

## **Student's Declaration**

We **GORLU LAKSHMI MURALI MANOHAR** Reg.No **22481A0564**, **BADAVATH SAI KARTHIKNEHRU** Reg.No **22481A0518**, **BHATTU JAGADEESH PRASAD** Reg.No **22481A0530**, **ADIGOPULA HEMANTH** Reg.No **22481A0503**, students of the Community Service Program from the Department of COMPUTER SCIENCE AND ENGINEERING, **Seshadri Rao Gudlavalleru Engineering College**, hereby declare that we have completed the mandatory community service from 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024 in Gudlavalleru under the faculty guidance of **Mrs.Y.V.N.TULASI, M.Tech**, Assistant Professor of Department of Computer Science and Engineering, Seshadri Rao Gudlavalleru Engineering College.

(Signature and Date)

## **Endorsements**

Faculty Guide:

Master of Trainer(S):

Head of the Department:

Principal:

## ACKNOWLEDGEMENTS

The satisfaction derived from the successful completion of any task is incomplete without acknowledging those who made it possible through their constant support, guidance, and encouragement. We extend our heartfelt gratitude to **Mrs.Y.V.N. TULASI,M.Tech**, Assistant Professor of Department of Computer Science and Engineering, Seshadri Rao Gudlavalleru Engineering College for his invaluable guidance, supervision, and motivation throughout our project work.

We also wish to express our sincere thanks to **Dr. M. Babu Rao**, Head of the Department of Computer Science and Engineering, for his unwavering encouragement and insights during the project's analysis phase. His constructive feedback and thoughtful guidance were instrumental in the successful completion of this work.

We are deeply grateful to our principal, **Dr. Burra Karuna Kumar**, for his support and for providing us the opportunity to undertake this project. We also thank the dedicated faculty members of our department, the programmers in our computer lab, and the non-teaching staff for their assistance along the way. Finally, we wish to thank our family, friends, and all others who offered direct and indirect support, making the completion of this project possible.

### Team Members

Gorlu Lakhmi Murali Manohar(22481A0564)  
Badavath Sai Karthik Nehru(22481A0518)  
Bhattu Jagadeesh Prasad(22481A0530)  
Adigopula Hemanth(22481A0503)

# **CHAPTER 1: EXECUTIVE SUMMARY**

The community service project is about a voluntary and organized effort in which individuals or groups dedicate their time, skills, and resources to address the needs of a community or a specific group of people. The primary goal of community service projects is to contribute to the well-being of others, promote positive social change, and improve the quality of life within a community.

Water ATMs have become a crucial solution for providing clean and accessible water in various locations. To enhance user convenience and operational efficiency, the integration of both smart card and coin mode in the portable vending machine offers a streamlined and secure payment system. This executive summary outlines the key benefits, features, and potential impact of implementing both smart card and coin mode for water ATMs.

## **Learning Objectives:**

- To identify and understand the living conditions of the people from disadvantaged sections.
- To assist individuals in launching community developmental activities in coordination with local/public/ government authority.
- To acquire knowledge and improve how to communicate with fellow students, teachers, officials, farmers, shopkeepers, and other people.
- Smart Card Technology is used to identify components and features of smart card in smart Any time water machine's.
- Operational knowledge is to explain the step-by-step process of loading credit onto a smart card.

## **Learning Outcomes:**

- Communicative skills have been developed.
- We can identify the problem as an engineer's problem.
- We can find the solution to the problem.
- We are willing to be active in any social activities.
- We know how to give awareness to people.
- We can implement the prevention steps and future steps, which helps to the community.

We gain knowledge and able to find out solutions through various ways.

## **CHAPTER 2: OVERVIEW OF THE COMMUNITY**

### **Community Overview: Gudlavalleru**

Gudlavalleru is a village in the Gudivada division of Krishna District, Andhra Pradesh, located about 50 km from Vijayawada. With a population of 51,753, comprising 25,711 males and 26,042 females, the village has one secondary school, one primary school, one engineering college, one polytechnic, and one degree college. It is well-connected by transport and has essential facilities, including one government hospital, two private hospitals, and shops selling medicines, fertilizers, and pesticides. The village has 3,723 acres of cultivated land and is home to a diverse population with three main religions.

### **Location:**

Gudlavalleru (v), Latitude: 16.3487, Longitude: 81.0492

### **Socio-economic Conditions:**

Gudlavalleru's socio-economic landscape is shaped by agriculture, industry, and services. The community relies on these sectors for livelihood, with a focus on improving education and literacy. Healthcare facilities, including a government hospital and primary health center, contribute to residents' well-being. The village is supported by basic infrastructure such as roads, water supply, sanitation, and electricity. Employment opportunities are a mix of formal and informal, with attention needed to address income disparities. Social and cultural practices are deeply rooted, with traditions influencing community life. Government programs aimed at socio-economic improvement play a crucial role, and their effectiveness is central to enhancing local living conditions.

## CHAPTER 3: COMMUNITY SERVICE PART

### ❖ **The activities carried out during the community service project are as follows:**

Initially, we obtained an acceptance letter from our department and discussed the project topic with our assigned guide, who provided valuable guidance. After selecting the topic, we sought permission from the village's Grama Sarpanch and collected population data for the project. We began by observing customer challenges within the community.

The project focused on implementing Smart Card and Coin payment modes for Smart ATW Portable Vending Machines. It began with a needs assessment, engaging local authorities and community members to understand water accessibility issues. Collaboration with technology experts ensured the seamless integration of the payment modes into the water ATMs.

User training sessions were conducted to familiarize the community with the new payment options, promoting ease of use. The systems were rigorously tested to ensure reliability, security, and efficiency. Accessibility features were incorporated to accommodate diverse user needs, and customization workshops allowed users to personalize their Smart Cards.

A public awareness campaign was launched to highlight the benefits of the new technology. Real-time monitoring systems were set up to track transactions and collect data for future decision-making. Community involvement events and maintenance workshops were organized to empower residents in managing and maintaining the technology.

The project's impact was assessed using both quantitative and qualitative measures, evaluating improvements in water accessibility, community engagement, and socio-economic conditions. The aim was to create a sustainable, community-driven solution to water accessibility challenges through the introduction of advanced payment modes.

## CHAPTER 5: OUTCOMES DESCRIPTION

**Details of the Socio-Economic Survey of the Village/Habitation. Attach the questionnaire prepared for the survey.**

z
2) What will you do if your money note is invalid?
3) Are you comfortable with only one mode of transaction?
4) Are you looking to reduce manpower?
5) What are the problems did you faced with card mode?
6) How do you feel if both card and coin modes are available in one machine?
7) What is the cost of this 20 ltr can?
8) Is this drinking water is safe to drink?
9) Which water did you consume before this water plant?
10) What is the overall Rating to your water vending machine?

### **Describe the problems you have identified in the community**

**Short-term and long-term action plan for possible solutions for the problems identified and that could be recommended to the concerned authorities for implementation.**

<b>Short-term action plans:</b>
<ul style="list-style-type: none"><li>● Increase in diameter of the Water Solenoid Valve and pipes would increase the flow rate. Hence, taking lesser time to fill in the tumbler.</li><li>● RFID tag identification and reading can be developed to accept the Money cards</li><li>● Can be used for other beverages and drinks also.</li></ul>
<b>Long-term goals:</b>
<p>We may access the machine through Aadhar credentials if information's are provided.</p> <ul style="list-style-type: none"><li>● By making slight modifications Same vending machines may be used to dispense other fluids.</li><li>● QR code may be used for accessing the water from vending machine</li></ul>

## Description of the Community awareness program/s conducted w.r.t the problems and their outcomes

### **Description:**

- The awareness regarding the community service project is done nearly three weeks in various locations with different people in the community.
- Initially the week awareness given to the customers and asked what the source for your drinking water.
- There is no multi-mode water vending machine.
- It is difficult to get water through vending machine.
- Conducted water conservation practices
- Implemented a community awareness campaign.
- Demonstrated water purification methods.
- We are unaware of multi-mode water vending machine.

### **Outcomes:**

- We can implement the multi-mode water vending machine.
- We make users very flexible to get water through vending machine.
- All the villages got awareness regarding operation of water vending machine.
- Increased awareness of water conservation practices.
- Successful completion of awareness campaign.
- Successful completion of conservation practices.
- We made their sustainable water vending machine to smart and coin-based modes.

**Report of the community service project work done in the related subject w.r.t the habitation/village.**

**Project Title: “ SMART ANY TIME WATER MACHINE’S”**

**Introduction:**

The project titled "**SMART ANY TIME WATER MACHINE'S**" aims to introduce a modern and innovative solution to address water accessibility challenges in rural communities. The idea behind the project is to integrate technology into water distribution systems by utilizing Smart ATW (Any Time Water) Portable Vending Machines, which offer 24/7 access to clean drinking water. This initiative is designed to ensure that residents in underserved and rural areas, particularly in Gudlavalleru, have easy access to clean water without the usual barriers of time or manual intervention.

Water scarcity and the unreliable availability of safe drinking water are pressing issues in many rural areas, including Gudlavalleru. With limited access to clean water, people often rely on traditional water sources that may be contaminated, affecting their health and well-being. By introducing Smart ATW machines, this project aims to provide a reliable, efficient, and user-friendly solution to these problems.

**Description of the Project:**

The project focuses on installing Smart ATW Portable Vending Machines that are powered by two payment modes: **Smart Card** and **Coin Mode**. These machines will allow people to access clean water at any time of the day by making small payments. The integration of these payment modes ensures that the water dispensing process is automated and transparent. It also removes the need for human intervention, making the system both efficient and hygienic.

The Smart ATW machines are designed to be user-friendly, ensuring that individuals of all ages and technological proficiency can use them with ease. The machines will be strategically placed in different areas of the village, ensuring accessibility to as many residents as possible.

To ensure that the project is successful, several preparatory activities were undertaken, such as discussions with the local authorities, specifically the **Grama Sarpanch** (village head), who granted the necessary permissions for the installation and operation of the machines. The community was also involved in the planning phase, with inputs gathered from local residents to tailor the system to their specific needs.

**Community Support and Awareness:**

One of the most critical aspects of this project is community awareness. The success of the Smart ATW Portable Vending Machines depends not only on the installation of the machines but also on how well the community understands how to use them. Therefore, a key part of the project is educating the community about the benefits and functionalities of the new water dispensing system.



To achieve this, several awareness campaigns were organized within the village. These campaigns included information sessions, workshops, and demonstrations aimed at educating the public on the advantages of using the Smart ATW machines, how to use the Smart Cards and Coin Mode, and the overall benefits of having reliable access to clean water at any time.

### **The Role of Technology in the Community:**

The use of technology in this project is crucial for providing a sustainable solution to water accessibility. The Smart ATW Portable Vending Machines are designed to be low-maintenance and efficient, ensuring that they can operate continuously without frequent breakdowns. These machines are equipped with sensors to monitor water levels, track usage patterns, and ensure water quality. The real-time monitoring system will also help detect any malfunctions or system errors quickly, allowing for prompt repairs.

### **Community Engagement and Involvement:**

Community involvement has been a cornerstone of this project. From the initial stages of planning to the final implementation, local residents, village leaders, and stakeholders have been actively engaged. Regular meetings and consultations with the Grama Sarpanch and community members helped in identifying the most suitable locations for the installation of the machines, ensuring that the machines would be easily accessible to as many residents as possible.

### **Challenges and Solutions:**

Like any community-driven project, there were challenges encountered during the implementation phase. One of the primary concerns was ensuring that the machines would be accessible to everyone, including the elderly and those with limited technological knowledge. To address this, special efforts were made to simplify the user interface and provide personal assistance during the early stages of machine usage.

### **Conclusion:**

The "SMART ANY TIME WATER MACHINE'S" project has made significant strides in addressing water accessibility challenges in Gudlavalleru. By combining modern technology with community involvement, the project has created a sustainable, efficient, and user-friendly solution for clean water access. Through awareness campaigns, training programs, and ongoing community support, the project has not only improved the quality of life for residents but also empowered them to take an active role in the management and maintenance of the system.

In the future, it is hoped that this initiative will serve as a model for other rural communities facing similar water accessibility issues. By leveraging technology and community-driven solutions, the project has demonstrated that even in rural areas, innovative approaches can solve longstanding problems and contribute to the well-being of the community.

## **CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS**

### **OF**

### **THE COMMUNITY SERVICE PROJECT**

#### **Recommendations:**

##### **1. Expansion of the Smart ATW Machines:**

- It is recommended to expand the reach of the Smart ATW Portable Vending Machines to more rural and underserved areas. Given the success of the initial installation in Gudlavalleru, extending this service to nearby villages could help address water accessibility challenges for a broader population. This would not only provide clean water but also create a network of automated water dispensing machines that can be continuously monitored for optimal performance.

##### **2. Continuous Community Engagement:**

- To ensure the long-term sustainability of the project, it is crucial to maintain continuous community involvement. Regular feedback sessions should be held to assess how the community is using the machines and to address any issues they may encounter. Community-led initiatives, such as forming local water management committees, can help manage and maintain the machines efficiently, ensuring that the system remains operational.

##### **3. Maintenance and Technical Support:**

- A dedicated technical support team should be established to provide prompt maintenance services for the machines. While training workshops were conducted for basic troubleshooting, a more robust and accessible technical support system should be set up to handle complex issues or system breakdowns. This could include a helpline or an app for residents to report issues directly to technicians.

##### **4. Awareness Campaigns for Hygiene and Water Conservation:**

- In addition to promoting the Smart ATW machines, there should be ongoing campaigns about water conservation and hygiene. Educating residents on the importance of using clean water, storing it properly, and conserving water resources will amplify the benefits of the project. Schools, local health centers, and community leaders can be key partners in spreading these messages.

##### **5. Integration with Local Water Bodies and Conservation Efforts:**

- As part of a broader strategy to improve water availability, the project can integrate with local water bodies and conservation programs. Efforts should be made to ensure that the water dispensed by the Smart ATW machines comes from sustainable sources, such as rainwater harvesting systems, bore wells, or local water treatment facilities. Linking the project to environmental sustainability can further enhance its long-term impact.

##### **❖ Development of an Interactive Website for Water Issues:**

- As part of the community service project, a website has been developed that provides detailed information on areas with water scarcity and water-related diseases. The website can be expanded to include a more comprehensive database of water sources, quality reports, and water conservation tips. Additionally, integrating features such as live mapping and disease prevention advice will help raise awareness of water-related health issues. The website can act as a platform for reporting problems, providing updates on water quality, and connecting community members with local resources.

## Conclusions:

The "SMART ANY TIME WATER MACHINE'S" project has proven to be a significant step in addressing water accessibility challenges in rural communities. Through the installation of Smart ATW Portable Vending Machines and the introduction of innovative payment modes, the project has improved residents' access to clean drinking water while promoting digital literacy and self-sufficiency.

The **deployment of a website** that covers information on low-water areas, water scarcity, and water-related diseases has also played a pivotal role in raising awareness and providing useful resources to the community. The website's visualization of data through interactive maps and pie charts on water-affected diseases offers a powerful tool for community members to understand the impact of water scarcity on their health. By integrating technology into the management of water resources, the project has laid a foundation for creating a more sustainable and community-driven solution to water challenges.

In conclusion, the "SMART ANY TIME WATER MACHINE'S" project has not only provided a much-needed solution for water access but also empowered the community with the tools, knowledge, and support required to manage and maintain it effectively. By focusing on sustainability, awareness, and community empowerment, the project has made a meaningful contribution to improving the quality of life in Gudlavalleru and can be adapted to other areas in need of reliable, accessible, and clean water solutions.

## Student Self-Evaluation for the Community Service Project

Student Name: Gorlu Lakshmi Murali Manohar

Registration No: 22481A0564

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi, M.Tech

Address with mobile number: Nuzvid,9063170012

**Please rate your performance in the following areas:**

**Rating Scale:**            1 is lowest and 5 is highest rank

1) Oral communication	1	2	3	4	5
2) Written communication	1	2	3	4	5
3) Proactiveness	1	2	3	4	5
4) Interaction ability with community	1	2	3	4	5
5) Positive Attitude	1	2	3	4	5
6) Self-confidence	1	2	3	4	5
7) Ability to learn	1	2	3	4	5
8) Work Plan and organization	1	2	3	4	5
9) Professionalism	1	2	3	4	5
10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Student

## Student Self-Evaluation for the Community Service Project

Student Name: Badavath Sai Karthik Nehru

Registration No: 22481A0518

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi, M.Tech

Address with mobile number: Machilipatnam,7989447352

**Please rate your performance in the following areas:**

**Rating Scale:**            1 is lowest and 5 is highest rank

1) Oral communication	1	2	3	4	5
2) Written communication	1	2	3	4	5
3) Proactiveness	1	2	3	4	5
4) Interaction ability with community	1	2	3	4	5
5) Positive Attitude	1	2	3	4	5
6) Self-confidence	1	2	3	4	5
7) Ability to learn	1	2	3	4	5
8) Work Plan and organization	1	2	3	4	5
9) Professionalism	1	2	3	4	5
10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Student

## Student Self-Evaluation for the Community Service Project

Student Name: Bhattu Jagadeesh Prasad

Registration No: 22481A0530

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number: Gudlavalleru,9490779598

**Please rate your performance in the following areas:**

**Rating Scale:**            1 is lowest and 5 is highest rank

1) Oral communication	1	2	3	4	5
2) Written communication	1	2	3	4	5
3) Proactiveness	1	2	3	4	5
4) Interaction ability with community	1	2	3	4	5
5) Positive Attitude	1	2	3	4	5
6) Self-confidence	1	2	3	4	5
7) Ability to learn	1	2	3	4	5
8) Work Plan and organization	1	2	3	4	5
9) Professionalism	1	2	3	4	5
10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Student

## Student Self-Evaluation for the Community Service Project

Student Name: Adigopula Hemanth

Registration No: 22481A0503

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number: Repalle, 8885385616

**Please rate your performance in the following areas:**

**Rating Scale:**            1 is lowest and 5 is highest rank

1) Oral communication	1	2	3	4	5
2) Written communication	1	2	3	4	5
3) Proactiveness	1	2	3	4	5
4) Interaction ability with community	1	2	3	4	5
5) Positive Attitude	1	2	3	4	5
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10) Creativity	1	2	3	4	5
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14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Student

### Evaluation by the Person in-charge in the Community/Habitation

Student Name: Gorlu Lakshmi Murali Manohar

Registration No: 22481A0564

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number: Gudlavalleru,9398778325

**Please rate the student's performance in the following areas:**

**Please note that your evaluation shall be done independent of the Student's self-evaluation**

**Rating Scale: 1 is lowest and 5 is highest rank**

1) Oral communication	1	2	3	4	5
2) Written communication	1	2	3	4	5
3) Proactiveness	1	2	3	4	5
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8) Work Plan and organization	1	2	3	4	5
9) Professionalism	1	2	3	4	5
10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

**Date:**

**Signature of the Supervisor**



## Evaluation by the Person in-charge in the Community/Habitation

Student Name: Badavath Sai Karthik Nehru

Registration No: 22481A0518

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number: Machilipatnam, 7989447352

**Please rate the student's performance in the following areas:**

**Please note that your evaluation shall be done independent of the Student's self-evaluation**

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14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Supervisor

### Evaluation by the Person in-charge in the Community/Habitation

Student Name: bhattu Jagadeesh Prasad

Registration No: 22481A0510

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number:

**Please rate the student's performance in the following areas:**

**Please note that your evaluation shall be done independent of the Student's self-evaluation**

**Rating Scale: 1 is lowest and 5 is highest rank**

1) Oral communication	1	2	3	4	5
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7) Ability to learn	1	2	3	4	5
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10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Supervisor

## Evaluation by the Person in-charge in the Community/Habitation

Student Name: Adigopula Hemanth

Registration No: 22481A0512

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.V.N.Tulasi,M.Tech

Address with mobile number: Repalle, 8885385616

**Please rate the student's performance in the following areas:**

**Please note that your evaluation shall be done independent of the Student's self-evaluation**

**Rating Scale: 1 is lowest and 5 is highest rank**

1) Oral communication	1	2	3	4	5
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7) Ability to learn	1	2	3	4	5
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10) Creativity	1	2	3	4	5
11) Quality of work done	1	2	3	4	5
12) Time Management	1	2	3	4	5
13) Understanding the Community	1	2	3	4	5
14) Achievement of Desired Outcomes	1	2	3	4	5
15) OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Supervisor

# SESHADRI RAO GUDLAVALLERU ENGINEERING COLLEGE

(An Autonomous Institute with Permanent Affiliation to JNTUK, Kakinada)  
Seshadri Rao Knowledge Village, Gudlavalleru

## Department of Computer Science and Engineering

### Program Outcomes (POs)

#### Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions., component, or software to meet the desired needs.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcomes (PSOs)**

PSO1 : Design, develop, test and maintain reliable software systems and intelligent systems.

PSO2 : Design and develop web sites, web apps and mobile apps.