**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, November 2022**

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|  | **3BT5190** | Roll No. | Total Printed Pages: 2 |
| **3BT5190** |  |
| B. Tech. III Year V-Semester (Main/Back) End Semester Examination, November 2022  **(CE / CC)** | |
| **BCE05107 / BCC05108 : Theory of Computation** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Convert the following NDFA to DFA  NFA-to-DFA-Conversion-Problem-02-.jpgNFA | **(8)** | **Create** |
|  |  |  |  |  |
|  | **(b)** | Differentiate between NFA and DFA. | **(4)** | **Understanding** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | Construct a DFA accepting the set of all strings ending with 00? | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | automata-moore-machine-example1  For a given transition diagram of moore machine construct a transition table and also generate the output wity proper transition states for input 00111. | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **UNIT-II (CO2)** |  |  |
|  |  |  |  |  |
| **Q.3** | **(a)** | Construct a different kinds of derivative trees with proper example and explain why derivative tree is constructed. | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | Convert the following DFA to reqular expression with proper conversion Steps.  DFA-regex-2 | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.4** | **(a)** | Explain regular expression and its operators with proper example how language is generated from regular expression. | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Differentiate ambiguous and unambiguous grammar. For a given grammar  E → I E → E + E E → E ∗ E E → (E) remove the ambiguity and rewrite the grammar again also justify your answer why grammar is ambiguous | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **UNIT-III (CO3)** |  |  |
|  |  |  |  |  |
| **Q.5** | **(a)** | Which language generate push down automata Also define and explain the push down automata with example? | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Construct pushdown automata for the following languages. Acceptance either by empty stack or by final state.  { an bmcm | m, n ∈ N } also justify your machine with acceptance of input a2 b3c3 | **(6)** | **Apply** |
|  |  | **OR** |  |  |
| **Q.6** | **(a)** | Demonstrate diffrent clouser property of CFL and how to decide grammer is finite or infinite justify with proper example. | **(6)** | **Understanding** |
|  |  |  |  |  |
|  | **(b)** | For an given grammer compute the first and follow function  E -> TR  R -> +T R | #  T -> F Y  Y -> \*F Y | #  F -> (E) | i  Note:- # represent empty production. | **(6)** | **Apply** |
|  |  | **UNIT-IV (CO4)** |  |  |
| **Q.7** | **(a)** | How Turing machine is constructed give the definition with proper working of Turing machine. | **(6)** | **Understading** |
|  |  |  |  |  |
|  | **(b)** | Design a turing machine that accept the language of all string over the alphabet (a,b) whose second letter is b. | **(6)** | **Apply** |
|  |  | **OR** |  |  |
| **Q.8** | **(a)** | Explain different variation of Turing machine with neat working diagram of each? | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | Design a turing machine that could recognize the following language L={ anbncn : n>=1}. Give the proper transition function for input a2b2c2 | **(6)** | **Apply** |
|  |  | **UNIT V (CO5)** |  |  |
| **Q.9** | **(a)** | Give the mathematical modeling of time complexity with proper explanation also give an example to compute time complexity of sum of n natural number algorithm. | **(6)** | **Understanding an apply** |
|  |  |  |  |  |
|  | **(b)** | Write Short notes on (1) Halting problem (3) Rice theorem | **(6)** | **Understanding** |
|  |  | **OR** |  |  |
| **Q.10** |  | Consider a two diffrent algorithm to check number is prime or not   1. function isPrime(n) { for (let i = 2; i < n; ++i) { if (n % i === 0) { return false; } } return true; }   **(2)** function isPrime(n) { for (let i = 2; i <= Math.sqrt(n); ++i) { if (n % i === 0) { return false; } } return true; }  Considering above two example show that which algorithm is faster by computing there time complexity | **(12)** | **Apply** |