

M.Sc. - I (Computer Science) (NEP Pattern) Semester-I  
**NEP-24-3 / 01MSCCS04.3 - Paper-IV - Elective-III - Theory of Computation & System Programming**

P. Pages : 2

Time : Three Hours



**GUG/S/25/15083**

Max. Marks : 80

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- Notes :
1. All questions are compulsory and carry equal marks.
  2. Draw neat and labelled diagram and use supporting data whenever necessary.
  3. Avoid vague answer and write specific answer related to question.

**Either :**

1. a) State and prove the pumping lemma for regular sets. 8
- b) Construct NFA for the following Regular expression. 8
- $R = (0+11)0^*1.$

**OR**

- c) What is Useless symbol? Find a CFG with no useless symbol equivalent to following 8
- $S \rightarrow AB \mid a$   
 $A \rightarrow a$
- d) Construct a DFA for the set of all strings containing atleast three consecutive 0's anywhere in the string over  $\Sigma = \{0,1\}$ . 8

**Either :**

2. a) What is Chomsky Hierarchy? Explain in detail. 8
- b) Construct a PDA for the following  $L = \{a^n b^m c^n \mid n \geq 1\}$  8

**OR**

- c) Prove following language is not a CFL.  $L = \{\text{the set of all strings containing equal no's of } a's, b's \text{ \& } c's\}$  8
- d) Construct a TM for the following 8
- $L = \{0^n 1^n 0^n \mid n \geq 1\}$

**Either :**

3. a) List and explain the role of device driver in detail. 8
- b) Describe Kernel symbol table in detail. 8

**OR**

- c) Explain the various security issues in detail. 8
- d) Describe how to splitting the kernel. 8

**Either :**

4. a) Explain different types of instructions in machine language. **8**
- b) Draw the block diagram of compiler and explain the whole compilation process in detail. **8**

**OR**

- c) Explain the architecture of 8086 in detail. **8**
- d) Describe various addressing modes in detail. **8**

5. Solve all the question

- a) Prove  $L = \{a^P \mid P \text{ is prime}\}$  is not Regular. **4**
- b) What is Regular Grammar. Explain Right linear Grammar and left linear grammar in detail. **4**
- c) Write a detail note on module parameters. **4**
- d) What is macros? Explain Recursive macros in detail. **4**

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