CS & IT ENGINEERING

Theory of Computation
(Finite Automata)

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DPP 11 Discussion Notes

$m == n$

A. $L = \{a^m b^n \mid m \not< n \text{ and } m \not> n\}$

B. $L = \{a^n b^n c^n \mid n \geq 100\}$

finite combination

C. $L = \{a^m b^n \mid \text{LCM}(m, n) = 100\}$

D. $L = \{aaa^n b^n bb \mid n \geq 1\}$

Consider the following two language L_1 and L_2.

[MCQ] (P)(W)

$L_1 = \{www \mid w \in \{a\}^*\} = \{\varepsilon, a^3, a^6, a^9, \ldots\} = (aaa)^* = a^{3n}$

$L_2 = \{\{a^n{}^n\} * \mid n \geq 1\} = a^*$

Which of the following is (correct?)

A. only L_1 is regular.

B. only L_2 is regular.

C. Both L_1 and L_2 are regular.

D. None of these.
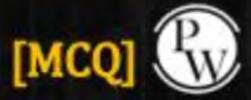
Q.3 Which of the following language is ~~non-regular?~~ [MCQ] (P W)

A. $L = \{wxw^R \mid x, w \in \{a, b\}^*\}. \longrightarrow reg$

B. $L = \{wxw \mid w, x \in \{a, b\}^*\}. \longrightarrow reg$

C. $L = \{wxwx \mid w, x \in \{a, b\}^*\}. \longrightarrow non\ reg$

$\underbrace{wx\,wx}_{y\ y}$

D. None of these

Q.4 Consider the following grammar G_1 and G_2:

[MCQ]

$G_1: S \to aAb$

$A \to aB \mid \epsilon$ $\Rightarrow A \to aAb \mid \epsilon$

$B \to Ab$

$a^n b^n$

$G_2: S \to a\underline{A}\underline{B}b$

a_b^+

$A \to aA \mid \epsilon \Rightarrow a^*$

$B \to bB \mid \epsilon \Rightarrow b^*$

Which of the following grammar generates a regular language?

A. G_1 only

B. G_2 only

C. Both G_1 and G_2

D. None of these

Q.5 Consider the following three languages: [NAT]

(1) $L = \{a^{n^n} \mid n \geq 1\}$

(2) $L = \{a^{m^n} \mid m = n^2, n \geq 1\} = \{a, a^8, \cdot a^{9^3}, \cdot \cdot \}$

(3) $L = \{a^{m^n} \mid n \geq 1, m > n\}$

Total number of regular languages is/are _____ 1 .

$a^{m^1} \rightarrow a^2, a^3, \cdot a^4, \cdot \cdot \cdot$

Q.6

Consider the following grammar

G:

$$G = S \rightarrow AB \mid CD$$

$A \rightarrow aaA \mid \in$ $\quad \rightarrow (aa)^*$

$B \rightarrow bB \mid \in$ $\quad \rightarrow b^*$

$C \rightarrow aaC \mid \in$ $\quad \rightarrow (aa)^*$

$D \rightarrow bD \mid \in$ $\quad \rightarrow b^*$

$$(aa)^* b^* + (aa)^* b^*$$

The language generated by above grammar is:

A. Finite ✗

B. Infinite but regular ✓

C. Non-regular ✗

D. None of these

Q.7 Which of the following language is non-regular? [MCQ]

A. $L = \{a^{2m} \underline{b^n} \underline{b^n} \mid m, n \geq 1\} = \{a^{2m} b^{2n} \mid m, n \geq 1\} \longrightarrow reg$

B. $L = \{\underline{a^m} \underline{b^n} X \mid m, n \geq 1, X \in \{a,b\}^*\} = a^+ b^+ (a+b)^* \longrightarrow reg$

C. $L = \{\{a^{n^2}\}^* \mid n \geq 0\} = a^* \longrightarrow reg$

D. None of these