PES UNIVERSITY, Bangalore

(Established under Karnataka Act No. 16 of 2013)

Department of Computer Science & Engineering

Automata Formal Languages & Logic

Question Bank - Unit 1

Questions from the Prescribed Textbook

Topic	Exercise No.	Question No's
Regular expression	**3.1** **3.2**	**12 to 21, 27, 28** **6,7, 15**
Regular expression to Finite Automata	**3.2**	**1-9**
Finite Automata to regular expression	**3.2**	**12**
Regular expression in practice	**3.2**	**17**

Extra Questions

1) Construct regular expression for each of the following
   a) Binary strings containing at least one 00 and at least one 11
   b) Binary strings with at least two occurrences of at least two consecutive 1 s, the two occurrences not being adjacent (i.e., 011011 is acceptable but 011111 is not).
   c) Strings over {*a*, *b*, *c*} in which the fourth symbol from the beginning is a *c*.
   d) {w| w begins with a 1 and ends with a 0} over the alphabet Σ (0,1)
   e) {w| w has length at least 3 and its third symbol is a 0 over the alphabet Σ (0,1)

2)convert the following RegEx to an equivalent NFA
   a) (0+λ)(1+λ)(1+2)*0(2+1)*
   b) (0+11+10(1+00)*01)*
   c) (a+b+c)*c(a+b)c(a+b)(c+λ)*
   d) 0*1*0* with three states

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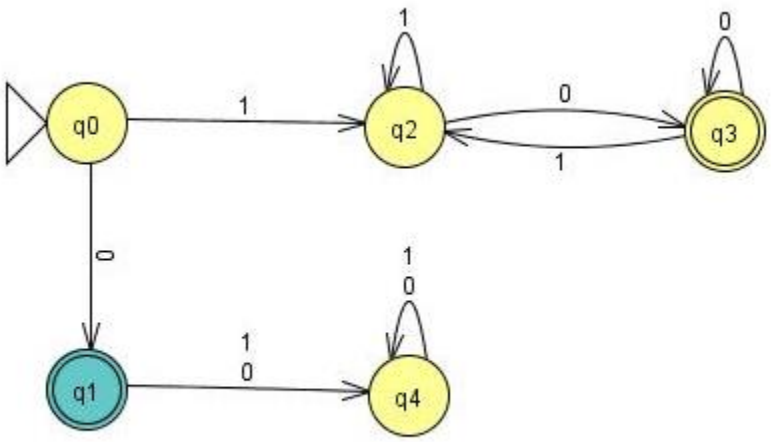
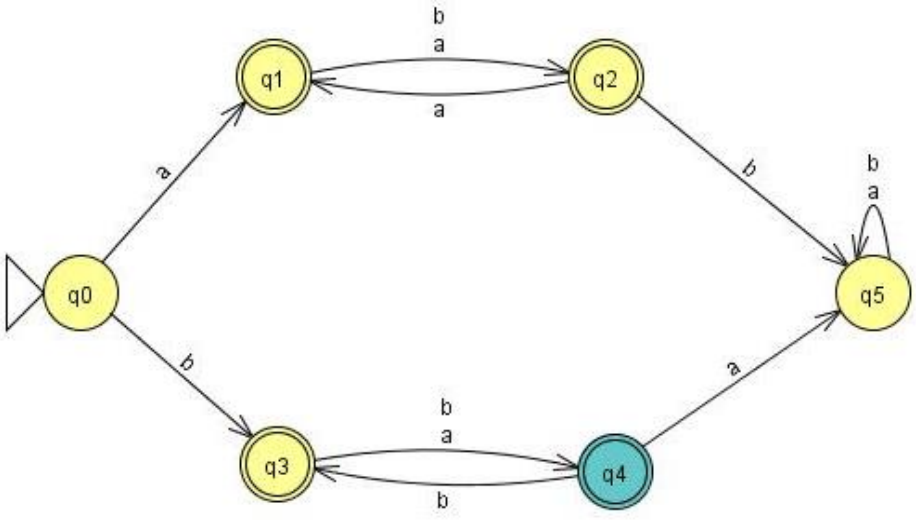
e) 1*(001*)* with three states

3) Convert the following DFA/NFA to an equivalent RegEx

a	
b	

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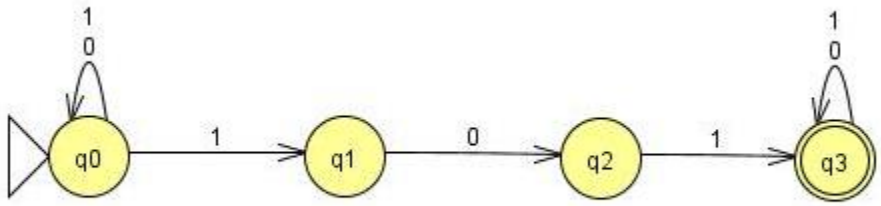
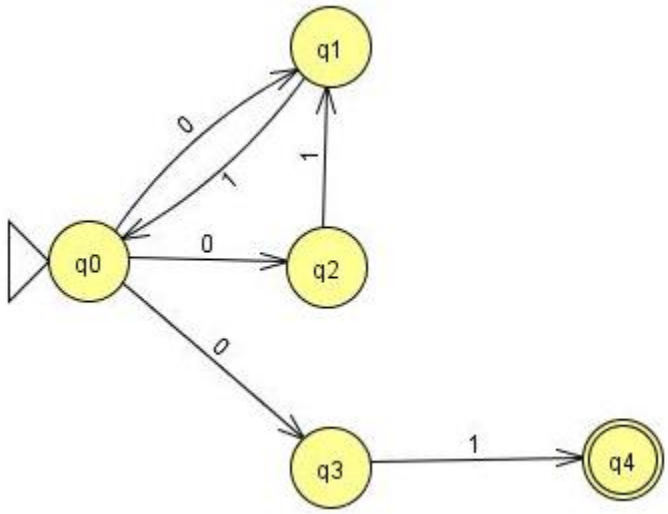
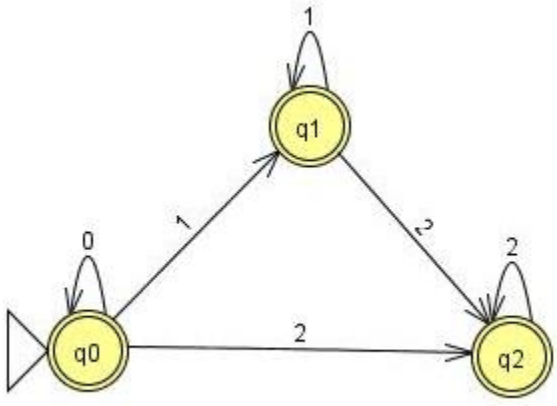
c	
d	
e	

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4) Are the following pairs of RegEx's equivalent(do they represent same set of strings
   a) (0+λ)(11*0)*(1+λ) and (1+λ)(011*)*(0+λ)
   b) (0*1*)* and (0+1)*
   c) (0+1)*(0+λ) and (1+λ)(1+0)*(0+1+λ)

5) Construct regular expression for each of the following
   a) All valid dates in the year 2012 expressed in the dd/mm format.

   b) All valid names of people: a first name and an optional last name and any number of middle names or middle initials (e.g., James Bond or James H. H. E. Bond); or any number of initials followed by a single name (e.g., J. H. H. E. Bond). First name, middle name and last name are all in init-caps (i.e., only the first letter is capitalized); initials are a capital letter followed by a period.

   c) 20. All valid monetary amounts: starting with the Rupee symbol with an optional decimal point and a two-digit fractional amount; if it is larger than three digits, then commas separate billions, millions and thousands (e.g., Rs. 101.99 or Rs. 10,000 or Rs. 1,670,439,444.49).