Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

MCA (2014 Batch) (Sem.–3)

THEORY OF COMPUTATION

Subject Code : MCA-305B

M.Code : 70777

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **SECTIONS-A, B, C & D contains TWO questions each carrying TWENTY marks each and students has to attempt any ONE question from each SECTION.**
2. **SECTION-E is COMPULSORY consisting of TEN questions carrying TWENTY marks in all.**

SECTION-A

1. a) Show, by mathematical induction that for all $n \geq 1$.

$$1+2+3+\ldots+n=\frac{n(n+1)}{2}$$

b) What is an equivalence relation? Explain with an example.

2. Design a finite automata for accepting the strings generated over $\Sigma = \{0, 1\}$ having even number of 0s and 1s.

SECTION-B

3. What is $\in$-transition? Give an example of an automata having two different final states (other states may be taken as per your choice) and both of them have incoming $\in$-transitions. How will you remove the $\in$-transitions?

4. What is pumping lemma for regular languages? Use it to prove that the language $L = \{0^n1^n : n \geq 1\}$ is not regular.

SECTION-C

5. Design a Push Down automata for accepting the language $L = \{0^n1^n : n \geq 1\}$.

6. Justify the statement : "*The intersection of two context-free language may not be a context-free language*".

SECTION-D

7. Design a Turing Machine for the addition of two numbers.

8. What is a recursive language? Give argument(s) in support of the statement : "*Recursive languages are closed under complementation*".

SECTION-E

9. Answer briefly :

a) Is the expression $(1^* - \in)$ regular? Justify your answer.

b) What is structural Induction?

c) State Kleen's Theorem.

d) Give an example of a regular grammar.

e) What is a derivation tree?

f) What is deterministic push down automata?

g) What is parsing?

h) Give the CFG for the language $L = \{0^n 1^n : n \geq 0\}$.

i) What is partial function?

j) Give an example of CSG.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.