END-SEMESTER EXAMINATION (MAY – 2018)

SEMESTER – I / III (SESSION – 2017-18)

(B.Tech..)

Subject Code: CS-0204
Subject: Theory of Computation.

Duration: 3 hours
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)*

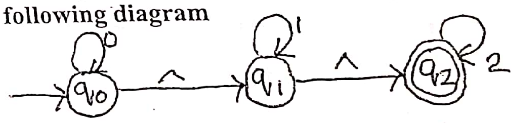
1. Define:
   I. Finite Automaton(FA)
   II. Transition diagram
2. What are the applications of automata theory?
3. Differentiate NFA and DFA
4. What is a regular expression?
5. Define a context free grammar
6. What is an ambiguous grammar?
7. Define Pushdown Automata?
8. When is a string accepted by a PDA?
9. Define Turing machine?
10. When we say a problem is decidable? Give an example of undecidable problem?

11. Construct the Minimum state automaton equivalent to the transition table given where initial state q_0 and final q_3

State	a	b
q_0	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
q_3	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

OR

(a) Find equivalent NFA without € transitions for following diagram



(b) Construct a DFA with reduced states equivalent to the regular expression.

10 (0+ 11)0*1

12. (a) Design CFG for $\sum = \{ 0 , 1 \}$ that generates the set of

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OR

Convert the following grammar G into GNF

$$S \to XA \mid BB$$
$$B \to b \mid SB$$
$$X \to b$$
$$A \to a$$

13. **Design a PDA which accepts the language**

L = {w € { a , b }* / w has the equal number of a's and b's }

OR

Design a PDA for the following language

$L = \{a^n b^n : n > 0\}$

14. **Design a TM that can accepts**

$L = \{0^n 1^n : n \geq 1\}$

OR

(a) Explain individually classes P and NP

(b) Explain the concept of Decidable and undecidable problem

OR

(a) NP-Hardness and NP-Completeness

(b) Recursive and Recursively enumerable languages