Assignment 10

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2019-04-10, 23:59 IST.

1) Consider the transition diagram of a PDA given below with input alphabet $\Sigma = \{a, b\}$ and stack alphabet $\Gamma = \{X, Z\}$. $Z$ is the initial stack symbol. This PDA accepts by final state. Let $L$ denote the language accepted by the PDA. Which one of the following is TRUE?

- $L = \{a^n b^n | n \geq 0\}$ and is not accepted by any finite automata
- $L = \{a^n b^n | n \geq 0\} \cup \{a^n | n > 0\}$ and is not accepted by any PDA
- $L = \{a^n b^n | n \geq 0\} \cup \{a^n | n \geq 0\}$ and is context-free
- None of these

(a) (b) (c) (d)

No, the answer is incorrect. Score: 0

Accepted Answers: (c)
Which of the following pairs have DIFFERENT expressive power?

(a) Deterministic finite automata (DFA) and Non-deterministic finite automata (NFA)
(b) Chomsky Normal Form (CNF) and Context-free Grammar (CFG)
(c) Both (a) and (b)
(d) None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

3)
If $L = \{(ab)^n a | n \geq 0\}$, then what is the missing part in the given below GNF, so that they are equivalent?

$S \rightarrow CE|a$
$A \rightarrow CE|a$
$B \rightarrow DF|b$
$C \rightarrow a$
$D \rightarrow b$
$E \rightarrow bFC|bC$

(a) $F \rightarrow aCD|aD$
(b) $F \rightarrow aED|aD$
(c) $F \rightarrow aFD|aD$
(d) None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b)

4)
Consider the language $L_1, L_2, L_3$ as given below.  

$L_1 = \{0^p1^q | p, q \in N \}$,  

$L_2 = \{0^p1^q | p, q \in N$ and $p = q \}$  

$L_3 = \{0^p1^q0^r | p, q, r \in N$ and $p = q = r \}$  

Which of the following statements is NOT TRUE?  

(a) Push Down Automata (PDA) can be used to recognize $L_1$ and $L_2$  

(b) $L_1$ is a regular language  

(c) $L_3$ is regular language  

(d) None of the above

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
(c)

5) The Greibach normal form grammar for the language $L = \{a^n b^{n+1} | n \geq 0 \}$ is?  

(a) $S \rightarrow aSB | b, B \rightarrow bB | \epsilon$  

(b) $S \rightarrow aSB | b, B \rightarrow bB | b$  

(c) $S \rightarrow aSB | b, B \rightarrow b$  

(d) None of the above

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
(c)

6) Consider $G$ be as below  

$S \rightarrow bA | bCB | bABC | bB | bABB$  

$B \rightarrow bC | bABC | b | bAB$  

$C \rightarrow b | bABC | b | bBBC | bABC | bABB | bABB$  

$X \rightarrow b$  

$A \rightarrow a$  

Is $G$ in the GNF (Greibach Normal Form) form?  

(a) Yes
(b) No

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)
(b)

7) The equivalent production rules corresponding to the production rules $S \rightarrow Sa_1|Sa_2|b_1|b_2$ is?

(a) $S \rightarrow b_1|b_2, \ A \rightarrow a_1A|a_2A|\epsilon$  
(b) $S \rightarrow b_1|b_2|b_1A|b_2A, \ A \rightarrow a_1A|a_2A|\epsilon$  
(c) $S \rightarrow b_1|b_2|b_1A|b_2A, \ A \rightarrow a_1A|a_2A$  
(d) None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b)

8)  

1 point
Consider the pushdown automaton (PDA) below which runs over the input alphabet \( (a, b, c) \). It has the stack alphabet \( \{Z_0, X\} \) where \( Z_0 \) is the bottom-of-stack marker. The set of states of the PDA is \( \{s, t, u, f\} \) where \( s \) is the start state and \( f \) is the final state. Initially \( Z_0 \) is in stack. The PDA accepts by final state. The transitions of the PDA given below are depicted in a standard manner. For example, the transition \( (s, b, X) \rightarrow (t, XZ_0) \) means that if the PDA is in state \( s \) and the symbol on the top of the stack is \( X \), then it can read \( b \) from the input and move to state \( t \) after popping the top of stack and pushing the symbols \( Z_0 \) and \( X \) (in that order) on the stack. \( (s, a, Z_0) \rightarrow (s, XXZ_0) \)
\[
\begin{align*}
(s, c, Z_0) & \rightarrow (f, \epsilon) \\
(s, a, X) & \rightarrow (s, XXX) \\
(s, b, X) & \rightarrow (t, \epsilon) \\
(t, c, X) & \rightarrow (u, \epsilon) \\
(u, c, X) & \rightarrow (u, \epsilon) \\
(u, c, Z_0) & \rightarrow (f, \epsilon)
\end{align*}
\]

The language accepted by the PDA is

(a) \( \{a^ib^nc^n | l = m = n\} \)
(b) \( \{a^ib^nc^n | l = m\} \)
(c) \( \{a^ib^nc^n | 2l = m + n\} \)
(d) \( \{a^ib^nc^n | m = n\} \)

No, the answer is incorrect.

Score: 0

Accepted Answers:
(a) 
(b) 
(c) 
(d) 

9) Consider the following grammars.
\[ G_1 = \{S \rightarrow a, S \rightarrow AZ, A \rightarrow a, Z \rightarrow \varepsilon\} \]
\[ G_2 = \{S \rightarrow a, S \rightarrow aZ, Z \rightarrow a\} \]
Which of \( G_1, G_2 \) are in CNF (Chomsky Normal Form)?
(a) \( G_1 \)
(b) \( G_2 \)
(c) Both
(d) None

No, the answer is incorrect.
The PDA \( M = (\{q_0, q_1, q_2\}, \{a, b\}, \{0, 1\}, \delta, q_0, 0, \{q_0\}) \)
with \( \delta(q_0, a, 0) = \{q_1, 10\}, \delta(q_1, a, 1) = \{q_1, 11\}, \delta(q_1, b, 1) = \{q_2, \lambda\}, \delta(q_2, b, 1) = \{q_2, \lambda\}, \delta(q_2, \lambda, 0) = \{q_0, \lambda\} \) Accepts the language

(a) \( L = \{a^n b^m | n, m \geq 0\} \)
(b) \( L = \{a^n b^n | n \geq 0\} \)
(c) \( L = \{a^n b^m | n, m > 0\} \)
(d) \( L = \{a^n b^n | n > 0\} \)