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# **T. K. M. COLLEGE OF ARTS AND SCIENCE**

NAAC RE-ACCREDITED "A++" GRADE

Kollam-691005, Kerala

Ref

Date

## **DEPARTMENT OF MATHEMATICS**

### **CERTIFICATE COURSE IN**

### **FORMAL LANGUAGES AND AUTOMATA THEORY**

**FOR THE ACADEMIC YEAR 2023-2024**

**COURSE COORDINATOR:**

**RISSANA T.A.  
ASSISTANT PROFESSOR  
DEPARTMENT OF MATHEMATICS  
T.K.M. COLLEGE OF ARTS AND SCIENCE**

**COURSE INSTRUCTORS:**

**Dr. ASWATHY M.R.  
&  
RISSANA T.A.**

## Curriculum

Name of the course : **Formal languages and Automata Theory**

Instructional hours per week : 3

Total hours : 30

### Module 1

Sets, Relation and functions, Graph theory preliminaries. Strings, Alphabets, Languages, Operations. (5 hours)

### Module 2

Central concepts of Automata, Equivalence between DFA and NFA, Regular expression, Finite state automata, DFA, NFA, NFA- Pumping lemma, Push down automata. Regular languages and regular grammar, Context free grammar. (15 hours)

### Module 3

Turing machine, definition and example, Programming techniques for turing machine, Combining turing machine, turing machine variants, Universal turing machine. (10 hours)

### Text books:

1. Peter Linz : **An introduction to formal languages and automata**, Fifth edition, Jones and Bartlett learning.
2. J.E. Hopcroft, R. Motwani and J.D. Ullman : **Introduction to automata theory, languages and computation**, 2001, Addison Wesley.

- Distinguishes between automation and computability.
- Analyze the concept of turing machine.
- Demonstrates the programming techniques for turing machine.

### **Instructional Methods :**

- Lecture/Tutorial
- Peer teaching in form of seminars.
- Accessing web sources in terms of videos and tutorial notes.

### **Mode of Assessment :**

- Quiz based on the topic - 30 marks
- Online/Written test at the end of the course - 50 marks
- Assignment/Seminar - 20 marks

Grades were awarded on the following basis:

80% and above - A Grade

70% - 79% - B Grade

60% - 69% - C Grade

Below 60% - D Grade

A minimum of C grade is necessary to provide certificate

## References:

1. Mishra and Chandrasekharan: **Theory of computer Science and Automata languages and computation**, Second edition, PHI.
2. John C. Martin : **Introduction to languages and theory of computation**, TMH.
3. D. Goswami and K.D. Krishna: **Formal languages and automata theory**, Lecture notes, 2010.

## Outline of the Course :

This course is introductory in nature. Students with mathematical background in higher secondary level can pursue this course. It serves as a stepping stone to automata theory .

## Targeted Audience :

Final year undergraduate students of any discipline having mathematical background and postgraduate Mathematics students.

## Pre-requisites :

Sets , Relations, Functions, Mathematical Logic, Graph theory.

## Learning outcomes :

At the end of this course, student will be able to

- Recall the concept of set, relations and functions, preliminaries of Graph Theory
- Describe the idea of automata theory.
- Apply finite automata and regular languages.



**T.K.M. COLLEGE OF ARTS & SCIENCE**  
Re-accredited by NAAC with "B++" Grade

Department of Mathematics offers certificate course in



# Formal Languages and Automata Theory.

## About:

Automata Theory is a branch of computer science that is related to mathematics. This course introduces the theory of computation through the concept of finite automata, push down automata and turing machines. It examines the relationship between automata and formal languages.

## Who can attend?

The course has been designed for students studying in final year degree courses of any stream and post graduate students preferably with a mathematical background .

**Duration : 3 months**

**Academic Year : 2023-2024**

**Course starts in November 2023**

**Course Facilitator : Rissana T.A.**  
Assistant Professor,  
Department of Mathematics,  
T.K.M College of Arts and Science,

Contact number- 9496600755

Sl. No.	Candidate Code	Name	Admission No.	Class & Batch
1.	62022142001	Ahsana B.S.	58908	S <sub>3</sub> M.Sc. Mathematics 2022-24 Batch
2	02	Ahsana M.	58841	"
3	03	Ajila	58512	"
4	04	Allan Benziger	58669	"
5	05	Anamika S.	58511	"
6	06	Atheena Abubaker	58916	"
7	07	Athira U	59093	"
8	08	Bincy Wilson	59066	"
9	09	Devika Jayakumar	59029	"
10	10	Fathima R-A	55716	"
11	11	Fitha Nasarudeen	58776	"
12	12	Fiza Nasrin	58912	"
13	13	Fousiya S.A.	58906	"
14	14	Jincy P.S.	58510	"
15	15	Jinsham Shejahan	59024	"
16	16	Karthika J.	58638	"
17	17	Nandhini S.P.	59092	"
18	18	S.G. Dayaprasad	58672	"
19	19	Sona Johnson	58513	"
20	62023142001	ABIN.P	59736	S <sub>1</sub> M.Sc. Mathematics 2023-25 Batch
21	03	APARNA.A.S	59734	"
22	04	ARCHANA.E	59428	"
23	05	HRIDHYA.B.R	59745	"
24	06	LITA CHANDRAN.R	59732	"
25	07	MUHAMMED AZHARUDEEN.A	59536	"
26	08	REHNA.MUHAMMAD	59678	"
27	09	SABITHA SHAJI	59685	"
28	10	SAJNA BEEVI M	59683	"
29	11	THANST.N	59470	"

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**Certificate Course on  
Formal Languages and Automata Theory**

**Summary Report 2023-24**

The certificate course 'FORMAL LANGUAGES AND AUTOMATA THEORY' offered by the Department of Mathematics, had a duration of 30 hours. Ms. Rissana T.A. is the coordinator of the course. Classes were engaged by Dr. Aswathy M.R. and Ms. Rissana T.A. The course started on November 28, 2023. The course is provided to first semester and third semester post graduate students of the college. 29 students enrolled for the course during the academic year 2023-24.

**Mode of Assessment :**

- Quiz based on the topic - 30 marks
- Online/Written test at the end of the course - 50 marks
- Assignment/Seminar - 20 marks

Grades were awarded on the following basis:

80% and above - A Grade

70% - 79% - B Grade

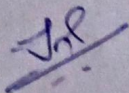
60% - 69% - C Grade

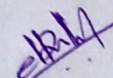
Below 60% - D Grade

A minimum of C grade is necessary to provide certificate

Out of 29 students enrolled, 25 students passed the exam, 2 failed and 2 students did not complete the course. Out of 25 students, 21 students secured A grade and 4 got B Grade. Certificates were issued to all the passed candidates.

Course Coordinator



  
Head of the Department