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CSE204 Enrol. No. .....

[ET]

END SEMESTER EXAMINATION : APRIL – MAY, 2018

THEORY OF COMPUTATION

Time : 3 Hrs. *Maximum Marks : 70*

Note: ***Attempt questions from all sections as directed.***

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six.**
Each question carries **06** *marks.*

1. Analyze the languages proposed by Chomsky with the help of examples.

2. Convert the given Context Free Grammar into Chomsky Normal form.

A->bAA/aS/b

B->aBB/bS/b

S → AB

3. State Post Correspondence Problem (PCP). Prove that the following instance of PCP has no solution over $\Sigma = \{0,1\}$, X and Y be lists of three strings as follows :

P.T.O.

	List X	List Y
i	w_i	x_i
1	10	101
2	011	11
3	101	011

4. Under what circumstances we use total, partial and recursive functions. Justify your answer.

5. Describe the TM that accepts the language

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

Also derive the computation sequence for the input sequence w=aaabbb.

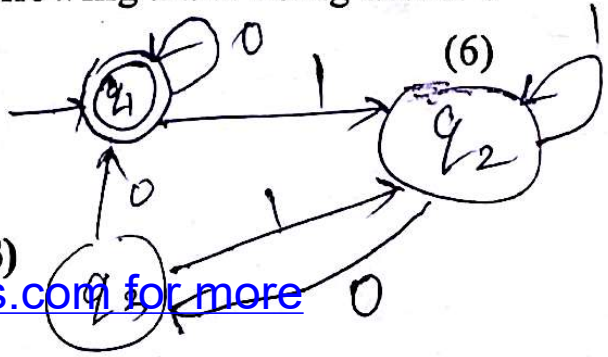
6. State pumping Lemma Theorem. Prove that $L = \{a^n \mid n \text{ is a prime}\}$ is not a context free language.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**

Each question carries **10** *marks.*

7. (a) Explain Arden's theorem. Construct regular expression from the following DFA using arden's theorem.



(b) Design a mealy machine for modulo-4 problem. (4)

8. (a) State Universal TM. Design a TM which computes the following function.

$f(w)=ww^R$, where w^R is the reverese of string w. ($w \in (a,b)^*$) (7)

(b) Show that halting problem of a hiring machine is undecidable. (3)

9. (a) Convert the following CFG to PDA. (5)

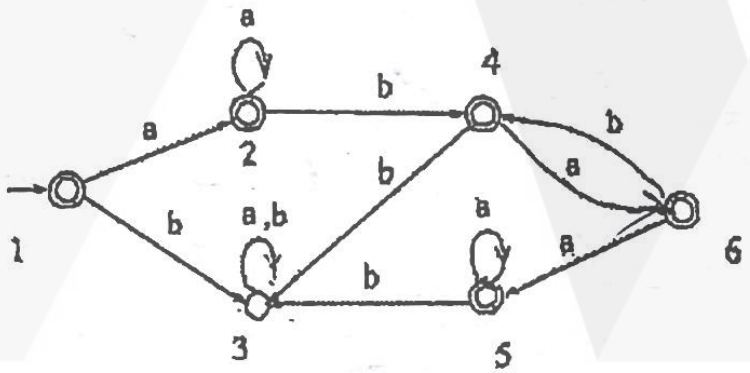
S -> aABB / aAA

A -> aBB / a

B -> bBB / ACa

C -> b

(b) Minimize the given DFA. (5)



DFA Example 2

P.T.O.

SECTION – C (20 Marks)

(Compulsory)

10. (a) Convert the following CFG into GNF

S -> AB

A -> BS/b

B -> SA/a (8)

(b) Design a turing machine which computes the multiplication of two numbers. (10)

(c) Differentiate between Non Deterministic and Deterministic Finite Automata (2)