

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
THEORY OF COMPUTATION
 (COMMON TO COMPUTER SCIENCE & ENGINEERING, INFORMATION TECHNOLOGY
 AND COMPUTER SCIENCE & SYSTEMS ENGINEERING)

NOVEMBER 2005

TIME - 3 HOUR
MARK - 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Let $R = \{(1, 2), (2, 2), (2, 3)\}$ be a relation on the set $\{1, 2, 3\}$, Find R^* .
- (b) Develop a Deterministic Finite Automaton accepting the language given over the alphabet $\{0, 1\}$. $L = \{\text{the set of all strings such that every block of five consecutive contain at least two } o\text{'s}\}$
- (c) Give mathematical definition of NFA and state main differences between NFA and DFA. [4+4+8]
2. For the NFA- given check whether the string *aannanan* is accepted or not. If accepted write the transition path. Find the equivalent NFA without epsilon transitions, explain the procedure used and check the string given on your new NFA. Figure 1 [16]
3. (a) Construct a regular expression representing the following sets The set of all strings over $\{a, b\}$ in which there are atleast two occurrences of b between any two occurrences of a .
- (b) Describe whether $L = \{a^2n \mid n \geq 1\}$ is regular. State and explain the theorem used. [9+7]
4. (a) Construct regular grammar G generating the regular set $a^* b(a + b)^*$.
- (b) Define CFG and give examples. What is CFL generated by the grammar
- $$S \rightarrow abB, A \rightarrow aaBb, B \rightarrow bbAa, A \rightarrow E \quad [8+8]$$
5. (a) Construct PDA for the grammar
- $$S \rightarrow aA$$
- $$A \rightarrow aABC/bB/a$$
- $$B \rightarrow b$$
- $$C \rightarrow c$$
- (b) Convert the following to CNF
- $$S \rightarrow 0S0/1S1/A$$
- $$A \rightarrow 2B3$$
- $$B \rightarrow 2B3/3. \quad [16]$$
6. Construct Turing machine to accept following language and give its state transition table and diagram. Check the machine by tracing a suitable instance. $L = \{anbm : n \geq 1 \text{ and } n \leq m\}$. [16]
7. (a) Discuss different languages and their corresponding machines.

(b) Write the design procedure of shift reduce parser by taking a suitable example. [12+4]

8. (a) Explain the Turing reducibility in detail.

(b) What is post correspondence problem? Is there any solution for the following

PCP problem? If so give the solution If not discuss why? [12+4]

List A List B

i w_i x_i

1 00 0

2 001 11

3 1000 011

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