4. The school organized a children's day celebration event for all its students. The students participated in various games of the events. One such game is picking the color flowers from the pool. The student has to pick the flowers in the order specified. The one who is picking all the flowers in the specified order at the earliest is the winner. The colored flowers are red, green, violet and yellow.

Case (i) : First they should pick 'n' number of red flowers then 'm' number of green flowers then '2 m' number of violet flowers and at least '3 n' number of yellow flowers.

Case (ii) : First they should pick 'n' number of red flowers then '4 n' number of green flowers.

i. Write the language for both the cases using set former. 5 4 3 2

ii. Construction of PDA for both the cases. 8 3 3 4

iii. Check whether one red flower followed by 4 green flowers can be picked using instantaneous description in case (ii)'s PDA? 5 3 3 4

iv. What can be inferred from the PDAs constructed for the given scenario? 1 4 3 2

(A) The PDA constructed for case (i) is non deterministic

(B) The PDAs constructed for case (i) and case (ii) are deterministic

(C) The PDA constructed for case (ii) is non deterministic

(D) The PDAS constructed for case (i) and (ii) are non-deterministic

v. What can be said about the language accepted by a PDA with 121 stack elements? 1 4 3 2

(A) Regular

(B) Context free

(C) Recursive

(D) Nothing can be inferred

Red, green, violet, yellow $\Rightarrow r, g, v, y$

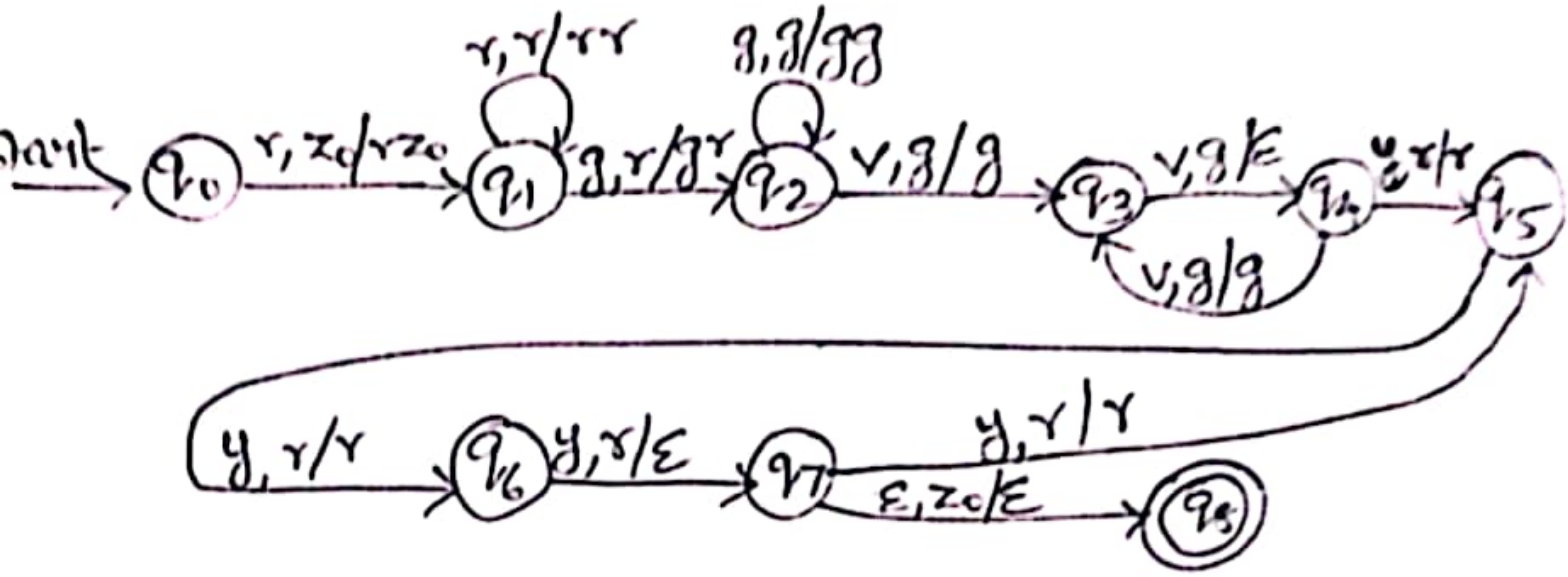
case (i)

$$L_1 = \{ r^n g^m v^{2m} y^{3n} \mid n \geq 1, m \geq 1 \}$$

case (ii)

$$L_2 = \{ r^n g^{4n} \mid n \geq 1 \}$$

PDA, $P = (\{q_0, q_1, \ldots q_8\}, \{x, y, v, z\}, \{x, y, z_0\}, \delta, q_0, z_0, \{q_8\})$



$\delta(q_0, x, z_0) = (q_1, xz_0)$

$\delta(q_1, x, x) = (q_1, xx)$

$\delta(q_1, y, x) = (q_2, yx)$

$\delta(q_2, y, y) = (q_2, yy)$

$\delta(q_2, v, y) = (q_3, y)$

$\delta(q_3, v, y) = (q_4, \varepsilon)$

$\delta(q_4, v, y) = (q_3, y)$

$\delta(q_4, y, x) = (q_5, x)$

$\delta(q_5, y, x) = (q_6, x)$

$\delta(q_6, y, x) = (q_7, \varepsilon)$

$\delta(q_7, y, x) = (q_5, \varepsilon)$

$\delta(q_7, \varepsilon, z_0) = (q_8, \varepsilon)$

b) PDA, $P = (\{q_0, q_1, \ldots q_6\}, \{r, g\}, \{r, z_0\}, \delta, q_0, z_0, \{q_6\})$

$\delta(q_0, r, z_0) = (q_1, rz_0)$

$\delta(q_1, r, r) = (q_1, rr)$

$\delta(q_1, g, r) = (q_2, r)$

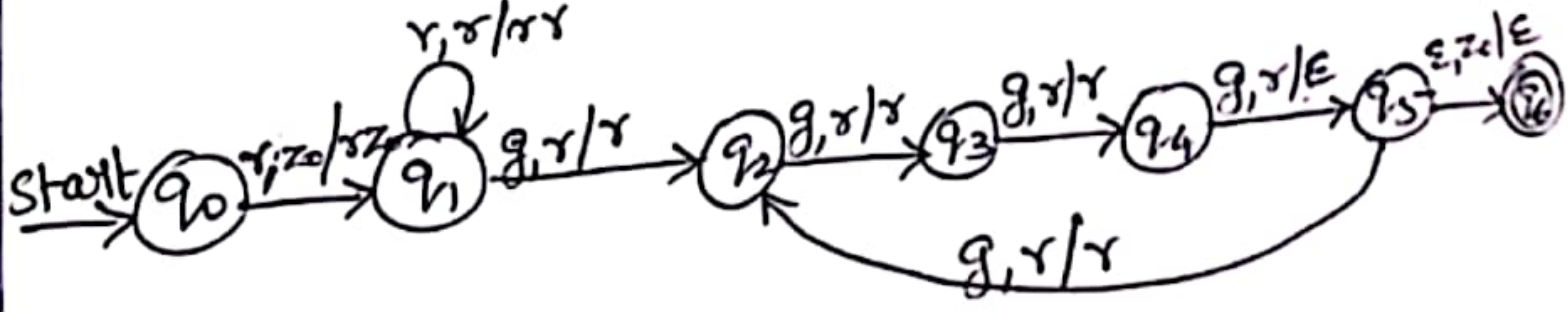
$\delta(q_2, g, r) = (q_3, r)$

$\delta(q_3, g, r) = (q_4, r)$

$\delta(q_4, g, r) = (q_5, \varepsilon)$

$\delta(q_5, g, r) = (q_2, r)$

$\delta(q_5, \varepsilon, z_0) = (q_6, \varepsilon)$



$(q_0, rgggg, z_0) \vdash (q_1, gggg, rz_0)$

$\vdash (q_2, ggg, rz_0)$

$\vdash (q_3, gg, rz_0)$

$\vdash (q_4, g, rz_0)$

$\vdash (q_5, \varepsilon, z_0)$

$\vdash (q_6, \varepsilon, \varepsilon)$