COURSE CODE : CSE322

COURSE NAME : FORMAL LANGUAGES AND AUTOMATION THEORY

Max.Marks: 100

Time Allowed: 03:00 hrs

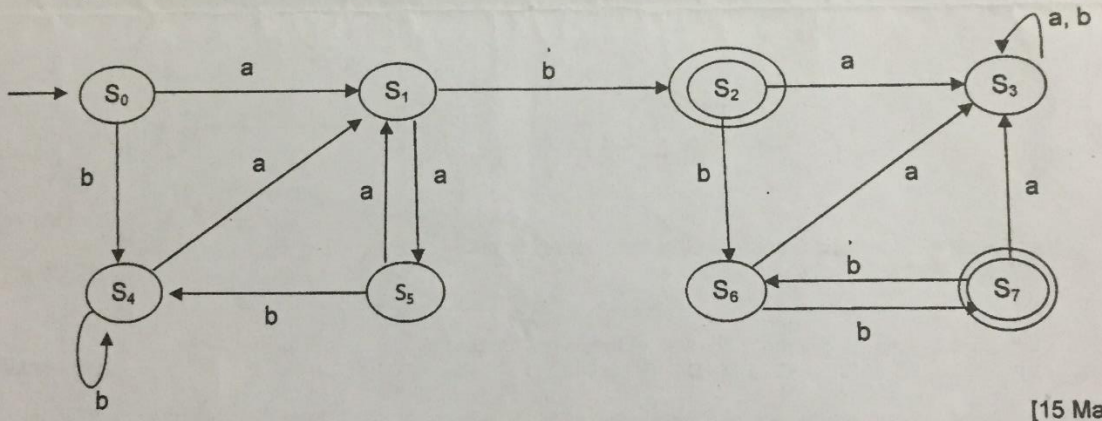
1. *This paper contains 6 questions divided in two parts.*
2. *All questions are compulsory.*
3. *The marks assigned to each questions are shown at the end of each question in square brackets.*
4. *Attempt either (a) OR (b) from each question of Part B.*
5. *Answer all questions in serial order.*
6. *Do not write anything on the question paper except your registration number at the designated space.*

PART A

Q1(a) Define the term automaton. Explain all characteristics of an automaton. [2.5 Marks]
(b) What is the difference between DFA and NDFA? [2.5 Marks]
(c) Mention the steps used to remove null moves from NDFA. [2.5 Marks]
(d) Find a regular expression which accepts the set of all strings containing exactly 2a's. [2.5 Marks]
(e) What do you mean by type 3 grammar and give an example of type 3 grammar. [2.5 Marks]
(f) Test whether 001122 is in the language generated by the grammar S->0SA2, S->012, 2A->A2, 1A->11 [2.5 Marks]
(g) Define ambiguity with respect to Context Free Grammar. [2.5 Marks]
(h) What is GNF (Greibach Normal Form)? [2.5 Marks]
(i) What do you mean by pushdown store? [2.5 Marks]
(j) What do you mean by parsing? [2.5 Marks]

PART B

Q2(a) Construct the minimum State Automation equivalent to the following transition diagram:



[15 Marks]

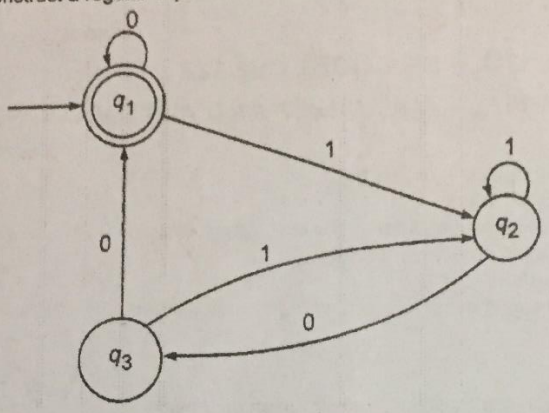
OR

(b) Define Mealy machine. Construct a Mealy machine which is equivalent to Moore machine defined by table below:-

Present state	Next state		Output
	$a = 0$	$a = 1$	
$\rightarrow q_0$	q_1	q_2	1
q_1	q_3	q_2	0
q_2	q_2	q_1	1
q_3	q_0	q_3	1

[15 Marks]

Q3(a) i) Construct a regular expression corresponding to the following state diagram:



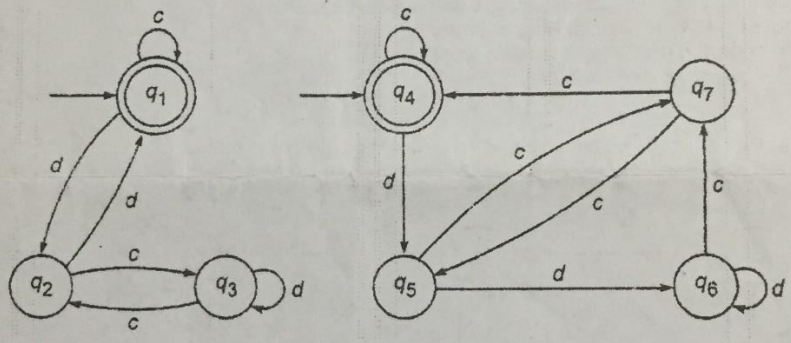
[10]

ii) Discuss Arden's theorem. [5] [15 Marks]

OR

(b) i) Discuss NDFA with ε-Moves and regular expressions. [10]

ii) Show that the Automata M1 and M2 defined by figures are not equivalent.



[5]

[15 Marks]

Q4(a) Reduce following grammar to Greibach Normal form:
S →XY, X →YS | b, Y →SX |a [15 Marks]

OR

(b) Construct a reduced grammar equivalent to the grammar
S →AB, A →a , B → C | b, C → D, D →E, E →a [15 Marks]

Q5(a) Construct a PDA to accept the language L={W2W^r, where |W ϵ {0,1}*and W^r is the reverse of W} by the empty stack and by the final state. [15 Marks]

OR

(b) Construct an equivalent PDA for the following context free grammar.
S → aAB / bBA

A → bS / a

B → aS / b

Show an ID for the string abbaaabbbbab for the PDA generated with stack description. [15 Marks]

Q6(a) Elaborate the various ways of representing a Turing machine with the help of example. [15 Marks]

OR

(b) Construct a Turing machine that accepts the language:
$\{1^n2^n|n>=1\}$ [15 Marks]

-- End of Question Paper --