Department of Computer Science and Engineering
Academic Year 2022 – 2023 (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 IV / Normal forms for CFG, Closure properties of CFL, TM as Computer of Integer functions

Course Outcome: CO 4

Topic Learning Outcome: TLO 12,13,14

Activity Chosen: Mind map, Video Lecture with Discussion, Seminar

Justification:

1. Mind Map

- A mind map is a visual representation of thoughts and ideas. It is a visual thinking tool that aids in data organization. It fastly writes down ideas. The topic closure properties of CFL have different types operators for closure and not closure. This activity helps the student to identify theoretical concepts in the image and aid in easy recall for their exams.
- **Time Allotted for the Activity:** 15 minutes

Details of the Implementation:

- The instructor explained the specific concepts/topic in the classroom on 10.4.2023.
- Based on the discussion and after clarifying the students' doubts, the teacher instructed the students to create a mind map related to the topic in 15 minutes.
- Based on their level of understanding, each student created a mind map. The sheets were collected from the students by the instructor.
- 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:

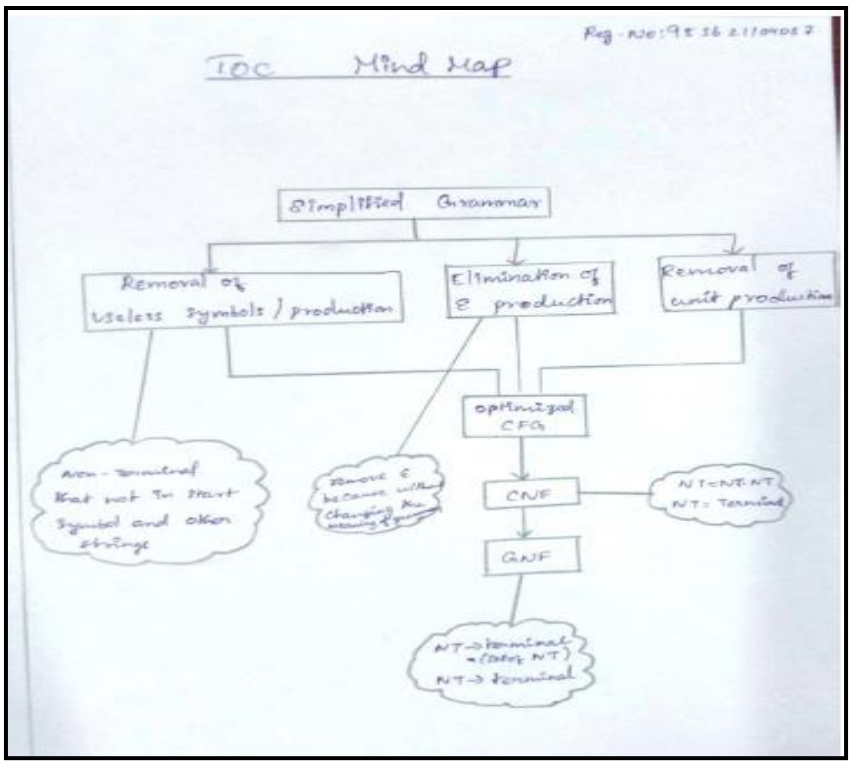

Fig:1. Mind Map Activity by Vignesh Mano S

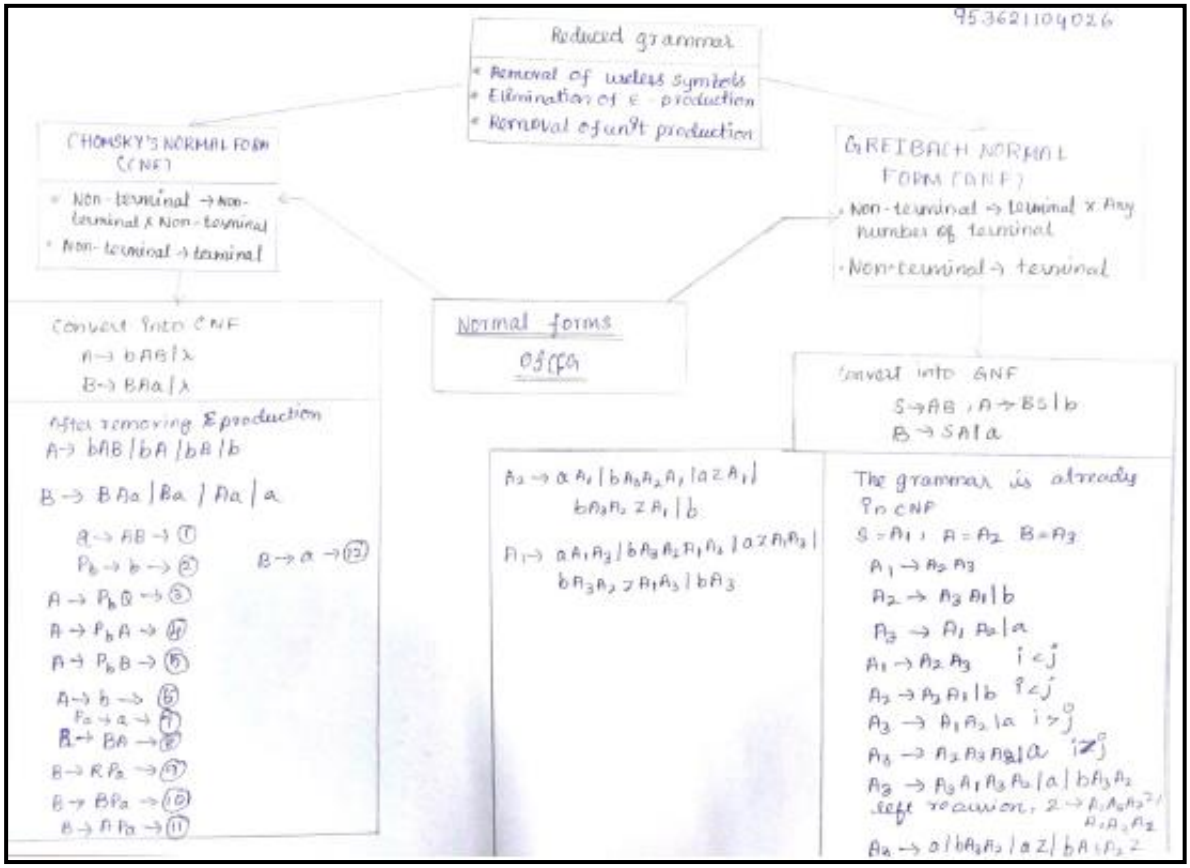

Fig:2. Mind Map Activity by Mahesh Selvalakshmi M

2. Video Lecture with Discussion

Learning by Doing is an educational approach to problem-based learning. Greibach Normal Form is an important concept in normal form. While doing the problem one should optimize the grammar and need to check the grammar is already in CNF for further process. As a result, this topic is critical, and many people will make mistakes in solving it. To address the issue, a video lecture was created and posted on the department's YouTube channel before the actual lecture, and the students were instructed to watch the video (https://www.youtube.com/watch?v=Zly895N0Rxk). It helps students in making concepts more interesting and motivating them to learn more about a specific topic.

- **Time Allotted for the Activity: 50 minutes**

Details of the Implementation:

- The students were informed about the event, and a video lecture was posted in advance so that they could contribute enough time to learning the subject.
- Instructor explained the important of Learning by Doing to the students and informed the students about it is an educational approach to problem-based learning.
- A student was chosen at random to solve the problem on the board using any of the teaching aids.
- Gomathi Lakshmi M of this class solved the problem in this event.
- First, she explained how GNF has been simplified by eliminating useless, epsilon and unit productions. Then, on the white board with PPT, the construction of an GNF was explained.
- Finally, the instructor consolidated the information that was discussed in this activity.
- This assisted the students to learn self and answering questions about the topic with ease.

Images / Screenshot of the practice:

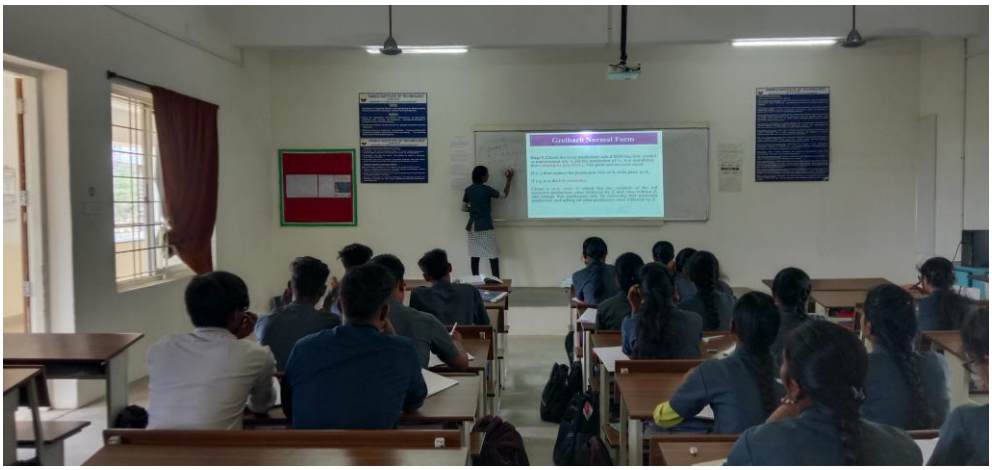

Fig:3. Peer Discussion by Gomathi Lakshmi M

Fig:4. Discussion of problem solution step by step by Gomathi Lakshmi M

3. Seminar on Closure properties of CFL

The seminar was given to the students Asuthosh Sakka Raja P B, Jeya Aravinth S 1 week before. The students prepared for the session through self-learning. The day before the seminar, students were shown the PowerPoint and clarified their doubts. On 13.04.2023 the students were taken to a seminar on the closure properties of CFL. The students were addressed on all the doubts raised by the students. Finally, the instructor consolidated the information and revised the topic.

Images / Screenshot of the practice:

Fig:5. Seminar taken by Jeya Aravinth S

Fig:6. Seminar taken by Asuthosh Sakka Raja P B

4. Seminar by P. Siva Kumar, III CSE

On April 24, 2023, the student of III CSE, P. Siva Kumar, took a seminar on TM as a Computer of Integer Functions. P. Siva Kumar scored an "o" in the subject. He was interested in taking class with the juniors. He enthusiastically discussed the reverse string problem with proper logic and a transition diagram with the students. Finally, he addressed how to prepare for the problematic subject and clarify the doubts raised by the students.

Images / Screenshot of the practice:

Fig:7. Reverse the string problem discussion by Siva Kumar.P

CO – PO / PSO mapping:

CO	PO1	PO2	PO3	PO4	PO9	PO10	PSO1
CO 4	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	To apply basic mathematic knowledge to solve closure problems, Normal forms, TM	To analyze the problems that could be solved using Closure properties, TM, Normal Forms	To know detailed knowledge of how to design Turing machine	To design the appropriate Turing machine	To work as an individual	To Communicate effectively on complex engineering activities	Will be able to develop various software components

- **Reflective Critique:**
  - ***Feedback of practice from students and other stakeholders:***
    - Students stated that the activity assisted them in determining their level of understanding of the concept.
    - 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 answer questions, and to share ideas with their classmates.
  - ***Benefit of the practice:*** (E.g.: Outcome attainment would have increased due to innovative practice over conventional practice)
    - This activity enables students to recall only the most important information using key words, and then visually connect facts and ideas.
    - It made key note making easier to students, as it reduces pages of notes into one single side of paper. Also mind map made slow learners to remember the information more quickly.

- This activity helped the student to analyze their performance of problem solving with others and it also induces the student to do problem daily.
- Students spent their time in self-learning.
- 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:***

- Effectively motivate students who are not participating in the activity by addressing the benefits of self-learning.
- Motivated the students to address the importance of taking a seminar.
- Some of the students represent very less key points in the mind map.

References:

1. https://www.ritrjpm.ac.in/images/computer-science/2021-2022/Unit_1_Mind%20MAp.pdf
2. https://www.ritrjpm.ac.in/images/computer-science/Mind%20Map.pdf
3. https://www.ritrjpm.ac.in/images/computer-science/43.CS6703_MindMap.pdf
4. https://www.ritrjpm.ac.in/images/computer-science/5_CS8591_Mindmap.pdf
5. https://www.lucidchart.com/pages/how-to-make-a-mind-map
6. https://flearningstudio.com/pros-and-cons-of-animated-educational-videos/
7. https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching
8. tips/developing-assignments/cross-discipline-skills/teaching-problem-solving-skills
9. https://k12.thoughtfullearning.com/blogpost/teaching-innovation-and-problem-solving