Code No: 155BK

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2021
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, IT)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) Convert the following Mealy Machine in to an equivalent Moore Machine. (figure 1)

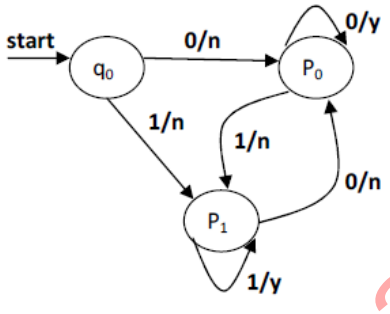

Figure 1

b) Convert the following NFA into equivalent DFA. [8+7]

δ	0	1
→q0	{q0,q1}	q1
(q1)	Φ	{q0,q1}

2.a) Construct Moore for the input from (0+1)* that give residue modulo 4 of input treated as binary.

b) Construct the minimum state automata equivalent to the following. (figure 2) [7+8]

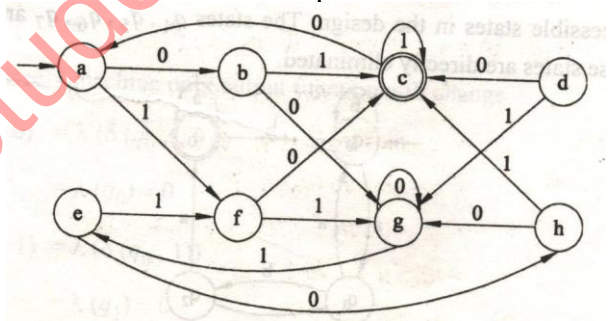

Figure 2

3.a) Describe the following sets by regular expressions.
i) The set of all strings of a‟s and b‟s beginning with „aa‟
ii) The set of all strings of a‟s and b‟s beginning with „b‟ and ending with „aa
iii) The set of all strings of a‟s and b‟s with atleast two consecutive a‟s

b) State pumping lemma for regular languages. Prove that the following language $\{a^n \mid n \text{ is a prime number}\}$ is not a regular. [8+7]

4.a) Construct the NFA with ε transition for the following expression (0+1)*00(0+1)*

b) Construct the regular expression for the following finite automata. (figure 3) [8+7]

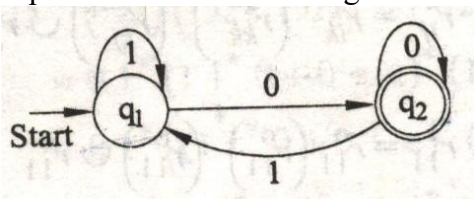

Figure 3

5.a) Find CFG for the language L={ $a^i b^j c^k$ | i=j}.

b) Let G be the grammar S→aB | bA, A→a | aS | bAA, B→b | bS | aBB. Find a Right most derivation for the string "aaabbabbba" and also draw the derivation Tree. [8+7]

6.a) Design a PDA for the following language L={ $0^n 1^{2n}$ / n≥1}.

b) Construct the CFG for the PDA M =($\{q_0 q_1\}$, {0,1}, {R,Z_0}, δ, q_0, Z_0, Φ) and δ is given by [7+8]

$\delta(q_0,1,Z_0)=(q_0,RZ_0)$
$\delta(q_0,1,R)=(q_0,RR)$
$\delta(q_0,0,R)=(q_1,R)$
$\delta(q_1,0, Z_0)=(q_0, Z_0)$
$\delta(q_0,\varepsilon, Z_0)=(q_0,\varepsilon)$
$\delta(q_1,1,R)=(q_1,\varepsilon)$

7.a) Convert the following grammar to Greibach Normal Form.
S→ABA | AB | BA | AA | B
A→aA | a
B→bB | b

b) Reduce the following grammar such that there are no unit productions. [8+7]
S → AA
A → B | BB
B → abB | b | bb

8.a) Design a Turing Machine to accept the language L={ WCW^R / w in (0+1)*}.

b) Discuss about Post Correspondence Problem. [8+7]

---ooOoo---