Name: _____

Reg. No.: | | | | | | | | | | |

**END-SEMESTER EXAMINATION (Dec – 2019)**

**SEMESTER – I** (batch 2017)

(B.Sc.)

**Subject Code: BCS0305** **Duration: 3 hours**

**Subject: Theory of Computation** **Max. Marks: 100**

**Instructions**

- **All Questions are compulsory**
- **The Question paper consists of 2 sections - Part A contains 10 questions of 2 marks each. Part B consists of 5 questions of 16 marks each.**
- **There is no overall choice. Only Part B question include internal choice.**

## PART – A

*(2 * 10 = 20 Marks)*

1. What is meant by language? Give some example.
2. Define concatenation with example.
3. Differentiate between Deterministic and Non-deterministic finite automata.
4. What is meant by transition graph?
5. Write the relationship between regular languages and finite automata.
6. Write closure properties of regular languages.
7. Define Context free grammar with example.
8. What is meant by Pumping lemma?
9. Define halting problem.
10. Write the difference between recursively enumerable and recursive languages.

## PART – B

*(16 * 5 = 80 Marks)*

11. a)i) Explain in detail about Basic operations on language with example. (10)

ii) Write the regular expression for the language accepting all combinations of a's, over the set $\sum = \{a\}$ (2)

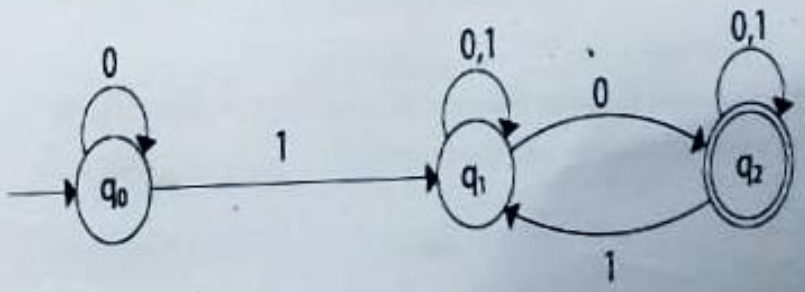
iii) Write the regular expression for the language accepting all combinations of a's except the null string, over the set $\sum = \{a\}$ (2)

iv) Write the regular expression for the language accepting all the string containing any number of a's and b's. (2)

OR

b) Draw a deterministic and non-deterministic finite automate which accept 00 and 11 at the end of a string containing 0, 1 in it, e.g., 01010100 but not 000111010. (16)

12.a) Convert the given NFA to DFA. (16)



OR

b) Explain the procedure for converting NFA to DFA with example. (16)

13.a) (i) Define Pushdown Automata. (4)

(ii) Construct a PDA for language $L = \{0^n1^m2^m3^n \mid n>=1, m>=1\}$ (12)

OR

b) i) Check whether the given grammar G is ambiguous or not.

$E \rightarrow E + E$

$E \rightarrow E - E$

$E \rightarrow id$ (8)

ii) Check whether the given grammar G is ambiguous or not.

$S \rightarrow aSb \mid SS$

$S \rightarrow \varepsilon$ (8)

14. a) Construct a Turing Machine for language $L = \{0^n1^n2^n \mid n\geq1\}$ using transition diagram and transition table (16)

OR

b) i) Write the difference between Deterministic and Non-deterministic pushdown automata. (6)

ii) Briefly describe properties of context free languages. (10)

15.a) Explain in detail about Recursively enumerable and recursive languages. (16)

OR

b)(i) Define Universal Turing machine. (3)

(ii) How can you say that Turing machine as a model of computation? (3)

(iii) Briefly describe language acceptability and decidability. (10)