cycle test - 3 Answer key FLA. Set B

part A

① G - Girl
B - Boy. 8m

i	G1	G2
1	B	BBB
2	BGBBB	BG
3	BG	G

Take this combination 2, 1, 1, 3.

By concatinating strings in this series.

$G1_2\ G1_1\ G1_1\ G1_3 = G2_2\ G2_1 G2_1\ G2_3$.

BG BBB B B BG = BG BBB BBB G.

∴ instance of PCP : 2, 1, 1, 3.

In this problem, PCP is decidable. 2m

In general PCP is undecidable, ie., given an instance, we will not be able to tell 100% percent of the times if that instance has a match & not.

Part B

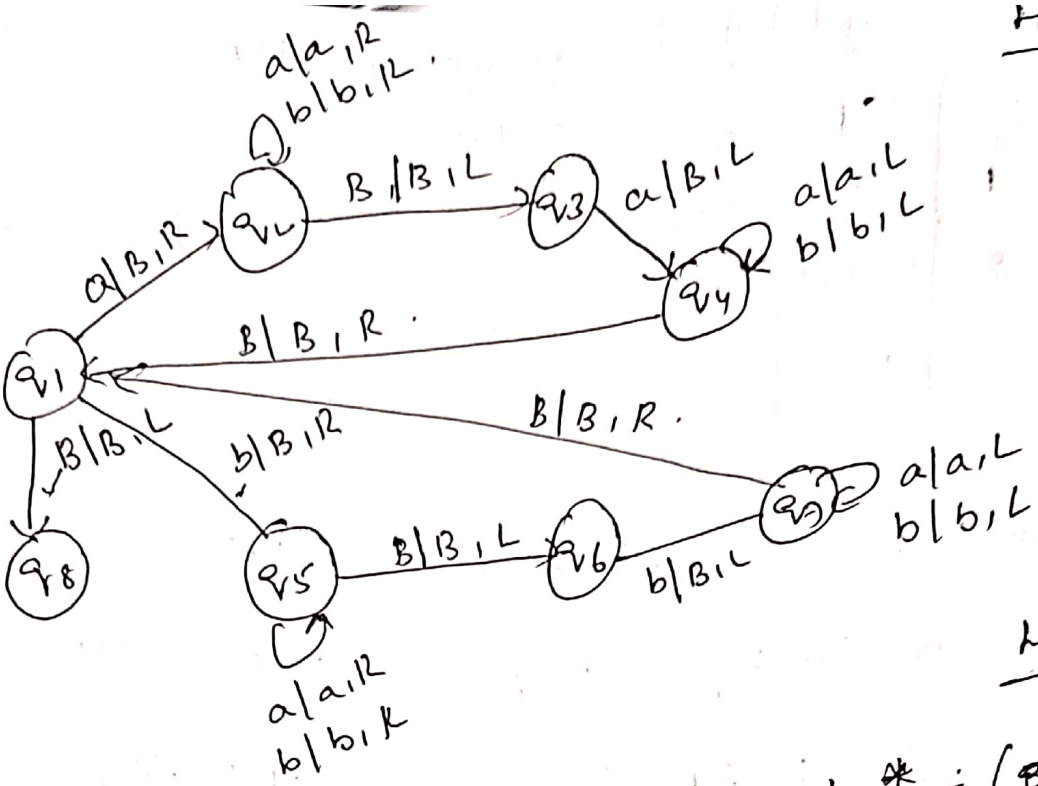
② The language represented by the given is

$L = \{ ww^R \mid w \in \{a, b\}\}$. — 2m

The transitions are — 8m

	a	b	B
start → q_1	(q_2, B, R)	(q_5, B, R)	(q_8, B, L)
q_2	(q_2, a, R)	(q_4, b, R)	(q_3, B, L)
q_3	(q_4, B, L)		
q_4	(q_4, a, L)	(q_4, b, L)	(q_1, B, R)

	a	b	B
q_5	(q_5, a, R)	(q_5, b, R)	(q_6, B, L)
q_6		(q_7, B, L)	
q_7	(q_7, a, L)	(q_7, b, L)	(q_1, B, R)
*q_8	–	–	–



HM

HM

iii) $(q_1\ a\ baba) \vdash (B\ q_1\ baba) \vdash^{*} (B\ bab\ q_3\ B)$

$\vdash^{*} (B\ q_1\ babB) \vdash^{*} (BB\ a\ q_7\ BB)$

$\vdash^{*} (BB\ q_1\ BBB)$

$\vdash (BB\ B\ q_2\ BB)$

$\vdash (B\ B\ BB\ q_3\ B)$

at q_3 we don't have transition for B

Hence ababa not accepted by given TM

iv) A

v) a, b, c, d any option is correct.

(2)

Finite automata

3) 1) It recognises regular languages.

2) Input tape is of finite length

3) The transition function in finite automata can be represented by

$$\delta : Q \times \Sigma^* \to Q$$

Turing machine

1) It recognises not only regular language but also context free language, context sensitive language and recursively enumerable languages.

2) Input tape is of infinite length.

3) Transition function in Tm is

$$\delta : Q \times T \to Q \times T \times \{L, R\}$$

ii) C — 1m

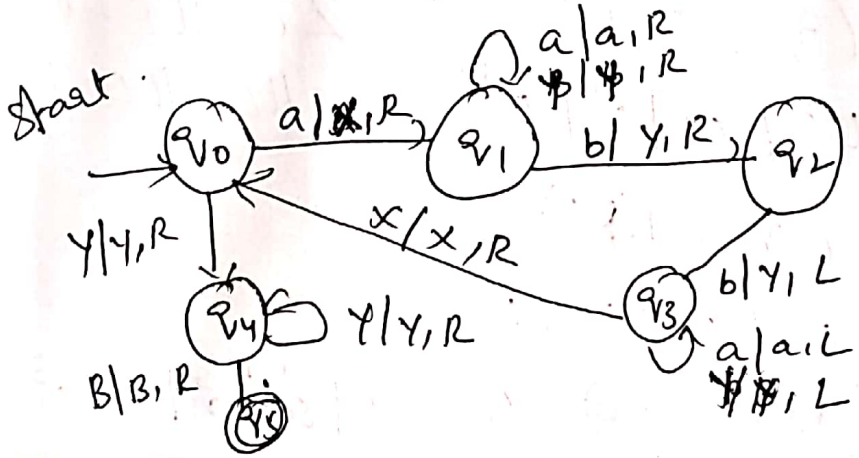
iii) B — 1m

iv) The language for the given scenario is $L = \{ a^m b^{2n} \mid w \in \{ n > 0 \} \}$ — 2m

a - milk

b - bread

5m



v) The above machine is deterministic because it does not have multiple transitions for any i/p. It does n't perform more than one action for any given situation.

4 3) A

ii) D

iii) 3m

The Tm is for incrementing binary number by 1.

iv)

States	Tape symbols	Pm
q_0 – 0	0 – 0	L – 0
q_1 – 00	1 – 00	R – 00
q_2 – 000	B – 000	N – 000

$\delta(q_0, 0) = (q_0, 0, R)$

$C_1 = 0^1|0^1|0^1|0^1|0^2$

$\delta(q_0, 1) = (q_0, 1, R)$

$C_2 = (0^1|0^2|0^1|0^2|0^2)$

$\delta(q_0, B) = (q_1, B, L)$

$C_3 = (0^1|0^3|0^2|0^3|0^1$

$\delta(q_1, 1) = (q_1, 0, L)$

$C_4 = 0^2|0^2|0^2|0^1|0^1$

$\delta(q_1, B) = (q_2, 1, N)$

$C_5 = 0^2|0^3|0^3|0^2|0^3$

$\delta(q_1, 0) = (q_2, 1, N)$ $C_6 = 0^2|0^1|0^3|0^2|0^3$

note

N – N is for no move.

This can be taken as L & R. & it can be given a code.

Tm is $\angle C_1 || C_2 || C_3 || C_4 || C_5 || C_6$.

$(q_1 00) \vdash (0 q_1 0) \vdash (00 q_1 B) \vdash$

$(00 q_2 B) \vdash (0 q_3 01 q_2 B)$

↑ Halt and reaches final state

Hence the turing machine is for incremented the binary number.