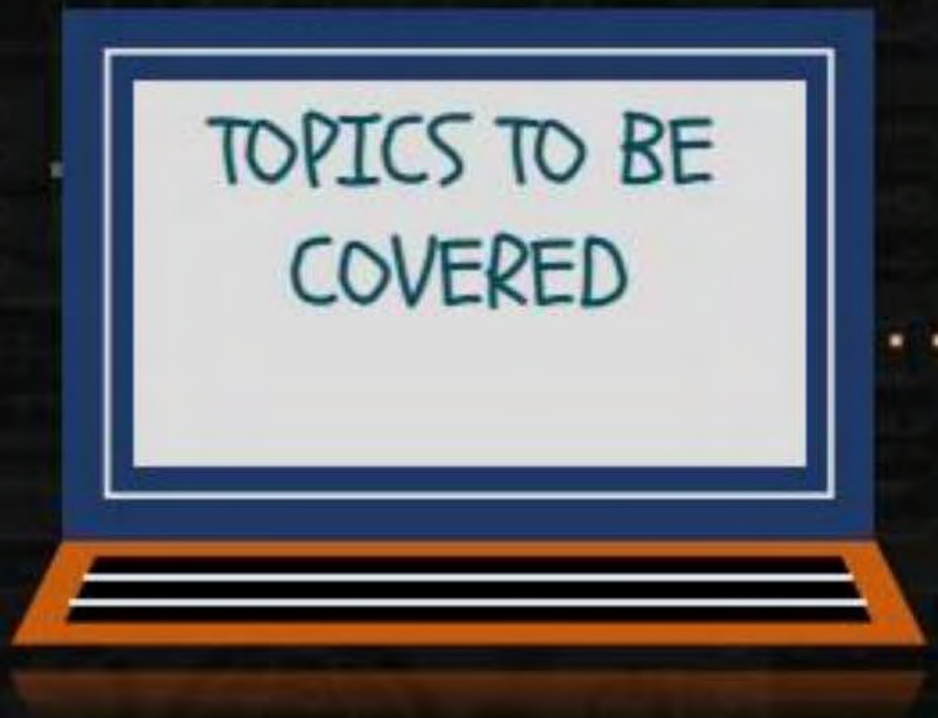
CS & IT ENGINEERING

Discussion Notes

Theory of Computation

Undecidability & Decidability II
DPP 02

Mallesham Devasane Sir



01 Question

02 Discussion

Q.1

Let L = {(X) | is a DFA and L (X) is a infinite language }; where (X) represents the illustration of the deterministic finite automata (DFA).

[MSQ]

Then which of the statement is/are correct?

A. It is recognizable by Turing.

B. Its complement is recognizable by Turing.

C. It is Turing decidable (recursive).

D. It is context-free but not regular.

Q.2

Which of the following statement is/are incorrect? [MSQ]

A. If L is CFL and A is DCFL then L–A is CFL.

B. The subset of a decidable language is always decidable.

C. If L and A are DCFL then $\left(\overline{L} \cap \overline{A}\right)$ is CFL.

D. None of the above are incorrect.

Incorrect

Incorrect

Incorrect

$CFL - DCFL = CFL \cap \overline{DCFL} \Rightarrow CFL \cap DCFL \Rightarrow CSL$

Q.3

Consider some language $P \in \{0,1\}^*$ reduces to another language $Q \in \{0,1\}^*$. Which of the following statement is true? [MCQ]

$P \leq Q$

A. P is decidable. ✗

B. A Turing machine that recognizes P can be used to construct a truing that recognizes Q. ✗

C. If Q is decidable then P is decidable. ✓

D. If P is decidable then Q is decidable. ✗

Q.4 [MCQ]

Consider the following statement:

S_1: In phase structured language, membership problem is semi decidable. TRUE

S_2: In context-free languages, membership problem can be solved in polynomial time. TRUE $O(n^3)$

A. Only S_1 is true

B. Only S_2 is true

C. Both S_1 and S_2 is true

D. Neither S_1 nor S_2 is true

Q.5 [MCQ]

Consider the following statements:

S_1: For a decidable language X, X^R may or may not be decidable. (X^R represents the reverse of language X). False

S_2: If X is not recursively enumerable then $\overline{X}$ must be recursively enumerable. False

A. Only S_1 is true

B. Only S_2 is true

C. Both S_1 & S_2 are false

D. Both S_1 & S_2 are true

Q.6

Consider the following statements about Turing machine. [MCQ]

S_1: If there is some Turing machine that accepts every string in L and rejects every string not in L then L is decidable.

S_2: If there is some Turing machine that accepts every string in L and either rejects or loops on every string not in L, then L is semi-decidable or computably enumerable (CE).

A. Only S_1 is true

B. Only S_2 is true

C. Both S_1 & S_2 are true

D. Neither S_1 nor S_2 is true

Q.7 Which of the following is/are decidable properties of context-free?

[MSQ]

A. for context-free grammar X, find if string $w \in L(X)$

B. for context-free grammar X, find if $L(X) = \phi$.

C. for context-free grammar X, find if L(X) is infinite.

D. none of the above are decidable properties of context free.

Q.8 [MCQ]

Consider the following statements:

S_1: There is language for which no TM available. Then surely language will be Not RE.

S_2: Language is undecidable if and only there is no HTM available for language.

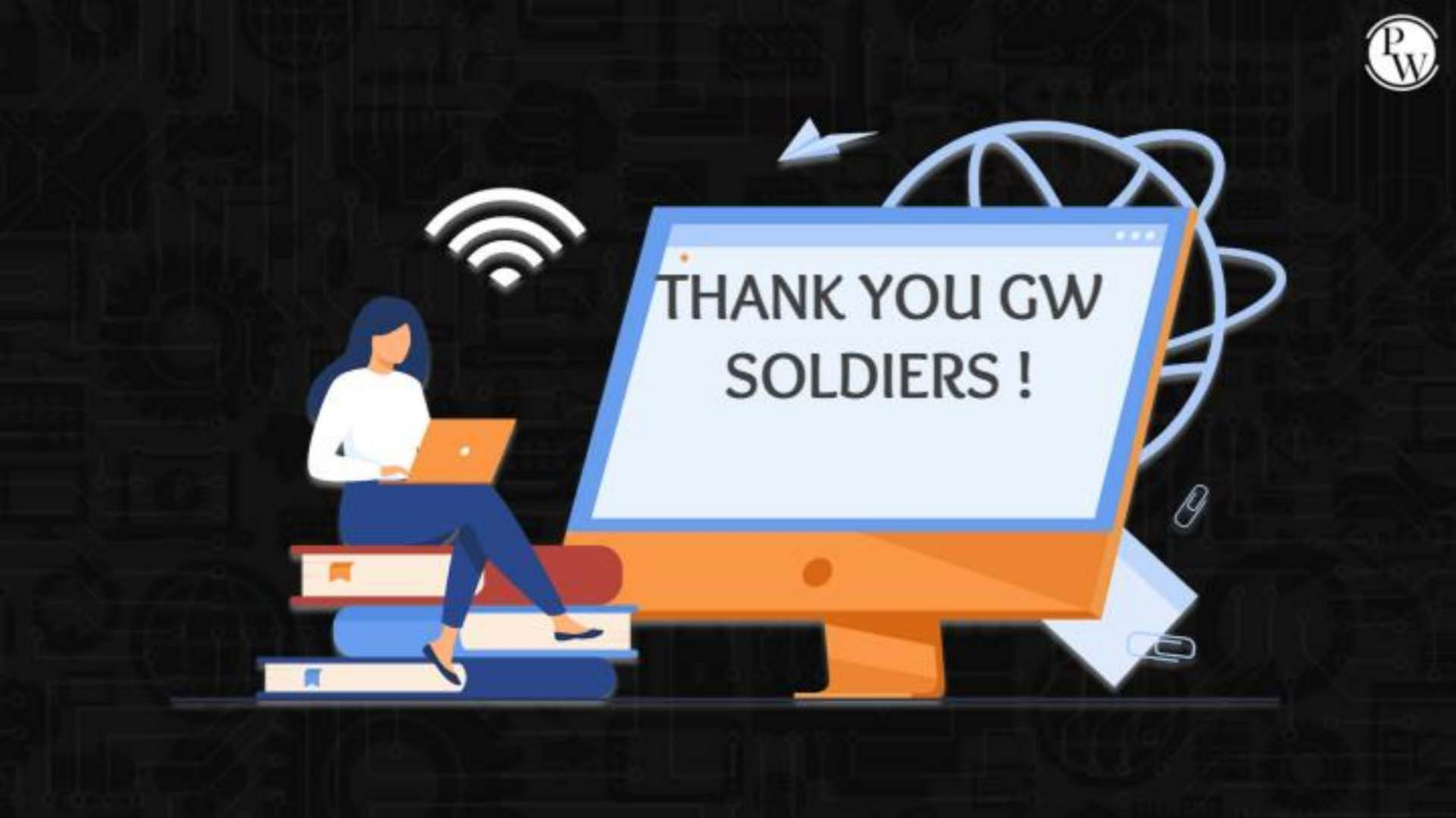
Which of the following is incorrect?

A. S_1 only.

B. S_2 only.

C. Both S_1 and S_2.

D. Neither S_1 Nor S_2.


THANK YOU GW
SOLDIERS !