DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY

B.TECH. SEMESTER VI [Information Technology]

SUBJECT: Theory of Automata and Formal Language

Examination	: Block -repeater	Seat No.	:
Date	: 09 /11/2017	Day	:
Time	: 11:00 to 12:15	Max. Marks	: 36

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) Find a possible alphabet Σ for the following languages. [02]
1) The language L={'this','that','at' }
2) The language of all decimal strings

(b) Myhill Nerode theorem is consisting of the following statements - [01]
1) L partitions Σ into distinct classes.
2) If L is regular then, L generates finite number of classes.
3) If L generates finite number of classes then L is regular.
4) All of the above

(c) Which of the following statements is true? Why? [02]
1) If a language is context free it can always be accepted by a deterministic push-down automaton
2) The union of two context free languages is context free
3) The intersection of two context free languages is context free
4) The complement of a context free language is context free

(d) If relation is reflexive, symmetric and transitive, it is called _____ [01]
[equivalence relation / equal relation/ matching relations]

(e) Identify if following languages are regular or not. If they are regular, give the corresponding regular expression. [04]
1) Binary strings with five times as many 0s as 1s
2) Binary strings of the form uvu; where u and v are nonempty strings
3) Strings over the decimal alphabetf0; 1; 2; : : : ; 9 with characters in sorted order
4) Strings in which the number of 0 s is even.

(f) Let L be any infinite regular language, defined over an alphabet Σ then there exist three strings x, y and z belonging to Σ such that all the strings of the form $XY^n Z$ for n=1,2,3, … are the words in L. is called. _____ (Complement of L / pumping lemma /Kleene's theorem /None in given) [01]

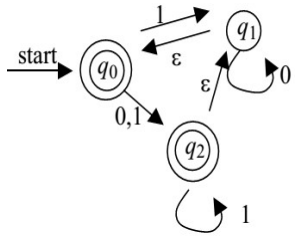
(g) The following problem(s) ---------- is/are called decidable problem(s). [01]
1)The two regular expressions define the same language
2)The two FAs are equivalent 3) Both (1) and (2) 4) None of given

Q.2 Attempt following questions.(any two)

(a) Explain all components of Chomsky hierarchy for languages and automato. [06]

(b) State and explain kleene's theorem part1. [06]

Q.3 (a) Convert the NFA shown below into a DFA , using the subset construction. [08]



(b) Consider the CFG S-> aS| aSbS | ε. [04]
Give two different parse trees for "aaba"