Department of Computer Science and Engineering

Academic Year 2024 – 2025 (Even Semester)

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

Course Code & Title:CS3452 Theory of Computation

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

Innovative Practice Description

Unit / Topic: Unit V / Tractable and Intractable problems

Course Outcome: CO 5

Topic Learning Outcome: TLO 18

Activity Chosen: Mind map

Justification:

1. **Mind Map**
    - The concepts of tractable and intractable problems, including complexity classes like P, NP, NP-Complete, and NP-Hard, are core topics in courses such as Theory of Computation or Design and Analysis of Algorithms. However, these topics are abstract and often difficult for students to visualize and relate to real-world problem-solving. To overcome this challenge, a Mind Mapping activity was introduced as an innovative teaching-learning practice. This approach encourages students to explore the topic visually, enabling them to identify connections among concepts, understand hierarchies and relationships, and actively engage with the learning material.
    - **Time Allotted for the Activity:** 20 minutes

Details of the Implementation:

- The faculty explained the key concepts of tractable and intractable problems during regular classroom sessions.
- Students were given instructions on how to construct a mind map, including structure, use of branches, and classification levels.
- Students had to visually represent concepts including:
    - Tractable problems (class P)
    - Intractable problems (NP, NP-Complete, NP-Hard)
- This helped students recall the topic taught that day, generate new ideas about the topic, and answer questions about the topic with ease.

Images / Screenshot of the practice:

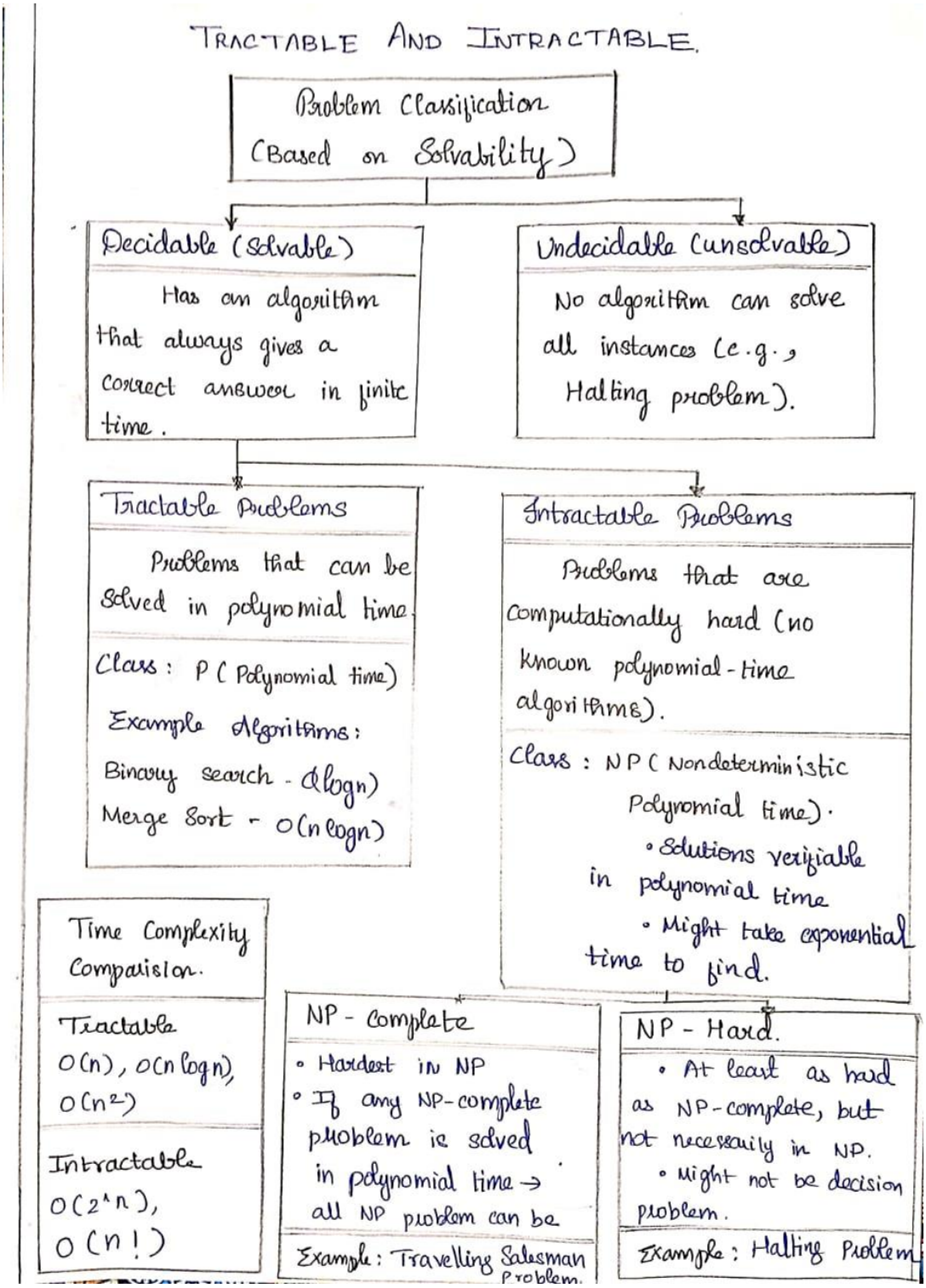

Fig:1. Mind Map Activity by Arunadevi M (953623104012)

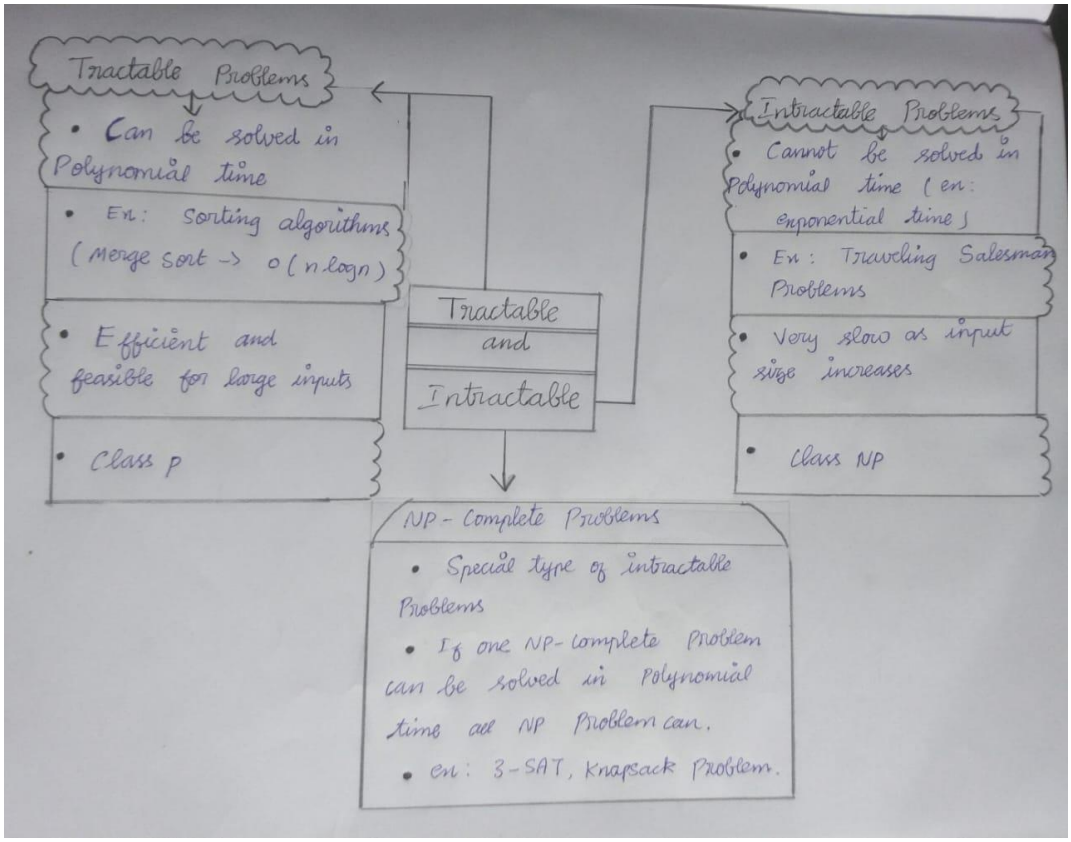

Fig:2. Mind Map Activity by Jeci Carmel A (953623104042)

CO – PO / PSO mapping:

CO	PO1	PO2	PO3	PO4	PO9	PSO1
CO 5	2	2	2	1	1	1

(1 – Low 2 – Moderate 3 – High)

PO / PSO mapped:

Innovative practice	PO1	PO2	PO3	PO4	PO9	PSO1
	2	2	2	1	1	1
Justification for correlation	Students applied their knowledge in distinguishing between tractable and intractable problems	Students analyzed suitable algorithms for solving engineering problems and determining whether they belonged to class P, NP, or beyond.	Students designed structured and organized visual representations through mind mapping to analyze and classify complex computational problems.	Students investigated systems by differentiating between efficiently solvable (tractable) and non-deterministically solvable (intractable) cases	Worked independently to analyze and visually represent the classification	Students will be able to identify, formulate the problem by categorizing the decidable and un-decidable problems.

- **Reflective Critique:**
  - ❖ ***Feedback of practice from students and other stakeholders:***

    - Students stated that the activity assisted them in visual learning and enabled them to understand complex classifications more effectively.
    - The majority of students thought that this experience made it easier for them to recall the lecture material.
    - Students told the teacher that the activity encouraged them to learn independently, to remember the examples by placing them on branches.

  - ❖ ***Benefit of the practice:*** (E.g.: Outcome attainment would have increased due to innovative practice over conventional practice)

    - Visual representation allowed students to break down and connect theoretical concepts with real-world examples.
    - It simplified note-taking by condensing lengthy content into a single-page mind map, making it easier for students especially slow learners to grasp and retain information quickly.
    - From this activity, the students can get more clarity in the particular topic.

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

    - Motivated the students to understand the importance of taking notes and how it helps in visualizing concepts through mind maps.
    - Some of the students represent very less key points in the mind map.

References:

1. https://www.ritrjpm.ac.in/images/computer-science/Mind%20Map.pdf
2. https://www.ritrjpm.ac.in/images/computer-science/43.CS6703_MindMap.pdf
3. https://www.ritrjpm.ac.in/images/computer-science/5_CS8591_Mindmap.pdf
4. https://www.lucidchart.com/pages/how-to-make-a-mind-map
5. https://www.ritrjpm.ac.in/images/computer-science/2021-2022/Unit_1_Mind%20MAp.pdf