Printed page:02 Subject Code:ACSE0404/ACSEH0404/AMICSE0404

Roll No: 1 3 2

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)
Affiliated to Dr. A.P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow
Course:B.Tech/M.Tec(Int.) Branch:CSE/CSE-R/M.Tech(Int.)/AI/AIML/DS/IOT/CY/CS/IT
Semester: IV Sessional Examination:3rd
Subject Name: Theory of Automata & Formal Languages Year- (2023-2024)
Time: 1.15Hours Max. Marks:30

General Instructions:

- *This Question paper consists of 2 pages & 5 questions. It comprisesthree Sections -A, B, &C. You are expected to answer them as directed.*
- *Section A–Q.No- 1 isof one 1 mark each &Q.No- 2 carries 2 markseach.*
- *Section B-Q. No- 3 carries5 marks each.Attempt any two parts*
- *Section C-Q.No-4 &5carries6markseach.Attempt any one part a orb*

SECTION – A [08Marks]

1. All questions are compulsory- (4×1=4)

a. Identify a unit production. (1) CO3
1) A→B
2) A→aB
3) A→Bb
4) A→a

b. Push down automata accepts _____ languages. (1) CO4
1) Type-3
2) Type -2
3) Type-1
4) Type-0

c. PDA is more powerful than (1) CO4
a) Turing machine
b) Finite automata
c) Both (a) and(b)
d) None of these

d. Choose correct option regarding, Turing machine is more powerful than Finite automata. (1) CO5
a) Turing machine head movement is continued to one direction.
b) Turing machine head moment is in no directions
c) Turing machine has capability to remember arbitrary long sequence of input string.
d) All are correct

2. All questions are compulsory- (2×2=4)

a. Difference between DPDA and NPDA. (2) CO3

b. Discuss Basic Model of Turing Machine. (2) CO5

SECTION – B [10Marks]

3. Answer any two of the following- (2×5=10)

a. Let G be the grammar S → aB | bA, A →a | aS | bAA, B → b | bS | aBB. For the string "aaabbabbba", find (5) CO3
a)Parse tree
b)Leftmost derivation
c)Rightmost derivation

b. Describe Context Free Grammar (CFG).Convert the following grammar into CNF: S→aAbB, A→aA, B→bB|b (5) CO3

c. Convert the grammar: S→aAA, A →a|aS|bS to a PDA that accepts the same language by empty stack. (5) CO4

SECTION – C [12Marks]

4 Answer any one of the following- (1×6=6)

a. State Pumping Lemma theorem for regular languages. Show that the language L= $\{a^i b^j \mid j=i^2\}$ is not Context Free Language. (6) CO3

b. Construct a PDA for the language L=$\{a^n b^n c^m \mid n,m>=1\}$ (6) CO4

5. Answer any one of the following- (1×6=6)

a. Design a Turing Machine for the Language L=$\{ a^n b^n \mid n>=0\}$ (6) CO5

b. Write Short note on any two of the following: (6) CO5
1) Universal Turing Machine
2) Church's theses
3) Variants of Turing Machine

Printed page:02 Subject Code:ACSE0404/ACSEH0404/AMICSE0404

Roll No: | | | | | | | | | | 1 | 3 | 2 |

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

Course:B.Tech/M.Tec(Int.) **Branch:CSE/CSE-R/M.Tech(Int.)/AI/AIML/DS/IOT/CY/CS/IT**

Semester: IV **Sessional Examination:3rd**

Subject Name: Theory of Automata & Formal Languages **Yèar- (2023-2024)**

Time: 1.15Hours **Max. Marks:30**

General Instructions:

- *This Question paper consists of 2 pages & 5 questions. It comprisesthree Sections -A, B, &C. You are expected to answer them as directed.*
- *Section A-Q.No- 1 isof one 1 mark each &Q.No- 2 carries 2 markseach.*
- *Section B-Q. No- 3 carries5 marks each.Attempt any two parts*
- *Section C-Q.No-4 &5carries6markseach.Attempt any one part a orb*

SECTION – A [08Marks]

1. All questions are compulsory- (4×1=4)

a. Identify a unit production. (1) CO3
1) A→B
2) A→aB
3) A→Bb
4) A→a

b. Push down automata accepts _____ languages. (1) CO4
1) Type-3
2) Type -2
3) Type-1
4) Type-0

c. PDA is more powerful than (1) CO4
a) Turing machine
b) Finite automata
c) Both (a) and(b)
d) None of these

d. Choose correct option regarding, Turing machine is more powerful than Finite automata. (1) CO5
a) Turing machine head movement is continued to one direction.
b) Turing machine head moment is in no directions
c) Turing machine has capability to remember arbitrary long sequence of input string.
d) All are correct

2. All questions are compulsory- (2×2=4)

a. Difference between DPDA and NPDA. (2) CO3

b. Discuss Basic Model of Turing Machine. (2) CO5

SECTION – B [10Marks]

3. Answer any two of the following- (2×5=10)

a. Let G be the grammar S → aB | bA, A →a | aS | bAA, B → b | bS | aBB. For the string **"aaabbabbba"**, find (5) CO3
a)Parse tree
b)Leftmost derivation
c)Rightmost derivation

b. Describe Context Free Grammar (CFG).Convert the following grammar into CNF: S→aAbB, A→aA, B→bB|b. (5) CO3

c. Convert the grammar: S→aAA, A →a|aS|bS to a PDA that accepts the same language by empty stack. (5) CO4

SECTION – C [12Marks]

4 Answer any one of the following- (1×6=6)

a. State Pumping Lemma theorem for regular languages. Show that the language L= $\{a^i b^j \mid j=i^2\}$ is not Context Free Language. (6) CO3

b. Construct a PDA for the language L=$\{a^n b^n c^m \mid n,m>=1\}$ (6) CO4

5. Answer any one of the following- (1×6=6)

a. Design a Turing Machine for the Language L=$\{ a^n b^n \mid n>=0\}$ (6) CO5

b. Write Short note on any **two** of the following: (6) CO5
1) Universal Turing Machine
2) Church's theses
3) Variants of Turing Machine