Theory of Computation - MINOR 2
Common to II and III Yr. CSE

Time: 30 mins

Name: _____   Year: _____   Section: _____

Date: 21/11/2022

Max. Marks: 15

Roll No: _____

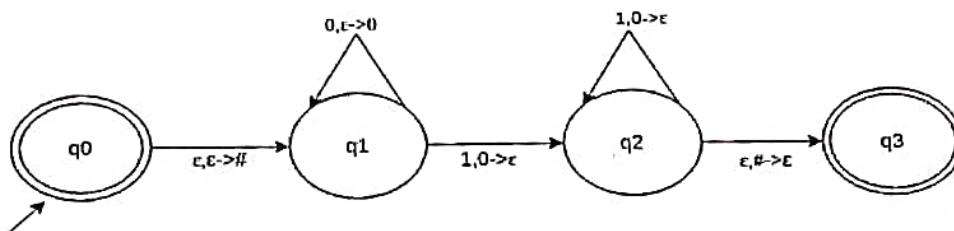1. If direction is not defined on the current state and the current tape symbol, then the machine _____.   [b]

   a) does not halts   b) halts
   c) goes into loop forever   d) none of the mentioned

2. Choose the correct option: [c]
   Statement: If L1 and L2 are recursively enumerable languages over S, then the following is/are recursively enumerable.
   a) L1 U L2   b) L1 ∩ L2
   c) Both L1 U L2 and L1 ∩ L2   d) None of the mentioned

3. Given a Turing Machine
   M= ({q_0, q_1, q_2, q_3}, {a, b}, {a, b, B}, δ, q_0, B, {q_3})
   Where δ is a transition function defined as
   $δ(q_0, a) = (q_1, a, R)$
   $δ(q_1, b) = (q_2, b, R)$
   $δ(q_2, a) = (q_2, a, R)$
   $δ(q_3, b) = (q_3, b, R)$
   The language L(M) accepted by the Turing Machine is ___ ∅ ___.

4. The Language for given PDA is ___ $0^n 1^n$ ___.
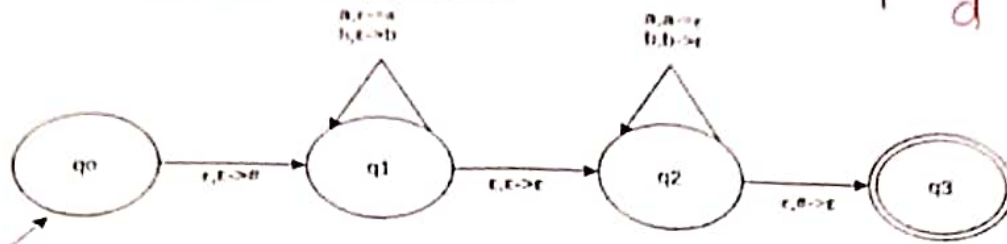

5. Which of the following is/are correct?   [a]
   I.   A language is context free if and only if it is accepted by PDA.
   II.   PDA is a finite automata with push down stack.
   a) Both I and II are true   b) Both I and II are false
   c) Only II is true   d) Only I is true

6. Which of the functions are not performed by the Turing machine after reading a symbol?   [d]

   a) Writes the symbol   b) moves the tape one cell left/right
   c) proceeds with next instruction or halts   d) none of the mentioned

7. If the start symbol is one of those symbols which produce no terminal through any sequence, the CFL is said to be   [b]
   a) nullable   b) empty   c) eliminated   d) none of the above

8. Minimum number of states require to construct PDA acceptance by empty stack for the language
   L = { $a^i b^j c^k d^l$ | i=k or j=l } is ___ 8 ___.

9. Consider the following Push Down Automata P

[d]

Also consider the following grammars
a) A → aAa| bAb | a | b | ε
c) A → aAa | bAb | aAb | bAa | ε
b) A → AaAbA | AbAaA | ε
d) A → aAa | bAb | ε
Which of the above grammars generate exactly the same language accepted by the P?

10. Which of the following assertion is true?

[d]

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

11. A single tape Turing Machine M has two states q0 and q1, of which q0 is the starting state. The tape alphabet of M is {0, 1, B} and its input alphabet is {0, 1}. The symbol B is the blank symbol used to indicate end of an input string. The transition function of M is described in the following table.

	0	1	B
q0	$q1, 1, R$	$q1, 1, R$	Halt
q1	$q1, 1, R$	$q0, 1, L$	$q0, B, L$

Which of the following statements is true about M?

[a]

a) M does not halt on any string in $(0 + 1)^+$ b) M halts on all string ending in a 0
c) M does not halt on any string in $(00 + 1)^*$ d) M halts on all string ending in a 1

12. A PDA machine configuration (p, w, y) can be correctly represented as:

[a]

a) (Current state, unprocessed input, stack content)
b) (Unprocessed input, stack content, current state)
c) (Current state, stack content, unprocessed input)
d) none of the mentioned

13. Which of the following a Turing machine does not consist of?

[d]

a) input tape   b) head   c) state register   d) none of the mentioned

14. What is the minimum number of productions present in the below given context free grammar to make it Chomsky Normal Form?

[b]

S → XYx
X → xxy
Y → Xz

a) 7   b) 8   c) 9   d) 10

15. The minimum number of states required by a Turing Machine to accept strings which consists of even number of 1's is ___2___ .