

**EPT-TEST- 45(TOC)**  
**Total Questions: 20**  
**Time: 60 Minutes**

**Q1. [MCQ]**

**Consider the following grammar G:**

**S-> aSa | aAa**

**A->Bb**

**B->c**

**The grammar G belongs to which type of Chomsky classification?**

- (A) Type 3**
- (B) Type 2 but not type 3**
- (C) Type 1 but not type 2**
- (D) Type 0 but not type 1**

**Q2. [MCQ]**

**What is the highest type number that can be assigned to the following grammar?**

$S \rightarrow aA \mid bB$

$A \rightarrow aB \mid bC$

$B \rightarrow aB \mid bB$

$C \rightarrow aC \mid bC \mid \in$

(A) Type 0

(B) Type 1

(C) Type 2

(D) Type 3

### Q3. [MCQ]

Consider the following grammar G with starting symbol S:

$S \rightarrow bTbb$

$T \rightarrow bTbb \mid Acccb$

$A \rightarrow aAc \mid \in$

What is the highest type number that can be assigned to the following grammar?

(A) Type 0

(B) Type 1

(C) Type 2

(D) Type 3

**Q4. [MCQ]**

A grammar has the following productions:

$S \rightarrow aSSb \mid a \mid bSa$

Which of the following sentences are in the language that is generated by this grammar?

(A) aaaaabb

(B) aabbaabb

(C) bbbaabbaa

(D) All of the answers above are correct

**Q5. [MCQ]**

Consider the grammar below, with the start symbol S.

$S \rightarrow AS \mid SB \mid \epsilon$

$A \rightarrow Aa \mid a$

$B \rightarrow Bb \mid b$

**Which of the following strings can't be generated by this grammar?**

- (A) a
- (B) abb
- (C) abba
- (D) aaabbb

**Q6. [MCQ]**

**Which of the following strings cannot be derived from the symbol S using the rules**

$$S \rightarrow SS \mid aaa \mid aaaaa \text{ ?}$$

- (A) aaaaaa
- (B) aaaaaaa
- (C) aaaaaaaaa
- (D) aaaaaaaaaa

**Q7. [MCQ]**

**Consider the following grammar**

$$S \rightarrow XY \mid W$$

$X \rightarrow aXb \mid \epsilon$

$Y \rightarrow cY \mid \epsilon$

$W \rightarrow aWc \mid Z$

$Z \rightarrow bZ \mid \epsilon$

What is the language generated by this grammar?

- (A) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j = k$  }
- (B) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j \text{ or } i = k$  }
- (C) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j \text{ or } j = k$  }
- (D) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i \neq j \text{ or } i \neq k$  }

#### Q8. [MCQ]

The language generated by the following grammar is

$S \rightarrow aB \mid bA$

$A \rightarrow a \mid aS \mid bAA$

$B \rightarrow b \mid bS \mid aBB$

(A) Strings contain equal number of a's and equal number of b's.

(B) Strings contain odd number of a's and odd number of b's.

(C) Strings contain odd number of a's and even number of b's.

(D) Strings contain even number of a's and even number of b's.

### Q9. [MSQ]

Consider the following grammar

$$S \rightarrow 0S0 \mid 0S1 \mid 1S0 \mid 1S1 \mid 0$$

What is the language generated by this grammar?

(A) { $w \in \{0, 1\}^*$  | the length of  $w$  is odd }

(B) { $w \in \{0, 1\}^*$  | the length of  $w$  is odd and the middle symbol is 0 }

(C) { $w \in \{0, 1\}^*$  | the length of  $w$  is odd and the middle symbol is 1 }

(D) { $w \in \{0, 1\}^*$  |  $w$  contains 0 in middle }

### Q10. [MCQ]

Consider the following grammar  $G$  with start symbol  $S$  over the alphabet  $\Sigma = \{a, b\}$

$$S \rightarrow Aa \mid MS \mid SMA$$

$A \rightarrow Aa \mid \in$

$M \rightarrow \in \mid MM \mid bMa \mid aMb$

The language generated by G is

- (A) All strings with more a's than b's.
- (B) All strings with one more a's than b's.
- (C) All strings with more b's than a's.
- (D) All strings with equal a's and b's.

### Q11. [NAT]

How many of the following is/are true? \_\_\_\_\_

- (i)  $baa \in a^*b^*a^*b^*$
- (ii)  $b^*a^* \cap a^*b^* = a^* \cup b^*$
- (iii)  $a^*b^* \cap c^*d^* = \emptyset$
- (iv)  $abcd \in (a(cd)^*b)^*$

### Q12. [MCQ]

The regular expression  $b^*ab^*ab^*ab^*$  represents the language

- (A)  $L = \{w : w \in \Sigma^*, na(w) = 3\}$

(B)  $L = \{w : w \in \Sigma^* \text{ } na(w) \leq 3\}$

(C)  $L = \{w : w \in \Sigma^* \text{ } na(w) \geq 3\}$

(D) none

### Q13. [NAT]

How many of the following is/are true?

(i)  $(ab)^*a = a(ba)^*$

(ii)  $(a + b)^* b (a + b)^* = a^* b (a + b)^*$

(iii)  $[(a + b)^* b (a + b)^* \cup (a + b)^* a (a + b)^*] = (a + b)^*$

(iv)  $[(a + b)^* b (a + b)^* \cup (a + b)^* a (a + b)^*] = (a + b)^+$

(v)  $[(a + b)^* ba (a + b)^* \cup a^*b^*] = (a + b)^*$

### Q14. [MSQ]

Which of the following regular expressions are equivalent to the regular expression

$$R = (bba + aab + ab + b + a)^* \in$$

(A)  $(a^*b^*)^* \quad$  (B)  $(a^*b^*)^* \in$

(C)  $(a + b + aa)^* \quad$  (D)  $(a + b)^*$

### **Q15. [MCQ]**

The language generated by the following grammar is

$$S \rightarrow aB \mid bA$$

$$A \rightarrow a \mid aS \mid bAA$$

$$B \rightarrow b \mid bS \mid aBB$$

- (A) Strings contain equal number of a's and equal number of b's.
- (B) Strings contain odd number of a's and odd number of b's.
- (C) Strings contain odd number of a's and even number of b's.
- (D) Strings contain an even number of a's and even number of b's.

### **Q16. [MCQ]**

Which language generates the grammar G given by the productions

$$S \rightarrow aSdd \mid A$$

$$A \rightarrow bAc \mid bc$$

(A)  $L(G) = \{ a^n b^m c^m d^{2n} \mid n \geq 0, m > 0 \}$

- (B)  $L(G) = \{ a^m b^m c^n d^{2n} \mid n \geq 0, m > 0 \}$
- (C)  $L(G) = \{ a^i b^m c^n d^{2n} \mid i > 0, n \geq 0, m > 0 \}$
- (D)  $L(G) = \{ a^n b^i c^j d^{2n} \mid n \geq 0, i > 0, j > 0 \}$

### Q17. [MCQ]

Consider the following grammar G with start symbol S over the alphabet  $\Sigma = \{a, b\}$

$$S \rightarrow aXa \mid bXb \mid a \mid b$$

$$X \rightarrow aX \mid bX \mid \epsilon$$

The language generated by G is

- (A) All strings that start and end with the same symbol.
- (B) All non empty strings that start and end with the different symbol.
- (C) All nonempty strings that start and end with the same symbol.
- (D) None of the above.

### Q18. [MCQ]

Consider the following language:

$$L = \{a^k b^{2k} \mid k \geq 2\}$$

Which of the following grammar generates L?

- (A)  $S \rightarrow aSbb \mid \epsilon$
- (B)  $S \rightarrow aSbb \mid abb$
- (C)  $S \rightarrow aSbb \mid aabb$
- (D)  $S \rightarrow aX \mid bbY$

$$X \rightarrow aX \mid \epsilon$$

$$Y \rightarrow bbY \mid \epsilon$$

### Q19. [MCQ]

The language generated by the following grammar is:

$$S \rightarrow 0S1 \mid C$$

$$C \rightarrow 1C0 \mid \epsilon$$

- (A)  $L_1 = \{0^n 1^m 0^m 1^n \mid n, m \geq 0\}$
- (B)  $L_1 = \{0^m 1^2 n^1 \mid n, m \geq 0\}$
- (C)  $L_1 = \{0^n 1^m 0^2 m^1 n^1 \mid n, m \geq 0\}$
- (D)  $L = \{0^n 1^n 1^m 0^m \mid n, m \geq 0\}$

### Q20. [MCQ]

**Consider the following grammar**

$$S \rightarrow aSc \mid X$$

$$X \rightarrow bXc \mid \epsilon$$

**What is the language generated by this grammar?**

(A) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i + j = k$  }

(B) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } i = j + k$  }

(C) {  $a^i b^j c^k \mid i, j, k \geq 0, \text{ and } k = i - j$  }

(D) None of the above

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## **ANSWERS**

**A1. B**

**A2. D**

**A3. C**

**A4. A**

**A5. C**

**A6. B**

**A7. B**

**A8. A**

**A9. A,B,D**

**A10. A**

**A11. 2**

**A12. A**

**A13. 4**

**A14. A,B,C,D**

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**A15. A**

**A16. A**

**A17. C**

**A18. C**

**A19. A**

**A20. A**

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