بسم الله الرحمن الرحيم

Select the right answer for the following questions (just 1 answer):

1- The language L = $\{a^i, b^j, c^k; i = j \ or \ j = k\}$ is :
   - a- Type -3 Grammar
   - b- Type -2 Grammar
   - c- Type -4 Grammar
   - d- Type -0 Grammar
   - e- Type -1 Grammar

2- Every DFA Recognizing the language L = {w € {0,1}* : w ends with 01} needs at least states:
   - a- 2
   - b- 3
   - c- 4
   - d- 5
   - e- None

3- Which of The following statement about Regular Expression is true ?
   - a- Regular Expression can only recognize Regular Languages
   - b- Regular Expression can recognize any computable languages
   - c- RE are more powerful than PDA
   - d- RE can be directly converted into turning machines

4- Which of the following statement about the closure properties of CFL are true ?
   - a- CFL are closed under union , intersection and complement
   - b- CFL are closed under union , intersection but not complement
   - c- CFL are closed under union , concatenation but not complement
   - d- CFL are not closed with any of the mentioned

5- Which of the following statement about the Equivalence of DFAs and NFAs true ?
   - a- DFAs and NFAs are not Equivalent as NFAs can recognize more languages than DFAs
   - b- DFAs and NFAs are not Equivalent as DFAs can recognize more languages than NFAs

c- DFAs and NFAs are Equivalent as they can recognize same class of languages (Regular Ex)

d- DFAs and NFAs are Equivalent as they can both converted into Turning machines

e- DFAs and NFAs are not Equivalent as they have different computational models

6- A regular Expression is always :
   a- Finite
   b- Infinite
   c- Either a or b
   d- Undecidable

7- Which of this RE describes a languages of all strings starting with the letter 'a':
   a- (a+b)*a
   b- (a+b)*b
   c- a(a+b)*
   d- b(a+b)*
   e- none

8- Which of this recognize {w | w contains an odd number of 0s }
   a- 1(00)*01
   b- (011)*0
   c- 0(1*1)*0
   d- (0*10*10*)*

9- S → aSa | bSb |a |b ; The language generated by prev grammar over {a,b} is the set of :
   a- All palindromes
   b- All odd length palindromes
   c- String begin and end with same symbol
   d- All even length palindromes

10- A → aA|a |b The Number of steps to form aaab
   a- 2
   b- 3
   c- 4
   d- 5

11- Which of the following isn't computational function that can be computed by Turning machine

a- Multiplication of natural numbers
b- Addition of natural numbers
c- Exponentiation of natural numbers
d- Finding the greatest common divisor of natural numbers
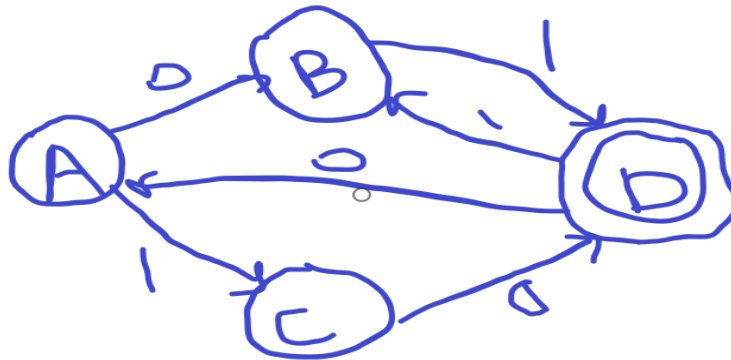e- Solving the halting problem

12- The Grammar in question 10 is :
   a- Type 1
   b- Type 2
   c- Type 3
   d- Type 0
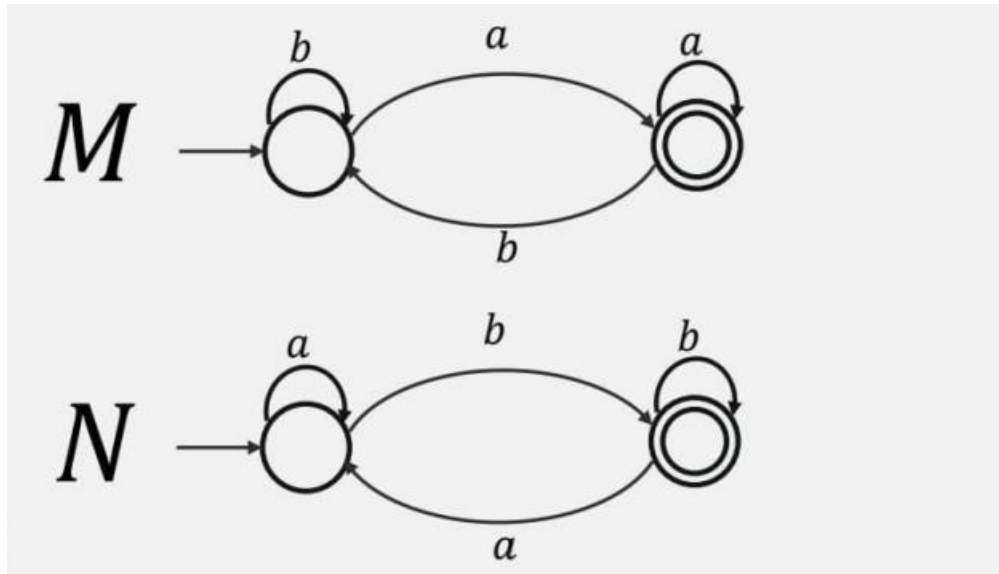
13- Which of this is correct about useless variable
   a- Reachable
   b- Generator
   c- Both a b
   d- None

14- The following automata Which edge of it not traversed (visited) when enter this String 011100101
   a- B
   b- C
   c- CD
   d- A

15- The number of states for L(M).L(N) For the following two automates M N is :

a- 1
b- 2
c- 3
d- 5

16- The Regular Rules for the automata in question *14* –
a - A → 0B|1C , B → 1 ,C→0, D→ 1B|0A
b- A → 0B|1 , B → 1D ,C→0D, D→ 1B|0A
c – A → 0|1C , B → 1D ,C→0D, D→ 1B|0A
d - A → 0|1C , B → 1D ,C→0, D→ 1B|0A

17- We still in 14 if we change all normal states into final states and vice versa how many words will be accepted then ?
a- 1
b- 2
c- 4
d- 5
e- Can't decide

18- Let ∑= {0,1}* and the grammar G be: S → ε | SS | 0S1 | 1S0 State which of the following is true for the given:
(A) Language of all and only Balanced strings
(B) It contains equal number of 0's and 1's
(C) Ambiguous Grammar (D) All of the mentioned

19- Which among the following cannot be accepted by a regular grammar

   (A) L is a set of numbers divisible by 2
   (B) L is a set of binary complement
   (C) L is a set of string with odd number of 0
   (D) L is a set of $0^{\wedge}n$, $1^{\wedge}n$

20- consider this two grammar S and R S → aSb | epsilon , R → cRd |epsilon If we define grammar G = S union R so the number of steps to give productions will equal to :
   a-   1
   b-   2
   c-   4
   d-   5 can't decide

21- What we can consider this grammar
   B → AC|a
   a-   Regular
   b-   Non regular
   c-   Ambiguous
   d-   CNF

22- What we can consider this grammar
   A → aA|b
   a-   Regular
   b-   Non regular
   c-   Ambiguous
   d-   CNF

23- Which of The Following isn't component of Turning Machine
   a-   Tape
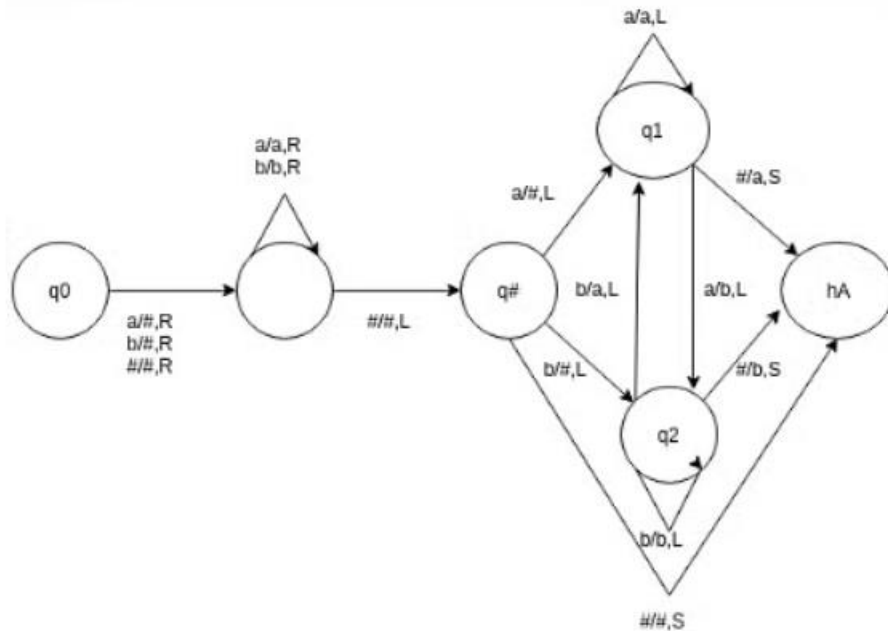   b-   Stack
   c-   Finite Control
   d-   Head

24- Which of the following is a parctical application of turing machin?

   a- solving differential equations

   b- recognize regular languages

c- simulating a computer program

e- generating random number

25- Consider This Turning Machine :

The following turing machine acts like:

- A- Copies a string
- B- Delete a symbol
- C- Insert a symbol
- D-None of the mentioned

26- What is the language of this grammar S→ aSa | aAa , A → bA | b with {a,b}
   a-   a^n b^n a^m
   b-   a^n b^m a^n
   c-   a^n b^m a^(n+m)
   d-   a^n b^(n+m) b^m

27- CYK algorithm for This grammar :
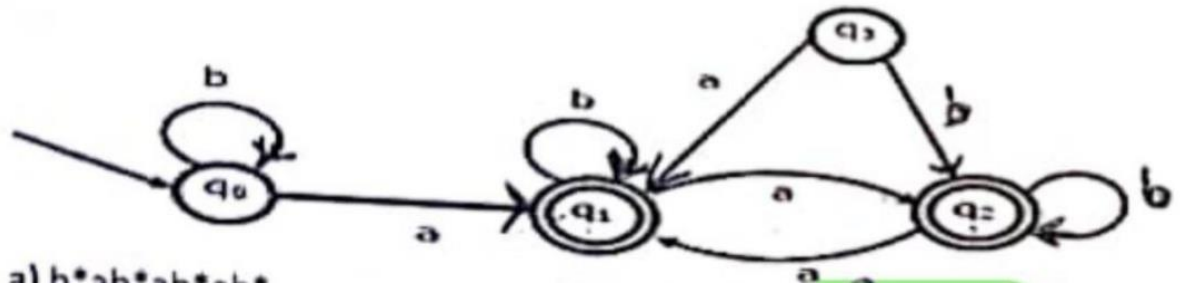   S → AB
   A → AA|AB|a
   B → CC
   C → b
   And this word aaabb
   By applying the Cyk algorithm for the above word what we will get ?
   a-   S
   b-   A,S

c- A,B,C,S

d- Phi

e- S,A,B

28- The languages accepted for this DFA is :

a- b*ab*ab*ab*

b- (a+b)*

c- b*a(a+b)*

d- b*ab*ab*

29- Which of The following is/are true ?

a- {epsilon=phi}

b- aa*=a

c- epsilon accepted by any finite automata

d- both b and c

e- none

30- let's take this two RE T = (a+b*)* and S = (a+b)* select the right answer :

a- S ⊆ T

b- T ⊆ S

c- S=T

d- S intersection T = phi

31- The minimum Number of states to recognize an octal number divisible by 3 are/is :

a- 5

b- 3

c- 4

d- 7

32- What is The difference between DFA and NFA

a- DFA has single transition for each state and input symbol , while an NFA can have multi transitions

b- DFA can recognize more languages than NFA

c- DFA has fixed number of states while an NFA can have infinite number of states

d- DFA has tape , while NFA aren't

33- What is the relation between Regular Expression and Regular Grammar

a- RE and RG are completely unrelated

b- RE can be used to generate RG

c- RG can be used to generate RE

d- Both are equivalent in their expressive power

34- In TM id d not defined on the current state and the current tape symbol then the machine :

a- Doesn't halts

b- Halts

c- None

d- Goes into loop forever

35- Consider the following languages :

(I) $\{a^n b^m \mid n > m \lor n < m\}$
(II) $\{a^n b^m \mid n \geq m \lor n \leq m\}$
(III) $\{a^n b^m \mid n > m \land n < m\}$
(IV) $\{a^n b^m \mid n \geq m \land n \leq m\}$

Which of the following languages are regular?

a- Only (I) and (IV)

b- Only (II) and (III)

c- Only (II), (III) and (IV)

d- None of the above