

Total No. of Questions : 6]

SEAT No. :

P5087

[Total No. of Pages : 3

TE/Insem.-636
T.E. (Computer Engineering) (Semester-I)
THEORY OF COMPUTATION
(2015 Pattern)

Time : 1 Hour]

[Maximum Marks : 30

Instructions to the candidates:

- 1) Attempt questions Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

- Q1)** a) Compare DFA and NFA. [3]
- b) Construct a DFA to accept strings of 0's and 1's having at least three consecutive 0's. [3]
- c) Construct an equivalent DFA for the following NFA- [4]

States/ Σ	0	1
$\rightarrow p$	{p,q}	{q}
\textcircled{q}	{r}	{r}
r	-	{r}

OR

- Q2)** a) Compare NFA and NFA - ϵ . [3]
- b) Construct a Mealy Machine which is equivalent to the Moore Machine given in the following table: [3]

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

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- c) Construct the DFA for the language of all strings that begin and end with same symbol over the alphabet $\Sigma = \{0, 1\}$. [4]

Q3) a) Define the following with suitable example [3]

i) Regular expression & operations

ii) Prove or disprove the following $(rs+r)^* r = r(sr+r)^*$

b) Construct the finite Automata defined over $\Sigma = \{0, 1\}$ for the following Regular expression $1(01+10)^* + 0(11+10)^*$ [3]

c) Using the pumping lemma for the regular set, prove that $L = \{a^{i^2} \mid i \geq 1\}$ is not regular. [4]

OR

Q4) a) What are the algebraic laws of regular expression. [3]

b) Convert the following regular expression to ϵ -NFA. and find the ϵ -closure of all the states. $(0+1)^* . 1 . (0+1)$ [3]

c) Using the pumping lemma for the regular set, prove that $L = \{a^m b^n\}$ is not regular. [4]

Q5) a) Write in brief about "Sentential form" with reference to context free grammar. [3]

b) Write equivalent left linear grammar for the following right liner grammar.
 $S \rightarrow 0A$

$A \rightarrow 10A \mid \epsilon$ [3]

c) Write context free grammar for the following language $0(0+1)^* 01(0+1)^* 1$ [4]

OR

Q6) a) Eliminate ϵ -productions from the grammar G [3]

$A \rightarrow aBb|bBa$

$B \rightarrow aB|bB|\epsilon$

b) Write CFL for following CFG [3]

$S \rightarrow aB|bA$

$A \rightarrow a|aS|bAA$

$B \rightarrow b|bS|aBB$

c) Write an equivalent left-linear grammar for the right-linear grammar. [4]

$S \rightarrow 0A|1B$

$A \rightarrow 0C|1A|0$

$B \rightarrow 1B|1A|1$

$C \rightarrow 0|0A$

