



**TULSIRAMJI GAIKWAD-PATIL College of Engineering and Technology**

Wardha Road, Nagpur- 441108

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**Department of Electronics and Communication Engineering**

# **Department of Electronics and Communication engineering**

**CASE STUDY ON INNOVATIVE TEACHING LEARNING**

**SUBJECT MICROPROCESSOR AND MICROCONTROLLER**

**FOURTH SEMESTER**



Classic Digital Art 9370961466

**Subject–Microprocessor & Microcontroller**

**(Course code-BEC2404)**

**Course Co-ordinator-Prof.Suraj Mahajan**



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## Department of Electronics and Communication Engineering

### Course Outcome

EC240 4	Course Outcomes
<b>CO1</b>	<b>Explain</b> the structure, organization, and instruction set of 8086 microprocessor.
<b>CO2</b>	<b>Implement</b> interfacing of 8086 microprocessor with input output devices by using program peripheral devices.
<b>CO3</b>	<b>Analyze</b> the organizational structure & instruction set of microcontroller 8051.
<b>CO4</b>	<b>Apply</b> programming knowledge for controlling displays and motors using 8051 microcontroller.
<b>CO5</b>	<b>Evaluate</b> the working behavior of advance peripheral interface controller and Arduino.



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## Introduction

Microprocessors and microcontrollers are foundational components in modern computing and embedded systems. They form the backbone of various electronic devices and systems, from simple consumer electronics to complex industrial applications. Understanding these technologies is crucial for anyone interested in fields such as computer engineering, electronics engineering, and embedded systems development.

## Context

In today's interconnected world, the role of microcontrollers and microprocessors extends far beyond traditional computing applications. These powerful components are integral to the functioning of various electronic devices and systems, ranging from everyday consumer electronics to sophisticated industrial machinery and IoT-enabled smart devices. Understanding their capabilities, applications, and integration into real-world scenarios is essential for engineers and developers aiming to innovate and address modern challenges effectively.



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## Department of Electronics and Communication Engineering

### Benefits

#### Benefits of Innovative Teaching-Learning Process:

Enhanced Engagement

Improved Retention

Critical Thinking Development

Creativity Promotion

Assessment of Higher-Order Skills

- Use of interactive tools and technologies
- Gamification and hands-on activities
- Real-world applications of concepts

- Multisensory learning experiences
- Collaborative projects and discussions
- Personalized learning pathways

- Problem-based learning
- Open-ended questions and scenarios
- Analysis of complex real-world issues

- Encouragement of diverse perspectives
- Exploration of unconventional solutions
- Integration of arts and creativity into subjects

- Performance-based assessments
- Portfolios showcasing diverse skills
- Application of knowledge to authentic situations



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### Innovative Teaching Learning

#### 1) Game pedagogy based on unit one (Snake and Ladder Unit1)

Assessment one for subject Microprocessor & Microcontroller is assessed by Game-based pedagogy, Subject contain problems and specific words to encounter students engagement and interest, Snake and Ladder decided as a game pedagogy **on date-10/2/2024** which involves integrating educational games into the teaching and learning process, offers a range of benefits that can enhance students' engagement, learning outcomes, and overall educational experience, **Game pedagogy based on Unit 1 ,question paper of game-based pedagogy:**

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DTE CODE 4151 3.32 CGPA

Department of Electronics & Communication Engineering  
Session: 2023-24(Even Semester)  
**Snake Ladder Puzzle on unit 1, unit2, FPI 8755 & 8086**  
Course Coordinator- Prof. Suraj Mahajan

☐☐ New Thoughts 🤔 & Curiosity to get New Things to Learn☐☐  
👉 Everyday Funday  
So let's play  
Winning Position is 26  
**Snake 🐍 - Ladder 🪜** ✓

Instructions 📌

- Check the 6 questions are given below
- Try to find the correct Answer and play the game
- If your answer is correct  
➤ You have to take moves as per Pawn Position mentioned in questions.
- If you found ladder, you can climb up and if you found snake you will fall down


Note: All students have to prepare their answers in following format  
Initial Position 1  
Question No. -- Option- Pawn Position  
Attempt 2  
Question No. -- Option- Pawn Position  
Ex. Question No.1 is correct -- move 1- Pawn Position 2

🎯🎯🎯  
Start 🎮  
🌍 Keep learning 🌍

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- The intel 8086 microprocessor is a \_\_\_\_\_ processor (Correct-1 Position )  
a) 8 bit  
b) 16 bit  
c) 32 bit  
d) 4 bit
- The 16-bit flag of 8086 microprocessors is responsible to indicate \_\_\_\_\_  
(Correct-1 Positions)  
a) the condition of result of ALU operation  
b) the condition of memory  
c) the result of addition  
d) the result of subtraction

Fig1-Glimpses of question paper



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### Conclusion

- **Increased Engagement:** Games inherently engage and motivate students to actively participate in learning. The elements of competition, challenge, and reward encourage students to remain focused and invested in their studies.
- **Active Learning:** Games often necessitate problem-solving, critical thinking, and decision-making, promoting interactive learning where students engage with content actively rather than passively.
- **Enhanced Retention:** Due to their memorable and immersive nature, games help students retain information effectively. The interactive features of games reinforce learning through repetition and practice.
- **Immediate Feedback:** Many educational games offer instant feedback, enabling students to learn from their mistakes in real-time. This feedback loop aids in comprehension and performance improvement.
- **Differentiated Learning:** Educational games can adapt to various learning styles and paces, providing personalized experiences that cater to diverse student needs.
- **Increased Attention Span:** Games often require sustained attention, which can improve students' ability to focus and concentrate on tasks over extended periods.
- **Assessment and Progress Tracking:** Games can assess students' progress and performance, offering educators valuable data to adjust their instructional approaches effectively.

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>Game Pedagogy(Snake and Ladder)</b>	✓	✓		✓								✓

Table1-Po Mapped with Activity



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### 2) Learning through NPTEL Video Lecture.(Based on unit 2)

Learning through NPTEL videos is an effective way to enhance students' interest and understanding. For **Unit 2**, which covers the interfacing of peripherals with various applications, the instruction is delivered through video lectures that provide detailed explanations of the working principles and practical implementations. These lectures are conducted on **02/03/2024**. Following the video, an assessment test in the form of multiple-choice questions (MCQs) is administered, based on the content of the lecture.



Fig2-Glimpses of students watching NPTEL Video



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## Department of Electronics and Communication Engineering

### Outcome and Conclusion

- Enhanced Technical Knowledge:** Students will gain a deeper understanding of technical concepts and theories through structured NPTEL video lectures, enabling them to apply this knowledge effectively in practical scenarios.
- Improved Problem-Solving Skills:** Through the analysis of case studies and problem-solving exercises presented in NPTEL videos, students will develop the ability to approach and solve complex engineering problems with confidence and precision.
- Development of Independent Learning Abilities:** Students will cultivate self-directed learning skills by engaging with NPTEL video content, encouraging them to take initiative in exploring topics beyond the classroom curriculum.
- Integration of Theory and Practice:** NPTEL video lectures will facilitate the integration of theoretical knowledge with practical applications, allowing students to see the real-world impact of the concepts they learn.
- Continuous Assessment and Feedback:** By participating in assessments following NPTEL video lectures, students will receive timely feedback on their understanding and progress, helping them to identify areas for improvement and achieve their learning objectives.
- Modern Engineering Tools:** Students will develop the ability to effectively use modern engineering tools and software demonstrated in NPTEL video lectures, enhancing their technical capabilities in design, analysis, and problem-solving.
- Ethical Use of Technology:** By learning through NPTEL video lectures, students will be equipped to make informed decisions about the ethical implications of using modern engineering tools and technologies, ensuring responsible and ethical usage in their careers.

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Learning through NPTEL Video Lecture	√	√		√	√					√		√

Table 2-Po Mapped with Activity





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### 3) Learning through Story board writing. (Unit 3)

The storyboard outlines the development of an assessment framework aimed at evaluating student understanding and mastery of key concepts. The assessment strategy is designed to measure various cognitive levels, ranging from basic knowledge recall to advanced problem-solving and application skills. The assessment process begins with the integration of concepts taught in class, presented on the board in the form of a story or flowchart, centered around the main idea of the concept. Each stage of the assessment is carefully crafted to align with the learning outcomes, with a particular focus on modern tool usage, ethical understanding, and technical proficiency. This assessment is specifically tailored for Unit 3: Microcontroller Architecture and program status word 8051, Conducted on **date 16/03/2024**.

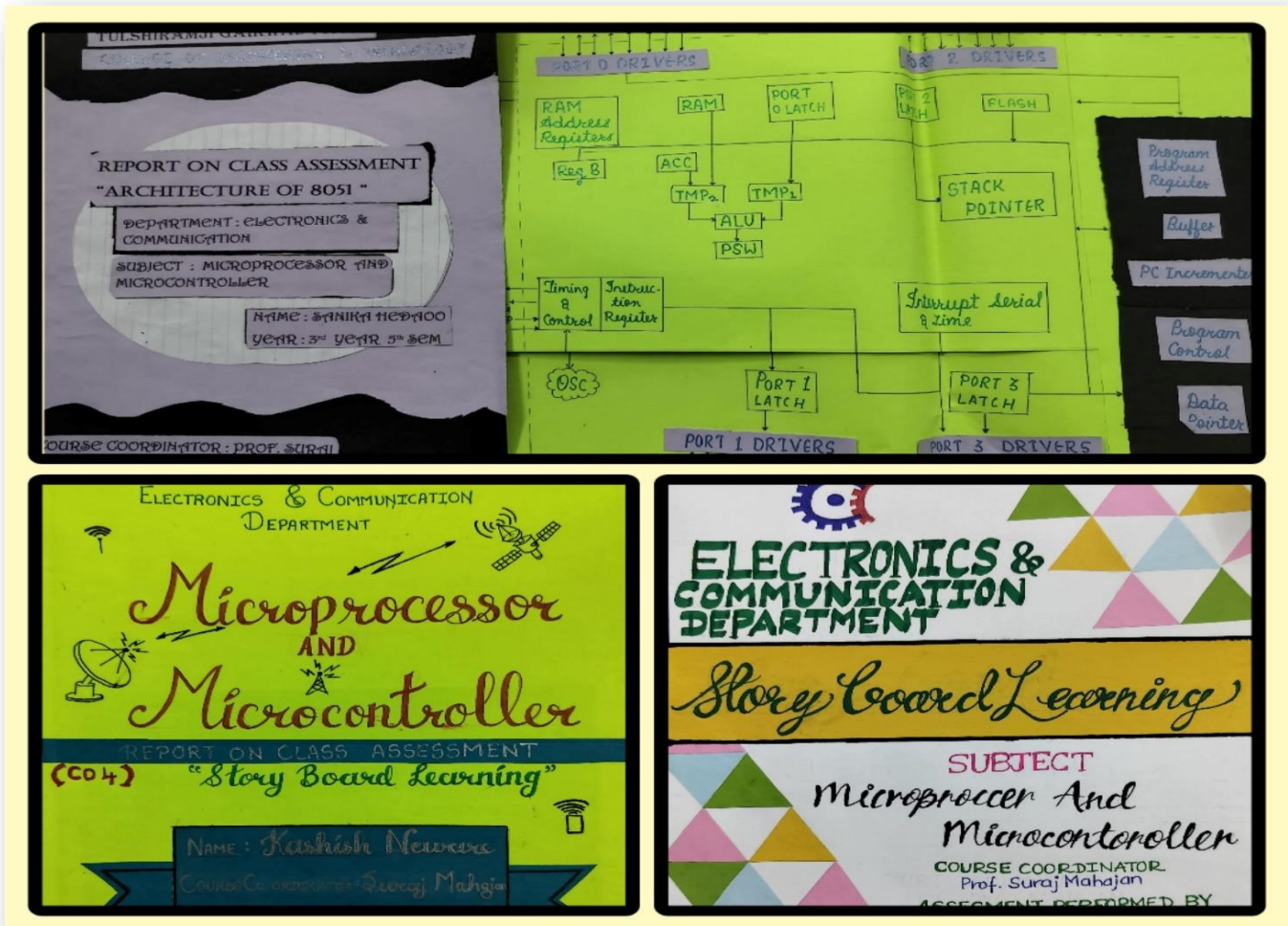


Fig3-Report on Story Board Writing



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### Conclusion & Outcome of Assessment

- **Diverse Assessment Methods:** Traditional exams were complemented by various assessment approaches, including project submissions, group discussions, presentations, and simulation-based evaluations. This allowed students to demonstrate their understanding through multiple formats.
- **Increased Student Engagement:** The introduction of innovative methods led to heightened student engagement and participation in class. Students expressed greater interest in the subject due to the interactive and practical nature of the learning experiences.
- **Enhanced Practical Skills:** The inclusion of simulations and hands-on activities led to a significant improvement in students' practical skills, making them better equipped to apply theoretical concepts in real-world networking scenarios.
- **Strengthened Critical Thinking:** Problem-based learning and case studies nurtured critical thinking abilities, requiring students to analyze complex situations, think creatively, and develop effective solutions.
- **Industry Relevance:** Interaction with industry experts and exposure to real-world challenges helped students connect academic concepts with practical applications, thereby making them more prepared for the job market.

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>Learning through Story board writing</b>	√	√		√	√			√	√	√		√

**Table 3-Po Mapped with Activity**



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## 4) Demonstration and application of theoretical contents. (Unit 4)

The demonstration of Unit 4's content on microcontroller interfacing was conducted **on 06/04/2024**, utilizing projects based on controller interfacing to provide students with practical experience. Demonstrating theoretical concepts through hands-on applications offers several benefits, particularly in enhancing understanding and retention. It bridges the gap between abstract ideas and real-world scenarios, making it easier for students to grasp complex concepts. By observing theory in action, students can better visualize and comprehend how principles are applied, leading to a deeper understanding. Additionally, practical demonstrations engage multiple senses, which can enhance memory retention compared to passive learning methods.



**Fig4-Glimpses of Demonstration**



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### Conclusion & Outcome

- Apply theoretical knowledge of microcontroller interfacing to real-world scenarios.
- Develop the ability to identify, analyze, and resolve issues in the interfacing process, enhancing problem-solving skills.
- Integrate microcontrollers into larger systems, managing complex interfacing tasks.
- Evaluate and optimize interfaced systems through testing and performance analysis.
- Collaborate effectively on interfacing projects, fostering teamwork and idea-sharing.
- Apply safety protocols and industry standards in interfacing projects.

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>Demonstration and application of theoretical contents</b>	√	√	√	√	√	√		√	√	√	√	√

**Table 4-Po Mapped with Activity**



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**5) Flipped Classroom Model Assessment (Unit 5):** In this approach, students were provided with pre-recorded video lectures and reading materials before the class. Class time was then utilized for discussions, problem-solving, and interactive activities. Students relate concept with real life application. This enabled students to come prepared and engage in deeper discussions with the instructor which is based on **unit no**

**5. Assessment Conducted on 30/04/2024**



**Fig5-.Glimpses of Activity**



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### Conclusion

- **Improved Understanding of Concepts:** Students achieve a deeper understanding of the material as they review content independently before class and apply it during in-class problem-solving sessions.
- **Increased Responsibility and Accountability:** Students take greater ownership of their learning, as they are responsible for mastering pre-class material to participate effectively in classroom activities.
- **Better Use of Class Time:** Class time is utilized more efficiently, focusing on applying concepts, addressing misconceptions, and engaging in collaborative learning rather than simply delivering content.
- **Enhanced Collaboration and Communication:** Students work together on in-class projects and discussions, improving their teamwork and communication skills.
- **Personalized Learning Experience:** Students receive more personalized feedback and support from instructors during class, allowing for a tailored learning experience that meets individual needs.
- **Greater Flexibility in Learning:** Students benefit from the flexibility to learn at their own pace outside of class, reviewing materials as needed to reinforce their understanding.
- **Increased Student Confidence:** Students gain confidence in their ability to apply knowledge independently, as the flipped classroom model encourages self-directed learning and active participation.

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>Flipped Classroom Model Assessment</b>	√	√	√	√	√	√		√	√	√		√

Table 5-Po Mapped with Activity



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### Outcomes of Innovative teaching methods

- Best result of CT1 and CT2 which is **95% Microprocessor and Microcontroller**
- More number of students secured **out of marks in Microprocessor and Microcontroller.**
- **82% feedback of Microprocessor and Microcontroller** subject, students are confident about subject and understanding of subject.
- **End Semester Result 90%.**
- Innovative activity mapped POs

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>Game Pedagogy(Snake and Ladder)</b>	√	√		√								√
<b>Learning through NPTEL Video Lecture</b>	√	√		√	√					√		√
<b>Learning through Story board writing</b>	√	√		√	√			√	√	√		√
<b>Demonstration and application of theoretical contents</b>	√	√	√	√	√	√		√	√	√	√	√
<b>Flipped Classroom Model Assessment</b>	√	√	√	√	√	√		√	√	√		√
<b>PO Mapped Through Activity</b>	√	√	√	√	√	√		√	√	√	√	√

Table 6 -Po Mapped with Activity

sd/-  
Prof. Suraj Mahajan  
Course Coordinator

sd/-  
Dr.SanjayAsutkar  
HoD ECE