Total No. of Questions :10]

SEAT No. :

P3625

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[5560]-581

T. E. (Information Technology)

THEORY OF COMPUTATION

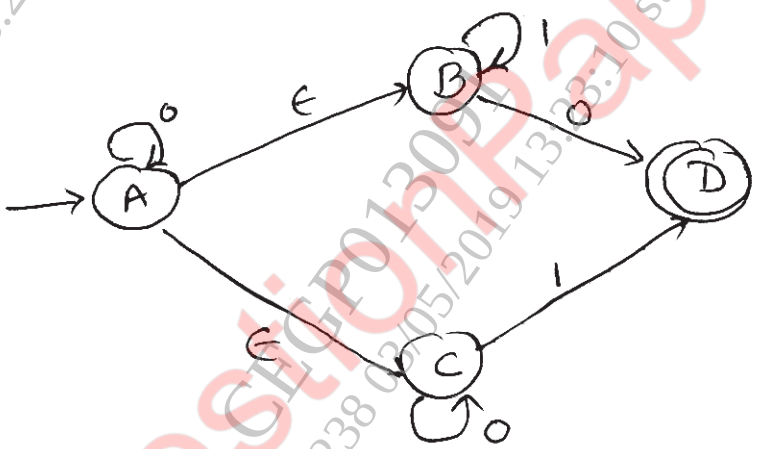
(2015 Pattern) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Convert the following NFA with ∈-moves into NFA without ∈ moves. **[6]**



b) Give formal definitions for the following **[4]**

i) Deterministic finite automata

ii) Moore machine

iii) Reachable states of P

iv) Acceptance of a string by FA

OR

Q2) a) Construct FA for the following language L.

L=[w/w is a binary word of length 4i , i>=1 such that each consecutive block 4 bits contains at least 2 0's] **[8]**

b) Give difference between moore & mealy machine. **[2]**

P.T.O.

Q3) a) Show that. **[6]**

i) $(a.b)^* \neq a^*.b^*$

ii) $(a+b)^* = (a+b)^* + (a+b)^*$

b) Convert the following grammar to GNF **[4]**

$S \rightarrow ABA|AB|BA|AA|A|B$

$A \rightarrow aA/\ a$

$B \rightarrow bB/\ b$

OR

Q4) a) Write CFG for the following languages. **[6]**

$L=\{0^i 1^j 0^k \mid j > i+k\}$

$L=\{0^i 1^j 2^k \mid i = j+k\}$

b) Convert the following grammar to CNF. **[4]**

$S \rightarrow bA|aB$

$A \rightarrow bAA|as|a$

$B \rightarrow aBB|bs|b$

Q5) a) Construct PDA that accepts the language by the following CFG. **[8]**

$S \rightarrow SS|(S)|()$

b) Construct post Machine that accepts the following language. **[8]**

$L = \{a^n b^n a^n \mid n \geq 0\}$

OR

Q6) a) Show that: $L = \{a^n b^n c^n \mid n \geq 1\}$ not a CFL. **[5]**

b) Construct post machine that accepts following language **[5]**

$L = \{a^n b^m \mid n \geq 0, m \geq 0\}$

c) Construct PDA that accepts following language $L = \{a^n b^n \mid n \geq 0\}$. **[6]**

Write simulation for string 'aaabbb'

Q7) a) Construct a TM to compute $L=\{a^n b^{2n} \mid n>0\}$ Write simulation for the string.

i) abb ii) aabbbb **[10]**

b) Design TM for the language L=$\{0^{2n}\}$ over $\Sigma=\{0,1\}$. **[8]**

OR

Q8) a) Design a TM that multiplies two unary numbers over $\Sigma=\{1\}$. Write simulation for the string 11&111. **[8]**

b) Design TM to accept the set L of all strings formed with 0&1 and having substring '000'. **[8]**

c) Differentiate between FA & TM. **[2]**

Q9) a) Prove that **[8]**

i) AREX= {<R,W>| R is a regular expression that generates string w} is a decidable language.

ii) ECFG=$\{< G >| G \text{ is a CFG and } L(G)=\phi\}$ is a decidable language.

b) Explain class P with two examples. **[8]**

OR

Q10)a) Prove that ATM=$\{< m,w >| M \text{ is a TM and accepts w}\}$ is undecidable **[8]**

b) Explain post correspondance problem. **[8]**

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