Q.25 Let T be the language represented by the regular expression $\Sigma*0011\Sigma*$ where $\Sigma = \{0, 1\}$. What is the minimum number of states in a DFA that recognizes L' (complement of L)? **GATE 2015**

(A) 4 (B) 5 (C) 6 (D) 8

Q.26 Which one of the following regular expressions is NOT equivalent to the regular expression $(a + b + c)^*$? **GATE 2004**

(A) $(a^* + b^* + c^*)^*$ (B) $(a^*b^*c^*)^*$

(C) $((ab)^* + c^*)^*$ (D) $(a^*b^* + c^*)^*$

Q.27 Which of the following statements is TRUE about the regular expression 01^*0? **GATE 2005**

(A) It represents a finite set of finite strings. (B) It represents an infinite set of finite strings.

(C) It represents a finite set of infinite strings. (D) It represents an infinite set of infinite strings

Q.28 The language $\{0^n 1^n 2^n \mid 1 \le n \le 10^6\}$ is **GATE 2005**

(A) regular

(B) context-free but not regular.

(C) context-free but its complement is not context-free.

(D) not context-free

Q.29 Which one of the following regular expressions represents the language : the set of all binary strings having two consecutive 0's and two consecutive 1's? **GATE 2016**

(A) $(0+1)^*0011(0+1)^*+(0+1)^*1100(0+1)^*$ (B) $(0+1)^*(00(0+1)^*11+11(0+1)^*00)(0+1)^*$

(C) $(0+1)^*00(0+1)^*+(0+1)^*11(0+1)^*$ (D) $00(0+1)^*11+11(0+1)^*00$

Q.30 The number of states in the minimum sized DFA that accepts the language defined by the regular expression $(0+1)^*(0+1)(0+1)^*$ is _____ **GATE 2016**

(A) 2 (B) 3 (C) 4 (D) 5

Q.31 Consider the following two statements:

I. If all states of an NFA are accepting states then the language accepted by the NFA is Σ^*.

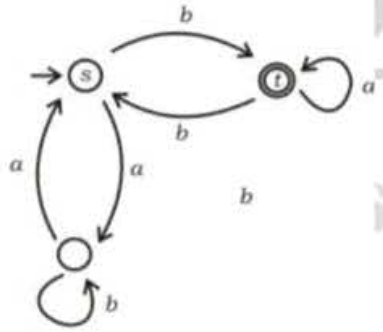
II. There exists a regular language A such that for all languages B, $A \cap B$ is regular.

Which one of the following is CORRECT? **GATE 2016**

(A) Only I is true (B) Only II is true

(C) Both I and II are true (D)Both I and II are false

Q.32 In the automaton below, s is the start state and t is the only final state.



Consider the strings u = abbaba, v = bab, and w = aabb. Which of the following statements is true?

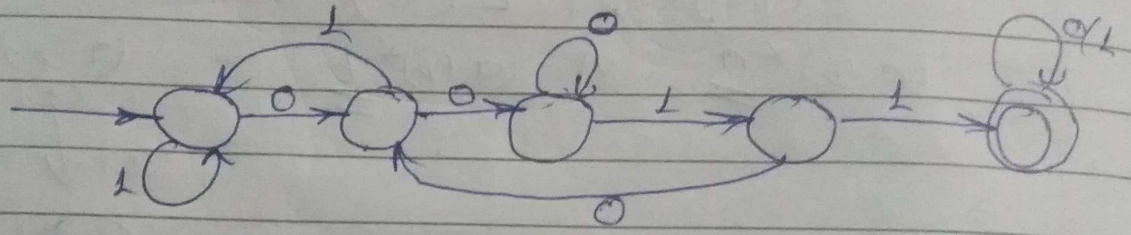
GATE 2006

(A) The automaton accepts u and v but not w (B) The automaton accepts each of u, v, and w

(C) The automaton rejects each of u, v, and w (D) The automaton accepts u but rejects v and w

25⇒ $RE = \Sigma^* 0011 \Sigma^*$

(B)



Minimum = 5 states

26⇒ $RE = (a+b+c)^*$ nat equivalent

(C)

(C) → $((ab)^* + c^*)^*$ nat equivalent

because → $(ab)^*$ always give 'ab'.

27⇒ True about - 01^*0

(B) (B)→ It represent an infinite set of finite strings.

28⇒ $L = \{0^n 1^n 2^n \mid 1 \le n \le 10^6\}$

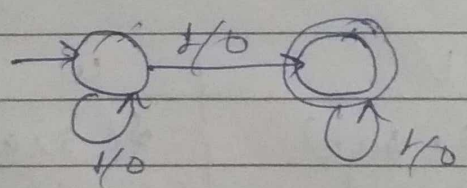
(A) (A)→ Regular.

29⇒ 2 consecutive 0's & 1's → (RE)

(B) (B)→ $(0+1)^*(00(0+1)^*11 + 11(0+1)^*00)(0+1)^*$

30⇒ $(0+1)^*(0+1)(0+1)^*$

(A)



(A) Minimum 2 states

31 ⇒ (I) If all states of an NFA are accepting states the language accepted by the NFA is Σ^*.

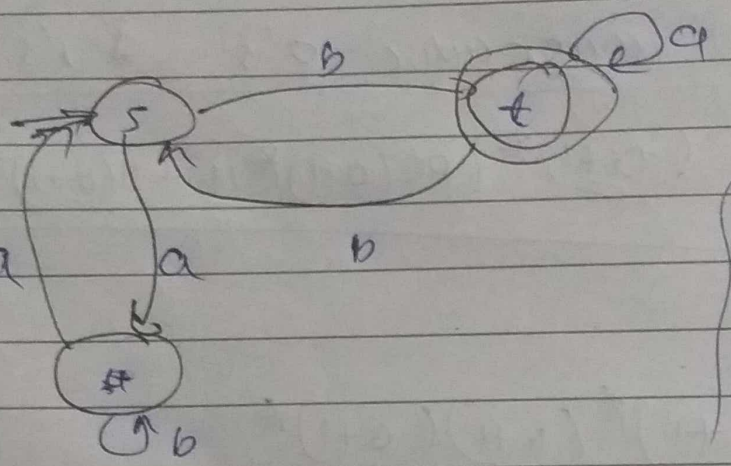
(B)

(II) There exists a regular language A such that for all languages B, $A \cap B$ is regular.

(B) → only II true.

32

(P)



True = ?

u	v	w
$\delta(s, abbaba)$	$\delta(s, bab)$	$\delta(s, aabb)$
$\vdash \delta(s, bbaba)$	$\vdash \delta(s, ab)$	$\vdash \delta(s, abb)$
$\vdash \delta(s, baba)$	b	$\vdash \delta(s, bb)$
$\vdash \delta(s, aba)$	reject	$\vdash \delta(s, b)$
$\vdash \delta(s, ba)$		reject
$\vdash \delta(s, a)$		
$\vdash \delta(s, \varepsilon)$		
accept ~~reject~~		

(D) Automaton accept u, reject v, w.

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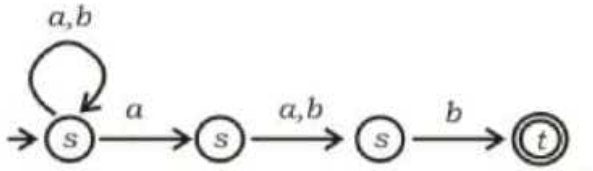
Q.33 Which regular expression best describes the language accepted by the non-deterministic automaton below? **GATE 2006**



(A) (a + b)* a(a + b)b
(B) (abb)*
(C) (a + b)* a(a + b)* b(a + b)*
(D) (a + b)*

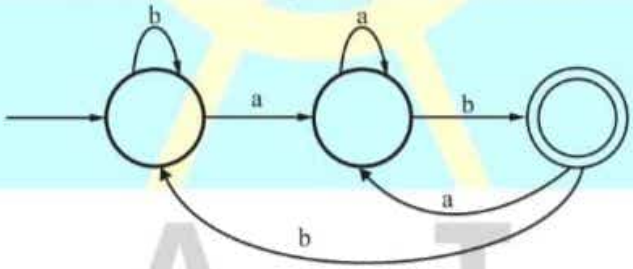
Q.34 Which of the following regular expressions describes the language over {0, 1} consisting of strings that contain exactly two 1's? **GATE 2008**

(A) (0 + 1) * 11(0 + 1) *
(B) 0 * 110 *
(C) 0 * 10 * 10 *
(D) (0 + 1) * 1(0 + 1) * 1 (0 + 1) *

Q.35 Let N be an NFA with n states and let M be the minimized DFA with m states recognizing the same language. Which of the following in NECESSARILY true? **GATE 2008**

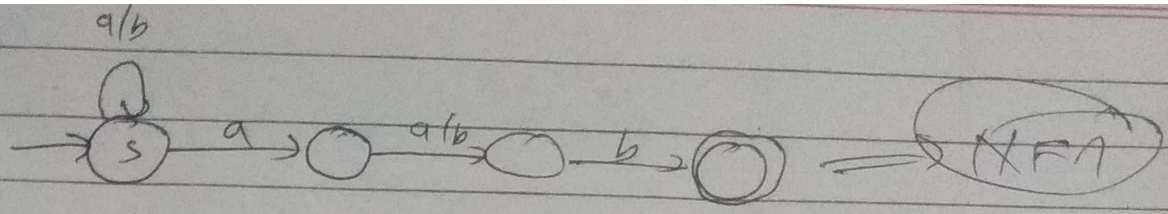
(A) $m \leq 2^n$
(B) $n \leq m$
(C) M has one accept state
(D) $m = 2^n$

Q.36 If the final states and non-final states in the DFA below are interchanged, then which of the following languages over the alphabet {a,b} will be accepted by the new DFA? **GATE 2008**



(A) Set of all strings that do not end with ab
(B) Set of all strings that begin with either an a or a b
(C) Set of all strings that do not contain the substring ab,
(D) The set described by the regular expression b*aa*(ba)*b*

33⇒



A

A) RE = $(a+b)^* a(a+b)b$

34⇒ RE = ? exactly 2 1's

C

C) RE = $0^*10^*10^*$

35⇒ N → NFA → n States → Same Lang.
M → DFA → m States

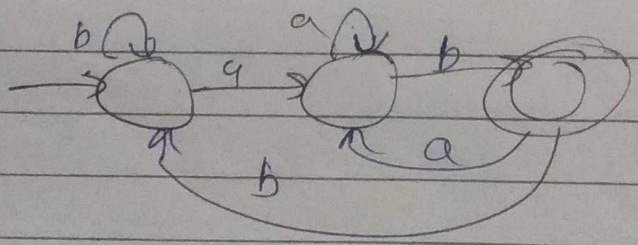
A

Clue - ?

A) $m \leq 2^n$

DFA is proper subset of NFA

36⇒



A

A) Set of all string do not end with 'ab'

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