Roll No. .....

23067

M. Tech. 1st Sem. (Computer Engg.) Examination – January, 2016

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Paper : MTCE-603-A

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What do you mean by PDA ? How it works ? Explain ID for PDA. 10

(b) Design a PDA for the following language : 10

$$L = (a^n b^n : n > 0)$$

2. (a) Design a turing machine M to recognize the language $\{1^n 2^n 3^n \mid n \geq 1\}$ 10

(b) Discuss the Post Correspondence Problem. 10

3. (a) Prove pumping ıa for regular sets. What are application of P g Lemma ? 10

(b) Reduced the fol ; : 10

CFG to GNF S - |a, A → aaA, B → bAb

4. (a) What is primit cursive function ? Explain. Prove that the ing functions are primitive recursive :

(i) Concatenat

(ii) Transpose,

(iii) Identity. 10

(b) State and prove theorm. 10

5. Explain :

(i) Multi-tape and ıead Turing machine.

(ii) Linear Boundec ıata. 20

6. (a) Write and brie plain the characteristics of each class of ıar classified according to Chowmsky Hie . 10

(b) What is the di e between time and space complexity ? C ct the time complexity T(n) for the Turing r e $L = \{0^n1^n / n \geq 1\}$. 10

7. (a) Write a CFG which generates string having equal number of **a** and **b**. 10

(b) Construct a DFA with reduced state equivalent to the regular expression 10 + (0 + 11) 0*1. 10

8. What is the difference between NFA and DFA ? Minimize the following DFA : 20

δ/Σ	A	b
→q_0	q_1	q_5
q_1	q_6	q_2
* q_2	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2