Total No. of printed pages = 3

SUBJECT CODE: CSE024104

Roll No. of candidate | | | | | | | | | | |

2017

End Semester M.Tech Examination

1st Semester

THEORY OF COMPUTATIONS

Full Marks- 70 Pass Marks- 21 Time- 3 hours

The figures in the margin indicate full marks.

PART-A

Q.1. Answer all questions: **16 x 1 = 16**

a) What is transition function in DFA?

b) Give the difference between DFA and NFA.

c) Write the regular expression for the language **L ={W ∈ {0,1}* : W has no pair of consecutive zeroes}**.

d) Draw the finite automata for **r = a** where **'a'** is the regular expression.

e) Give an example of regular grammar.

f) Write the regular expression for **L = { $a^n b^n$: n+m is even}.**

g) Give two examples of operators of regular expression.

h) What do you mean by ambiguous grammar?

i) Which of the following computational models is more powerful: Push Down Automata or Turing Machine?

j) Draw the model of Turing machine.

k) Construct a DFA for **L = 0^+** over ∑={0}.

l) Arrange the following computational models in the ascending order of their power of accepting more class of languages: DFA, DPDA, NFA, NPDA, TM

m) Give an example of unit production.

n) Why reduced grammar is required?

o) Explain Push Down Automata.

p) What is Grebaich Normal Form (GNF)?

PART-B

Q.2. Answer the following questions: **4 x 3.5 =14**

a) Explain Arden's theorem with an example.

b) Convert the given regular expression into **ε-NFA**:

ab + (b+aa) b* a

c) Find a grammar in CNF equivalent to

S → abSb | a | aAb

A → bS | aAAb.

d) Find the CFG for **(110 + 11)* (10)***

PART-C

Q.3.

Construct a DFA equivalent to the NFA. **M = ({ q_0 , q_1 , q_2 } , {a ,b} , δ , q_0, { q_2})** where **δ** is given by the table below. Here **q_0** is the initial state and **q_2** is the final state . **10**

STATES	**INPUTS**	
	a	**b**
q_0	**{ q_0 , q_1}**	**{q_2 }**
q_1	**{q_1}**	**{ q_0}**
q_2	**{ q_0}**	**{q_1, q_2 }**

OR

Write short notes on: **5x 2=10**

a) Context free grammar.

b) Deterministic Finite Automata.

Q.4. Design a PDA for the language **L={ $a^m b^m c^n$ | m , n > = 1}**. **10**

OR

Design a PDA for accepting the language { **L = $0^n 1^n$ | n >=1** }. **10**

Q.5. Explain the working of Turing Machine with an example. **10**

OR

Construct the Turing Machine which recognizes the language **L={ wcw | w ∈ (0+1)*}**. **10**

Q.6. What is pumping lemma for regular languages? Design a DFA with ∑= **{a,b}** that accepts the strings having: **1+3+3+3=10**

(i) even number of a's.

(ii) three consecutive b's (not necessarily at the end).

(iii) either even number of a's or even number of b's.

OR

Explain how NFA with **ε**-moves can be converted to NFA without **ε**-moves with an example. **10**