Summary in Graph

Exam Summary (GO Classes Test Series 2024 | Theory of Computation | Test 4)

Qs. Attempted:	**15** (5 + 10)	**Correct Marks:**	**12** (4 + 8)
Correct Attempts:	**8** (4 + 4)	**Penalty Marks:**	**2.33** (0.33 + 2)
Incorrect Attempts:	**7** (1 + 6)	**Resultant Marks:**	**9.66** (3.66 + 6)

Total Questions:	**15** (5 + 10)
Total Marks:	**25** (5 + 20)
Exam Duration:	**45 Minutes**
Time Taken:	**40 Minutes**

EXAM RESPONSE | EXAM STATS | FEEDBACK

Technical

Q #1 | Multiple Select Type | Award: 1 | Penalty: 0 | Theory of Computation

Consider the following context-free grammar G :

$$\mathrm{S} \rightarrow \mathrm{A}\ \mathrm{S} \mid b$$
$$\mathrm{A} \rightarrow \mathrm{A}\ \mathrm{A} \mid a \mid b$$
$$\mathrm{B} \rightarrow \mathrm{B}\ \mathrm{B} \mid a$$

The complement of the language generated by G is?

A. Regular
B. Context Free
C. Context Sensitive
D. Recursive

Your Answer: A;B;C;D | **Correct Answer: A;B;C;D** | Correct | Discuss

Q #2 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Theory of Computation

Consider the following two languages.

$$\mathrm{L}_1 = \{x \in \{a,b\}^* \mid x \text{ has equally many } a \text{ 's and } b \text{ 's } \}$$
$$\mathrm{L}_2 = \{x \in \{a,b,c\}^* \mid x \text{ has equally many } a \text{ 's, } b \text{ 's, and } c \text{ 's } \}$$

Which of the following is true about L_1 and L_2?

A. L_1 and L_2 are both regular.
B. L_1 is regular, and L_2 is context-free but not regular.
C. Neither L_1 nor L_2 is regular, but both are context-free.
D. L_1 is context-free but not regular, and L_2 is not context-free.

Your Answer: D **Correct Answer: D** Correct Discuss

Q #3 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

$$\mathrm{L}_1 = \left\{ww^{\mathrm{R}} \mid w \in \{0,1\}^*\right\}$$
$$\mathrm{L}_2 = \left\{wcw^{\mathrm{R}} \mid w \in \{0,1\}^*\right\}$$
$$\mathrm{L}_3 = \{ww \mid w \in \{0,1\}^*\}$$

Which one of the following is TRUE?

A. L_1 is deterministic CFL
B. L_2 is deterministic CFL
C. L_3 is a CFL but not a deterministic CFL
D. L_3 is deterministic CFL

Your Answer: B **Correct Answer: B** Correct Discuss

Q #4 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

Consider the following statements :

1. No infinite subset of $\{a^n b^n \mid \mathrm{n} > 0\}$ is regular.
2. No infinite subset of $\{ww \mid w \in \{a,b\}^*\}$ is regular.

Which of the above statements is/are true?

A. Only 1
B. Only 2
C. Both
D. None

Your Answer: A **Correct Answer: A** Correct Discuss

Q #5 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

Consider the following languages :

a. $\{a^m b^n \mid m,n \in \mathbb{N}\}$
b. $\{a^m b^n \mid m \leqslant n\}$
c. $\{a^m b^n \mid m+n \leqslant 4\}$

Which of the above languages is regular?

A. Only a

B. Only c
C. Only a, c
D. All

Your Answer: A **Correct Answer: C** Incorrect Discuss

Q #6 Multiple Select Type Award: 2 Penalty: 0 Theory of Computation

Set of all finite languages is/are closed under which of the following operations?

A. Union
B. Set Difference
C. Complementation
D. Subset

Your Answer: A;B;C **Correct Answer: A;B;D** Incorrect Discuss

Q #7 Multiple Select Type Award: 2 Penalty: 0 Theory of Computation

Set of all Non-regular languages is/are closed under which of the following operations?

A. Union
B. Intersection
C. Complementation
D. Reversal

Your Answer: D **Correct Answer: C;D** Incorrect Discuss

Q #8 Multiple Select Type Award: 2 Penalty: 0 Theory of Computation

Which of the following is/are true?

A. The union of all finite subsets of a regular language is regular.
B. The union of all infinite subsets of an infinite regular language is regular.
C. The union of all subsets of a regular language is regular.
D. For every infinite CFL L, At least one proper infinite subset of L is regular.

Your Answer: A;B;C **Correct Answer: A;B;C** Correct Discuss

Q #9 Multiple Choice Type Award: 2 Penalty: 0.67 Theory of Computation

Consider the following language over the alphabet $\{a, b\}$:

$\mathrm{L} = \{xy |\ x, y \in \{a, b\}^*$ and there are twice as many $a's$ in x as in $y\}$

Which of the following is true for L?

A. L is regular.
B. L is not regular But L is DCFL.
C. L is CFL but Not DCFL.
D. L is Not CFL.

Your Answer: C | Correct Answer: A | Incorrect | Discuss

Q #10 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Let Σ^* denote the set of all languages over the alphabet $\Sigma = \{0, 1\}$. We define a function f from Σ^* to Σ^*. For any language L in Σ^*, the function f replaces all $1's$ by $0's$ (and leaves the $0's$ as they are) in every string of L to get $f(\mathrm{L})$.

For instance, if $\mathrm{L} = \{\epsilon, 001, 00, 11, 111, 1100\}$, then $f(\mathrm{L}) = \{\epsilon, 000, 00, 0000\}$

Consider the following statements:

- $\mathrm{S1}$: If L is regular then $f(\mathrm{L})$ is regular.
- $\mathrm{S2}$: If $f(\mathrm{L})$ is regular then L is regular.

Which of the above statements is correct?

A. Only $\mathrm{S1}$
B. Only $\mathrm{S2}$
C. Both
D. None

Your Answer: C | Correct Answer: A | Incorrect | Discuss

Q #11 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Let Σ^* denote the set of all languages over the alphabet $\Sigma = \{0, 1\}$. We define a function f from Σ^* to Σ^*. For any language L in Σ^*, $f(\mathrm{L})$ is the language formed from L by changing every 0 to 1 and every 1 to 0 (simultaneously) in every string of L.

For instance, if $\mathrm{L} = \{\epsilon, 001, 00, 11, 01\}$, then $f(\mathrm{L}) = \{\epsilon, 110, 11, 00, 10\}$

Consider the following statements:

- $\mathrm{S1}$: If L is regular then $f(\mathrm{L})$ is regular.
- $\mathrm{S2}$: If $f(\mathrm{L})$ is regular then L is regular.

Which of the above statements is correct?

A. Only $\mathrm{S1}$
B. Only $\mathrm{S2}$
C. Both
D. None

Your Answer: C | Correct Answer: C | Correct | Discuss

Q #12 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Compiler Design

Consider the following statements :

1. If $\mathrm{L} = \mathrm{L}_1^+$ and L is context-free, then L_1 must be context-free.
2. A context-free grammar in Chomsky's normal form is always unambiguous.

Which of the above statements are true?

A. Both
B. Only 1

C. Only 2
D. None

Your Answer: D | Correct Answer: D | Correct | Discuss

Q #13 | Multiple Select Type | Award: 2 | Penalty: 0 | Theory of Computation

Consider languages L and L_1, each over the alphabet $\Sigma = \{a, b\}$, where

$$\mathrm{L}_1 = \{w \mid w \text{ contains some } \mathrm{x} \in \mathrm{L} \text{ as a substring; } w \in \Sigma^*\}$$

Which of the following must be true about L and L_1?

A. If L is regular, then L_1 is regular.
B. If L is context-free, then L_1 is context-free.
C. If L is recursive, then L_1 is recursive.
D. If L is regular then L_1 may be non- regular.

Your Answer: D | Correct Answer: A;B;C | Incorrect | Discuss

Q #14 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Consider the following languages :

- $\mathrm{L} = \{w \in \{0,1\}^* \mid w \text{ is the binary encoding of } 2^k, k > 0\}$
- $\mathrm{M} = \{w \in \{1\}^* \mid w \text{ is the unary encoding of } 2^k, k > 0\}$

Which of the above languages is Regular?

A. Only L
B. Only M
C. Both
D. None

Your Answer: A | Correct Answer: A | Correct | Discuss

Q #15 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Compiler Design

Assume that `<stmt>, <cond>`, and `<tail>` are

nonterminal symbols, and if, then, else, true, false, skip, fi are terminal symbols.

Which of the following sets of productions determine(s) an ambiguous context-free grammar?

I.
```
<stmt> → if <cond> then <stmt>
<stmt> → if <cond> then <stmt> else <stmt>
<stmt> → skip
<cond> → true | false
```

II.
```
<stmt> → if <cond> then <stmt> fi
<stmt> → if <cond> then <stmt> else <stmt> fi
<stmt> → skip
<cond> → true | false
```

III.

```
    <stmt> → if <cond> then <stmt> <tail>
    <stmt> → skip
    <cond> → true | false
    <tail> → ε
 5. <tail> → else <stmt>
```

A. I only
B. II only
C. II and III only
D. I and III only

Your Answer: C **Correct Answer: D** Incorrect Discuss