TOC Unit 5-PDA MCQ Qb - bdb

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1. A push down automata is different than finite automata by:
(A) Its memory
(B) Number of states
(C) Both (a) and (b)
(D) None of these
Ans: A
Expanation: Finite automata don't have any memeory to store data

2. **Which automata takes stack as storage?**

(A) Finite automata

(B) Push down automata

(C) Turing machine

(D) Regular expression

Ans: b
Expanation: PDA uses stack as storage, TM uses tape as storage, FA don't have memory to store

3. The transition a Push down automaton makes is additionally dependent
upon the: a) stack
b) input tape
c) terminals
d) none of the mentioned
Answer: a
Explanation: A PDA is a finite machine which has an additional stack storage. Its transitions are based not only on input and the correct state but also on the stack.

4. **PDA is more powerful than**
(A) Turing machine
(B) Multi tape Turing machine
(C) Finite automata
(D) All of these
Answer : C
Explanation: A PDA is more powerful than FA. Any language which can be acceptable by FA can also be acceptable by PDA. PDA also accepts a class of language which even cannot be accepted by FA. Thus PDA is much more superior to FA.

5. **Which of the following are the actions that operates on stack top?**
(A) Pushing
(B) Updating
(C) Popping

(D) All of the mentioned

Answer : D

Explanation: in PDA all operation are opertaes on top of the stack(ToS)

6. With reference of a DPDA, which among the following do we perform from the start state with an empty stack?

a) process the whole string

b) end in final state

c) end with an empty stack

d) all of the mentioned

Answer: d

Explanation: The empty stack in the end is our requirement relative to finite state automatons.

7. A DPDA is a PDA in which:

a) No state p has two outgoing transitions

b) More than one state can have two or more outgoing transitions

c) Atleast one state has more than one transitions

d) None of the mentioned

Answer: a

Explanation: A Deterministic Push Down Automata is a Push Down Automata in which no state p has two or more transitions.

8. State true or false:

Statement: For every CFL, G, there exists a PDA M such that L(G) = L(M) and vice versa. a) true

b) false

Answer: a

Explanation: There exists two lemma's such that:

a) Given a grammar G, construct the PDA and show the equivalence

b) Given a PDA, construct a grammar and show the equivalence

9. If the PDA does not stop on an accepting state and the stack is not empty, the string is: a) rejected

b) goes into loop forever

c) both (a) and (b)

d) none of the mentioned

Answer: a

Explanation: To accept a string, PDA needs to halt at an accepting state and with a stack empty, else it is called rejected. Given a PDA M, we can construct a PDA M' that accepts the same language as M, by both acceptance criteria.

10. A language accepted by Deterministic Push down automata is closed under which of the following?
a) Complement
b) Union
c) Both (a) and (b)
d) None of the mentioned
Answer: a
Explanation: Deterministic Context free languages(one accepted by PDA by final state), are drastically different from the context free languages. For example they are closed under complementation and not union.

11. The instantaneous PDA is has the following elements
a) State
b) Unconsumed input
c) Stack content
d) All of the mentioned
Answer: d
Explanation: The instantaneous description of a PDA is represented by 3 tuple: (q,w,s) where q is the state, w is the unconsumed input and s is the stack content.

12. A push down automata can represented using:
a) Transition graph
b) Transition table
c) ID
d) All of the mentioned
Answer: d
Explanation: Yes, a PDA can be represented using a transition diagram, transition table and an instantaneous description.

13. State true or false:
Statement: Every context free grammar can be transformed into an equvalent non deterministic push down automata.
a) true
b) false
Answer: a
Explanation: Push down automata is the automaton machine for all the context free grammar or Type 2 languages.

14. Which of the following statement is false?

a) For non deterministic PDA, equivalence is undecidable

b) For deterministic PDA, equivalence is decidable

c) For deterministic PDA, equivalence is undecidable.

d) None of the mentioned

Answer: c

Explanation: Geraud proved the equivalence problem decidable for Deterministic PDA .

15. Which of the following are the actions that operates on stack top?

a) Pushing

b) Popping

c) Replacing

d) All of the mentioned

Answer: d

Explanation: Push, pop and replace are all the basic and only operations that takes place on stack top.

16. A push down automata is said to be _____ if it has atmost one transition around all configurations.

a) Finite

b) Non regular

c) Non-deterministic

d) Deterministic

Answer: d

Explanation: DPDA or Deterministic Push down automata has atmost one transition applicable to each configuration.

17. A pushdown automata can be defined as: (Q, ∑, G, q0, z0, A, d) What does the symbol z0 represents?

a) an element of G

b) initial stack symbol

c) top stack alphabet

d) all of the mentioned

Answer: d

Explanation: z0 is the initial stack symbol, is an element of G. Other symbols like d represents the transition function of the machine.

18. Which among the following is true for the given statement?

Statement :If there are strings R and T in a language L so that R is prefix of T and R is not equivalent to T.

a) No DPDA can accept L by empty stack

b) DPDA can accept L by an empty stack

c) L is regular

d) None of the mentioned

Answer: a

Explanation: If M is a DPDA accepting L by an empty stsck, R and T are distinct strings in L, and R is a prefix of T, then the sequence of moves M must make in order to accept R leaves the stack empty, since R L. But then T cannot be accepted, since M cant move with an empty stack. $\in$

19. Which of the following can be accepted by a DPDA?

a) The set of even length palindrome over {a,b}

b) The set of odd length palindrome over {a,b}

c) {xx^c| where c stands for the complement,{0,1}}

d) None of the mentioned

Answer: d

Explanation: Theorem: The language pal of palindromes over the alphabet {0,1} cannot be accepted by any finite automaton , and it is therefore not regular.

20 A push down automaton employs _____ data structure.

a) Queue

b) Linked List

c) Hash Table

d) Stack

Answer: d

Explanation: A push down automata uses a stack to carry out its operations. They are more capable than the finite automatons but less than the turing model.

21. State true or false:

Statement: The operations of PDA never work on elements, other than the top. a) true

b) false

Answer: a

Explanation: The term pushdown refers to the fact that the elements are pushed down in the stack and as per the LIFO principle, the operation is always performed on the top element of the stack.

22 Push down automata accepts _____ languages.

a) Type 3

b) Type 2

c) Type 1

d) Type 0

Answer: b

Explanation: Push down automata is for Context free languages and they are termed as Type 2 languages according to Chomsky hierarchy.

23 Which of the operations are eligible in PDA?

a) Push

b) Delete

c) Insert

d) Pop

Answer: a, d

Explanation: Push and pop are the operations we perform to operate a stack. A stack follows the LIFO principle, which states its rule as: Last In First Out.

24 A string is accepted by a PDA when

a) Stack is empty

b) Acceptance state

c) Both (a) and (b)

d) None of the mentioned

Answer: c

Explanation: When we reach the acceptance state and find the stack to be empty, we say, the string has been accepted by the push down automata.

25 The following move of a PDA is on the basis of:

a) Present state

b) Input Symbol

c) Both (a) and (b)

d) None of the mentioned

Answer: c

Explanation: The next operation is performed by PDA considering three factors: present state,symbol on the top of the stack and the input symbol.

26 Which of the following is analogous to the following?
:NFA and NPDA

a) Regular language and Context Free language

b) Regular language and Context Sensitive language

c) Context free language and Context Sensitive language

d) None of the mentioned

Answer: a

Explanation: All regular languages can be accepted by a non deterministic finite automata and all context free languages can be accepted by a non deterministic push down automata.

27. A language is accepted by a push down automata if it is:

a) regular

b) context free

c) both (a) and (b)

d) none of the mentioned

Answer: c

Explanation: All the regular languages are the subset to context free languages and thus can be accepted using push down automata.

28 A PDA machine configuration (q, a, X) can be correctly

represented as: (A) (unprocessed input, stack content, current state)

(B) (current state, unprocessed input, stack content)

(C) (current state, stack content, unprocessed input)

(D) none of the mentioned

Answer: B

Explanation: q=current state, a= unprocessed input, X=stack symbol

29. **A DPDA is a PDA in which:**

(A) No state has two outgoing transitions

(B) More than one state can have two or more outgoing transitions

(C) At least one state has more than one transitions

(D) None of the mentioned

Answer: A

Explanation: DPDA is a deterministic PDA, in which one state has only one outgoin transitionon one input

30. **The push down automata accepts the input string in form of**

(A) Finial state

B) Empty stack

C) Both (a) and (b)

(D) None of these

Answer: C

Explanation: PDA canaccept by two way:1)acceptance of pda by dinal state & 2) acceptance of pda by empty stack

31. **Limitation of PDA can overcome by:**

(A) Mealy machine

(B) Moore machine

(C) Turing machine

(D) FA

Answer: C

Explanation:Limitation of PDA can overcome by TM as TM tape head can move both direction

32. Can we convert PDA to equivalent CFG?
(A) Yes
(B) No
(C) May be
(D) Can't say
Answer: S
Explanation: If a grammar G is context-free, we can build an equivalent nondeterministic PDA which accepts the language that is produced by the context-free grammar G. A parser can be built for the grammar G. In the next two topics, we will discuss how to convert from PDA to CFG and vice versa.

33. Which of the following pairs have DIFFERENT expressive power?
(A) Deterministic finite automata(DFA) and Non-deterministic finite automata(NFA) **(B)** Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA) **(C)** Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine
(D) Single-tape Turing machine and multi-tape Turing machine
Answer: (B)
Explanation: NDPDA can handle languages or grammars with ambiguity, but DPDA cannot handle languages with ambiguity and any context-free grammar.

34. Which of the following option resembles the given PDA?
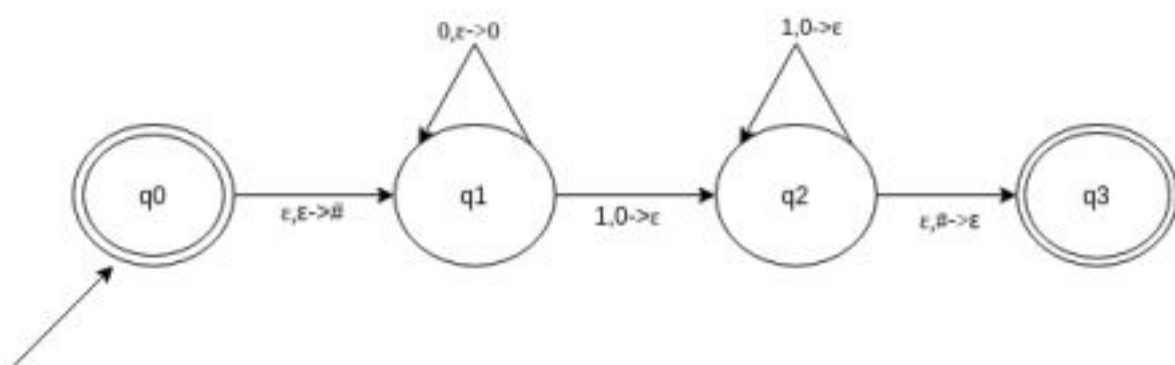
a. $\{0^n 1^n | n >= 0\}$
b. $\{0^n 1^{2n} | n >= 0\}$
c. $\{0^{2n} 1^n | n >= 0\}$
d. None of the mentioned
Answer: a

35. |-* is the _____ closure of |-
a) symmetric and reflexive

b) transitive and reflexive

c) symmetric and transitive

d) none of the mentioned

Answer: b

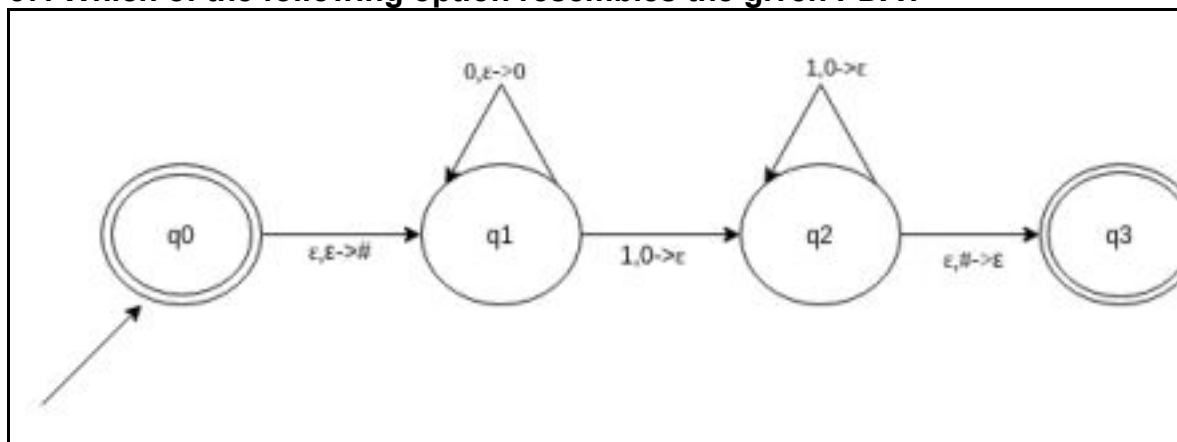Explanation: A string w is accepted by a PDA if and only if (s,w, e) |-* (f, e, e)

36. The moves in the PDA is technically termed as:

a) Turnstile

b) Shifter

c) Router

d) None of the mentioned

Answer: a

Explanation: A turnstile notation is used for connecting pairs od ID's taht represents one or many moves of a PDA.
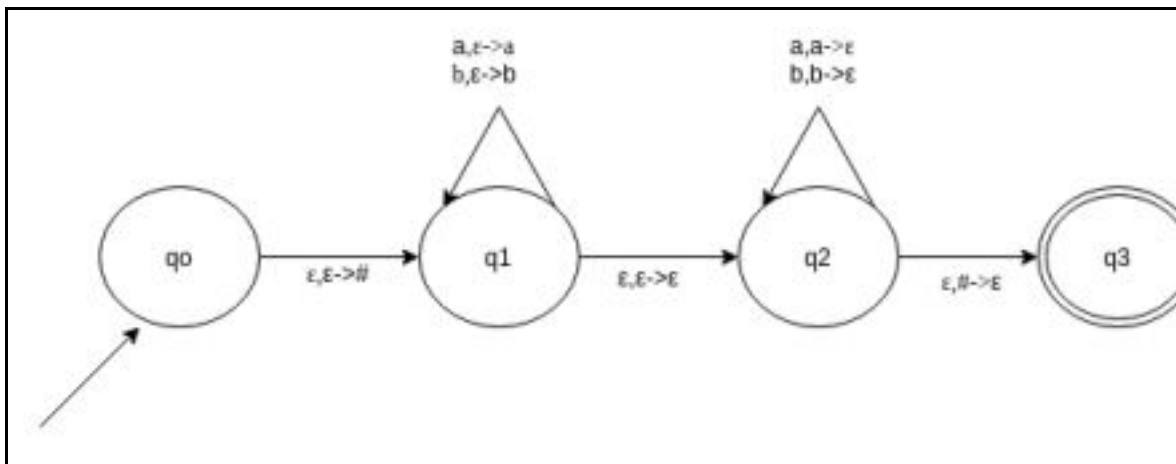
37. Which of the following option resembles the given PDA?

a) $\{0^n1^n|n>=0\}$

b) $\{0^n1^{2n}|n>=0\}$

c) $\{0^{2n}1^n|n>=0\}$

d) None of the mentioned

Answer: a

38. Which of the following correctly resembles the given state diagram?

a) {ww^r|w=(a+b)*}
b) ε is called the initial stack symbol
c) Both (a) and (b)
d) None of the mentioned

Answer: a

Explanation: Initially we put a special symbol '#' into the empty stack. At state q1, the w is being read. In state q2, each 0 or 1 is popped when it matches the input. If any other input is given, the PDA will go to a dead state. When we reach that special symbol '#', we go to the accepting state q3.

39. Which of the following assertion is false?
a) If L is a language accepted by PDA1 by final state, there exist a PDA2 that accepts L by empty stack i.e. L=L(PDA1)=L(PDA2)
b) If L is a CFL then there exists a push down automata P accepting CF; ; by empty stack i.e.
L=M(P)
c) Let L is a language accepted by PDA1 then there exist a CFG X such that
L(X)=M(P) d) All of the mentioned

Answer: d

Explanation:
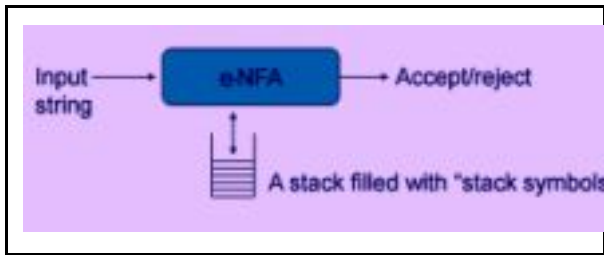All the assertions mentioned are theorems or corollary.

40. A push down automata can be represented as:
PDA= ε-NFA +[stack] State true or false:
a) true
b) false

Answer: a

Explanation:

A stack filled with "stack symbols"

41. A pushdown automata can be defined as: (Q, ∑, G, q0, z0, A, d)

What does the symbol z0 represents?

a) an element of G

b) initial stack symbol

c) top stack alphabet

d) all of the mentioned

Answer: d

Explanation: z0 is the initial stack symbol, is an element of G. Other symbols like d represents the transition function of the machine.

42. Which of the following correctly recognize the symbol '|-' in context to PDA? a) Moves

b) transition function

c) or/not symbol

d) none of the mentioned

Answer: a

Explanation: Using this notation, we can define moves and further acceptance of a string by the machine.

43. Which among the following is true for the given statement?
Statement :If there are strings R and T in a language L so that R is prefix of T and R is not equivalent to T.

a) No DPDA can accept L by empty stack

b) DPDA can accept L by an empty stack

c) L is regular

d) None of the mentioned

Answer: a

Explanation: If M is a DPDA accepting L by an empty stsck, R and T are distinct strings in L, and R is a prefix of T, then the sequence of moves M must make in order to accept R leaves the stack empty, since R L. But then T cannot be accepted, since M cant move with an empty stack. ∈

44. Which of the following can be accepted by a DPDA?

a) The set of even length palindrome over {a,b}

b) The set of odd length palindrome over {a,b}

c) {xx^C| where c stands for the complement,{0,1}}

d) None of the mentioned

Answer: d

Explanation: Theorem: The language pal of palindromes over the alphabet {0,1} cannot be accepted by any finite automaton , and it is therefore not regular.

45. Which of the following allows stacked values to be sub-stacks rather than just finite symbols?

a) Push Down Automaton

b) Turing Machine

c) Nested Stack Automaton

d) None of the mentioned

Answer: c

Explanation: In computational theory, a nested stack automaton is a finite automaton which makes use of stack containing data which can be additional stacks.

46. A non deterministic two way, nested stack automaton has n-tuple definition. State the value of n.

a) 5

b) 8

c) 4

d) 10

Answer: d

Explanation: The 10-tuple can be stated as: NSA= ‹Q,Σ,Γ,δ,q0,Z0,F,[,],]›.

47. A push down automaton employs _____ data structure.

a) Queue

b) Linked List

c) Hash Table

d) Stack

Answer: d

Explanation: A push down automata uses a stack to carry out its operations. They are more capable than the finite automatons but less than the turing model.

48. Which of the following automata takes stack as auxiliary storage?

a) Finite automata

b) Push down automata

c) Turing machine

d) All of the mentioned

Answer: b

Explanation: Pushdown Automaton uses stack as an auxiliary storage for its operations. Turing machines use Queue for the same.

49. 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. Let *L* denote the language accepted by
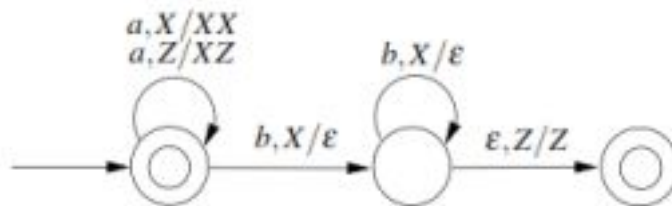
the PDA.

Which one of the following is **TRUE**?

a) $L=\{a^n b^n | n \geq 0\}$

b) $L=\{a^n | n \geq 0\} \cup \{anbn | n \geq 0\}$

c) L is not accepted by any Turing machine that halts on every input

d) $L = \{a^n | n \geq 0\} \cup \{a^n b^n | n \geq 0\}$ and is deterministic context-free

Answer: d

Explanation: in diagram while reading a self loop means number of a's are in the starting followed by b's

50. Push down automata accepts _____ languages.
a) Type 0
b) Type 1
c) Type 2
d) type 3

Answer: c

Explanation: Type 2 Grammar; it generates Control Free Language accepted by a Push Down Automata (PDA).