-	
٤ = ٤ ١ ٤	the Laboratoria	140 22	Challe I			-	
Tape Current	state A a	rrent st	ate 3		Chrise	-	
Symbol WRITE	tape Initial was	TE Tape	Next	write		-	
,	L B '	R	C	1	R	B	
show boo below of	La Cal dadis	R		41		ingle	
does trad hopeline be	c 42a1 . 33om	And St.	Acres no	sur 2		1	
symbol qo	21	92	2010	200		1	
a IRa	1290	1123					
b ILa	I Rq.	1894	s 20) 4	: And			
en a la constante	BOX HOLD BUILD	rat since	Mu. sa	anter!			
eg- M=(0xE, S, 90, B, F)							
$x = \{a, b\}$, $\epsilon = \{i\}$ $q_0 = \{q_0\}$ $\beta = b a_0k$, $\epsilon = \{q_1\}$							
a no service its	+ = 1 9r 3	5 And 07	1 M 21	7		-	
Symbol 20	3 9	30200	th el	8		-	
a Irai	1190 1	La.	Mymos	4		-	
6 /Laz	IRQ. 1	Rg.				-	
It moves right	& next state	is a	That			-	
12 implies with	te symbol	is 1.	The to	ransa	chon	-	
left and enext	is 92.	Engli		Pn	iones	1	
Copie roll milligin	Com Bridge Kar	abong the	montain 43			1	
From above, S(qx, Qx) = (q2, b) or 8(q3, a)							
Visit 1 adding	in throther was	(94	, 2) .				
where que is some newly chosen state and first							
change transaction and second							
being more t	languetion.		>			1	
		9.4	3 0				

2. A two-stack npda is an npda with two independent stacks. A move depends on the tops of the two stacks and results in new values being pushed on these two stacks. Show that two-stack npdas are equivalent to standard Turing machines. As usual, showing equivalency requires showing both directions.





3. Assume that S_1 and S_2 are countable sets. Prove that $S_1 \cup S_2$ and $S_1 \times S_2$ are also countable.

