Department of Computer Science and Engineering

Academic Year 2024 – 2025 (Even Semester)

Degree, Semester & Branch: IV Semester B.E. CSE-A

Course Code & Title: CS3452 Theory of Computation

Name of the Faculty member (s): Mrs.S.Manjula

Innovative Practice Description

Unit / Topic: Unit I / Equivalence of Finite Automata and regular expressions

Course Outcome: CO 2

Topic Learning Outcome: TLO 5

Activity Chosen: Engaged Learning Through Challenges

Justification:

- To strengthen students' understanding of the equivalence between Finite Automata and Regular Expressions, an innovative Engaged Learning Through Challenges activity was organized. The objective was to enhance conceptual clarity through problem-solving and collaborative learning. By employing various conversion techniques such as Arden's Theorem, State Elimination Method, and the Rij(k) method, students explored different approaches to solving the same problem, thereby reinforcing their comprehension and analytical abilities.
- **Time Allotted for the Activity:** 50 minutes

Details of the Implementation:

- The class was divided into 13 groups, each comprising 4 to 5 students.
- Each group was assigned challenging problems requiring the conversion of Finite Automata to Regular Expressions using different techniques (Arden's Theorem, State Elimination Method, and the Rij(k) method).
- The groups independently solved their assigned problems and then discussed their solutions within their teams.
- After completing the problem-solving phase, the groups came together to compare and analyze their answers.
- Due to time constrain 3 volunteer (953623104030-Divyadharsini A, 953623104051-K S Kamalasri, 953623104104-Sindhe Mohith Siva Sai) shared the final answer with other teams along with their solving steps.
- A key discussion point was the consistency of results across different methods, i.e., verifying whether different approaches yielded the same regular expression.
- Some teams initially arrived at deviating answers, which led to further discussions and re-evaluation of their problem-solving steps.
- The session concluded with a collective discussion on the correct approaches and common errors, ensuring a thorough understanding of the concepts.

CO – PO / PSO mapping:

CO	PO1	PO2	PO3	PO4	PO9	PO10	PSO1
CO 2	2	2	2	1	1	1	1

(1 – Low 2 – Moderate 3 – High)

PO / PSO mapped:

Innovative practice	PO1	PO2	PO3	PO4	PO9	PO10	PSO1
	2	2	2	1	1	1	1
Justification for correlation	Students applied basic knowledge of Finite Automata in mathematical modeling.	Students analyzed complex engineering problems using first principles of mathematical concepts.	Designed Finite Automata (FA) and solved Regular Expressions	Developed appropriate automaton machines for given Regular Expressions and Regular Languages.	Worked both individually and collaboratively to solve particular problems	Students communicated effectively on complex engineering activities	By designing Finite Automata, students will be able to develop various software components in the future..

- **Images / Screenshot of the practice:**

Figure 1: Problem-Solving: Students Discussing Finite Automata to Regular Expression Conversions

Figure 2: Engaged Learning in Action: Teams Tackling FA-RE Challenges

Reflective Critique:

❖ ***Feedback of practice from students and other stakeholders:***

o Students reported that the activity improved their problem-solving skills as they were able to learn from their teammates' insights and mistakes.

o Students told the teacher that the activity encouraged them to listen to lectures and ask more questions.

❖ ***Benefit of the practice:***

- Helped students to understand multiple methods of conversion and compare their effectiveness.
- Encouraged active participation and teamwork.
- This activity encouraged the students to share their knowledge with others.
- From this activity, the students can get more clarity in the particular topic.

❖ ***Challenges faced in implementation:***

- Some teams initially struggled with understanding certain methods like Rij(k) Method, requiring additional guidance.
- Time constraints made it difficult to ensure that every group had equal participation in discussions.
- A few students needed extra support in solving problems.

References:

1. https://cei.umn.edu/teaching-resources/active-learning/addressing-active-learning-challenges
2. https://www.skillshub.com/blog/active-learning-strategies-examples/
3. https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching
4. https://www.watermarkinsights.com/resources/blog/engaging-learners-innovative-tools-techniques/
5. https://www.edutopia.org/topic/collaborative-learning/