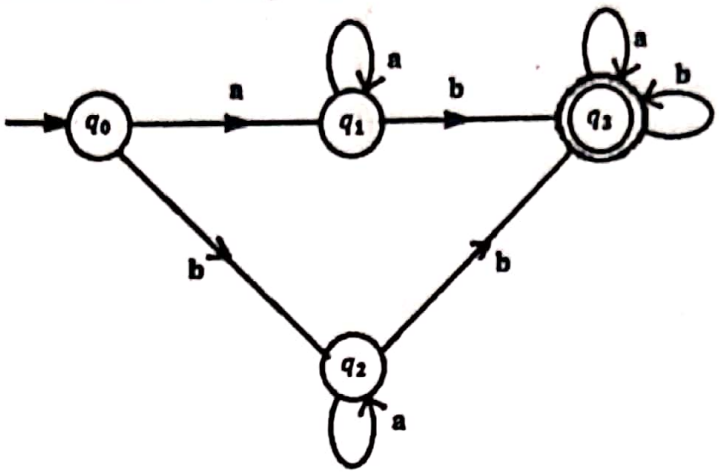
SYCS/SEM IV/EXT/TOC

Time: 2½ hrs. **Marks:75**

Note:
1. All questions are compulsory with internal choice.
2. Draw neat diagrams wherever necessary.
3. Figures to the right indicate full marks.

Q.1 **Answer the following (any FOUR)** **(20)**

(a) Consider the following automata.



Determine initial state, final state and acceptability of string
i) ababaa ii) aaabab

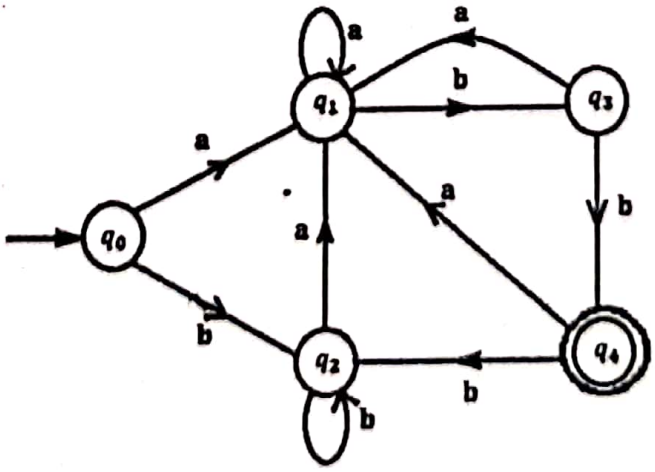
(b) Design a DFA for a language L = set of all strings that start with 0. Also check the acceptability of the following string.
i) 0101001 ii) 1010110

(c) Write the difference between DFA & NFA.

(d) Find equivalent DFA for the NFA given by
L = [{A, B, C}, {a, b}, δ, A, {C}], where δ is given by

	a	b
A	A,B	C
B	A	B
Ⓒ	--	A,B

(e) Construct minimize DFA equivalent to the following DFA



(f) Define grammar. Generate grammar by language L = $\{a^n b^m | n \geq 1 \& m \geq 0\}$

Q.2 **Answer the following (any FOUR)** **(20)**

(a) Describe the following sets by regular expression.

i) L_1 = Set of all strings of 0's and 1's ending with 00.

ii) L_2 = Set of all strings of 0's and 1's starting with 0 and ending with 1.

(b) Write any five identities of regular expression.

(c) Convert the following regular expression into DFA.

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

(d) Find a reduced grammar equivalent to the grammar G, having production rules:

P: S → AC|B, A → a , C → c|Bc, E → aA|e.

(e) Convert the following CFG to CNF

P: S → ASA| aB, A → B|S, B → b|ϵ

(f) Convert the following CFG to GNF

P: S → CA|BB, B → b|SB, C → b, A → a

Q.3 **Answer the following (any FOUR)** **(20)**

(a) Let G = {{S, A}, {a, b}, P, S}, where, P consists of:

S → aAS| a | SS

A → SbA|ba

Draw derivation tree.

(b) For generating string 00110101 form grammar,

S → 0B| 1A

A → 0| 0S|1AA

B → 1|1S|0BB

Find left most derivation tree.

(c) Design Turing machine which can accept language. $L = 0^n1^n$

(d) Construct PDA which is equivalent to the following CFG.

S → 0CC, C → 0S, C → 1S, C → 0

Test whether 010^4 is accepted by N(A)

(e) Write components of Push Down Automata.

(f) Construct the PDA that accepts $L = \{0^n1^n | n \geq 0\}$

Q.4 **Answer the following (any FIVE)** **(15)**

(a) Define DFA.

(b) Write difference between Mealy Machine and Moore Machine.

(c) What are the different operations performed on languages?

(d) Prove that : $(1+00^*1)+(1+00^*1)(0+10^*1)^*(0+10^*1) = 0^*1(0+10^*1)^*$

(e) Define Turing Machine.

(f) Define Push Down Automata (PDA).

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