

**2021**

**Computer Science**

**[M. Sc]**

**(CBCS)**

**(M.Sc. First Semester End Examination-2021)**

**PAPER- CS-104**

**(Switching & Finite Automata)**

**Full Marks: 40**

**Time: 02 Hrs**

*The figures in the right hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

*Illustrate the answers wherever necessary*

**Group A**

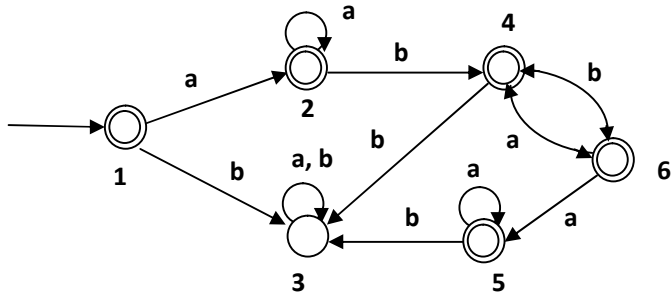
**1. Answer any FIVE questions of the following: 5x2=10**

- a) Define finite automata.
- b) Differentiate between DFA and NFA.
- c) Differentiate between PDA and NPDA.
- d) Explain Arden's theorem.
- e) State pumping lemma theorem for R.E.
- f) What is universal Turing machine? Give example.
- g) Differentiate between  $L^*$  and  $L^+$
- h) What is ambiguous grammar? Explain with example.

**Group B**

2. Answer any FOUR questions of the following: 5x4 = 20

a) Minimize the given DFA



b) Convert the given CFG into CNF from

$$S \rightarrow AB$$

$$A \rightarrow bAA / as / b$$

$$B \rightarrow aBB / bs / b$$

c) Convert the given CFG into GNF .

$$S \rightarrow AB$$

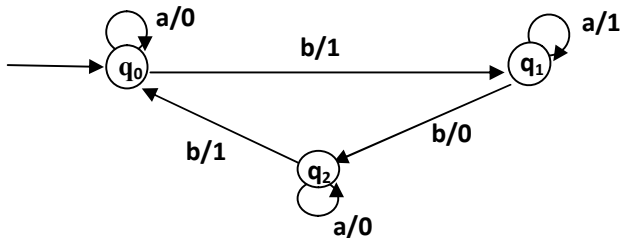
$$A \rightarrow BS / b$$

$$B \rightarrow SA / a$$

d) Design TM for the language  $L = \{0^n 1^n 2^n \mid n \geq 1\}$

e) Design PDA for the language  $L = \{a^n b^n \mid n \geq 0\}$

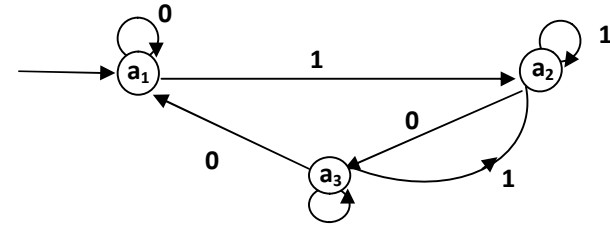
f) Convert Mealy machine to corresponding Moore Machine.



**Group C**

3. Answer any ONE questions of the following: 10x1 = 10

a) i) Construct Regular Expression for the following FA:



b) Explain Chomsky's hierarchy for formal languages. Give production Rule and language Accepted by each type of language. 4+6

b) i) Design the finite automata accepting all the decimal numbers divisible by 4.

ii) Design a TM for set of all strings with equal number of 'a' and 'b' 5+5

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