



MARRI LAXMAN REDDY **INSTITUTE OF TECHNOLOGY AND MANAGEMENT**

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

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PREFACE

Enterprise cloud concept Processing form the backbone of modern computing, enabling efficient solutions to complex problems in areas like optimization, networks, and data processing. This lab manual for M.Tech CSE I Year II Semester equips students with hands-on skills to implement and analyze key techniques—from brute-force enumeration to sophisticated string matching and flow algorithms—fostering deep insight into performance trade-offs.

The experiments align with core texts like S. Sridhar's *Design and Analysis of Algorithms* and references such as Cormen et al.'s *Introduction to Algorithms*, emphasizing practical coding in C/C++ alongside theoretical rigor. Through these 10 structured labs, students will not only code solutions but also evaluate time/space complexities, preparing them for real-world applications in IT infrastructure and systems design.



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COMPUTER SCIENCE AND ENGINEERING

ENTERPRISE CLOUD CONCEPTS LAB MANUAL

GENERAL INSTRUCTIONS

- Students are instructed to attend the ENTERPRISE CLOUD CONCEPTS on time. Late comers will not be entertained in the lab.
- Students must be punctual. Experiments conducted during the session will not be repeated for those who are absent or late.
- Students are expected to come prepared with the theory and procedure of the experiment scheduled for the day.
- The use of mobile phones inside the lab is strictly prohibited.
- Any damage or loss of system components such as keyboard, mouse, or other peripherals during the lab session will be the responsibility of the student, and a fine or penalty will be imposed accordingly.
- Students must update their lab records and observation books session-wise. Before leaving the lab, the student should get their observation book signed by the concerned faculty member.
- Lab records must be submitted in the next lab session to the respective faculty members in the staffroom for correction and return.
- Students should not move around or disturb others during the lab session.
- In case of any emergency, students must obtain written permission from the concerned faculty member before leaving the laboratory.
- Faculty members reserve the right to suspend any student from the lab session on disciplinary grounds.



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COMPUTER SCIENCE AND ENGINEERING **ENTERPRISE CLOUD CONCEPTS LAB MANUAL** **INSTITUTE VISION AND MISSION**

Vision:

To be as an ideal academic institution by graduating talented engineers to be ethically strong, competent with quality research and technologies.

Mission:

- Utilize rigorous educational experiences to produce talented engineers
- Create an atmosphere that facilitates the success of students
- Programs that integrate global awareness, communication skills and Leadership qualities
- Education and Research partnership with institutions and industries to prepare the students for interdisciplinary research



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COMPUTER SCIENCE AND ENGINEERING **ENTERPRISE CLOUD CONCEPTS LAB MANUAL**

DEPARTMENT VISION AND MISSION

Vision:

To empower the students to be technologically adept, innovative, self-motivated and responsible global citizen possessing human values and contribute significantly towards high quality technical education with ever changing world.

Mission:

- To offer high-quality education in the computing fields by providing an environment where the knowledge is gained and applied to participate in research, for both students and faculty.
- To develop the problem solving skills in the students to be ready to deal with cutting edge technologies of the industry.
- To make the students and faculty excel in their professional fields by inculcating the communication skills, leadership skills, team building skills with the organization of various co-curricular and extra-curricular programs.
- To provide the students with theoretical and applied knowledge, and adopt an education approach that promotes lifelong learning and ethical growth.



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COMPUTER SCIENCE AND ENGINEERING ENTERPRISE CLOUD CONCEPTS LAB MANUAL

PROGRAM OUTCOMES

PO No.	NBA Statement / Vital Features	No. of Vital Features
PO1.	<p>An ability to independently carry out research /investigation and development work to solve practical problems.</p> <ol style="list-style-type: none"> 1. Research problems in Computer Science and Engineering are clearly identified and defined. 2. Literature review highlights research gaps and suitable methods. 3. Experiments or simulations are conducted using appropriate tools. 4. Data collection, analyses, and interpretation systematically. 5. Innovative approaches are applied to engineering problem-solving. 6. Results are validated against established theories and standards. 	6
PO 2.	<p>An ability to write and present a substantial technical report/document</p> <ol style="list-style-type: none"> 1. Technical reports, dissertations, and papers are well-structured. 2. Referencing and academic integrity practices are properly maintained. 3. Content is presented with clarity, precision, and logical flow. 4. Oral communication and presentation skills are effectively demonstrated. 5. Digital tools are used for documentation and visualization. 6. Research findings are communicated to both technical and non-technical audience. 	6
PO 3.	<p>Students should be able to demonstrate advanced proficiency in Computer Science and allied emerging areas of Engineering.</p> <ol style="list-style-type: none"> i. In-Depth Technical Knowledge ii. Advanced Problem-Solving and Algorithmic Skills. iii. Hands-On Practical Expertise iv. Research and Innovation Aptitude v. Interdisciplinary Integration 	5
PO 4.	<p>Students should be able to identify, analyze, and effectively solve complex real-world problems by applying advanced computing concepts, while considering solutions from</p>	

	<p>a global perspective</p> <ul style="list-style-type: none"> i. Ability to break down multifaceted problems into manageable parts and develop effective solutions using advanced computing techniques. ii. Analytical Thinking and Critical Reasoning iii. Advanced Computing Knowledge. iv. Capability to understand and model complex systems, considering interdependencies and dynamic behaviors within global contexts. v. Global and Societal Awareness. vi. Aptitude for developing novel approaches and innovative solutions to address complex challenges. vii. Ability to work effectively in diverse teams and integrate knowledge from multiple disciplines to solve global problems. viii. Skill in clearly presenting problem analyses, solutions, and their implications to technical and non-technical global audience. 	8
<p>PO 5.</p>	<p>An ability to acquire and apply advanced technical knowledge, professional skills, and modern computing tools to develop sustainable solutions</p> <ul style="list-style-type: none"> i. Ability to continuously learn and apply cutting-edge technical knowledge in computing and related fields. ii. Proficiency with Modern Computing Tools. iii. Capability to design and implement solutions that are environmentally, and economically feasible. iv. Understanding of professional ethics and responsibility in creating technology solutions with long-term positive impact. v. Integration of Multidisciplinary Knowledge. vi. Adaptability to sustainable practices. 	6
<p>PO 6.</p>	<p>An Ability to recognize the significance of lifelong learning and actively pursue continuous professional development by adapting technologies in emerging areas.</p> <ul style="list-style-type: none"> i. Self-Directed Learning. ii. Skill in quickly learning and integrating new technologies and tools as they emerge in the field. iii. Capability to assess the relevance and impact of emerging technologies and decide on their applicability. iv. Continuous Professional Development Planning. v. Ability to engage with professional communities, attend workshops, and collaborate to stay updated. vi. Habit of regularly reflecting on personal growth, learning experiences, and professional competencies to improve continuously. 	6



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COMPUTER SCIENCE AND ENGINEERING

ENTERPRISE CLOUD CONCEPTS LAB MANUAL

PROGRAM EDUCATIONAL OBJECTIVES

Sl. No.	PEOs Name	Program Education Objective Statements
1	PEO – 1	Graduates will achieve professional excellence and success in the field of Computer Science and Engineering by applying strong technical foundations and problem-solving skills to contribute effectively to industry, academia, and entrepreneurship.
2	PEO – 2	Graduates will demonstrate a commitment to lifelong learning by continuously enhancing their knowledge and skills through professional development and self-directed learning to effectively adapt to evolving global challenges.
3	PEO – 3	Graduates of the Computer Science and Engineering program will actively pursue advanced research, contributing to the development of solutions for complex problems and the generation of new knowledge to effectively address real-world challenges.
4	PEO – 4	Graduates will exhibit professionalism, effective communication, leadership skills, and ethical responsibility while working in multidisciplinary teams to deliver computing solutions that address societal needs and contribute to sustainable development.



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PROGRAM SPECIFIC OUTCOMES

PSO1: Applications of Computing: Ability to use knowledge in various domains to provide solution to new ideas and innovations.

PSO2: Programming Skills: Identify required data structures, design suitable algorithms, develop and maintain software for real world problems.



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Course Structure

ENTERPRISE CLOUD CONCEPTS Lab will have a continuous evaluation during II semester for 40 sessional marks and 60 end semester examination marks.

Out of the 40 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 20 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned.

The end semester examination shall be conducted with an external examiner and internal examiner. The external examiner shall be appointed by the principal / Chief Controller of examinations



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COMPUTER SCIENCE AND ENGINEERING **ENTERPRISE CLOUD CONCEPTS LAB MANUAL**

Course Objectives:

1. To Build the Foundation of cloud computing
2. To Understand How to Build the Neural Network.
3. To enable students to develop successful machine learning concepts.

Course Outcomes:

1. Understand importance of cloud architecture
2. Illustrating the fundamental concepts of cloud security
3. Analyze various cloud computing mechanisms
4. Understanding the architecture and working of cloud computing.



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2425836: ENTERPRISE CLOUD CONCEPTS LAB (Professional Elective - III Lab)

M.Tech. CSE I Year II Sem.

L T P C

0 0 4 2

Course Objectives: Knowledge on significance of cloud computing and its fundamental concepts and models.

Course Outcomes:

1. Understand importance of cloud architecture
2. Illustrating the fundamental concepts of cloud security
3. Analyze various cloud computing mechanisms
4. Understanding the architecture and working of cloud computing.

List of Experiments:

1. Install Virtualbox/VMware Workstation with different flavors of linux or windows OS on top of windows 7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java..
4. Find a procedure to transfer the files from one virtual machine to another virtual machine.
5. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
6. Install Hadoop single node cluster and run simple applications like word count.

E-Resources:

1. <https://www.iitk.ac.in/nt/faq/vbox.htm>
2. <https://www.google.com/urlsa=t&ret=j&q=&esrc=s&source=web&cd=&ved=2ahUKewjqrNG0za73AhXZt1YBHZ21DWEQFnoECAMQAQ&url=http%3A%2F%2Fwww.cs.columbia.edu%2F~sedwards%2Fclasses%2F2015%2F1102-fall%2Flinuxvm.pdf&usq=AOvVaw3xZPuF5xVgk-AQnBRsTtHz>
3. <https://www.cloudsimtutorials.online/cloudsim/>
4. <https://edwardsamuel.wordpress.com/2014/10/25/tutorial-creating-openstack-instance-in-trystack/>
5. <https://www.edureka.co/blog/install-hadoop-single-node-hadoop-cluster>

Experiment-1

Install VirtualBox/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.

Steps:

1. Download & Install:
 - VirtualBox or
 - VMware Workstation Player
2. Create a New Virtual Machine:
 - Launch VirtualBox/VMware
 - Click New → Select OS type → Allocate RAM (min 2GB) and disk space (20GB+)
 - Mount ISO and install OS (e.g., Ubuntu, CentOS, Windows)

Experiment-2

Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.

For Linux (Ubuntu/Debian):

```
sudo apt update
```

```
sudo apt install build-essential
```

Sample C Program

```
#include <stdio.h>
```

```
int main() {
```

```
printf("Hello, World!\n");
```

```
return 0;
```

```
}
```

Compile and Run:

```
gcc hello.c -o hello
```

```
./hello
```

Output:

```
Hello, World!
```

Experiment-3

Install Google App Engine. Create a hello world app and other simple web applications using python/java.

Install Google Cloud SDK:

```
sudo apt install python3-pip
pip install --upgrade gcloud
gcloud init
```

Create Python Web App:

1. Create app.yaml:

```
runtime: python39
entrypoint: python main.py
```

2. Create main.py:

```
from flask import Flask
app = Flask(__name__)
@app.route('/')
def hello():
    return 'Hello, Cloud!'
if __name__ == '__main__':
    app.run()
```

3. Install Flask:

```
pip install Flask
```

4. Deploy: gcloud app deploy

5. Browse: gcloud app browse

Output:

Hello, Cloud!

Experiment-4

Find a procedure to transfer the files from one virtual machine to another virtual machine.

Method 1: Shared Folder (VirtualBox)

1. **Install Guest Additions** (Devices > Insert Guest Additions)
2. Add a shared folder from VirtualBox settings.
3. Mount inside the VM:

```
sudo mount -t vboxsf shared_folder /mnt/shared
```

Method 2: Using SCP

If both VMs are networked:

```
scp file.txt user@vm-ip:/home/user/
```

Experiment-5

Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

Steps:

1. Visit: <https://trystack.org> (if available — or use *OpenStack Public Cloud*)
2. Sign in using Facebook (as TryStack required that)
3. Create a new instance:
 - Choose Image (e.g., Ubuntu)
 - Flavor: m1. small
 - Create Key Pair (download pem)
 - Launch Instance

4. Connect:

```
ssh -i yourkey.pem ubuntu@<Instance-IP>
```

Experiment-6

Install Hadoop single node cluster and run simple applications like word count.

Prerequisites:

- Java: Install OpenJDK 11

```
sudo apt install openjdk-11-jdk
```

- Hadoop: Download and extract Hadoop

```
wget https://downloads.apache.org/hadoop/common/hadoop-3.3.6/hadoop-3.3.6.tar.gz
```

```
tar -xzf hadoop-3.3.6.tar.gz
```

```
mv hadoop-3.3.6 hadoop
```

Configure Hadoop:

1. Edit etc/hadoop/core-site.xml:

```
xml
```

```
<configuration>
```

```
  <property>
```

```
    <name>fs.defaultFS</name>
```

```
    <value>hdfs://localhost:9000</value>
```

```
  </property>
```

```
</configuration>
```

2. Edit etc/hadoop/hdfs-site.xml:

```
xml
```

```
<configuration>
```

```
  <property>
```

```
    <name>dfs.replication</name>
```

```
    <value>1</value>
```

```
  </property>
```

```
</configuration>
```

3. Edit etc/hadoop/mapred-site.xml:

```
Xml
```

```
<configuration>
```

```
  <property>
```

```
    <name>mapreduce.framework.name</name>
```

```
<value>yarn</value>
</property>
</configuration>
4. Edit etc/hadoop/yarn-site.xml:
xml
<configuration>
  <property>
    <name>yarn.nodemanager.aux-services</name>
    <value>mapreduce_shuffle</value>
  </property>
</configuration>
```

5. Edit etc/hadoop/hadoop-env.sh:
export JAVA_HOME=/usr/lib/jvm/java-11-openjdk-amd64

Format Namenode:

```
hdfs namenode -format
```

Start Hadoop:

```
start-dfs.sh
```

```
start-yarn.sh
```

Run Word Count Example:

1.Create Input File:

```
echo "hello world hello hadoop" > file.txt
```

```
hdfs dfs -mkdir /input
```

```
hdfs dfs -put file.txt /input
```

2.Run WordCount:

```
hadoop jar $HADOOP_HOME/share/hadoop/mapreduce/hadoop-mapreduce-examples-3.3.6.jar
wordcount /input /output
```

3.View Output:

```
hdfs dfs -cat /output/part-r-00000
```

Output:

```
hello 2
```

```
hadoop 1
```

```
world 1
```

