(REG) PICT In-Semester Examination AY: 2021-2022(SEM-I)

Branch: Information Technology Class(Course): TE(2019)
SUBJECT NAME(Code): Theory of Computation (314441)
Date &Time:. 22-10-2021, 11 AM to 11.45 AM
Max. Marks :30

Instructions to the candidates:

1) There are 29 MCQ's with 36 marks. Correct 30 marks questions will be considered.
2) Duration of exam is 45 Minutes..
3) Submit the exam before the due time.
4) You should put your video on during the examination.
5) Assume Suitable data if necessary

Hi, Shashank. When you submit this form, the owner will see your name and email address.

* Required

1

Roll No. : *

Enter your answer

2

Permanent Registration Number
*

Enter your answer

3

Name of the student:
*

Enter your answer

4

Regular Languages are closed under? [1 Marks]
*

(1 Point)

- A. Intersection
- B. Union
- C. Complement
- D. All

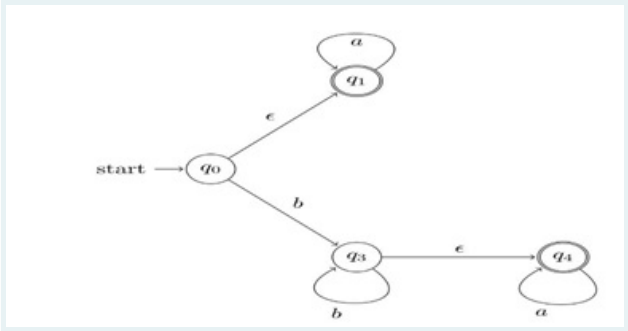
5

How many states will be there in the DFA constructed for the regular expression a*b*a using direct method? [1 Mark]
*

(1 Point)

- ○ i) 4
- ◉ ii) 5
- ○ iii) 3
- ○ iv) 6

6



Consider the above NFA.
Which of the following REs has the same language as the above NFA?
[2 Marks]
*

(2 Points)

- ○ A) bb*a*
- ◉ B) b*a*
- ○ C) a*(a*+b*)
- ○ D) (a*+b*)b*

7

What is meant by extended transition function? *
(1 Point)

- ○ applying transition function many times
- ○ finding the destination state for an input alphabet from a current state
- ◉ finding the destination state for an input string from a current state
- ○ used to get a path from source to destination

8

The minimum number of states required to design a DFA that accepts the strings over {a,b}* which end with aa or bb *
(1 Point)

- 4
- 5
- 6
- 7

9

Which of the following statements is true? [1 Mark]
*
(1 Point)

- i) A regular language is accepted by pumping lemma.
- ii) pumping lemma is used to check if a language is regular or not.
- iii) pumping lemma is used to prove a language is regular.
- iv) pumping lemma is used to prove a language is not regular.

10

Which of the following gives an equation of Arden's law? [1 Mark]
*
(1 Point)

- i) ∈+aa* => a*
- ii) r=p+rq =>pq*
- iii) r=q+rp =>pq*

iv) r=p+rq ==>qp*

11

R1: a*(ab*+b*)+b*(ba*+a*)
R2: (a*+b*)(a*+b*)
R3:a*+bb*a*
R4: a*b*+b*a*
Refer above regular expression and choose the correct statement?[2 Marks]
*

(2 Points)

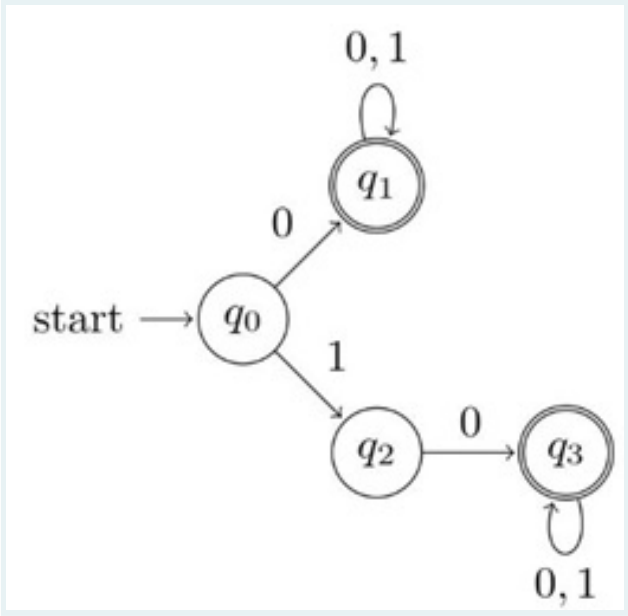
A) Only R2 and R4 are Equivalent to each other.

B) Only R1, R2 and R4 are Equivalent to each other.

C) Only R2, R3 and R4 are Equivalent to each other.

D) Only R1, R2 and R3 are Equivalent to each other.

12



What is the regular expression corresponding to the above NFA? [1 Marks]
*

(1 Point)

- ○ A) 0(0+1)*+1(0+1)*
- ○ B) (0+1)(1+0)*
- ○ C) (0+1)0(0+1)*
- ◉ D) (1+ϵ)0(0+1)*

13

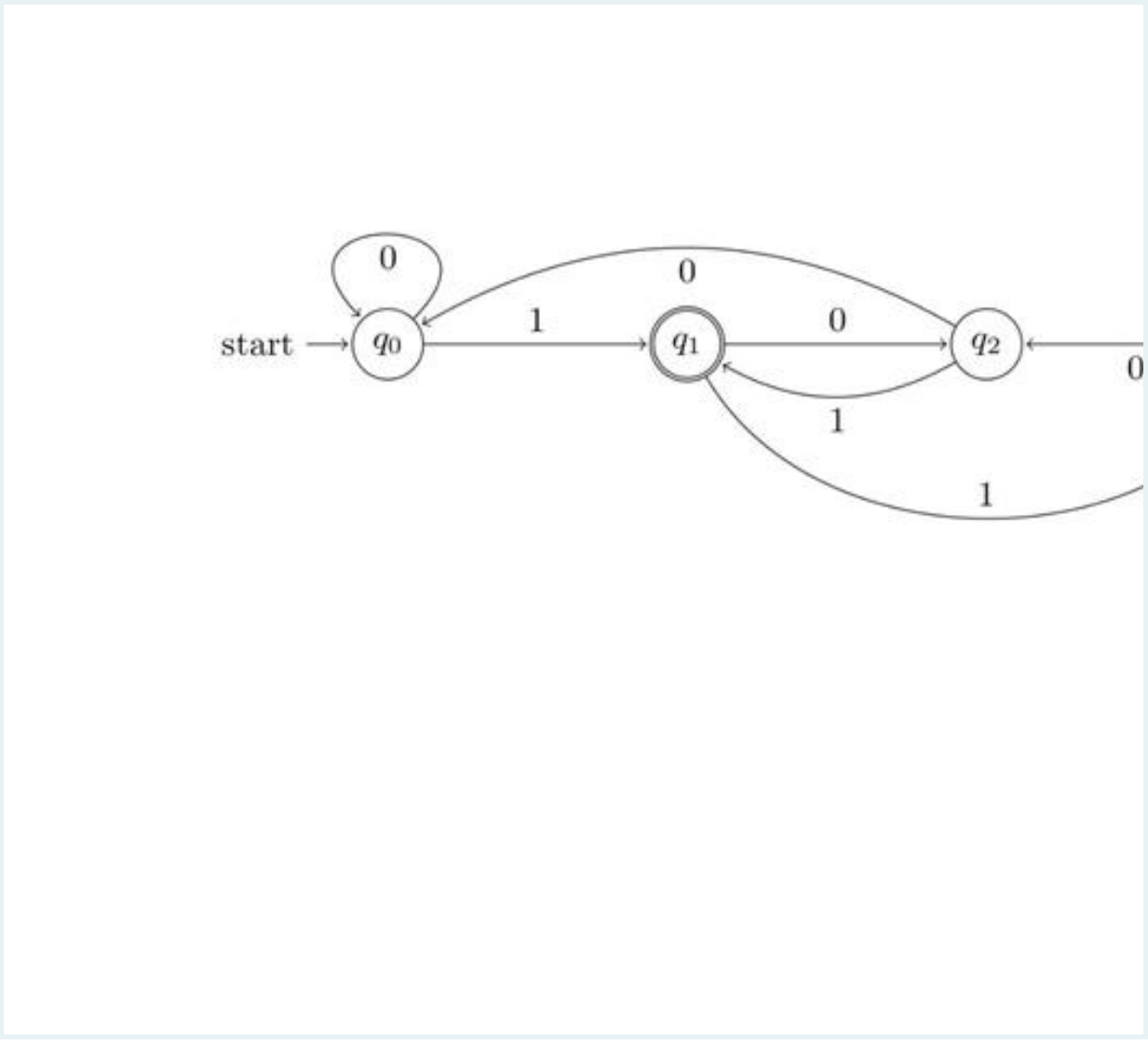
Which of the following is true? [1 Mark] *

(1 Point)

- ○ i) a.b=b.a
- ◉ ii) (ab)*a=a(ba)*
- ○ iii) (a+b)*=a*+b*+(ab)*
- ○ iv) a*b*=(b*a*)*

14

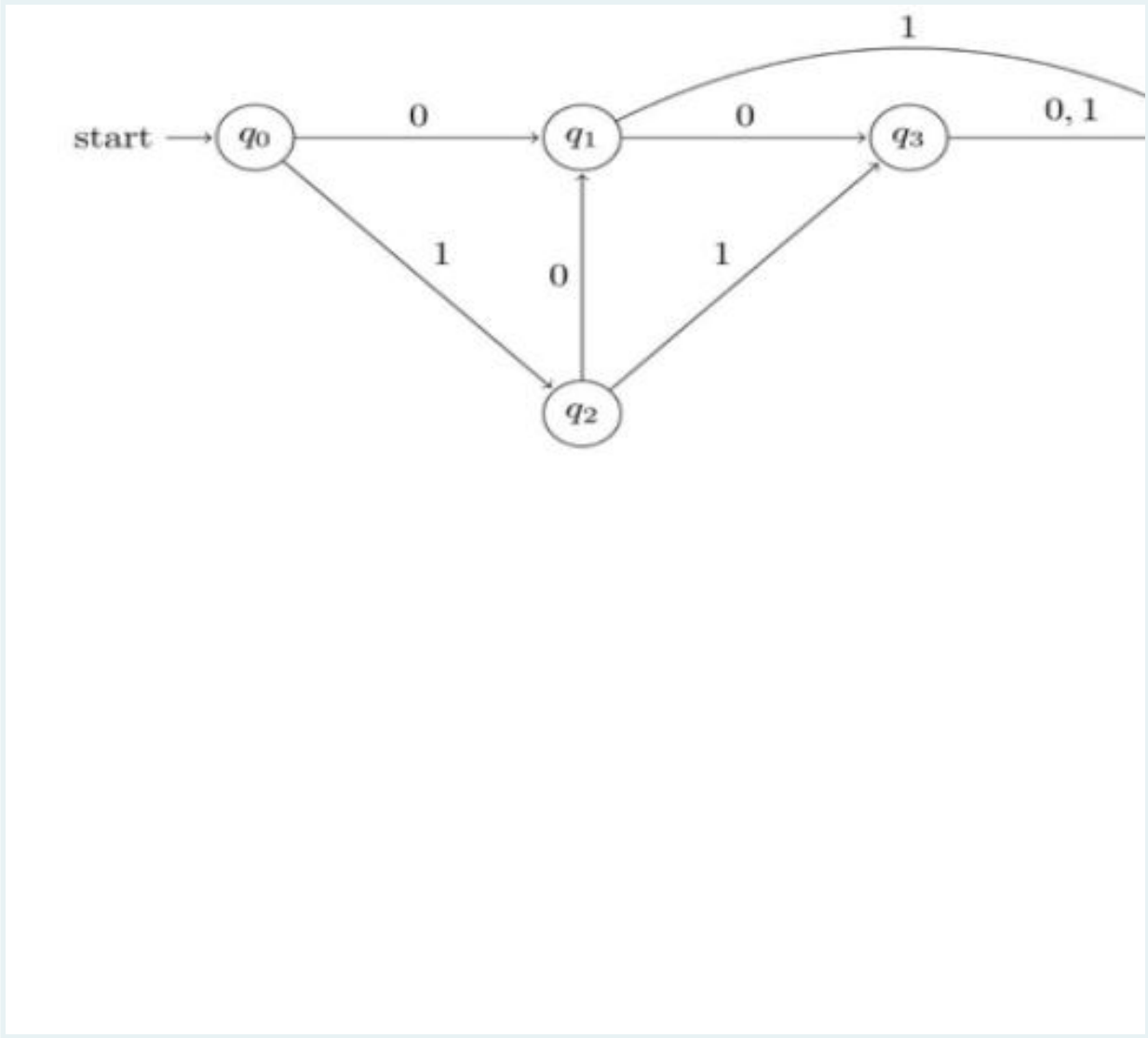
Choose the correct language accepted by following FA? *
(1 Point)



- ◯ Set of binary strings not divisible by 4
- ◯ Set of binary strings which are divisible by 4
- ◯ Set of binary strings which have odd number of 0's
- ◉ Set of binary strings which are odd

15

Cardinality of the language recognized by the given NFA is * (1 Point)



- ○ 7
- ◉ 8
- ○ 9
- ○ infinite

16

Choose the incorrect statement

*

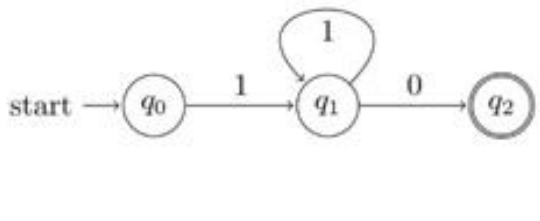
(1 Point)

- ○ Moore and Mealy machines are FSM with output capabilities
- ○ Any given Moore machine has an equivalent Mealy machine
- ○ Any given Mealy machine has an equivalent Moore machine

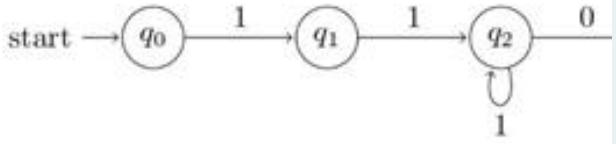
- [x] Moore machine is not an FSM

17

Consider the following two NFAs A1 and A2. Which one of the following is true? *
(1 Point)



NFA A_1



NFA A_2

- [ ] NFA A1 and NFA A2 are Equivalent to each other.
- [ ] Any string accepted by A1 is also accepted by A2
- [x] L(A1) ⊂ L(A2)
- [ ] None of the above

18

The range of the transition function of NFA-null is *
(1 Point)

- ○ Set of states
- ○ union of set of states and {null string}
- ○ union of set of alphabets and {null string}
- ◉ power set of set of states

19

Which of the following RE is equivalent to (a+b)*ab(a+b)*+b*a* [1 Mark] *
(1 Point)

- ○ i) ab+b*a*
- ○ ii) (a+b)*ab+b*a*(a+b)*
- ◉ iii) (a+b)*
- ○ iv) (ab)*b*a*

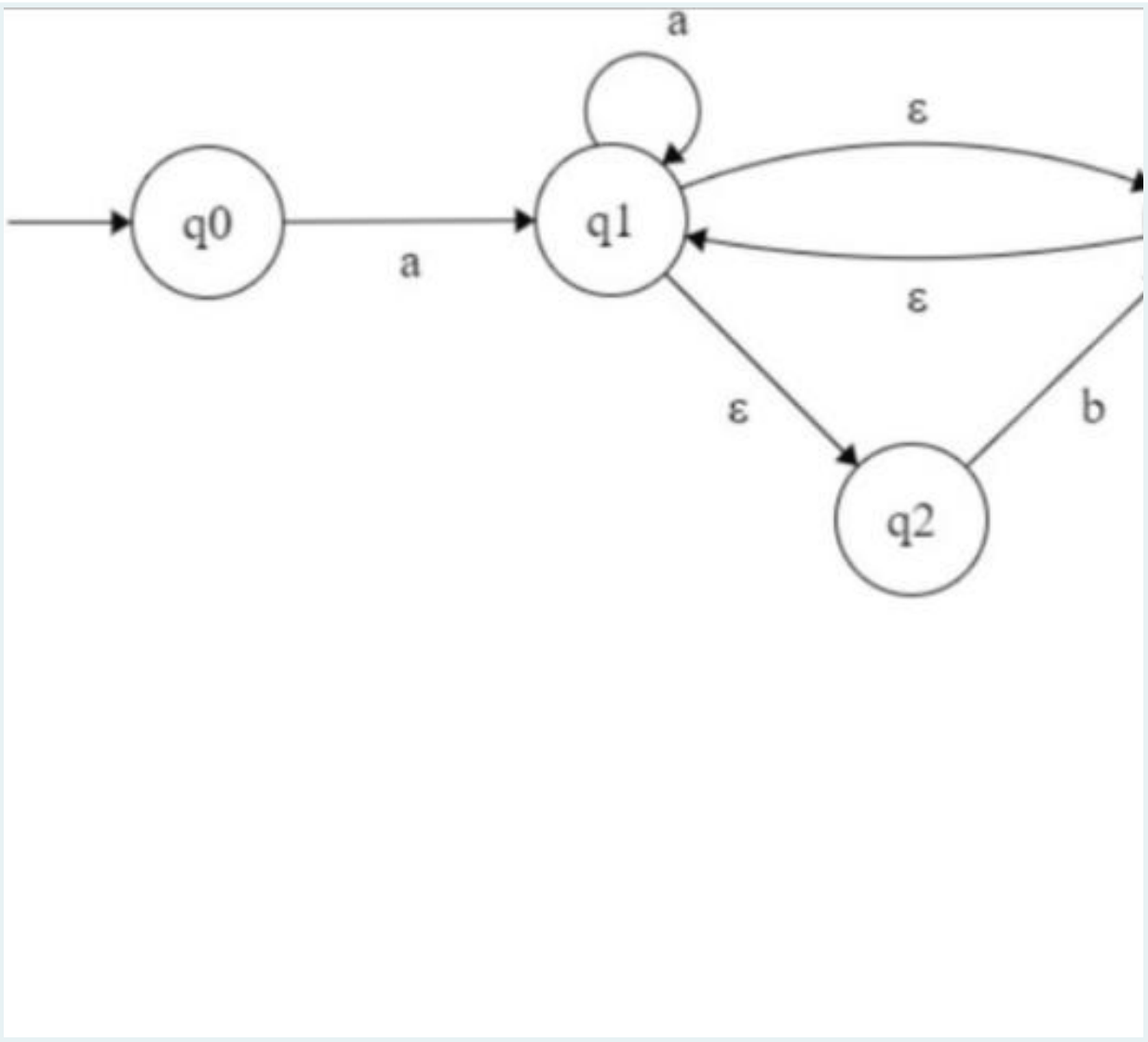
20

When you convert an NFA to equivalent DFA, the number of states *
(1 Point)

- ○ always reduce
- ○ always increase
- ○ remain the same
- ◉ None of the above

21

What is *(q0,abb) is equal to ? *
(2 Points)



- q3
- {q3}
- {q1,q2,q3}
- None of the above

22

To describe the complement of a language, it is very important to describe the _____ of that language over which the language is defined. [1 Mark]

*

(1 Point)

- (●) i) Alphabet
- ( ) ii) Regular Expression
- ( ) iii) String
- ( ) iv) Word

23

Which of the following sets are regular?[1 Mark]

*

(1 Point)

- ( ) i) { a^i | i = n^2, n >=1 }
- ( ) ii) { a^p | p is prime }
- ( ) iii) { ww | w ∈ {a, b}+ }
- (●) iv) { a^n | 1000<=n >=1 }

24

If L={b, ab}, which of the following string is in L*? *

(1 Point)

- ( ) aabaaab
- ( ) bababaab
- (●) bababbab

- ◯ None of the above

25

What happens when a DFA is minimized *
(1 Point)

- ◉ the number of states are reduced
- ◯ the number of transitions from each state are reduced
- ◯ both the above
- ◯ number of alphabets are reduced

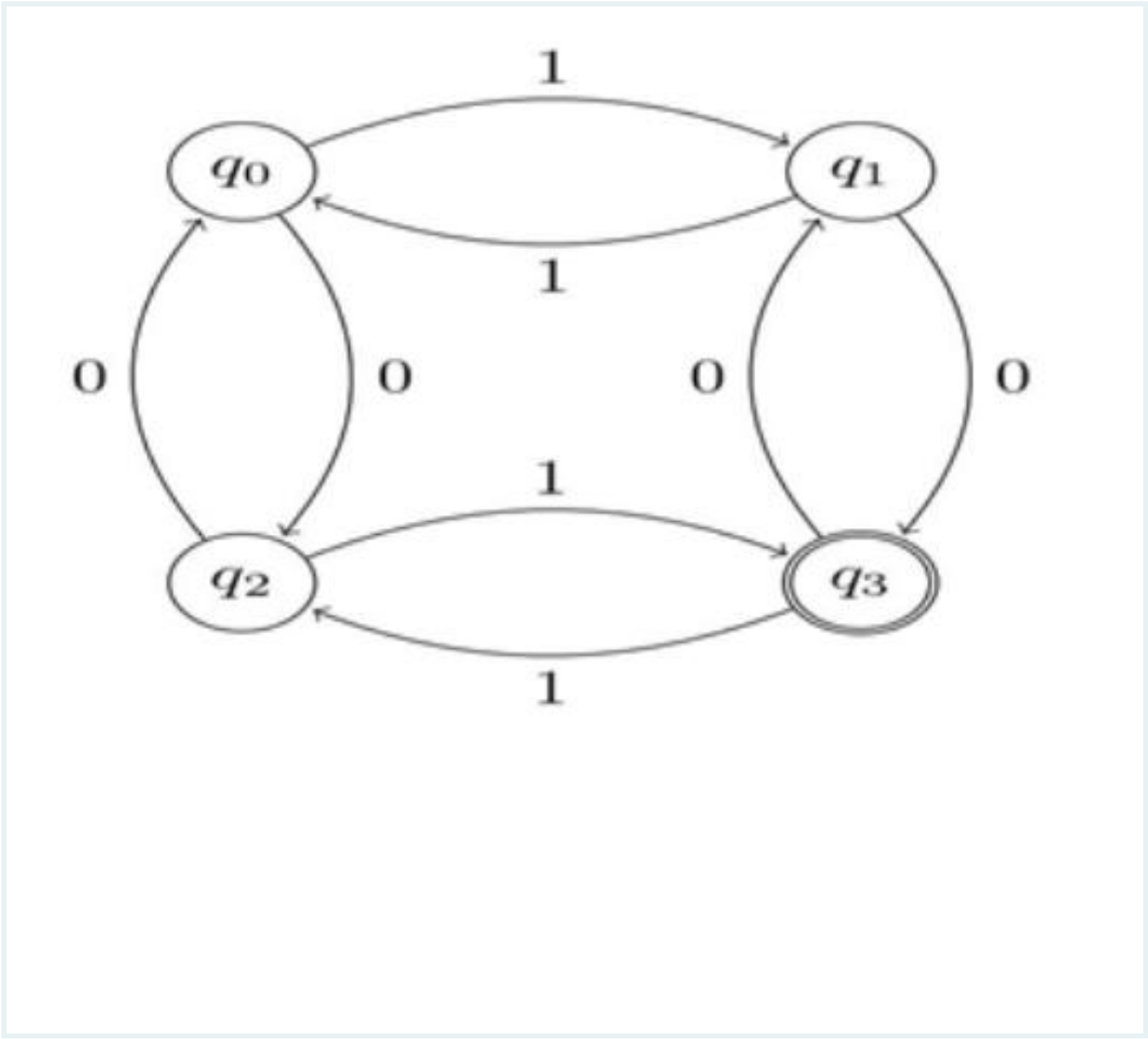
26

Which of the following is true? *
(1 Point)

- ◯ NFA is unambiguous
- ◉ DFA is unambiguous
- ◯ NFA-null always accepts a null string
- ◯ NFA cannot accept a null string

27

Which state in the following DFA should be made the initial state to make it accept the language L={w∈{0,1}∗|w has odd no of 1's and even number of 0's}? *
(2 Points)



- ◯ q0
- ◯ q1
- ◉ q2
- ◯ q3

28

If L={0,10,11}, which of the following is in L*? [1 Marks] *
(1 Point)

- ◯ 01001
- ◯ 1000111
- ◯ 1111111
- ◉

- [x] 00101110

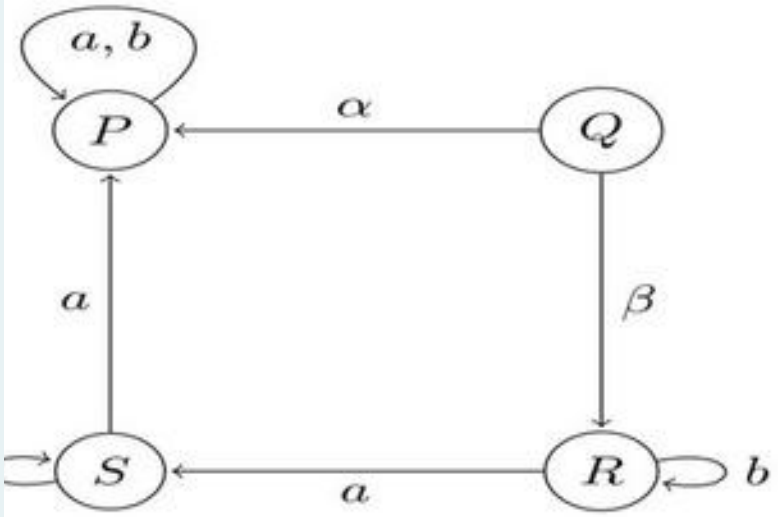
29

A language has strings with length <=3 and start with b and end with a over {a,b}. Find the number of strings in this language? *
(1 Point)

- [ ] 4
- [x] 3
- [ ] 2
- [ ] 1

30

Consider the following finite automata M. Choose the correct modifications so that M becomes a DFA and L(M)={w∈{a,b}∗ | w starts with b and has exactly one a}. *
(2 Points)



- ◯ Replace α by 'a' and β by 'b' and make S starting state and Q accept state
- ◉ Replace α by 'a' and β by 'b' and make Q starting state and S accept state
- ◯ Replace α by 'b' and β by 'a' and make Q starting state and S accept state
- ◯ Replace α by 'a' and β by 'b' and make P starting state and Q accept state

31

The RE (0+1)*00 represents the binary numbers [1 Mark]

*

(1 Point)

- ◯ i) that are divisible by 4
- ◉ ii) that end with 00
- ◯ iii) that are divisible by 2

- ◯ iv) with length at least 2

32

What is the RE for the language set strings with at least one 1, one 2 and one 3? [1 Mark]

*

(1 Point)

- ◯ i) 1 + 2 + 3
- ◉ ii) 11* 22* 33*
- ◯ iii) 1* 2 * 3*
- ◯ iv) Both i) and ii)

33

What is the regular expression for the following language [2 Marks] L={w∈{a,b}∗|w has no two consecutive a's or b's and has at least one b}?

*

(2 Points)

- ◯ A) (b+ϵ)a(ba)*(b+ϵ)
- ◉ B) (a+ϵ)b(ab)*(a+ϵ)
- ◯ C) (ba)*
- ◯ D) ba(ba)*(b+ϵ)

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