

(i) Printed Pages : 4]

Roll No.

(ii) Questions : 9]

Sub. Code :

3	6	1	9
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Exam. Code :

0	4	6	1
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M.Sc. 3rd Semester Examination

1127

INFORMATION TECHNOLOGY

(Theory of Computation)

Paper : MS-69

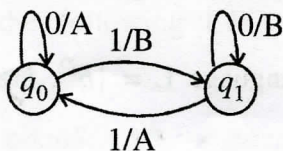
Time : 3 Hours]

[Max. Marks : 80

Note :- Attempt *five* questions in all. Question No. 9 (Section-E) is compulsory and select *one* question each from Sections A to D.

Section-A

1. (i) Differentiate between deterministic and non-deterministic finite state machines.
- (ii) Convert the automata given in below diagram of Mealy machine to Moore machine.



8,8

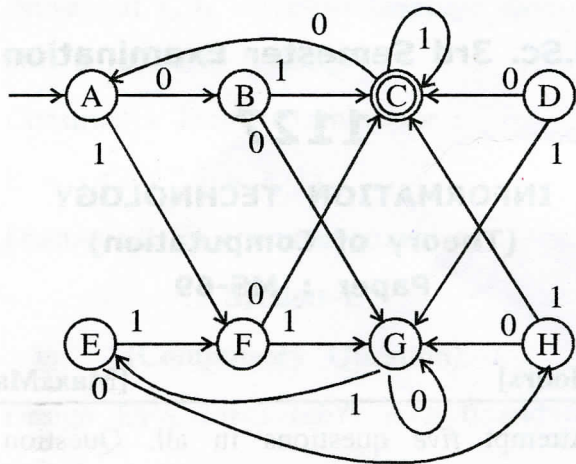
NA-356

(1)

Turn Over

2. (i) Discuss Chomsky classification of languages with suitable examples.

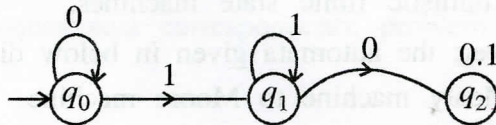
(ii) Minimize the following DFA :



8,8

Section-B

3. (i) Construct the regular expression from given DFA.



(ii) Prove the language $L = \{b^{i^2}, i \geq 1\}$ is regular or not.

8,8

4. (i) Prove the theorem; Let r be a regular expression, then there exists a NFA with ϵ transitions that accepts $L(r)$.
- (ii) Construct NFA for the regular expression given below :

$$r = (01 + 10)^+ \quad 8,8$$

Section-C

5. (i) The CFG $(\{S, A, B, C\}, \{a, b\}, P, S)$, where P is $S \rightarrow AB|BC$, $A \rightarrow BA|a$, $B \rightarrow CC|b$, $C \rightarrow AB|a$. Using CYK prove $w \in L$, where $w = \text{"baaba"}$.
- (ii) Construct CFG for the language L which has all the strings which are all palindrome over $\Sigma = \{a, b\}$. 8,8
6. (i) Design a PDA for accepting language $\{L = a^n b^n \mid n \geq 1\}$. Simulate this PDA for string $aaabbb$.
- (ii) Construct the following CFG into Chomsky Normal Form,

$$S \rightarrow aaaaS, \quad S \rightarrow aaaa \quad 8,8$$

Section-D

7. (i) Construct a Turing machine for palindrome of a string of odd length with $\Sigma = \{0, 1\}$.
- (ii) Prove : If L is recursive language then \bar{L} is also a recursive language. 8,8
8. (i) Construct a Turing machine for :
 $L = \{a^n b^n C^n \mid n \geq 1\}$.
- (ii) Discuss LR(K) grammar properties. 8,8

Section-E

(Compulsory Question)

9. (i) Design DFA for : $(ab)^n$, $n \geq 0$ and $(ab)^n$, $n \geq 1$.
- (ii) Prove : If L_1 and L_2 are two regular languages, then $L_1 \cup L_2$ is regular.
- (iii) Define Chomsky and Greibach Normal forms.
- (iv) Discuss post correspondence problem. 4×4=16