BCA (H) 6th Semester Examination, 2021
Subject: Computer Application
Paper Title: Theory of Computation   Paper Code: BCA601(Elective-I)

F.M. 80   Time: 3Hrs.

1.   Answer any six questions   6*5=30

   a.   Differentiate between DFA and NFA.
   b.   Draw NFA of the regular expression r= (a|b)*abb.
   c.   Give the DFA of the following Language over $\sum$ = {a,b}   L={w : na(w)mod 3=0}   .
   d.   Prove that if l1 and l2 are regular Languages then so is L1 INTERSECTION L2
   e.   State the properties of Regular Expression.
   f.   What is CNF? Give example.
   g.   Define Push Down Automata(PDA).
   h.   Explain that the "turing machine is language acceptor" .

2.   Answer any five questions   5*10=50
   a.   Differentiate between Mealy machine and Moore machine. Convert the following Mealy
   machine to Moore machine.

States	Input , Output	
	a	b
Q_0 (Initial)	$Q_1, 1$	$Q_2, 0$
Q_1	$Q_2, 1$	$Q_1, 0$
Q_2	$Q_0, 0$	$Q_3, 1$
Q_3 (Final)	$Q_3, 1$	$Q_0, 0$

   b.   What is a derivation tree and what are its properties? Explain GNF with the help of suitable
        example.

   c.   Design a PDA for the following (any two)
           i. $a^{2n}b^n$: n>1
          ii. $a^n b^m c^n$: n, m > 1, n > m
         iii. $a^n b^m$ | n,m> 1, n > m

   d.   Write the regular expression and draw the DFA/NDFA for the following :
           i.   Strings of 1's and 0's, beginning with '1' and ending with '00' or '11'.
          ii.   Strings of 1's and 0's, such that 1's are followed by 0's and ending with '1'.

e. Design a FA for the expression (0+1)*0(0+1)*0(0+1)*. Find out the regular expression for the automata given in the following figure.
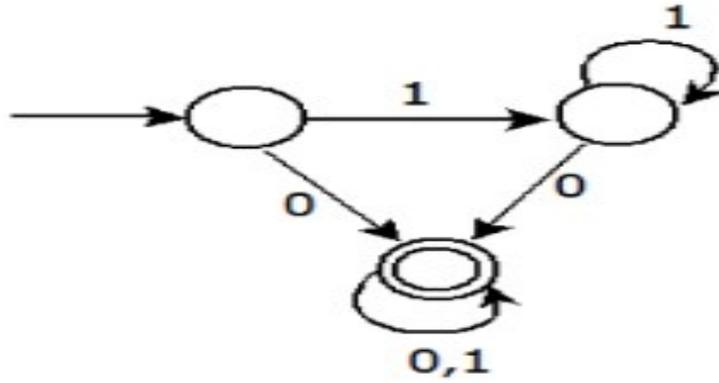
f. When is a CFG said to be ambiguous, give example. Minimize the following DFA
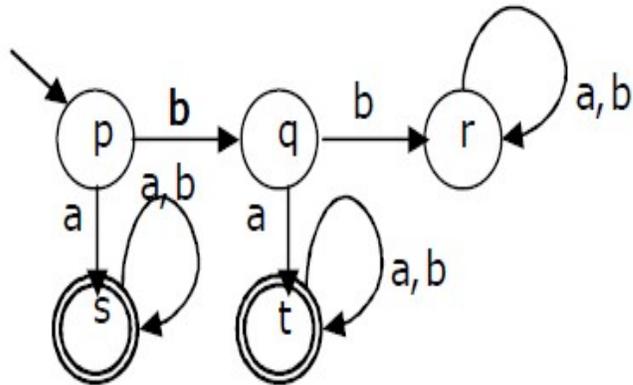
g. Design a Turing Machine that accepts the language: $L=\{ 0^n1^n 2^n: n>=1\}$

F.M. 80   Time: 3Hrs.

1. Answer any six questions   6*5=30
a) Discuss on lossy image compression methods with proper example.

b) Differentiate between brightness and contrast of a digital image.

c) Explain the basic relationship between pixels.

d) Write down Huffman coding algorithm.

e) Explain fidelity criteria.

f) Explain run length coding.

g) Briefly explain histogram equalization with proper example.

h) What is image sampling? Give example.

2. Answer any five questions   5*10=50

a) Briefly discuss image operations.

b) What is thresholding? Explain its merits and limitations in image segmentation.

c) If all the pixels in an image area shuffled, will there be any change in the histogram? Justify.

d) Explain Fast Fourier Transformation (FFT) in detail.

e) Discuss any one image segmentation technique.

f) Explain K-L transformation.

g) Short note on Walsh transformation.