TOC Second Unit Test

Total points 22/30

The respondent's email address (**17ce037@charusat.edu.in**) was recorded on submission of this form.

✓ Match the following grammars to the language they generate 2/2

(1)	$S \rightarrow SaSaS \mid bS \mid \varepsilon$	(a)	$\{w \mid w \in \{a,b\}^*, w \text{ is palindrome}\}$
(2)	$S \rightarrow SaSbS \mid SbSaS \mid \varepsilon$	(b)	$\{w \mid w \in \{a,b\}^*, w \text{ contains even number of } a's\}$
(3)	$S \rightarrow aSa \mid bSb \mid aSb \mid bSa \mid \varepsilon$	(c)	$\{w \mid w \in \{a,b\}^*, w \text{ is of even length}\}$
(4)	$S \rightarrow aSa \mid bSb \mid a \mid b \mid \varepsilon$	(d)	$\{w \mid w \in \{a,b\}^*, w \text{ contains equal number of } a's \text{ and } b's\}$

- (a) (1,d) (2,a) (3,d)(4,c)
- (b) (1,b) (2,d) (3,c) (4,a) ✓
- (c) (1,b)(2,c) (3,a)(4,d)
- (d) (1,d)(2,c)(3,a)(4,b)

✓ Which string is generated by below G? 1/1

$S \rightarrow AB$
$A \rightarrow aa \mid ab \mid ba \mid bb$
$B \rightarrow aBa \mid bBb \mid C$
$C \rightarrow aa \mid ab \mid ba \mid bb$

- bababbab ✓
- abaab
- aaabbbb
- babaa

✓ Consider the following grammar G, S→aSaS | ε Which one of the following is true? 1/1

- (a) G is ambiguous ✓
- (b) G is unambiguous
- (c) L(G) is CFL but not regular
- (d) L(G) is CSL but not CFL

✓ Which one of the following statement is true in a nondeterministic halting TM M? 1/1

- Tape alphabet T is same as the input alphabet Σ
- x∈L(M) if any only if M accepts x on exactly one computation path
- On an input x, M halts on all computation path ✓
- If x∈L(M), then M halts and accepts on at least one computation paths or may not halt on other paths

✗ Let M be a DTM. If it is known that M does not halt on an input x, then which of the following statement is necessarily true? 0/1

- (a) There are finitely many different configurations of M with respect to x
- (b) There are indefinitely many different configurations of M with respect to x ✗
- (c) There is exactly one configuration of M with respect to x
- (d) Every configuration of M with respect to x yield another configuration

Correct answer

- (d) Every configuration of M with respect to x yield another configuration

✗ Let G1 and G2 be two grammars such that: Which of the following statement is correct about the following statements? 0/2

G1:
S →AS | ε
A → A1 | 0A1 | 01
G2:
S → AB | aaB
A → a | Aa
B → b

- (a) Only G1 is Ambiguous grammar.
- (b) Only G2 is Ambiguous grammar. ✗
- (c) Both G1 and G2 are Ambiguous grammar.
- (d) None of the above is true.

Correct answer

- (c) Both G1 and G2 are Ambiguous grammar.

✓ Which of the following is FALSE with respect to possible outcomes of executing a Turing Machine over a given input? 1/1

- It may halt and accept the input
- It may halt by changing the input ✓
- It may halt and reject the input
- It may never halt

✓ Consider the following statements( ) : S1 : There exists no algorithm for deciding if any two Turing machines M1 and M2 accept the same language. S2 : The problem of determining whether a Turing machine halts on any input is undecidable. Which of the following options is correct ? 1/1

- (a) Both S1 and S2 are correct ✓
- (b) Both S1 and S2 are not correct
- (c) Only S1 is correct
- (d) Only S2 is correct

✓ Given a Turing MachineM = ({q0, q1, q2, q3}, {a, b}, {a, b, B}, δ, B, {q3})Where δ is a transition function defined asδ(q0, a) = (q1, a, R)δ(q1, b) = (q2, b, R)δ(q2, a) = (q2, a, R)δ(q3, b) = (q3, b, R)The language L(M) accepted by the Turing Machine is given as: 2/2

- aa*b
- abab
- aba*b ✓
- aba*

✓ Which of the following statements in true? 1/1

- If a language is context free it can always be accepted by a deterministic push-down automaton
- The union of two context free languages is context free ✓
- The intersection of two context free languages is context free
- The complement of a context free language is context free

✓ Let ‘X’ be set of all languages accepted by deterministic push down automata (DPDA) by final state and ‘Y’ be set of all languages accepted by DPDA by empty stack then, which of the following is true? 1/1

- (A) X is proper subset of Y
- X = Y
- X is proper super set of Y ✓
- none of the above

✓ Which of the following pairs have DIFFERENT expressive power? 1/1

- Deterministic finite automata (DFA) and Non-Deterministic finite automata(NFA)
- Deterministic push down automata (DPDA) and Non-deterministic pushdown automata ✓
- Deterministic single-tape Turing machine and Non-deterministic single-tape Turing Machine
- none of the above

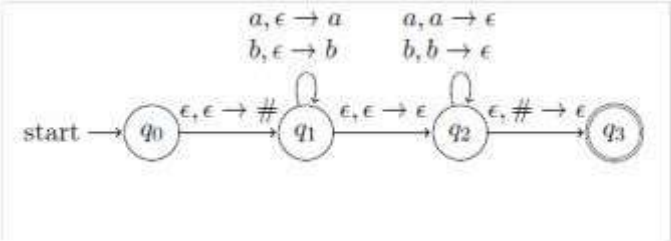
✓ Here, wr is the reverse of the string w. Which of these languages are deterministic Context-free languages? 1/1

Consider the following languages over the alphabet $\Sigma = \{0,1,c\}$:

$L_1 = \{0^n 1^n \mid n \geq 0\}$
$L_2 = \{wcw^r \mid w \in \{0,1\}^*\}$
$L_3 = \{ww^r \mid w \in \{0,1\}^*\}$

- (A) None of the languages
- Only L1
- Only L1 and L2 ✓
- All the three languages

✗ What is the language accepted by following PDA? 0/2



- {a^n b^n |n≥0}
- {ww |w∈{a,b}*}
- {ww^r∈{a,b}*}
- {w|w∈{a,b}* is odd length palindrome string}
- Option 5 ✗

Correct answer

- {ww^r∈{a,b}*}

✓ Which is not true for mechanical diagram of PDA? 1/1

- (a) PDA contains a stack
- (b) The head reads as well as writes ✓
- (c) The head moves from left to right
- (d) The input string is surrounded by an infinite number of blanks in both sides

✗ The difference between FA and PDA is in 0/1

- (a) Reading head
- (b) Input tape
- (c) Finite Control ✗
- (d) Stack

Correct answer

- (d) Stack

✓ Instantaneous description remembers 1/1

- (a) The information of state and input tape content at a given instance of time
- (b) The information of state and stack content at a given instance of time ✓
- (c) The information of input tape and stack content at a given instance of time
- (d) The information of state, input tape and stack content content at a given instance of time

✓ Which one of the following cannot be designed by a PDA? 1/1

(a) $\{a^n b^n c^i | n,i > 0\}$

(b) $\{a^n b^n c^n | n > 0\}$

(c) $\{a^n b^i c^n | n,i > 0\}$

(d) $\{c^i a^n b^n | n,i > 0\}$

- [ ] a
- [x] b ✓
- [ ] c
- [ ] d

✓ The symbols belong to the stack of a PDA 1/1

- [ ] (a) Terminals only
- [ ] (b) Non-Terminals only
- [ ] (c) States
- [x] (d) Both Terminals and Non-Terminals ✓

✓ The TM is the machine format of _____ language 1/1

- [x] (a) Type 0 ✓
- [ ] (b) Type 1
- [ ] (c) Type 2
- [ ] (d) Type 3

✓ Which is not true for mechanical diagram of TM? 1/1

- (a) stack ✓
- (b) read write head
- (c) Finite Control
- (d) Input tape

✗ Which is not true for the mechanical diagram of the Turing machine? 0/1

- (a) The head moves in both directions
- (b) The head reads as well as writes ✗
- (c) The input string is surrounded by an infinite number of blank in both sides
- (d) Some symbols are pushed on to the stack

Correct answer

- (d) Some symbols are pushed on to the stack

✗ The difference between TM and PDA is in the 0/1

- (a) Head movement
- (b) Finite Control
- (c) Stack ✗
- (d) All of these

Correct answer

- (d) All of these

✓ A multi-tape TM has 1/1

- (a) Multiple tape
- (b) Multiple head
- (c) Multiple finite control
- (d) Multiple tape and head ✓

✓ In respect to the k-dimensional TM, a simple TM is 1/1

- (a) 0 dimensional
- (b) 1 dimensional ✓
- (c) 2 dimensional
- (d) 3 dimensional

✓ Which of the following has a read only tape? 1/1

- (a) Single tape TM
- (b) Multi tape TM
- (c) Linear Bounded Automata ✓
- (d) None of these