## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: CSE/IT** | **Semester: V/V** |
| **Course: #Network Administration** | **Group: A*/A*** |
| **Course Code: NWA198921** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 2 | 4 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

This Course will help the students to comprehend the fundamentals of network administration and tools. This course will also familiarize the students in details of ADS and network security.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Configure ADS and DHCP**
- **Install and use network monitoring tools**
- **Network Troubleshooting**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Identify and use various network devices, connectors, topologies, communication basics. | Remember, Understand, Apply |
| CO2 | Implement security for network by understanding internal external threats, wired & wireless security, Kerberos, PGP, SMTP, S_MIME | Remember, Understand |
| CO3 | Install and configure network printer, network administration ,monitoring tools | Apply |
| CO4 | Install windows server edition n configure ADS/DHCP | Apply |

## 6. COURSE CONTENTS

| Sr. No. | TOPICS/ Sub-Topics | Hours | Marks | COs |
|---|---|---|---|---|
| 1 | **Introduction to network**<br>1.1. Network hardware<br>1.2 Network topology<br>1.3 Network media | 02 | 06 | CO1 |
| 2 | **Network administrator**<br>2.1 Network related jobs<br>2.2 Network architecture/designer<br>2.3 Administrator responsibility<br>2.4 Duties of network engineer | 04 | 10 | CO1 |
| 3 | **Network Management Models**<br>3.1 RARP, BOOTP<br>3.2 DHCP<br>3.3 DNS<br>3.4 Network printing<br>3.5 Printer sharing | 06 | 10 | CO4 |
| 4 | **Information models and directories services**<br>4.1 Architecture<br>4.2 Types of directories services<br>4.3 LDAP, information models<br>4.4 ADS | 04 | 10 | CO4 |
| 5 | **Network Administration tools**<br>5.1. Web based tools for System and network analysis-ShareEnum, NTFS Permissions Explorer, TcpView, WireShark, Look@LAN etc.<br>5.2. NetStat, PortScan, HostAlive, TraceRoute and Ping, Network analyzer , NetCat, win dump,Nmap | 04 | 10 | CO3 |
| 6 | **Server and network Monitoring tool**<br>6.1. Introduction of server monitoring<br>6.2. Server monitoring tool<br>6.3. Introduction server monitoring, local server monitoring and log files, open source and properterships third party software /tool case studies: HP Open View and Tivoli.<br>6.4. Need, features ,case studies : Microsoft Network Monitor, Nagios | 04 | 10 | CO3 |

| | | | | |
|---|---|---|---|---|
| 7 | **Security**<br>7.1. Wired/wireless –<br>7.2. Firewalls : concept, design principles, limitations, trusted systems, Kerberos - concept<br>7.3. Security topologies – security zones, DMZ, Internet, Intranet, VLAN, security implication<br>7.4. Email security : Email security standards : Working principle of SMTP, PEM, PGP, S/MIME, spam | 08 | 14 | CO2 |
| | **TOTAL** | **32** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 16 experiments/assignments with approx. no. of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiment/Assignment/Exercise/Tutorial/Drawings | Approx. Hrs required | COs |
|---|---|---|---|
| 1. | Install Network Packet Tracer | 02 | CO1 |
| 2. | To configure WAN | 04 | CO1 |
| 3. | To create network cable using RJ-45 connectors | 04 | CO1 |
| 4. | To install a network interface card (NIC) & locate MAC address of computer. | 02 | CO1 |
| 5. | To perform network commands- NetStat, PortScan, HostAlive, TraceRoute and Ping, NetCat | 04 | CO3 |
| 6. | Installing and configuring DHCP and DNS | 04 | CO4 |
| 7. | Installing Windows 2003 Server | 02 | CO3 |
| 8. | Demonstration on installation of Active Directory | 02 | CO4 |
| 9. | To Create user/Group in Active Directory Service | 04 | CO4 |
| 10. | Demonstration on Wireshark | 02 | CO2 |
| 11. | Understanding Wireshark working with filters, menu options | 04 | CO2 |
| 12. | To install a network printer - Windows 2008 | 02 | CO3 |
| 13. | To configure VLAN on Network packet tracer | 04 | CO1 |
| 14. | Demonstration on Network monitoring tool - TNM | 02 | CO3 |
| 15. | Demonstration on Nagios | 02 | CO3 |
| 16. | Installing IIS, making web server, web directory, connection via remote desktop, to know browsers | 04 | CO2 |
| 17. | Execution of WinDump / TCPDump, WiFiMan, SysFiles, EmailVerify, etc | 04 | CO3 |
| 18. | Demonstration on Kerberos | 04 | CO2 |
| 19. | To identify different problems of network example- no network, card problem, cable problem, IIS problem | 04 | CO1, CO2 |
| 20. | To implement security algorithms | 04 | CO2 |
| | **Total** | **64** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Demonstrations
4. Slides
5. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | The Complete Reference Networking | Craig Zacker | Tata McGraw-Hill Education |
| 2. | Networking A Beginner's Guide | Bruce Hallberg | Tata McGraw-Hill Education |
| 3. | Introduction to Networking | Richard A. McMohan, Sir | Tata McGraw-Hill Education |
| 4. | Microsoft Press ,MCSE Training Kit , Networking Essential Plus | Microsoft Press Staff | Microsoft Press |

## 10. WEB REFERENCES

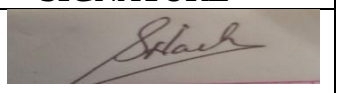
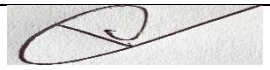
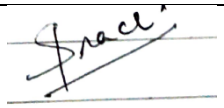
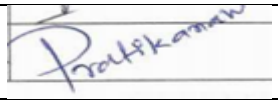
1. http://www.nmap.org.
2. http://www.tamos.com
3. http://www.gfi.com/blog/101-free-admin-tools

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | Introduction to network | 2 | 2 | 2 | 6 |
| 2. | Network administrator | 2 | 4 | 4 | 10 |
| 3. | Network management models | 2 | 2 | 6 | 10 |
| 4. | Information models and directory services | 2 | 2 | 6 | 10 |
| 5. | Network Administration tools | - | 4 | 6 | 10 |
| 6. | Server and network Monitoring tool | - | 4 | 6 | 10 |
| 7. | security | 4 | 4 | 6 | 14 |
| **TOTAL** | | **12** | **22** | **36** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**
NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mrs. Swapna Naik |  |
| 2 | Internal | Mrs. Krishna Bhatt |  |
| 3 | Internal | Mrs. Prachi Arora |  |
| 4 | External | Mr. Pratik Kanani<br>Asst. Professor, DJSCOE |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: V** |
| **Course: #Embedded System** | **Group: A*** |
| **Course Code: EMS190811** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+ D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 04 | 02 | _ | _ | 06 | 03 | 70 | 20 | 10 | 70 | 50 | -- | 50 | 200 |

## 3. COURSE OBJECTIVE

The study of embedded systems is essential part of Computer Science. It deals with computer hardware with software embedded in it. This subject will enable student to develop logical thinking and use of "Firmware". It is practical oriented subject having theoretical prerequisites of Microprocessor, Digital Techniques, Data Structures and Computer Architecture. Students will be able to develop Real Time Systems, Device drivers, use interrupt service mechanism, program timing and counting devices and develop embedded C-Programs for Microcontroller.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Design and develop Embedded system**

**5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -**

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Conceptualize various building blocks of 8051 Micro controller. | Remember, Understand |
| CO2 | Implement programs for 8051 micro controller. | Understand, Apply |
| CO3 | Design an embedded system. | Remember, Understand, Apply |
| CO4 | Use of the Buses, Device Drivers and Interrupt mechanism used in Embedded Systems. | Understand, Apply |
| CO5 | Solve the problems using concepts in RTOS. | Remember, Understand, Apply |

**6. COURSE CONTENTS**

| Sr.No. | Topic/Sub-Topics | Hours | Marks | Cos |
|---|---|---|---|---|
| 1 | **8051 Microcontroller Architecture**<br>1.1 Difference between Microprocessors and Microcontrollers<br>1.2 Introduction to 8051 microcontrollers family, Architectural block Diagram, Pin diagram and use of pins.<br>1.3 Functions General Purpose and Special Function Registers,<br>1.4 Oscillator and clock circuit, Reset circuit, I/O Port circuits,<br>1.5 Memory organization, Internal program and data memory, Instruction Set, Assembly level programming and Embedded C programming. | **10** | **12** | **CO1** |
| 2 | **8051 Serial and Timer/ Counter Programming**<br>2.1 Serial data input/output and associated registers.<br>2.2 Various modes of serial data communication, serial data, communication programs in Assembly language/ Embedded C.<br>2.3 Use of counter as timer, Timer/Counters and associated registers, Various modes of timer/counter operations.<br>2.4 Time delay programs in Assembly language/ Embedded C. | **10** | **12** | **CO2** |
| 3 | **8051 Interrupts**<br>3.1 Concept of Interrupt, interrupt versus polling, Interrupt execution Steps<br>3.2 Types of interrupts in 8051, interrupt control and associated registers, interrupt vectors, Interrupt execution | **8** | **10** | **CO2** |

| | | | | |
|---|---|---|---|---|
| | 3.3 RETI instruction, software generated interrupt<br>3.4 Interrupt handler subroutine for timer/counter and serial data transmission/reception in Assembly language/ Embedded C. | | | |
| **4** | **Introduction to embedded system**<br>4.1. Embedded systems, processors embedded into a system, Embedded hardware units & devices in a system, Embedded software in a system, Applications of embedded systems.<br>4.2. SOC & use of VLSI circuit design technology, IP core, FPGA, complex system design & processors.<br>4.3. Design process in embedded system<br>4.4. Formalization of system design & examples<br>4.5. Classification of embedded system<br>4.6. Skills required for an embedded system designer | **18** | **14** | **CO3** |
| **5** | **Communication buses & Interrupts Servicing Mechanism**<br>5.1 Network Embedded System<br>5.2 Types of network embedded system- Embedded networking with CAN Bus, properties, Frame format: Extended and Standard,<br>5.3 I2C Bus, Arbitration process, Data Transfer in I2C, USB, Ethernet<br>5.4 I/O types & SPI, SCI, SI<br>5.5 Serial communication devices, parallel device ports, wireless devices.<br>5.6 Timer & counting devices, watchdog timer, real time clock<br>5.7 Interrupts handling Mechanism, Context switching, Latency. | **10** | **12** | **CO4** |
| **6** | **RTOS & Inter-process Communication**<br>6.1 Concepts of RTOS, Functions: signal, pipe, mailbox, message.<br>6.2 Multitasking, Task synchronization & Mutual Exclusion, Starvation, Deadlock, Multiple processes,<br>6.3 Problem of sharing data by multiple tasks and routines.<br>6.4 Inter-process communication & embedded Linux. | **8** | **10** | **CO5** |
| | **Total** | **64** | **70** | |

## 7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 12 experiments/assignments with approx. no of 32 hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiments | Approx. Hrs required | COs |
|---|---|---|---|
| **1.** | To explore various simulators used in embedded systems. | 02 | CO3 |
| **2.** | To write sample assembly program in Keil & to observe various files created. | 02 | CO3 |
| **3** | To write a program in Embedded C. | 02 | CO2 |
| **4** | To perform I/O operations with 8051 Ports in Embedded C. | 02 | CO1 |
| **5** | To perform Serial communication with 8051 in Embedded C. | 02 | CO2 |
| **6** | To perform Timers programming with 8051 in Embedded C. | 04 | CO2 |
| **7** | To perform Interrupt Handling programming with 8051. | 02 | CO2 |
| **8** | To interface the 4 X 4 matrix Keyboard with 8051 using a simulator. | 02 | CO2 |
| **9** | To interface the LCD with 8051 using simulator | 02 | CO2 |
| **10** | To interface the ADC with 8051 using simulator | 02 | CO2 |
| **11** | To interface real world embedded devices with 8051 mc using a simulator. | 02 | CO2 |
| **12** | To Demonstrate various functionalities of Embedded Linux. | 02 | CO5 |
| **13** | To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay. | 02 | CO2 |
| **14** | To demonstrate block wise erasing of memory for micro controller using flash magic. | 02 | CO2 |
| **15** | To demonstrate communication between two controllers using SPI in master mode. Only master will send and Slave will receive. | 02 | CO4 |
| | Total | 32 | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Practical/assignments
3. Guest/Expert lectures
4. Slides
5. Seminar
6. Case Study
7. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | An Embedded Software Primer | David E. Simon | Pearson Education |
| 2. | The 8051 Microcontroller And Embedded Systems | Muhammad Ali Mazidi | Pearson Education |
| 3. | Programming and Customizing the 8051 Microcontroller | Mike Predko | Tata Mc graw Hill |
| 4 | Embedded Systems | Rajkamal | Tata Mc graw Hill |

## 10. WEB REFERENCES

1 www.cis.upenn.edu
2 www.nptel.iitm.ac.in
3. www.embeddedindia.com
4. www.ee.hacettepe.edu.tr

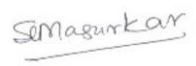
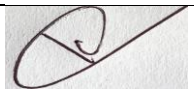
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | 8051 Microcontroller architecture | 08 | 04 | - | 12 |
| 2. | 8051 Serial and Timer/ Counter Programming | - | 04 | 08 | 12 |
| 3. | 8051 Interrupts | 02 | 04 | 04 | 10 |
| 4. | Introduction to embedded system | 02 | 04 | 08 | 14 |
| 5. | Communication buses & Interrupts Servicing Mechanism | - | 06 | 06 | 12 |
| 6. | RTOS & Inter-process Communication | 02 | 04 | 04 | 10 |
| TOTAL | | 14 | 26 | 30 | 70 |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | **Internal** | Mr. Siddhesh Masurkar |  |
| 2 | **Internal** | Mrs.Krishna Bhatt |  |
| 3 | **Internal** | Mrs. Sharyu Kadam |  |
| 4 | **External** | **Dr. Prasad S. joshi**<br>**Organization: D.J.Sanghvi college of Engineering** |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: V** |
| **Course: #Python for Hardware Applications** | **Group: A*** |
| **Course Code: PHA190807** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+ D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 03 | 02 | _ | _ | 05 | 03 | 70 | 20 | 10 | 70 | 50 | 50 | -- | 200 |

## 3. COURSE OBJECTIVE

This course will enable students to learn Raspberry Pi which uses a variety of input/output devices based on protocols to communicate with the outside world. In this course students will learn how to use protocols with other external devices to get your IoT device to interact with the real world. Students will learn how to build more sophisticated hardware systems using Raspberry Pi expansion boards to create fun and exciting IoT devices. Students will also learn to use Python-based IDE (integrated development environments) for the Raspberry Pi and to trace and debug Python code on the device.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Use various IOT protocols in communication.**
- **Build a network of IOT enabled devices.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to:

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Interface devices with Raspberry Pi board. | Remember, Understand, Apply |
| CO2 | Conceptualize with the basic taxonomy and terminology in the Internet of things. | Remember, Understand |
| CO3 | Apply Basic IOT protocols in wireless sensor network. | Understand, Apply |
| CO4 | Implement IOT application using Python. | Understand, Apply |

## 6. COURSE CONTENTS

| Sr.No. | TOPIC<br>Sub-Topics | Hours | Marks | COs |
|---|---|---|---|---|
| 1 | **Raspberry Pi**<br>1.1 Overview of Linux, Understanding Linux<br>1.2 File Structure, Linux Commands, Permissions<br>1.3 Introduction of Raspberry Pi Architecture.<br>1.4 Raspberry Pi specifications and features<br>1.5 Raspberry Pi models<br>1.6 Raspberry Pi vs Arduino comparison<br>1.7 Introduction to GPIO pins<br>1.8 Python library GPIO<br>1.9 Raspberry Pi UART<br>1.10 Creating NOOB card<br>1.11 Setting up of Raspberry Pi | 9 | 12 | CO1 |
| 2 | **Interfacing**<br>2.1 Setting up of Raspberry Pi<br>2.2 Interfacing of camera module<br>2.3 Connecting an HDMI or DVI display<br>2.4 Interfacing keyboard, mouse and USB hub<br>2.5 Inserting and flashing SD card<br>2.6 Configuring I2C Bus, CAN Bus interface, SPI, SI | 6 | 10 | CO1 |

| | | | | |
|---|---|---|---|---|
| **3** | **Internet of Things**<br>3.1 Definition of Internet of Things (IoT)<br>3.2 IoT Paradigm<br>3.3 IoT Architecture<br>3.4 IoT Protocols<br>3.5 IoT Communication Models<br>3.6 IoT in Global Context<br>3.7 Different Areas of IoT<br>3.8 Trends in the Adaption of the IoT | 9 | 13 | CO2 |
| **4** | **IOT Protocols**<br>4.1 RFID + NFC<br>4.2 Wireless Networks + WSN<br>4.3 RTLS + GPS<br>4.4 Agents + Multi – Agent Systems<br>4.5 Composition Models for the Web of Things and resources on the Web,Discovery, Search, IoT Mashups and Others.<br>4.6 IoT Protocols - M2M, BacNet, ModBus, Bluetooth, Wifi, ZigBee | 9 | 12 | CO3 |
| **5** | **Wireless Sensor Networks**<br>5.1 History and Context<br>5.2 The Node, Connecting Nodes, Networking Nodes<br>5.3 Secured Communication for IoT<br>5.4 Networking and the Internet - IP Addressing<br>5.5 Protocols - MQTT, CoAP, REST Transferring data | 8 | 12 | CO3 |
| **6** | **Applications and Use Cases**<br>6.1 Concrete Applications and Use – Cases of Web Enabled Things: Energy Management and Smart Home<br>6.2 Ambient Assisted Living, Intelligent Transport.<br>6.3 Business Cases and Issues - Agriculture, Music Therapy, Smart Home, Smart Grid Network, Wearable, Healthcare. | 7 | 11 | CO4 |
| | **TOTAL** | **48** | **70** | |

## 7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 12 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiments | Approx.Hrs required | COs |
|---|---|---|---|
| **1.** | To set up the Raspberry Pi board and configure it | 02 | CO1 |
| **2.** | To install a Linux-based operating system and navigate the file system and managing processes. | 02 | CO1 |
| **3** | To execute General Terminal Commands for the Raspberry Pi, File and Directory Commands, Networking Commands, System Commands | 04 | CO3 |
| **4** | To set up a static IP Address on Raspberry Pi. | 02 | CO1 |
| **5** | To Configure networking socket (as Client and Server) interface to transfer data across the network programmatically. | 02 | CO3 |
| **6** | To setup raspberry WiFi on Rasberry Pi3 using USB dongle. | 02 | CO2 |
| **7** | To set up a touch screen LCD on Rasberry Pi and program it to display Data. | 02 | CO1 |
| **8** | To manipulate and powering an LED using GPIO pins | 02 | CO1 |
| **9** | To control LED through a Push button | 02 | CO1 |
| **10** | To interface Passive infrared sensor with Rasberry Pi. | 02 | CO1 |
| **11** | To build a simple alarm using a PIR sensor. | 02 | CO1 |
| **12** | To interface a 16x2 LCD with Rasberry Pi. | 02 | CO1 |
| **13** | To install and set up Apache and PHP. | 02 | CO3 |
| **14** | To turning and blinking LED on from a Web Page controls. | 02 | CO1 |
| **15** | To develop GUI with TKinter. | 02 | CO4 |
| | Total No. of Hours | 32 | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Practical/assignments
3. Guest/Expert lectures
4. Slides
5. Seminar
6. Case Study
7. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Raspberry Pi for Dummies | Sean McManus, Mike Cook | 3rd Edition |
| 2. | Raspberry Pi User Guide | Eben Upton, Gaeth Halfacree | 4th Edition, Wiley |
| 3. | Learning Python with raspberry PI | Alex Bradbury, Ben Everard | Wiley |
| 4 | Internet of Things : Systems and Applications | Jamil Y. Khan, Mehmet R. Yuce | Jenny Stanford |
| 5 | Internet of Things for Architect | Perry Lea | |
| 6 | Internet of Things: A Hands-On Approach | Vijay Madisetti, Arshdeep Bahga | |

## 10. WEB REFERENCES

1 https://opensource.com/resources/raspberry-pi
2 https://www.w3schools.com/nodejs/nodejs_raspberrypi.asp
3. https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT
4. https://www.techopedia.com/definition/28247/internet-of-things-iot

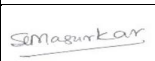
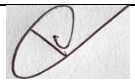
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | Raspberry Pi | 02 | 04 | 06 | 12 |
| 2. | Interfacing | - | 06 | 04 | 10 |
| 3. | Internet of Things | 02 | 04 | 07 | 13 |
| 4. | IOT Protocols | 04 | 04 | 04 | 12 |
| 5. | Wireless Sensor Networks | 03 | 03 | 06 | 12 |
| 6. | Applications and Use Cases | 02 | 03 | 06 | 11 |
| **TOTAL** | | **13** | **24** | **33** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | **Internal** | Mr. Siddhesh Masurkar |  |
| 2 | **Internal** | Mrs. Krishna Bhatt |  |
| 3 | **Internal** | Mrs. Sharyu Kadam |  |
| 4 | **External** | **Dr. Prasad S. joshi ,**<br>**Organization: D.J.Sanghvi college of Engineering** |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: V** |
| **Course: #Linux Administration** | **Group: A*** |
| **Course Code: LXA190808** | **Duration:16 Weeks** |

## 2. TEACHINGAND EXAMINATIONSCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Schemeand Maximum Marks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 3 | 2 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 50 | 50 | - | 200 |

## 3. COURSE OBJECTIVE

This course is designed to provide overview of Linux Administration. Linux Operating System is widely used in industry, it is reliable, secure and flexible. Most of the Web applications, proxy server name server are developed and deployed on Linux Operated PCs.

## 4. SKILLCOMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Administer Linux system.**

## 5. COURSE OUTCOMES (COs)at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Install Linux distribution /package and execute various Linux commands | Remember |
| CO2 | Manage user/ group, access permission and disk quota | Remember, Understand |
| CO3 | Monitor and automate tasks in Linux | Remember, Apply |
| CO4 | Configure web server, name server, network file server and DHCP server and firewall | Remember, Apply |
| CO5 | Configure Storage in Linux | Remember, Understand |

## 6. COURSE CONTENTS

| Sr.No. | TOPIC/Subtopic | Hours | Marks | Cos |
|---|---|---|---|---|
| 1 | **Linux Installation and file Hierarchical System**<br>1.1 Installation of Linux distribution on multi-boot , Select criteria for Linux distribution Boot Loader : GRUB / LILO<br>1.2 Basic Linux installation, OS installers : YaST, Anaconda,<br>1.3 Partitioning Hard Drive(s), Setting up Swap Space, Choosing Partitions to Format,<br>1.4 Linux kernel and modules , Kernel Updates<br>1.5 File Hierarchical system | 6 | 8 | CO1 |
| 2 | **Software and configuration management**<br>2.1 RPM package , RPM /DNF/ YUM commands with options<br>2.2 Configuring DNF and DNF Repositories<br>2.3 Configuration Management Tools : Introduction , Benefits and Tools | 4 | 6 | CO1 |
| 3 | **User and Group management**<br>3.1 Root Account, Ownership of files and processes, changing root user , users sudo, Creating User Accounts, Changing User Passwords ,Disabling User Accounts, Removing User Accounts<br>3.2 Group management and directories<br>3.3 Linux Password & Shadow File Formats | 6 | 8 | CO2 |
| 4 | **Monitoring and Automation**<br>4.1 System Monitoring tools Viewing system process , Viewing block devices and File systems Viewing Hardware Information , Memory usage Viewing and Managing Log Files<br>4.2 Automating the task ,automated task utilities: cron, anacron, at, and batch<br>4.3 Bash Shell scripting , file names and permission , input output ,functions, conditional looping and bash arithmetic | 8 | 12 | CO3 |
| 5 | **Network and Server administration**<br>5.1 Network installation ,Configuring NetworkManager , setting up Network Server administration, Starting and stopping services<br>5.2 Configuration name server and dhcp server and associated files<br>5.3 Configuring web server , proxy server and associated files<br>5.4 Configuring a Windows File Sharing (Samba) Server<br>5.5 Setting up firewall IPtables , IP chain | 18 | 26 | CO4 |
| 6 | **Storage Management**<br>6.1 Configuration NFS and related files<br>6.2 Redhat storage Management Stack<br>6.3 Logical Volume manager, purpose , hierarchy and commands | 6 | 10 | CO5 |
| | **Total** | **48** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing 12 experiments with approx.no of hours required and corresponding CO attained should be specified here.

| Sr. No. | Title of Experiment/Assignment/Exercise/Tutorial/Drawings | Approx.Hrs required | Cos |
|---|---|---|---|
| 1 | To Install any Linux distribution and explore the FHS in Linux | 2 | CO1 |
| 2 | To execute Linux commands | 6 | CO1 |
| 3 | To perform various operations in software management using dnf/rpm/ | 2 | CO1 |
| 4 | To create user and group and explore the files associated with user management | 2 | CO2 |
| 5 | To monitor processes , hardware , memory usages and log files | 2 | CO3 |
| 6 | To automate tasks using CRON | 2 | CO4 |
| 7 | To configure TCP/IP client and demonstrate NetworkManager | 4 | CO4 |
| 8 | To configure the DNS and DHCP server | 2 | CO4 |
| 9 | To Configure web server , proxy sever | 2 | CO4 |
| 10 | To Configure a Windows File Sharing (Samba) Server | 2 | CO4 |
| 11 | To set up firewall using IPtables | 4 | CO4 |
| 12 | To Configure nfs server | 2 | CO5 |
| | Total | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides
6. Seminar/Case Study
7. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr.No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1 | Red Hat Linux 9 Bible - 10 | Christopher Negus | Wiley & Sons |
| 2 | Linux administration hand book- | Evi Nemeth and others | Prentice Hall Of India |
| 3 | Fedora 26 System Administrator's Guide | Stephen Wadeley Jaromír Hradílek | Red Hat Inc |

## 10. WEB REFERENCES

1. http://www.linux.org
2. http://www.cups.org
3. www.apache.org
4. www.kernel.org

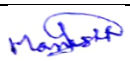
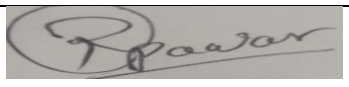
## 11. SUGGESTED SPECIFICATION TABLE

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Linux Installation and FHS | 4 | 4 | - | 8 |
| 2 | Software and configuration management | 4 | 2 | - | 6 |
| 3 | User and Group management | 4 | 4 | - | 8 |
| 4 | Monitoring and Automation | - | 4 | 8 | 12 |
| 5 | Network and Server administration | 4 | 6 | 16 | 26 |
| 6 | Storage Management | 6 | 4 | - | 10 |
| **TOTAL** | | **22** | **24** | **24** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| **1** | **Internal** | **Mr J. S. Kulkarni** |  |
| **2** | **Internal** | **Mr M. R. Solankhi** |  |
| **3** | **Internal** | **Mrs R. V. Pawar** |  |
| **4** | **External** | **Ms. Heena Sarvaiya**<br>**Manager , Morgan Stanley, Mumbai** |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester : V** |
| **Course: #Mobile Computing** | **Group : A*** |
| **Course Code: MCC190809** | **Duration :16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 3 | 2 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

To impart basic understanding of the wireless communication systems and to expose students to various aspects of mobile and ad-hoc networks.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Implement encryption and decryption algorithm**
- **Develop a mobile application**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Conceptualize communications basics and GSM Architecture | Remember, Understand |
| CO2 | Configure and test mobile network and WLAN. | Remember, Understand, Apply |
| CO3 | Apply security algorithms for encryption, decryption and authorization. | Remember, Understand, Apply |
| CO4 | Design and develop a mobile application | Remember, Understand, Apply |

## 6. COURSE CONTENTS

| Sr No. | Topic/Sub-Topics | Hours | Marks | CO |
|---|---|---|---|---|
| 1 | **BASICS OF MOBILE COMMUNICATION SYSTEM**<br>1.1. Radio communication- spectrum, signal propagation,<br>1.2. First Generation, Second and Third generation of mobiles,<br>1.3. Block diagram of mobile system, hand off, frequency reusability, transmitting, receiving, roaming, GSM and CDMA basics. | 06 | 10 | CO1 |
| 2 | **GSM MOBILE SYSTEMS**<br>2.1. G.S.M system architecture.<br>2.2. G.S.M services & features.<br>2.3. G.S.M radio subsystems,<br>2.4. G.S.M channel types.<br>2.5. Message & call processing in GSM,<br>2.6. Privacy & security in GSM. Advantages of GSM. | 10 | 14 | CO1 |
| 3 | **MODERN WIRELESS COMMUNICATION SYSTEM**<br>3.1. 3GW-CDMA (UMTS) (Universal mobile Telecommunication system.),<br>3.2. 3G CDMA 2000, 3G- TD-SCDMA (synchronous),<br>3.3. Wireless local loop & LMDS (local multipoint distribution) IMT 2000 | 08 | 14 | CO2 |
| 4 | **WIRELESS SECURITY ISSUES**<br>4.1. Traditional security issues,<br>4.2. Mobile and wireless security issues,<br>4.3. problems in Ad hoc network | 06 | 10 | CO3 |
| 5 | **APPLICATION DESIGN FOR MOBILE**<br>5.1 Introduction to Mobile Operating System (Only features) - Windows CE, Symbian OS, Linux for Mobile Devices, Android.<br>5.2 native application development<br>5.2.1 Android Overview, Android Architecture, Life Cycle of Android Activity.<br>5.2.2Android Tools Installation- JDK1.6, Eclipse Emulator, Android SDK Starter Package, Create Android Based simple Program like Hello Android on Emulator<br>5.2.3 UI components and layouts<br>5.2.4 designing user interface with view<br>5.3 hybrid application development<br>5.3.1 Flutter (Dart), IONIC (angular), react native. | 18 | 22 | CO4 |
| | **TOTAL** | **48** | **70** | |

## 7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 12 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiments/Assignment | Approx.Hrs required | COs |
|---|---|---|---|
| 1. | Identify and understand different sections and components of Mobile Phone Unit and Perform Installation of SIM Card in Mobile Phone | 2 | CO1 |
| 2. | Observe and analyse input/output signals of different sections of mobile phone | 2 | CO1 |
| 3. | Perform mobile handset testing. | 2 | CO1 |
| 4. | Read contents of SIM card. | 2 | CO1 |
| 5. | Implement any mobile network using emulator | 4 | CO2 |
| 6. | Demonstration of authorization types for WLAN using emulator | 2 | CO2 |
| 7. | Setting up and configuration of access point | 2 | CO3 |
| 8. | Use of tools for securing data. | 2 | CO3 |
| 9. | Installation of Android tools: Jdk 1.5 and above, Sdk Android starter package, Eclipse emulator. | 2 | CO4 |
| 10. | Write a program to display “Hello” on emulator. | 2 | CO4 |
| 11. | Develop a program to implement frame layout, table layout and relative layout | 2 | CO4 |
| 12. | Develop a program to implement button, image button and toggle button | 2 | CO4 |
| 13. | Develop a program to implement login window using UI controls | 2 | CO4 |
| 14. | Develop a program to implement list view, grid view, image view and scroll view | 2 | CO4 |
| 15. | Prepare a report on specifications of different handsets provided by different companies. | 2 | CO4 |
| | **TOTAL** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum 12 no. of practical/assignments etc
3 .Guest/Expert Lecture
4. Self-Learning Online Resource

## 9. LEARNING RESOURCES

| Sr. No. | Title of Book | Author | Publication |
|---|---|---|---|
| 1. | Mobile Communications Education, Second Edition, 2003 | Jochen Schiller, "Mobile | PHI/Pearson Education, |
| 2. | Mobile computing - Technology, applications and service creation, Second edition | Asoke K. Talukder | Tata McGraw Hill Education |
| 3. | Mobile Computing, Second Edition | Prashant K Patra, Sanjit K Dash | Scitech Publication |
| 4. | Hello, Android- Introducing Google's Mobile Development Platform, Third | Ed Burnette | Shroff Publishers and Distributors ( |

## 10. WEB REFERENCES

1. https://www.tutorialspoint.com/mobile_computing/index.htm
2. https://minigranth.com/mobile-computing/
3. https://www.javatpoint.com/mobile-communication-tutorial
4. https://developer.android.com/training/basics/firstapp

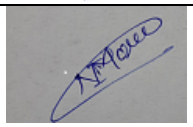
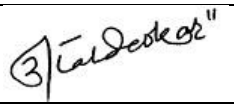
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Basics of mobile communication system | 4 | 6 | - | 10 |
| 2 | Gsm mobile systems | 4 | 4 | 6 | 14 |
| 3 | Modern wireless communication system | 2 | 6 | 6 | 14 |
| 4 | Wireless security issues | 4 | 2 | 4 | 10 |
| 5 | Application design for mobile | 4 | 6 | 12 | 22 |
| | **TOTAL** | **18** | **24** | **28** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | **Mr. Pratik Shah** |  |
| 2 | Internal | **Mr. Pankaj Rathod** |  |
| 3 | Internal | **Ms. Neha More** |  |
| 4 | External | **Mr. Ashish Taldeokar**<br>Organisation: IIT, Bombay |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: V** |
| **Course: #Database Administration** | **Group: M*** |
| **Course Code:DBA190810** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D +T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 3 | 2 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

In the present era it is very essential to develop and arrange data in such a way that it solves a complex problem efficiently. Data base administration is a subject which emphasizes on managing the data and this is performed by the database administrator (DBA). The position of DBA is vital since it deals with critical issues of design and management of data comprehensively

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Creation of Access privilege**
- **Management of database services**

**5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -**

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Describe the various components of the oracle database architecture. | Remember, Understand |
| CO2 | Execute Start and shut down processes of database server and. | Understand, Apply |
| CO3 | Manage table spaces, redo logs, Control files, data files, segments and extents | Understand, Apply |
| CO4 | Managing users and assigning privileges and Roles | Understand, Apply |

**6. COURSE CONTENTS**

| Sr No. | Topic/Sub-Topics | Hours | Marks | COs |
|---|---|---|---|---|
| 1 | **Architectural Components**<br>1.1. Overview of Primary Components, Server and Instance<br>1.2. Establishing a Connection and Creating a Session<br>1.3. Physical Structure<br>1.4. Memory Structure<br>1.5. System Global Area, Shared Pool, Library Cache, Data Dictionary Cache,<br>1.6. Buffers and pools<br>1.7. Program Global Area, User Process, Sever Process<br>1.8. Background Processes<br>1.9. Logical Structure, Processing a SQL Statement | 8 | 12 | CO1 |
| 2 | **Creating a Database And Managing an Instance**<br>2.1. Managing and Organizing a Database,<br>2.2. Creation Prerequisites<br>2.3. Planning Database Files Locations<br>2.4. Creating a Database<br>2.5. Operating System Environment<br>2.6. Initialization Parameter Files,<br>2.7. Starting UP a Database and Shutting Down the Database,<br>2.8. Shutdown Options | 8 | 12 | CO2 |

| | | | | |
|---|---|---|---|---|
| 3 | **Maintaining the Control File and Redo Log Files**<br>3.1. Use of control file, Multiplex and manage the control file<br>3.2. Using Redo Log Files, Structure of Redo Log Files,<br>3.3. How Redo Logs Work, Forcing Log Switches and Checkpoints | 8 | 12 | CO3 |
| 4 | **Managing Tablespaces and Data files**<br>4.1. Database Storage Hierarchy,<br>4.2. Creating Tablespaces, Space Management in Tablespaces, Changing the Storage Settings, Undo Tablespace, Data files, tables, undo data and indexes logical structure of table spaces within the database, Undo Segments, types of undo segments, | 10 | 12 | CO3 |
| 5 | **Managing Tables And Indexes**<br>5.1. Distinguish between an extended versus a restricted row id, structure of a row, creating regular and temporary tables, manage storage structures within a table, reorganize truncate, drop a table, purpose of undo data<br>5.2. Classification of Indexes, B-Tree Index, Bitmap Index | 6 | 10 | CO3 |
| 6 | **Managing Users, Role And Database Objects**<br>6.1 Managing users, privileges and roles.<br>6.2 Creating new database users alter and drop existing database users,<br>6.3 Monitor information about existing users,<br>6.4 Classify system and object privileges, Grant and revoke privileges,<br>6.5 Auditing, Create, modify and controlling availability of roles,<br>6.6 Remove roles, user predefined roles,<br>6.7 Display role information from the data dictionary | 8 | 12 | CO4 |
| | | 48 | 70 | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum 10 experiments with approx.no of hours required and corresponding CO attained should be specified here.

| Sr. No. | Title of Experiment/Assignment/Exercise/Tutorial/Drawings | Approx.Hrs required | Cos |
|---|---|---|---|
| 1. | Create a database and database configuration. | 2 | CO1 |
| 2. | Starting up and shutting down database with SQL Plus | 2 | CO2 |
| 3. | Starting up and shutting down and, viewing parameters list using database manager. | 2 | CO2 |
| 4. | Use GUI manager to create after and drop a table space. | 2 | CO3 |
| 5. | Use SQL Plus command prompt/GUI interface to create users and assign roles and grant permissions table space | 2 | CO4 |
| 6. | Create and undo table space with database control and monitor undo with SQL plus | 4 | CO3 |
| 7. | Create view with predefined conditions using GUI interface | 2 | CO4 |
| 8 | Create Index using GUI interface | 2 | CO3 |
| 9. | Create and configure table space for database. | 2 | CO3 |
| 10. | Create and undo table space with database control and monitor undo with GUI interface. | 4 | CO3 |
| 11. | Multiplex the redo log and translation the database to archive log mode | 4 | CO3 |
| 12. | Run a whole database backup and back up the control file | 4 | CO3 |
| | **TOTAL** | 32 | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum no of practical/assignments etc
3 . Guest/Expert Lecture
4. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr.No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1 | Database System Concepts | Korth | TMH |
| 2 | Oracle 9I Database: Fundamentals | Rama Velpuri | Oracle Press |
| 3 | Database Systems Design, Implementation and Management, | Peter Rob and Carlos Coronel | Thomson Learning-Course Technology, Seventh Edition |
| 4 | Database Principles, Programming and Performance | Patrick O'Neil and Elizabeth O'Neil | Harcourt Asia Pte. Ltd., First Edition. |

## 10. WEB REFERENCES

1) Oracle9*i* Database Administrator's Guide Release 2 (9.2)
https://docs.oracle.com/cd/B10501_01/server.920/a96521/toc.htm
2) https://www.oracletutorial.com/oracle-administration/oracle-database-architecture/

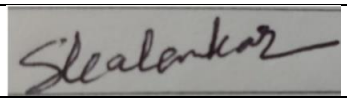
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr No | TOPIC | Distribution of Theory marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Architectural Components | 4 | 8 | - | 12 |
| 2 | Creating a Database And Managing an Instance | 4 | 4 | 4 | 12 |
| 3 | Maintaining the Control File And Redo Log Files | 4 | 4 | 4 | 12 |
| 4 | Managing Tablespaces and Data files | 4 | 4 | 4 | 12 |
| 5 | Managing Tables And Indexes | 2 | 4 | 4 | 10 |
| 6 | Managing Users, Role And Database Objects | 4 | 4 | 4 | 12 |
| | **Total** | **22** | **28** | **20** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr. Abhijit Dongaonkar |  |
| 2 | Internal | Mrs.Geetha.S |  |
| 3 | Internal | Mr Pankaj rathod |  |
| 4 | External | Mr. Samip Kalamkar<br>Database Architect |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: CSE/IT** | **Semester: V/V** |
| **Course: Web Development using PHP** | **Group: A/A*** |
| **Course Code: PHP198922** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+ D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 2 | 4 | - | - | 6 | - | - | - | - | - | 50 | 50 | - | 100 |

## 3. COURSE OBJECTIVE

PHP is an open source, easy to learn, flexible, well documented, wide community supported and most popular server-side scripting language used to build dynamic websites. It has very simple database integration with a wide range of drivers. This course intends to teach the students the concepts of web development with PHP.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Develop web application using PHP**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Use fundamentals, conditional statements, loops, arrays, strings and function in a PHP script. | Remember, Understand, Apply |
| CO2 | Implement Object Oriented Programming concepts of PHP | Remember, Understand, Apply |
| CO3 | Write dynamic web pages by handling forms with cookies, sessions and database. | Remember, Understand |
| CO4 | Build a web application using WordPress and PHP. | Remember, Understand, Apply |

## 6. COURSE CONTENTS

| Sr. No | Topics/Sub-Topics | Hours | COs |
|---|---|---|---|
| 1 | **PHP Basics**<br>**1.1 Introduction:** History of PHP ,PHP Features, role of client and server, Apache Application Server, PHP Installation with XAMPP and configuring php.ini, Helloworld PHP script<br>**1.2 Fundamentals:** Keywords, Identifiers, Variables, Constants Data Types, Type Conversion, Operators and Expressions, Strings, Comments<br>**1.3 Conditional Statements:** if, if...else, nested if, else if ladder, switch…case<br>**1.4 Loops:** for, while, do…while<br>**1.5 Functions:** Defining a user defined function, passing and returning parameters, Call by value and Call by reference | 5 | CO1 |
| 2 | **Arrays and Strings**<br>**2.1 Arrays:** Anatomy of an Array, Creating index based and Associative array, Accessing array Element Looping with Index based array, Looping with associative array using each( ) and foreach( ), Some useful Library functions<br>**2.2 Strings:** Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function | 3 | CO1 |
| 3 | **Object Oriented Programming Concepts**<br>**3.1** Declaring a class and objects, The new keyword, constructor, Destructor,<br>**3.2** Access method and properties using $this variable, Public ,private, protected properties and methods, Static properties and functions, Class constant<br>**3.3** Inheritance & code reusability, Polymorphism, Parent:: & self:: keyword, Instance of operator, Abstract method and class, Interface, final keyword<br>**3.4** Exception Handling: Error handling, Exception Handling, try-catch-throw, Filters | 6 | CO2 |
| 4 | **Handling Html Form With PHP**<br>**4.1** Form Handling: Accessing Form controls from web page using $_GET , $_POST , $_REQUEST methods, include, include_once, require, require_once<br>**4.2** Cookies: Cookies, Start a PHP Cookies, Cookie variables,<br>**4.3** modify Cookie, destroy Cookie<br>**4.4** Session: Introduction to sessions, Start a PHP session, session variables, modify session, destroy session<br>**4.5** Sending Email through PHP | 6 | CO3 |

| | | | |
|---|---|---|---|
| 5 | **Database Connectivity with MySQL**<br>**5.1** Working with MySQL Admin: Working with PHP My Admin ,Types Data Type, Creating Database & Tables, Dropping Database & Tables, Adding Fields<br>**5.2** MySQL Connection: Establishing Connection with MySQL, Create table and Insert data to the table from PHP application, Retrieve ,Update and delete data from MYSQL table and display it in PHP page<br>**5.3** PHP web Application: Developing a PHP web application, Deploying and Hosting a PHP Application on a server. | 6 | CO3 |
| 6 | **WordPress**<br>**6.1** Installing WordPress, folder structure, creating custom pages-posts-categories and tags, uploading media, template hierarchy, Choosing, Installing and activating plugins, Themes,<br>**6.2** WordPress hooks: actions and filters, Implementing custom home, category and posts page, Fetching data from Database using custom queries (Querying Posts) , The WordPress Loop | 6 | CO4 |
| | **TOTAL** | **32** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr.No. | Title/Aim | Approx. Hrs required | COs |
|---|---|---|---|
| 01 | To Install and Set up XAMPP to run a HelloWorld PHP script | 2 | CO1 |
| 02 | To develop user defined functions in PHP | 2 | CO1 |
| 03 | To manipulate arrays and strings | 2 | CO1 |
| 04 | To implement Inheritance and handle Exceptions in PHP | 6 | CO2 |
| 05 | To extract form fields from an HTML form using $_GET, $_POST, $_REQUEST methods. | 4 | CO3 |
| 06 | To create, modify and destroy cookies in PHP | 4 | CO3 |
| 07 | To manage sessions in PHP | 6 | CO3 |
| 08 | To send an Email using PHP script. | 2 | CO3 |
| 09 | To check login of a user using MySQL database connection. | 4 | CO3 |
| 10 | To update MySQL database through Signup/Registration process. | 4 | CO3 |
| 11 | To develop a web application and to deploy it on the web server. (Case Study) | 4 | CO3 |
| 12 | To install WordPress and exploring WordPress admin through creating custom pages, posts, categories, tags and themes. | 4 | CO4 |
| 13 | To work with WordPress plugins, hooks, database custom queries and loop | 8 | CO4 |
| 14 | Mini Project | 12 | CO1 to CO4 |
| | **Total** | **64** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1) Teaching Plan/Tutorials
2) Minimum no of practical/assignments/drawings etc.
3) Guest/Expert lectures
4) Demonstrations/Simulations
5) Slides
6) Group discussions
7) Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | The Joy of PHP | Alan Forbes | Plum Island Publishing LLC |
| 2. | PHP: A Beginner's Guide | Vikram Vaswani | McGraw-Hill Education |
| 3. | Learning PHP, MySQL & JavaScript with j Query, CSS & HTML | Robin Nixon | O'Reilly |
| 4. | Building Web Apps with WordPress | Brian Messe Lehner and Jason Coleman | O'Reill y |

## 10. WEB REFERENCES

1. https://www.guru99.com/php-tutorials.html
2. https://www.phptpoint.com/php-tutorial/
3. https://www.javatpoint.com/php-tutorial
4. https://www.tutorialspoint.com/php/index.htm

## 11. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr.Manish R.Solanki |  |
| 2 | Internal | Ms. Priti P. Bokariya |  |
| 3 | Internal | Mr Pratik H. Shah |  |
| 4. | External | Mr. Sandeepraj Bhandari, SRES DBOI, Pune |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: V** |
| **Course: Software Development Methodologies** | **Group: M** |
| **Course Code: SDM190812** | **Duration:16 Weeks** |

## 2 TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory Hrs L** | **Practical Hrs P** | **Drawing Hrs D** | **Tutorial Hrs T** | **Credits (L+P+D+T)** | **Theory Paper Duration and marks(ESE)** | | **SSL** | **TA** | **TH** | **TW** | **PR** | **OR** | **TOTAL** |
| | | | | | **Hours** | **Marks** | | | | | | | |
| 2 | 4 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 25 | - | 25 | 150 |

## 3. COURSE OBJECTIVE

Students will learn and apply the concepts of software requirement analysis and design. They will examine various software development methodologies and processes and employ these methods in a development team environment.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Develop a system by applying core software engineering practices**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Write steps of SDLC and identify roles of System Analyst | Remember, understand |
| CO2 | Evaluate software development methodologies. | Understand, Apply |
| CO3 | Use tools for project Management | Remember, understand, Apply |
| CO4 | Classify different Documentations in Software Development environment. | Remember, understand |

## 6. COURSE CONTENTS

| Sr No. | Topic/Sub-Topics | Hours | Marks | CO |
|---|---|---|---|---|
| 1 | **Introduction to System Development Life Cycle**<br>1.1 Introduction: Definition of a System, Types of Systems<br>1.2 Types of information: operational, tactical, strategic<br>1.3 Need of information systems<br>1.4 Requirements of information at different levels of management<br>Phases of SDLC | 5 | 14 | CO1 |
| 2 | **Role of systems analyst in SDLC**<br>2.1 Attributes of a systems analyst<br>2.2 Roles of System Analyst<br>2.3 Task performed by System Analyst | 4 | 8 | CO1 |
| 3 | **Software Development Methodologies**<br>3.1 Software Development Methodologies,<br>3.2 Strengths and weaknesses of waterfall model<br>3.3 Agile software development methods<br>3.4 Agile manifesto and principles, agile framework, scrum<br>3.5 Differentiate between the waterfall and agile software development methods | 5 | 10 | CO2 |
| 4 | **Software Project Management**<br>4.1 Significance of software project management<br>4.2 Different project management tools<br>4.3 Work break down structure and advantages | 6 | 14 | CO3 |
| 5. | **Preliminary Survey, Feasibility study and SRS**<br>5.1 Preliminary Survey, Feasibility study and SRS contents<br>5.2 Preliminary Survey Report<br>5.3 Feasibility study Report<br>5.4 The Decision-making Body<br>5.5 Contents of SRS with a case study | 6 | 12 | CO1 |
| 6 | **System Design and Documentation**<br>6.1 System Design Specifications<br>6.2 Detailed design Specifications<br>6.3 Introduction to Documentation<br>6.4 Design documentation<br>6.5 User Documentation for Training, operations Documentation<br>6.6 User Reference Documentation | 6 | 12 | CO4 |
| | **Total** | **32** | **70** | |

## 7. LISTOF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Assignment | Approx.Hrs required | COs |
|---|---|---|---|
| 1 | Construct DFD for online food ordering system | 4 | CO1 |
| 2 | Construct ER Diagram for Employee Management system | 4 | CO1 |
| 3 | Construct Structure chart for an Electronic Mail Server | 4 | CO1 |
| 4 | Develop SRS using online documentation tool | 4 | CO4 |
| 5 | Develop Gantt chart to track the progress of the project. | 6 | CO3 |
| 6 | Develop Pert chart for designing a web site | 6 | CO3 |
| 7 | Design and Develop Student Enrollment System through traditional model | 8 | CO2 |
| 8 | Design Payroll System through agile model | 6 | CO2 |
| 9 | Develop Payroll System through agile model | 6 | CO3 |
| 10 | Design and develop a Product Management system using SCRUM tool | 6 | CO2 |
| 11 | Design and develop a Product Management system using JIRA tool | 6 | CO1,2,3 |
| 12 | Create operation Documentation using documentation tool | 4 | CO4 |
| | **TOTAL** | **64** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum no of practical/assignments etc
3 .Guest/Expert Lecture
4. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1 | The Analysis, Design and Implementation of Information **systems** | Henry C. Lucas. Jr. | Mogran – Hill Book Company |
| 2 | Systems analysis & Design | Elias m Avad | Galgotia Publications Pvt. Ltd |
| 3 | Introducing Systems Analysis & Design, Vol. 1 & 2 prepared by NCC (National Centre for Computing) | U.K.G.L. Simons | Galgotia Publications Pvt. Ltd |
| 4. | Software Engineering : A practitioners approach | Pressman Roger | Tata Mc Graw Hill |
| 5. | An Integrated Approach to software Engineering | Jalota Pankaj | Narosa Publication |

## 10. WEB REFERENCES

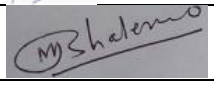
1 http://www.rspa.com
2 www.nptel.iitk.ac.in
3 www.ddegjust.ac.in/studymaterial/pgdca/ms-04.pdf
4 www.cba.edu
5. http://ww.idc-online.com/resources/technical-references/information-technology-technical-references.html
6. http:// www.minigranth.com/software-engineering-tutorial/case-tools/
7. https://www.atlassian.com/software/jira/guides/

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | Introduction to System Development Life Cycle | 4 | 6 | 4 | 14 |
| 2. | Role of systems analyst in SDLC | 2 | 4 | 2 | 8 |
| 3. | Software Development Methodologies | 2 | 4 | 4 | 10 |
| 4. | Software Project Management | 2 | 6 | 6 | 14 |
| 5. | Preliminary Survey, Feasibility study and SRS | 4 | 4 | 4 | 12 |
| 6. | System Design and Documentation | 4 | 4 | 4 | 12 |
| **TOTAL** | | **18** | **28** | **24** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**
NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | **Internal** | **Mrs. Radhika Patwardhan** |  |
| 2 | **Internal** | **Mr. M.R. Solanki** |  |
| 3 | **Internal** | **Mrs. Geetha S** |  |
| 4 | **External** | **Mr. Bhalerao Moreshwar H. (Government Polytechnic,Vikramgad)** |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: CSE** | **Semester: V** |
| **Course: Technical Writing and Tools** | **Group: A** |
| **Course Code: TWT190813** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D +T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| - | 2 | - | - | 2 | - | - | - | - | - | 50 | - | - | 50 |

## 3. COURSE OBJECTIVE

In the era of digital explosion conveying knowledge to diverse audiences is very much essential. Online technical content writing and presentation skills have become an integral part of technical communication. This course focuses on software tools used for technical writing such as reports, presentations and online content creation.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Develop soft skills for technical professionals using software tools.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Create technical documents | Remember, apply |
| CO2 | Create interactive presentations | Apply |
| CO3 | Use open source software for detecting plagiarism | Remember, apply |
| CO4 | Create digital content | Remember, apply |

## 6 LISTOF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Assignment | Approx.Hrs required | COs |
|---|---|---|---|
| 1 | Assignment on basic concept of technical communication | 2 | CO2 |
| 2 | Survey of a technical document and comparison of technical and nontechnical attributes | 2 | CO1 |
| 3 | Assignment on technical writing | 2 | CO1 |
| 4 | Installation of LATEX software | 2 | CO1 |
| 5 | Create a Latex Document Structure | 2 | CO1 |
| 6 | Typesetting Text in a LATEX document | 4 | CO1 |
| 7 | Insertion of tables and figures in a LATEX document | 4 | CO1 |
| 8 | Create Bibliography and Citations in a LATEX document | 4 | CO1 |
| 9 | Create an interactive presentation using LATEX | 4 | CO2 |
| 10 | Checking of plagiarism using online software tools | 4 | CO3 |
| 11 | Use of technical illustrator software | 2 | CO4 |
| | **TOTAL** | **32** | |

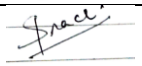
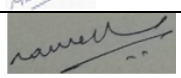
## 7. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum no of practical/assignments etc.
3 .Guest/Expert Lecture
4. Self-Learning Online Resources

## 8. WEB REFERENCES

1. https://techwhirl.com
2. https://www.questionpro.com
3. https://www.latex-project.org/
4. https://www.grammarly.com/plagiarism-checker
5. https://exelearning.org/

## 9. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr. Janardan Kulkarni |  |
| 2 | Internal | Mrs. Prachi Arora |  |
| 3 | Internal | Mrs. Geetha S. |  |
| 4 | External | Dr. Ramesh Vulavala, Retd. Professor, Dept of chemical Engg, D.J.S. College of Engineering |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: CSE/IT** | **Semester: V/V** |
| **Course: IT Innovative Project & Practices** | **Group: A** |
| **Course Code: IPP198923** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| - | 2 | - | - | 2 | - | - | - | - | - | 50 | - | - | 50 |

## 3. COURSE OBJECTIVE

Today the I.T field is growing rapidly. The use of latest Mobile devices and websites /apps has created curiosity and interest in students to explore emerging domain / technology. This course allow students to identify reliable web resources and domain, cleansing the data and present the report for the project implementation.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Identify the domain and technologies useful for project implementation.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Select the latest domain / technologies and understand the topic | Remember |
| CO2 | Write report on the topic | Remember, Understand |
| CO3 | Prepare the presentation and deliver the seminar | Remember, Apply |
| CO4 | Prepare for the project implementation | Remember, Apply |

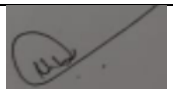
## 6. Implementation

The coordinator faculty member shall display the list of emerging/innovative topics from IT/CSE field to be selected by the students. The students form a group of Maximum 2 students and submit the topic. The Guide will be assigned by the program coordinator. The student will prepare the detailed report covering emerging trends and technologies, applications etc. and present to the guide.

## 7. Suggested Guidelines for assessment of Term work

The term work will be assessed on the basis of report and presentation. Both the assessments will be done by the guide. Report and presentation will be awarded 25 marks each(Total 50 Marks).

## 8. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | NAME | SIGNATURE |
|---|---|---|
| 1 | Mrs N. G. Kadukar |  |
| 2 | Mr J. S. Kulkarni |  |
| 3 | Mr Abhijit Dongaonkar |  |
| 4 | Dr M. M. Chandane<br>HOD ,Department of Computer Engineering & IT and<br>Local Coordinator: - Global Initiative of Academic Networks (GIAN), MHRD, India. |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: VI** |
| **Course: #Software Testing and Tools** | **Group: A*** |
| **Course Code: STT190814** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 03 | 02 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 50 | 50 | - | 200 |

## 3. COURSE OBJECTIVE

This course intends to teach the students the basic fundamentals of Software Testing. The students will learn to find problems in any computer program, plan an effective test approach, clearly report the finding and identify when your software is ready for release.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Software Testing**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Conceptualize software quality assurance and test life cycle. | Remember, Understand |
| CO2 | Prepare and implement test plan. | Understand, Apply |
| CO3 | Select testing methods. | Understand, Apply |
| CO4 | Use of automation testing tools. | Apply |

## 6. COURSE CONTENTS

| Sr.No. | Topic/Sub-Topics | Hours | Marks | Cos |
|---|---|---|---|---|
| **1** | **Software Testing Fundamentals**<br>1.1 Fundamentals of Test Process<br>1.2 Psychology of Testing<br>1.3 General Principles of Testing<br>1.4 Test Metrics<br>1.5 Testing and Debugging<br>1.6 Software Quality- QA Process, The "V" Concept of Testing | 6 | 10 | CO1 |
| **2** | **Software Testing Life Cycle**<br>2.1 Understand Requirement<br>2.2 Create Test Cases<br>2.3 Manual Testing<br>2.4 Automation Testing<br>2.5 Test Report<br>2.6 Software requirements specification - (SRS)<br>2.6.1 What is SRS<br>2.6.2 Finding gap in SRS<br>2.6.3 How to Write a Test Plan from SRS Document<br>2.6.4. Testing method for software requirements specification (SRS) | 8 | 10 | CO1 |
| **3** | **Testing Techniques**<br>3.1 Manual Testing -Writing test scenarios, Test planning, Test case design, Test data identification, Reviewing and Execution of Test cases/scri2pts<br>3.2 Automation Testing - Basics of automation testing – why, when and how to perform automation testing, Factors for choosing a particular tool, An overview for the major functional testing tools, Overview of Test management and bug tracking tools, Selenium, QTP<br>3.3 Functional Testing - Unit Testing, Integration Testing, System Testing, Regression Testing, Acceptance Testing<br>3.4 Non-Functional Testing- Performance Testing, Load Testing, Usability Testing ,Security Testing, Portability Testing<br>3.5 Web site Testing - Web Page Fundamentals<br>3.6 Black-Box Testing - Text, hyperlinks, graphics, forms, object and other simple miscellaneous Functionality<br>3.7 Gray Box Testing<br>3.8 White Box Testing<br>3.9 Configuration and compatibility testing<br>3.10 Usability Testing | 10 | 15 | CO2 |

| | | | | |
|---|---|---|---|---|
| **4** | **Test Management**<br>4.1 Test Organization<br>4.2 Test teams, tasks and Qualifications<br>4.3 Test Planning and scheduling<br>4.4 Quality Assurance Plan, Test Plan, Prioritization Plan, Test Exit Criteria<br>4.5 Test Budgeting<br>4.6 Test Plan - Build the Test Plan , Write the Test Plan<br>4.7 Preventive versus Reactive Approach, Analytical versus heuristic Approach<br>4.8 Test Activity Management, Incident Management, Configuration Management<br>4.9 Test Progress Monitoring and Control<br>4.10 Specialized Testing: Performance, Load, Stress & Security Testing | 10 | 15 | CO3 |
| **5** | **Testing Tools**<br>5.1 Web Application testing tools: Introduction ; tools: **Apache JMeter, NeoLoad, LoadRunner, LoadUI, Loadster.**<br>5.2 Website Security testing tools: Introduction; Tools: **Selenium, Test Cafe v14.1.3, CasperJS v1.1-beta3, Screenster**<br>5.3 Cross Browser testing tools: Introduction, Tools: Introduction; Tools: Lambda Test, Mabl, Ghost lab, Browsershots,etc<br>5.4 Mobile Application testing tools: Introduction; Tools: kobiton, TestProject, experitest | 6 | 10 | CO4 |
| **6** | **Object oriented Testing**<br>6.1 Introduction<br>6.2 OOT methods- state based, fault based, scenario based<br>6.3 Object Oriented Testing : Levels/Techniques<br>Class Testing<br>Inter-Class Testing<br>System Testing | 8 | 10 | CO3 |
| | **Total** | **48** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 08 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiment/Assignment | Approx. Hrs required | COs |
|---|---|---|---|
| 1. | Introduction to Software Testing Tools. | 2 | CO1 |
| 2. | Write Test Cases for any Application (e.g. Railway Reservation Form | 4 | CO3 |
| 3. | Design test cases for e-commerce website. (Login form) | 4 | CO4 |
| 4. | Prepare a test cases and test plan for notepad | 4 | CO2 |
| 5. | Automate Microsoft Word Application -Open Microsoft Word -Type text (automatically) -Generate random file name. - Save file and close Microsoft Word. | 4 | CO4 |
| 6. | Automate any installation procedure (e.g. WinZip) | 4 | CO4 |
| 7. | Prepare defect report after executing test cases for any login form. | 4 | CO2 |
| 8. | Assignment for Web Testing (use any Web testing tools e.g. Selenium) | 2 | CO4 |
| 9. | Assignment for any Bug Tracking Tool (e.g. Bugzilla,Bugit) | 2 | CO4 |
| 10. | Assignment for any test management tool (e.g. Test Director) | 2 | CO4 |
| | **Total** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments etc.
3. Guest/Expert lectures
4. Case Study
5. Self-Learning Online Resources

## 9. LEARNING RESOURSES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| **1.** | Software Testing: Principles and Practice | Srinivasan Desikan, Gopalaswamy Rames | Pearson India |
| 2. | Fundamentals of Software Testing | Bernard Homès | Wiley Publications |
| 3. | Software Testing: A practical Approach | Sandeep Desai, Abhishek Srivastava | PHI Learning Private Limited |

| | | | |
|---|---|---|---|
| 4. | Effective Methods for Software Testing | William E. Perry | SINGAPORE (WILEY) |

## 10. WEB REFERENCES

1. https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm
2. https://www.cigniti.com/blog/list-of-top-100-software-testing-tools/
3. https://www.minigranth.com/software-testing/object-oriented-testing/
4. https://www.toolsqa.com/

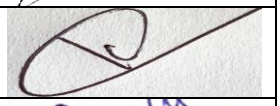
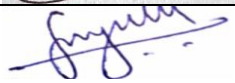
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Software Testing Fundamentals | 5 | 5 | - | 10 |
| 2 | Software testing life cycle (STLC) | 5 | 5 | - | 10 |
| 3 | Testing Techniques | 4 | 3 | 8 | 15 |
| 4 | Test Management | - | 5 | 10 | 15 |
| 5 | Testing Tools | - | 4 | 6 | 10 |
| 6 | Object oriented Testing | - | 5 | 5 | 10 |
| TOTAL | | 14 | 27 | 29 | 70 |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table

### 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | **Mrs Abhilasha More** |  |
| 2 | Internal | **Ms Sharyu Kadam** |  |
| 3 | Internal | **Mrs Krishna Bhatt** |  |
| 4 | External | **Ms. Sayali Kadam**<br>Vidyalankar Polytechnic, Wadala |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Program: Computer Engineering** | **Semester: VI** |
| **Course: #Advanced Network Administration** | **Group: A*** |
| **Course Code: ANA190815** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory Hrs L** | **Practical Hrs P** | **Drawing Hrs D** | **Tutorial Hrs T** | **Credits (L+P+D +T)** | **Theory Paper Duration and marks(ESE)** | | **SSL** | **TA** | **TH** | **TW** | **PR** | **OR** | **TOTAL** |
| | | | | | **Hours** | **Marks** | | | | | | | |
| 4 | 2 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

Managing and protecting a computer network in today's situation has become a critical task for a network administrator. This course covers very vital issues related to network like Virtual private network, network management tools, Back up, Network troubleshooting tools, Wireless network, Network security etc. It emphasizes on practical approach to administration and monitoring the network using different tools.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Network Administration and Monitoring.**
- **Network troubleshooting.**
- **Disaster recovery strategies.**
- **Network security.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Restore, Backup and recovery of file system | Understand, Apply |
| CO2 | Classify different wireless network and remote network access services. | Understand, Apply |
| CO3 | Implement Routing and Network management Protocols. | Understand, Apply |
| CO4 | Use Network Troubleshooting tools, security measures with guidelines of cyber laws. | Apply |

## 6. COURSE CONTENTS

| Sr.No. | Topic/Sub-Topics | Hours | Marks | CO's |
|---|---|---|---|---|
| **1** | **Back up**<br>1.1 Administering Disaster Recovery<br>1.2 Need, Backup Policy and Types of Backup<br>1.3 Scheduling Backups, Backup tools<br>1.4 Automated System Recovery ( ASR) and restore data<br>1.5 Basic and. Dynamic Disks- RAID<br>1.6 Disk Management Tools and Tasks | 8 | 10 | CO1 |
| **2** | **Mobile and wireless network**<br>2.1 Features of wireless network, Wireless Network topology<br>2.2 Energy and power constraints, scalability, applications<br>2.3 Wireless technologies<br>2.3.1 Wireless PAN (Bluetooth),<br>2.3.2Wireless LAN (Wi-Fi),<br>2.3.3Wireless MAN (WiMAX) | 10 | 10 | CO2 |
| **3** | **Remote Network Access**<br>3.1 Need of remote access, remote access technology,<br>3.2 VPN- Types<br>3.3 VPN Protocols<br>3.3.1 IPsec-modes and security protocols<br>3.3.2 L2TP, PPTP,SSL | 10 | 10 | CO2 |
| **4** | **Routing**<br>4.1 Static, Dynamic Routing<br>4.2 Delivery (direct Vs Indirect )<br>4.3 Forwarding – techniques, process<br>4,4 Routing protocols : RIP,OSPF,BGP<br>4.5 Unicast, multicast, broadcast routing | 10 | 12 | CO3 |
| **5** | **Network Management Models**<br>5.1 Organizational model, information model, Communication model, Functional model<br>5.2 Network Management System<br>5.3 SNMP( v1 & v2) | 8 | 8 | CO3 |

| | | | | |
|---|---|---|---|---|
| **6** | **Troubleshooting and security of Network**<br><br>6.1 Understanding the Problem – Troubleshooting, Segmenting the Problem, Isolating the Problem, Setting Priorities.<br>6.2 Troubleshooting Tools – Hardware, Software and Monitoring.<br>6.3 Internal Security<br>6.3.1 Account Security, File and Directory permissions, Practices and user education.<br>6.4 External security<br>6.4.1 External Threats – Front Door threats, Back Door threats, Denial of services<br>6.4.2 Network security devices – Firewall- Policies and configuration., Intrusion Detection Vulnerability , Assessment, Misuse Detection Anomaly Detection Network based IDS.Host based IDS, Honeypots.<br>6.5 Cryptography-Introduction -Plain text, Cipher text,Encryption , Decryption, Substitution nad transposition Techniques. | 10 | 12 | CO4 |
| **7** | **Cyber laws and Forensics**<br>7.1 Cyber Crime – Networking Ethics, Introduction to Ethical Hacking, Digital Forgery, Cyber Stalking.<br>**7.2** Cyber laws -Introduction ,need, Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards, National Cyber Security Policy<br>**7.3** Cyber Forensics- Introduction, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime , Image Capturing and its importance, Web Attack Investigations, Denial of Service Investigations. | 8 | 8 | CO4 |
| | **Total** | **64** | **70** | |

**7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS**

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| **Sr. No.** | **Title of Experiment/Assignment** | **Approx.Hrs required** | **COs** |
|---|---|---|---|
| 1. | Installing Backup tools and Configure it. | 2 | CO1 |
| 2. | Demonstrate Disk Management & Implementing Disk Quotas | 2 | CO1 |
| 3. | Configuring Hardware Profile | 2 | CO4 |
| 4. | Simulation of Network- Implementing Network | 2 | CO1 |
| 5. | Demonstrate Event Viewer, Task Manager, System Monitor & Performance Log. | 2 | CO4 |

| | | | |
|---|---|---|---|
| 6. | Demonstrate Wireless PAN (Bluetooth) and WiMAX | 2 | CO2 |
| 7. | Demonstrate Wireless LAN (Wi-Fi) | 2 | CO2 |
| 8. | Apply security to files, folders or application by using the access control, permissions etc. | 4 | CO4 |
| 9. | Implementing RIP in cisco packet Tracer | 4 | CO3 |
| 10. | Implementing OSPF in cisco packet Tracer | 4 | CO3 |
| 11. | Implementing RIP/OSPF on CLI | 4 | CO3 |
| 12. | Case Study on Cyber law/Forensic | 2 | CO4 |
| | **Total** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments etc.
3. Guest/Expert lectures
4. Case Study
5. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Data Communication and Networking. | Behrouz A Fourozan | Tata McGraw-Hill |
| 2. | Cryptography and Network Security | William Stalling, | Pearson |
| 3. | Cyber Laws and IT protection | Harish Chander | PHI Publications |
| 4. | Data Communication and Computer Networks | Rajneesh Aggarwal | S Chand |
| 5. | Computer Network Fourth edition | Tanenbaum Andrew S, | PHI learning |

## 10. WEB REFERENCES

1. https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking/networking-basics.html
2. https://www.dnsstuff.com/network-troubleshooting-steps
3. https://www.sciencedirect.com/topics/computer-science/network-management-system
4. https://www.tutorialsweb.com/networking/wireless-networks/computer-networks-implementation-considerations.htm
5. http://www.nmap.org.

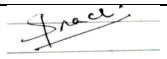
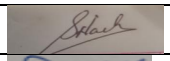
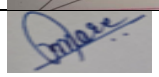
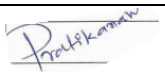
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Back up | - | 4 | 6 | 10 |
| 2 | Mobile and Wireless Network | 2 | 6 | 2 | 10 |
| 3 | Remote Network Access | - | 5 | 5 | 10 |
| 4 | Routing | - | 6 | 6 | 12 |
| 5 | Network Management Models | - | 4 | 4 | 8 |
| 6 | Troubleshooting and security of Network | 2 | 4 | 6 | 12 |
| 7 | Cyber Laws and Forensics | 2 | 2 | 4 | 8 |
| TOTAL | | 6 | 31 | 33 | 70 |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | **Mrs. Prachi Arora** |  |
| 2 | Internal | **Mrs. Swapna Naik** |  |
| 3 | Internal | **Mrs. Abhilasha More** |  |
| 4 | External | **Dr. Pratik Kanani**<br>DJSCOE, Mumbai |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester:VI** |
| **Course: #Project** | **Group:A*** |
| **Course Code: PRO190816** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| - | 06 | - | - | 06 | - | - | - | - | - | 50 | | 50 | 100 |

## 3. COURSE OBJECTIVE

To develop a project to give an in depth understanding of all the concepts learnt at the lower semesters. To expose students to the various stages of making a project and the capability to work in a team

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Design and develop Hardware and/or Software system**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Identify problem definitions that can be addressed by applying the acquired knowledge & skill | Understand, Apply |
| CO2 | Plan the activities with timeline chart, work in groups/team and co-ordinate the work | Understand, Apply |
| CO3 | Select design methodologies & its implementation. | Understand, Apply |
| CO4 | Write the Project Report | Understand, Apply |

## 6. Each student/group of students will submit project synopsis and detailed project report with following details

**A) Project synopsis**

Abstract

Chapter 1. Problem statement

Chapter 2. System requirement specification

Chapter 3. Proposed system/solution
Chapter 4. Estimation and planning
Chapter 5. Future scope
Chapter 6. Conclusion
Bibliography and References

**B) Project Report**

The report shall be presented in following sequence:
Title sheet
Project Certificate
Project approval sheet
Acknowledgement
Abstract
Table of contents
List of tables (if desired)
List of Figures (if desired)
Chapter 1: Introduction (domain)
Chapter 2: Problem statement and proposed system (input /output statement, description, feasibility)
Chapter 3: Literature Review
Chapter 4: Design and Implementation ( System Architecture, Requirement: hardware software any other , flow diagrams , activity diagrams, DFD , ER diagram if desired, User Interface )
Chapter 5: Result & Conclusions (Reports, future scope and limitation)
Bibliography and References

## 7. Identification of projects and allocation methodology to faculty members and relevance of the projects and their contribution towards attainments of PO's

i. In the preceding semester, the Head of Department notifies and briefs the students about project development, industry sponsored project, modification or value addition in previous project, project group formation, selection criteria and project scope. Students are asked to carry out the literature survey, review the latest technologies, look for emerging trends, list software platform available, refer previous project reports to prepare project proposals considering available time, cost, feasibility, environment, safety, standards, lab facility, ethics etc.
ii. At the beginning of the semester the project groups present their ideas in front of HOD and faculty members.
iii. Based on above criteria and relevance to contribution towards attainment of POs, the project topics are finalized group-wise and groups are allocated to faculties based on their area of expertise.

## 8. Process for monitoring and evaluation, process to assess individual and team performance

i. The students are asked to prepare and submit synopsis and detail implementation plan of 16 weeks to their respective guides.
ii. Interaction between students and project guide to discuss implementation methodology.
iii. The project guide monitors the progress of implementation on continuous basis.
iv. Final evaluation of project by examiners through presentation, demonstration and viva-voce.

## 9. Methodology to assess individual/collective contribution/understanding:

### a. Internal evaluation (50 marks) by project guide.

**Phase-I**: 30% evaluation

At the end of first month, all the groups are asked to give presentation on progress made till date in front of committee consisting of HOD and project guides. The projects are evaluated based on project idea, knowledge, amount of work done, adherence to plan at every stage, motivation, interest shown, demonstration of skills (hardware, software, presentation), self-motivation, sincerity, punctuality, ethics etc. by the project guide and project evaluation committee.

**Phase-II**: 30% evaluation
The above activity is carried out at the end of second month. The students are guided for preparation of project reports.

**Phase III**: 40% evaluation

The above activity is carried out at the end of the semester along with demo and submission of project report**.**

The internal evaluation will be done on the basis of following criteria and weightage:

| | **Phase 1 (2-4 Week)** | **Phase 2 (6- 8 Weeks)** | **Phase 3 (14-16 Week)** | **Total** |
|---|---|---|---|---|
| Marks | 15 | 15 | 20 | 50 |
| Evaluation Criteria | 1. Project idea<br>2. Presentation | 1. Progress made in the project<br>2. Presentation | 1. Progress made in implementation<br>2 Presentation | |

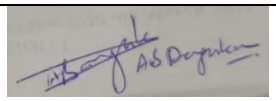
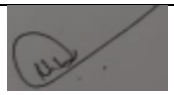
The student/ group will maintain the weekly report to monitor the progress of the project.

### b. External evaluation (50 marks) by expert from industry/institute (external examiner)

The students demonstrate the prototype/ working projects and give power point presentation in front of External examiner. Internal and external examiners evaluate the student on the following aspects:

a. Understanding and completeness of the Project
b. Approach to the solution of problem
c. Planning and implementation
d. Design and testing procedure
e. Project Report
f. Students' involvement in the Project

## 10. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr A .B. Dongaonkar |  |
| 2 | Internal | Mr. J S Kulkarni |  |
| 3 | Internal | Mrs. N. G. Kadukar |  |
| 4 | External | Dr Bhavesh Patel<br>Principal , |  |
| | | Organization: Shah & Anchor Kuthchi Engineering College , Mumbai | |

## 1. COURSEDETAILS

| | |
|---|---|
| **Programme: CSE/ IT** | **Semester: VI/VI** |
| **Course: #Cloud Application Development** | **Group: A*/A*** |
| **Course Code:CLD198924** | **Duration:16 Weeks** |

## 2. TEACHINGAND EXAMINATIONSCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TheoryHrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 4 | 2 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

Cloud computing is perhaps the most flamboyant technological innovation of the 21st century. Cloud computing offers pooled computing resources to entrepreneurs, organizations and society at large. It is a proven platform to resolve issues in emerging technologies such as cyber security.

## 4. SKILLCOMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Write Cloud Application and Deploy cloud environment**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Implement Virtualization | Remember, Apply |
| CO2 | Create CLI for cloud and write application for various cloud services | Remember, Apply |
| CO3 | Implement containerization | Remember, Apply |
| CO4 | Describe recent trends in cloud computing | Remember, Understand |

## 6. COURSE CONTENTS

| Sr.No. | TOPIC/Sub-Topic | Hours | Marks | COs |
|---|---|---|---|---|
| 1 | **Virtualization**<br>1.1 Introduction, Characteristics of virtualized environment Hypervisor types 1 and 2<br>1.2 Types : Vmware, Oracle Virtual Box ,Microsoft Hyper-V,<br>1.3 KVM , Xen , Advantages VM Migration VM consolidation VM Management disadvantages of virtualization | 10 | 10 | CO1 |
| 2 | **Introduction to Cloud computing**<br>2.1 On premise – virtual – Cloud<br>2.2 NIST cloud Computing definition , Model , Essential characteristics of cloud computing,<br>2.3 Cloud Deployment Model: Public cloud, Private cloud, Community cloud, Hybrid cloud ,Open Source, closed clouds<br>2.4 Cloud Service Models: Iaas, Paas, Saas Cloud Economics and Benefits Architecture of Cloud computing Cloud Computing Infrastructure | 12 | 14 | CO2 |
| 3 | **Cloud Platform**<br>3.1 Key Amazon offerings: EC2, SimpleDB, S3, Simple Queue, Simple Relational Database, Elastic MapReduce, Virtual Amazon Cloud. S3 Command Line tool Bundling Amazon instances: create and manipulate Amazon instances with command line tools, transfer application software to instances and bundle them into new AMI-s that could be offered to the public.<br>3.2 Amazon's AWS Identity Management and Security in the Cloud Amazon's Virtual Private Cloud (VPC) and Directory Service Amazon's RESTFul WebServices<br>3.3 AWS APIs interaction with AWS service. establish connectivity between own modules in the Cloud use RESTFul Web Services Elastic load balancing (ELB) | 24 | 26 | CO2 |
| 4 | **Containerization**<br>4.1 Container platform, Container Vs Virtualization, function as a service, event based processing, sever less Docker container | 6 | 8 | CO3 |
| 5 | **Recent trends and development**<br>5.1 Cloud trends in supporting Ubiquitous Computing , Enabling Technologies with the Internet of Things(RFID, Sensor Networks and ZigBee Technologies, GPS) , Innovative Applications with the Internet of Things(Ex: Smart Buildings and SmartPower Grid)<br>5.2 Future of Cloud-Based smart Devices, Faster time to Market for Software Applications, Home Based Cloud Computing, Energy Aware Cloud | 12 | 12 | CO4 |
| | **Total** | **64** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 Experiments/Assignment with approx.no of hours required and corresponding CO attained should be specified here.

| Sr. No. | Title of Experiment/Assignment/Exercise/Tutorial/Drawings | Approx.Hrs required | COs |
|---|---|---|---|
| 1 | To implement virtual machine | 2 | CO1 |
| 2 | To install and configure AWS CLI | 2 | CO2 |
| 3 | To implement cloud networking and use AWS VPC | 4 | CO2 |
| 4 | Host a word press application using EC2 | 4 | CO2 |
| 5 | Host a word press high available application using EC2 and ELB | 4 | CO2 |
| 6 | Host a static website using S3with Cloud Front CDN | 4 | CO2 |
| 7 | Use AWS Lambda to create A server less function | 4 | CO3 |
| 8 | Build a near real Time Event log System using Dockers Amazon SNS and SQS | 4 | CO3 |
| 9 | Write an application to log the data using Open Cloud platform | 4 | CO4 |
| 10 | Assignment on Public Clouds and Business model | - | CO2 |
| 11 | Assignment on Cloud services and component offered by Google | - | CO2 |
| 12 | Assignment on Cloud services and component offered by Azure | - | CO2 |
| | **Total** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides
6. Self-Learning Online Resources

## 9. LEARNING RESOURSES

| Sr.No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Virtualization for Dummies, Wiley Publication | Bernard Golden | Wiley publication |
| 2. | Cloud Computing Principles and Paradigms | Rajkumar Buyya | Wiley publication |
| 3. | Programming Amazon EC2 | Flavia Paganelli and Jurg van Vliet | O'reilly Publication |
| 4. | Cloud computing Black Book | Barrie Sosinsky | Dreamtech Publication |

## 10. WEB REFERENCES

1. www.aws.amazon.com
2. http://www.nist.gov
3. https://www.ibm.com/cloud
4. http://www.Tutorialpoint.com

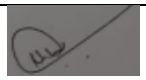
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Virtualization | 4 | 2 | 4 | 10 |
| 2 | Introduction to Clod computing | 4 | 4 | 6 | 14 |
| 3 | Cloud Platform | 4 | 8 | 14 | 26 |
| 4 | Containerization | 2 | 2 | 4 | 8 |
| 5 | Recent trends and development | 6 | 6 | - | 12 |
| **TOTAL** | | **20** | **22** | **28** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mrs N. G. Kadukar |  |
| 2 | Internal | Mr J. S. Kulkarni |  |
| 3 | Internal | Mr. Pratik H. Shah |  |
| 4 | External | Mr. Tejas J Shah<br>Practice Manager – Talent Transformation ,<br>Wipro Limited |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: VI** |
| **Course: #Data Warehousing & Mining** | **Group: A*** |
| **Course Code: DWM198925** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 2 | 4 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

This course will introduce the concepts of data ware house and data mining. The student will be able to identify the scope and essentiality of Data Warehousing and Mining. It covers Data Warehouse fundamentals, Data Mining Principles.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- Perform Data warehouse administration which includes use of ETL tools to create refined data.
- Analyse data using mining tools.

## 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to:-

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Summarize the features of Data ware house and classify metadata component. | Remember, Understand. |
| CO2 | Install and use various ETL tools for DWH operations | Remember, Understand. Apply |
| CO3 | Design OLAP cube using the concepts of Dimensional Modelling. | Remember, Understand. Apply |
| CO4 | Prepare a report on Data mining and Web mining | Remember, Understand. |

## 6. COURSE CONTENTS

| Sr No. | Topic/Sub-Topics | Hours | Marks | CO |
|---|---|---|---|---|
| 1 | **Introduction to Data Warehousing**<br>1.1 Need of Data warehousing.<br>1.1.1 Features of Data Warehousing<br>1.1.2 Data warehouse and Data Marts<br>1.1.3 Data warehouse design approaches.<br>1.2 Architecture Components of data warehouse.<br>1.2.1 Source data component<br>1.2.2 Data staging Component<br>1.2.3 Data storage Component<br>1.2.4 Information Delivery Component<br>1.2.5 Metadata Component<br>1.3 Benefits of data warehousing. | 4 | 08 | CO1 |
| 2 | **Data Extraction, Transformation, and Loading**<br>2.1 ETL Overview<br>2.2 Data Extraction<br>2.2.1 Source Identification<br>2.2.2 Data Extraction techniques<br>2.2.3 Evaluation of the Techniques<br>2.3 Data Transformation<br>2.3.1 Data Transformation: Basic tasks<br>2.3.2 Major Transformation Types<br>2.3.3 Data Integration and Consolidation<br>2.3.4 Transformation for Dimension Attributes<br>2.4 Data Loading<br>2.4.1 Applying Data: Techniques and Processes<br>2.4.2 Data Refresh Versus Update | 5 | 12 | CO2 |

| | | | | |
|---|---|---|---|---|
| 3 | **Principles of Dimensional Modeling**<br>3.1 ER Modelling Versus Dimensional Modelling.<br>3.2 The STAR Schema and SNOWFLAKE Schema<br>3.2.1 Inside a Dimensional table<br>3.2.2 Inside the Fact Table<br>3.2.3 The Factless Fact table<br>3.2.4 Data Granularity<br>3.2.5 STAR Schema Keys<br>3.2.6 Compare Star and Snowflake Schema models.<br>3.3 Updates to the Dimension Tables<br>3.3.1 Slowly Changing the Dimensions<br>3.3.2 Type 1 Changes: Correction of Errors<br>3.3.3 Type 2 Changes: Preservation of History<br>3.3.4 Type 3 Changes: Tentative Soft Revisions | 6 | 14 | CO3 |
| 4 | **Online Analytical Processing**<br>4.1 Introduction to Data Cube and OLAP<br>4.1.1 Demands for Online Analytical Processing<br>4.1.2 Need for Multidimensional Analysis<br>4.1.3 Introduction to hypercubes<br>4.2 OLAP operations<br>4.2.1 Drill-Down and Roll-Up<br>4.2.2 Slice- and-Dice or rotation<br>4.3 OLAP Models<br>4.3.1 The MOLAP Model<br>4.3.2 The ROLAP Model<br>4.3.3 Compare OLAP and OLTP tools.<br>4.3.4 Comparison of OLAP models | 5 | 12 | CO3 |
| 5 | **Significant Role Of Metadata**<br>5.1 Why Metadata Is Important<br>5.2 Metadata Types by Functional Areas<br>5.3 Business Metadata and Technical Metadata<br>5.4 Metadata Requirements<br>5.4.1 Sources Of Metadata<br>5.4.2 Metadata Repository | 4 | 8 | CO1 |

| | | | | |
|---|---|---|---|---|
| 6. | **Introduction to Data Mining**<br>6.1 Basics of data mining.<br>6.1.1 Data mining techniques.<br>6.1.2 The KDD process.<br>6.1.3 Data Mining and the Data Warehouse<br>6.3 Major issues in data mining.<br>6.4 Applications of Data Mining<br>6.4.1 Applications in Retail Industry<br>6.4.2 Applications in Telecommunications Industry<br>6.4.3 Applications in Banking and Finance<br>6.5. Social Impacts of Data Mining | 5 | 10 | CO4 |
| 7 | **Web Mining:**<br>7.1 Introduction to Web mining.<br>7.2 Types of Web Mining<br>7.2.1 Web Content Mining,<br>7.2.2 Web Structure Mining,<br>7.2.3 Web Usage mining | 3 | 6 | CO4 |
| | **TOTAL** | **32** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES

Term Work consists of Journal containing 10 experiments with approx.no of 64 hours required and corresponding CO attained should be specified here

| Sr. No. | Title of Assignment/Experiment | Approx.Hrs required | COs |
|---|---|---|---|
| 1 | Overview of Data Warehouse Architecture | 04 | CO1 |
| 2 | Features of ETL tools | 04 | CO2 |
| 3 | Data Extraction using ETL tool | 08 | CO2 |
| 4 | Data Transformation using ETL tool | 08 | CO2 |
| 5 | Data Loading using ETL tool | 08 | CO2 |
| 6 | Data analysis using open source ETL tool | 08 | CO2 |
| 7 | Design a report using report designer | 08 | CO2 |
| 8 | Creation of OLAP cube report | 08 | CO3 |
| 9 | Understand the concepts of Data Mining. | 04 | CO4 |
| 10 | Understand the concepts of Web mining | 04 | CO4 |
| | **TOTAL** | **64** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum no of practical/assignments etc
3. Guest/Expert Lecture
4. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title of Book | Author | Publication |
|---|---|---|---|
| 1. | Data Mining:Introductory and Advanced Topics | M.H.Dunham | Pearson Education |
| 2. | Data Mining Concepts & Techniques | Jiawei Han, Micheline Kamber | Elsevier |
| 3. | Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems | Sam Anahory, Dennis Murray, | Pearson Education |
| 4. | Data Warehousing System | Mallach | McGraw –Hill |
| 5 | Data WareHousing Fundamentals | Paulraj Ponniah | WILEY |

## 10. WEB REFERENCES

1. http://www.1keydata.com/datawarehousing/datawarehouse.html
2. http://www.redbooks.ibm.com/redbooks/pdfs/sg242238.pdf
3. https://www.educba.com/datawarehouse
4. https://www.toptal.com/data-science/data-warehouse-concepts-principles

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Introduction to Data Warehousing | 4 | 4 | - | 08 |
| 2 | Data Extraction, Transformation, and Loading | 4 | 4 | 4 | 12 |
| 3 | Principles of Dimensional Modelling | 4 | 4 | 6 | 14 |
| 4 | Online Analytical Processing | 2 | 4 | 6 | 12 |
| 5 | Significant Role Of Metadata | 4 | 4 | - | 8 |
| 6 | Introduction to Data Mining | 6 | 4 | - | 10 |
| 7 | Web Mining | 4 | 2 | - | 6 |
| **TOTAL** | | **28** | **26** | **16** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**
**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | Faculty | NAME | | SIGNATURE |
|---|---|---|---|---|
| 1 | Internal | Mr. Abhijit Dongaonkar | | |
| 2 | Internal | Mrs, Geetha. S | | |
| 3 | Internal | Mr. Pankaj D.Rathod | | |
| 4 | External | Mr. Vaibhav Vasani | | |
| | | K. J. Somaiya College of Engineering | | |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: VI** |
| **Course: #Hacking Techniques and Ethics** | **Group: A*** |
| **Course Code: HTE190817** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 04 | 02 | _ | _ | 06 | 03 | 70 | 20 | 10 | 70 | 50 | 50 | -- | 200 |

## 3. COURSE OBJECTIVE

Malicious hacking became more frequent in later decades, in parallel with the commercialization of consumer-oriented computer technologies. The need for ethical hacker to protect the web server, applications and devices against cyber-attacks is increasing day by day. This course focuses on various attacks and the tools used for test the vulnerability of a system

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through teaching learning experiences:

- **Design a defense layer to protect the computing system against the attacks**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Prepare a survey report on information security breach | Remember, Understand |
| CO2 | Use various tools for providing safeguard against ethical hacking | Understand Apply |
| CO3 | Apply various penetration techniques in system hacking | Understand Apply |
| CO4 | Use of appropriate tools against networking attacks | Remember, Understand Apply |
| CO5 | Identify social engineering threats and countermeasures | Remember, Understand |

## 6. COURSE CONTENTS

| Sr.No. | TOPIC<br>Sub-Topics | Hours | Marks | Cos |
|---|---|---|---|---|
| 1 | **Information Security Basics**<br>1.1 Confidentiality, Integrity, Availability<br>1.2 Challenges in implementing IS.<br>1.3 Information assurance, Authentication, Authorization, Accounting<br>1.4 Nonrepudiation, vulnerability, Exploit, Risk, Threat<br>1.5 IS Security Threats: Natural, Physical, Human<br>1.6 IS Management, Threat Modelling, IS policies<br>1.7 Types of malwares: Worms, viruses, Trojans, Spyware, Rootkits<br>1.8 Information security Acts and Laws<br>1.9 Case Study: EBay data Breach, Google Play Hacks, The home depot Data Breach, JP Morgan Chase Data Breach | 12 | 12 | CO1 |
| 2 | **Ethical Hacking**<br>2.1 Hacking, Types of hackers: Black, White, Gray, Suicide Hackers, spy hackers, Cyber terrorist<br>2.2 Necessity of ethical Hacking<br>2.3 Skills of ethical Hacker<br>2.4 Ethical Hacking Phases<br>2.5 Foot printing, Reconnaissance: Active and Passive, scanning, gaining access, maintaining access, clearing tracks<br>2.6 Tools used for Reconnaissance<br>2.7 Foot printing Methodology: Foot printing using advanced Google Hacking Techniques, Foot printing through Social networking sites, website foot printing, and Email foot Printing, DNS, WHOIS foot printing.<br>2.8 Foot printing tools.<br>2.9 Network Scanning; Techniques to check for live system, open ports.<br>2.10 Various scanning techniques.<br>2.11 Enumeration Concepts, Different types of enumeration.<br>2.12 SNMP, SMTP, DNS enumeration, Counter Measures<br>2.13 Fingerprinting | 14 | 18 | CO2 |

| | | | | |
|---|---|---|---|---|
| **3** | **System Hacking**<br>3.1 System Hacking goals<br>3.2 Techniques to gain access to the system<br>3.3 Various methods of password cracking, Types of password attack<br>3.4 Privilege Escalation techniques: Vertical and Horizontal<br>3.5 Techniques to create and maintain Remote Access to the System.<br>3.6 Overview of different types of Rootkits<br>3.7 Detection of rootkit<br>3.8 Steganography and stegaanalysis techniques.<br>3.9 Tools used for Steganography<br>3.10 Techniques to hide the evidence of Compromise<br>3.11 System Hacking Penetration testing | 14 | 14 | CO3 |
| **4** | **Network Attacks**<br>4.1 Overview of Sniffing concepts<br>4.2 Active and Passive sniffing<br>4.3 Various sniffing tools, Sniffing detection techniques<br>4.4 Counter Measures<br>4.5 MAC attacks<br>4.6 Various flooding techniques<br>4.7 DNS, ARP Poisoning, Spoofing attack<br>4.8 Session hijacking<br>4.9 Denial of Service Attack<br>4.10 Wireless Hacking: wireless threats<br>4.11 Wireless hacking methodology | 16 | 18 | CO4 |
| **5** | **Social Engineering**<br>5.1 Social Engineering Concept<br>5.2 Various Social Engineering Techniques<br>5.3 Understanding threats<br>5.4 Impersonation on Social Networking Sites<br>5.5 Identity theft | 8 | 8 | CO5 |
| | **TOTAL** | **64** | **70** | |

## 7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 10 Experiments/Assignment with approx.no of hours required and corresponding CO attained should be specified here

| Sr. No. | Title of Experiments/Assignment | Approx .Hrs required | COs |
|---|---|---|---|
| 1. | To Set up your Virtual Hacking Machine (Kali Linux/Parrot OS) on VMware/Virtual Box. | 02 | CO1 |
| 2. | To perform various types of Foot printing. | 02 | CO2 |
| 3 | To Learn about NMAP basic | 02 | CO4 |
| 4 | To perform on various password cracking tools. | 02 | CO3 |
| 5 | To perform Steganography using Tools. | 02 | CO3 |
| 6 | To perform discovery of live host, IP address and open ports with other information. | 04 | CO4 |
| 7 | To perform vulnerability scanning on system | 02 | CO2,4 |
| 8 | To perform SNMP, SMTP enumeration. | 04 | CO4 |
| 9 | To perform privilege Escalation. | 04 | CO4 |
| 10 | To perform spoofing attack. | 04 | CO4 |
| 11 | To defend from flooding attack. | 02 | CO4 |
| 12 | To perform vulnerability scanning on network | 02 | CO2,CO4 |
| 13 | Assignment on Social Engineering threats and couterthreats | - | CO5 |
| | **Total** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Practical/assignments
3. Guest/Expert lectures
4. Slides
5. Seminar
6. Case Study
7. Self-Learning Online Resources

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Hacking for Dummies | Beaver, Kevin | 3rded. John Wiley & sons., 2013. |
| 2. | Hacking Exposed | McClure S., Scambray J., and Kurtz G | Tata McGraw-Hill Education, 6the |
| 3. | Network Security and Ethical Hacking | Rajat Khare | Luniver Press, 2006 |
| 4 | Beginning Ethical Hacking with Kali Linux | Sanjib Sinha | Apress 2018 |
| 5 | Certified Ethical Hacker (CEH) Foundation Guide | Sagar Ajay Rahalkar | Apress 2016 |
| 6 | Learn Ethical Hacking from Scratch | Zaid Sabih | Packt Publishing 2018 |

## 10. WEB REFERENCES

1 https://www.hackthissite.org/
2 https://www.fromdev.com/
3. http://breakthesecurity.cysecurity.org/
4. https://www.hacking-tutorial.com/
5. https://sectools.org/
6. http://www.cyberaces.org/courses/

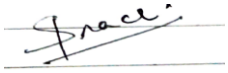
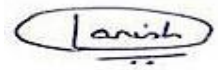
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | Information Security Basics | 8 | 4 | - | 12 |
| 2. | Ethical Hacking | 2 | 6 | 10 | 18 |
| 3. | System Hacking | 2 | 4 | 8 | 14 |
| 4. | Network Attacks | 2 | 6 | 10 | 18 |
| 5. | Social Engineering | 4 | 4 | - | 8 |
| **TOTAL** | | **18** | **24** | **28** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr S U Masurkar |  |
| 2 | Internal | Mrs P S Arora |  |
| 3 | Internal | Mr. J S Kulkarni |  |
| 4 | External | Mr. Danish Khatri<br>Tech Analyst, SmartStream Technologies. |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme: IT/CSE** | **Semester: IV/VI** |
| **Course: Game Design and Development** | **Group: A / A*** |
| **Course Code: GDD198926** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 3 | 2 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 25 | - | 25 | 150 |

## 3. COURSE OBJECTIVE: -

This subject will enable the students to comprehend the Game design and development concepts at practical level as well as theoretical level. The aim of this subject is to get broad perspective of game development engines, prototyping .It also introduces the basic game coding patterns and basics of physics engine.

## 4. SKILL COMPETENCY: -

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Implement basic game development concepts using C++(produce, test and present a beta version of a game of your own design)**
- **Apply the fundamentals of 2D and 3D graphics, shaders, physics, animation to game development**
- **Classify the game development process into its various stages.**

## 5. COURSE OUTCOMES (COs) AT THE END OF THE SEMESTER STUDENT WILL BE ABLE TO:

| COs | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Conceptualize and critique the fundamental elements of Game development. | Remember, Understand |
| CO2 | Construct a prototype and convert it to a game | Understand, Apply |
| CO3 | Create basic games to prove clarity of concepts in programming Languages | Understand, Apply |
| CO4 | Demonstrate basic understanding of Game Engine Architecture and working | Understand, Apply |

## 6. COURSE CONTENTS

| Sr.No. | Topics/Sub-Topics | Hours | Marks | Cos |
|---|---|---|---|---|
| 1 | **Basics of game design & Brainstorming an Idea**<br>A practical introduction to game design and game design concepts, emphasizing the basic tools of game design: paper and digital prototyping, design iteration, and user testing.<br>Brainstorming games- history of games and critique writing, games start out as ideas, brainstorming on ideas about game's concept, mechanics, setting, characters | 12 | 12 | CO1 |
| 2 | **Rapid prototyping**:<br>Involves using engines like unreal or unity to create a basic prototype of the game idea a team comes up with to see if their idea is actually enjoyable while playing or it looked good only in their heads.<br>As game developers, you need to be able to create. how to handle Unity3D game projects | 07 | 12 | CO2 |
| 3 | **Unity Game Engine**<br>Basics of handling Unity3D game projects<br>intermediate learners unity<br>Developing familiarity with practices and tools of game development. | 07 | 12 | CO3 |
| 4 | **Basic game coding patterns**<br>Vectors to linked lists to trees and graphs, an understanding of the 4 paradigms of OOP (Abstraction, Encapsulation, Inheritance, Polymorphism), concept of data-oriented programming, cache favoring memory allocation, memory alignment and SIMD vectors.<br>Discussing algorithmic complexity.<br><br>Understanding of static, stack and heap memory, intro to multi-threading, discussing how to write fast compiling code, which is both flexible and extendable | 06 | 10 | CO3 |

| | | | | |
|---|---|---|---|---|
| 5 | **Introduction to Game Engines**<br>introduction to engines ,Architecting & Creating a framework for running the game loop which communicates with the different subsystems of the game like Event Management, Audio, Physics, Input, Renderer, etc based on the concept learned in game programming. | 08 | 12 | CO4 |
| 6 | **Basics of game Physics and Graphics**<br>Introduction to Physics Engine and graphics fundamentals in game development | 08 | 12 | CO4 |
| | **TOTAL** | **48** | **70** | |

## 7. LIST OF PRACTICALS

Term Work consists of Journal containing the following experiments:-

| Sr. No. | Title of Experiment | Approx. Hrs required | COs |
|---|---|---|---|
| 1 | Modelling games using programming Language. | 4 | CO1 |
| 2 | Using unity game Engine create any two games. | 12 | CO2 |
| 3 | Analyze Game Development Performance Indicators and complexity of games. | 4 | CO3 |
| 4 | Explore 2D and 3D Game Engines Performance | 4 | CO3, CO4 |
| 5 | Utilize Graphical User Interface (GUI) | 4 | CO2 |
| 6 | Apply Animation to Game Assets | 4 | CO4 |
| 7 | Utilize the Physics Engine to demonstrate how physics is applied to make games more relevant to physics Laws. | 4 | CO4 |
| | **TOTAL** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adoption of the following strategy:

1. Conducting lectures as per the teaching plan and conduction tutorials.
2. Use of PowerPoint presentations during theory class and practical periods
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Implementing above mentioned experiments in the laboratory.

9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Game Coding | Mike McShaffry | Google Books |
| 2. | Game Development Essentials_ an Introduction | Jeannie Novak | Google Books |
| 3 | Game Engine Architecture | Jason Gregory. | Google Books |
| 4 | Game Programming Patterns | Robert Nystrom | Google Books |
| 5 | Game Design Workshop: A Playcentric Approach to Creating Innovative Games | Tracy Fullerton | CMP Books ,Third Edition, 2014 |

**10. WEB REFERENCES**

1. www.w3schools.com
2. https://en.wikipedia.org/wiki/Game_engine
3. https://books.google.com/books
4. http://www.xboxlivecommunitygames.org/

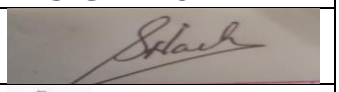
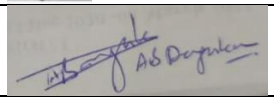
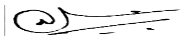
**11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER SETTING**

| Sr No | TOPIC | Distribution of Theory marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Basics of game design & Brainstorming an Idea | 4 | 8 | - | 12 |
| 2 | Rapid prototyping | - | 4 | 8 | 12 |
| 3 | Unity Game Engine | - | 4 | 8 | 12 |
| 4 | Basic game coding patterns | - | 4 | 6 | 10 |
| 5 | Introduction to Game Engines | - | 4 | 8 | 12 |
| 6 | Basics of game Physics and Graphics | - | 4 | 8 | 12 |
| | **TOTAL** | **04** | **28** | **38** | **70** |

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | Faculty Type | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mrs. Swapna Naik |  |
| 2 | Internal | Mr Manish Solanki |  |
| 3 | Internal | Mr Abhijit Dongaonkar |  |
| 4 | External | Dr Nandini Chaudhary<br>Principal,<br>J. T. Mahajan College of Engineering |  |

## 1. COURSE DETAILS

| | |
|---|---|
| **Programme : Computer Engineering** | **Semester: VI** |
| **Course: IOT and Applications** | **Group: A** |
| **Course Code:IOT198927** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+ D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 4 | 2 | - | - | 6 | 3 | 70 | 20 | 10 | 70 | 50 | - | 50 | 200 |

## 3. COURSE OBJECTIVE

IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Develop an IOT Application.**

## 5. COURSEOUTCOMES (COs)at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Provide overview of concept, main trends and challenges of IOT | Remember, Understand |
| CO2 | Develop ability to use IOT related software and hardware | Remember, Understand, Apply |
| CO3 | Apply basic protocols in wireless sensor network | Remember, Understand, Apply |
| CO4 | Maintain IoT applications in different domain and be able to use their performance | Understand, Apply |

## 6. COURSE CONTENTS

| Sr. No. | Topic/ Sub-Topics | Hours | Marks | COs |
|---|---|---|---|---|
| 1 | **Introduction to Internet of Things**<br>1.1 Definition of IOT<br>1.2 IOT Characteristics<br>1.3 Physical and Logical design of IOT<br>1.4 Functional blocks of IOT<br>1.5 IOT Hardware<br>1.6 Overview of embedded system<br>1.7 Communication models and APIs platforms for IOT Real time examples of IOT | 12 | 12 | CO1 |
| 2 | **Architectural Overview of IOT**<br>2.1 IOT architecture – state of the art<br>2.2 architecture reference model , IOT reference model<br>2.3 Introduction to M2M<br>2.4 Difference between M2M and IOT , M2M value Chains, IOT value chains<br>2.5 M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed Capabilities, An IoT Architecture outline, standards considerations.<br>2.6 Emerging industrial structure for IoT. | 14 | 12 | CO2 |
| 3 | **IOT Sensors and Actuators**<br>3.1 Need of sensors and actuators<br>3.2 Types of sensors and actuators<br>3.3 Types of IOT boards<br>3.4 Introduction to Wireless Sensor Networks<br>3.5 IOT protocol<br>3.6 Role of cloud in IOT | 12 | 14 | CO3 |
| 4 | **Challenges in IOT**<br>4.1 Design challenges<br>4.2 Development challenges<br>4.3 Security challenges<br>4.4 Compatibility challenges<br>4.5 IOT security Management | 06 | 08 | CO1 |

| | | | | |
|---|---|---|---|---|
| 5 | **Data management and Business Process in IOT**<br>5.1 Data management in IOT<br>5.2 Business process in IOT<br>5.3 IOT analytics<br>5.4 Information distribution architecture | 08 | 10 | CO4 |
| 6 | **Applications of IOT**<br>6.1 IoT applications for industry:<br>- Future Factory Concepts<br>- Brownfield IoT<br>- IoT for Retailing Industry<br>- IoT For Oil and Gas Industry<br>- IOT for e-Health<br>6.2 Domain specific application – Home automation, Surveillance applications, Agriculture, smart cities. | 12 | 14 | CO4 |
| | **TOTAL** | **64** | **70** | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title of Experiment/Assignment | Approx. Hrs required | COs |
|---|---|---|---|
| 1. | To prepare a survey on various types of sensors & its application | 02 | CO1 |
| 2. | Classify different types of IOT platforms. | 02 | CO2 |
| 3. | To perform Raspberry-Pi/Arduino based program for digital read using LED | 02 | CO2 |
| 4. | To perform Raspberry-Pi/Arduino based program for digital write using LED | 02 | CO2 |
| 5. | To perform Raspberry-Pi/Arduino based program for analog read using sensor. | 02 | CO2 |
| 6. | To perform Raspberry-Pi/Arduino based program for analog write using sensor. | 02 | CO2 |

| | | | |
|---|---|---|---|
| 7. | To perform Raspberry-Pi/Arduino based program for measuring temperature and humidity in the environment using sensor. the environment using DHT11 sensor and Raspberry Pi 3. | 04 | CO2 |
| 8. | To demonstrate Node MCU and its working | 02 | CO2 |
| 9. | WAP using ESP8266 to display alphanumeric characters on Seven Segment Display | 02 | CO2 |
| 10. | Introduction to MQTT and sending sensor data to cloud using Raspberry-Pi/Arduino. | 04 | CO2 |
| 11. | Create a web interface to control connected LEDs remotely using Raspberry-Pi/Arduino. | 02 | CO2 |
| 12. | Demonstrate the use of wireless sensor network simulator with the help of programs. | 02 | CO3 |
| 13 | Case study on IOT applications for Industry | 02 | CO4 |
| 14 | Case study on domain specific application of IOT | 02 | CO4 |
| | **Total** | **32** | |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical
3. Assignments.
4. Slides with animation
5. Self-Learning Online Resources.

## 9. LEARNING RESOURCES

| Sr. no. | Title of book | Author | Publication |
|---|---|---|---|
| **1.** | Internet of Things (A Hands-on-Approach) | Vijay Madisetti and Arshdeep Bahga | 1 st Edition, VPT |
| **2.** | IoT Security Advances in Authentication | Madhusanka Liyanage, An Braeken, Mika Ylianttila | Willey |
| **3.** | The Internet of Things Enabling Technologies, Platforms, and Use Cases | Pethuru Raj, Anupama C. Raman | CRC Press |
| **4.** | Internet of Things with ARDUINO and BOLT | Ashwin Pajankar | BPB |

## 10. WEB REFERENCES

1. https://www.udemy.com/internet-of-things-iot-for-beginners-getting-started/
2. https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT
3. https://www.edureka.co/blog/iot-applications/

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr. No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1 | Introduction to Internet of Things | 6 | 3 | 3 | 12 |
| 2 | Architectural Overview of IOT | 4 | 4 | 4 | 12 |
| 3 | IOT Sensors and Actuators | 2 | 4 | 8 | 14 |
| 4 | Challenges in IOT | 2 | 4 | 2 | 08 |
| 5 | Data Management & Business process in IOT | - | 4 | 6 | 10 |
| 6 | Applications of IOT | 2 | 2 | 10 | 14 |
| | **TOTAL** | **16** | **21** | **33** | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| **1** | **Internal** | Mr. Janardan Kulkarni | |
| **2** | **Internal** | Mr.Siddhesh Masurkar | |
| **3** | **Internal** | Ms. Sharyu Kadam | |
| **4** | **External** | Mr. Dev Savla<br>**Organization:**<br>**HERE Technologies,**<br>**Software Engineer** | |

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056

## 1. COURSEDETAILS

| | |
|---|---|
| **Programme: Computer Engineering** | **Semester: VI** |
| **Course: System Security** | **Group: A** |
| **Course Code:SYS190818** | **Duration:16 Weeks** |

## 2. TEACHING AND EXAMINATION SCHEME

| Scheme of Instructions and Periods per Week | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks(ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 3 | 2 | - | - | 5 | 3 | 70 | 20 | 10 | 70 | 50 | - | 25 | 175 |

## 3. COURSE OBJECTIVE

This course is intended to help student's gain fundamental and comprehensive understanding of **system security.** We will focus on an overview of major system security issues, technologies, and approaches. Students who successfully complete this course will have a concept and knowledge of security properties, concerns, Policies, User Authentication**,** cryptography, security evaluation, Access Control, Malicious Software, Denial-of-Service Attacks. Students will also have hands on experience in selected system security technologies through lab sessions.

This course will provide an understanding of principle concepts, major issues, technologies, and basic approaches in system security.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Design and test cryptographic tactics**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Analyze the possible security attacks in complex real time systems and their effective countermeasures | Remember, Understand |
| CO2 | Implement cryptography using mathematics terms | Remember, Understand, Apply |
| CO3 | Select and Implement various cryptographic algorithms | Remember, Understand, Apply |
| CO4 | Identify the security issues and resolve them | Remember, Apply |

## 6. COURSE CONTENTS

| Sr. No. | TOPIC/Sub-Topics | Hours | Marks | CO |
|---|---|---|---|---|
| 1 | **Information Security Concepts**<br>1.1 Information Security Overview: Background and Current Scenario<br>1.2 Types of Attacks<br>1.3 Goals for Security<br>1.4 E-commerce Security<br>1.5 Steganography | 6 | 10 | CO1 |
| 2 | **Security Threats and Vulnerabilities**<br>2.1 Overview of Security threats<br>2.2 Weak / Strong Passwords and Password Cracking<br>2.3 Insecure Network connections<br>2.4 Malicious Code<br>2.5 Programming Bugs<br>2.6 Cybercrime and Cyber terrorism | 8 | 10 | CO1 |
| 3 | **Cryptography fundamentals**<br>3.1 Divisibility, gcd, prime numbers, fundamental theorem of arithmetic,<br>3.2 Congruence's, Fermat's theorem, Euler function, Primality testing<br>3.3 Solution of congruence's, Chinese remainder theorem. | 10 | 15 | CO2 |
| 4 | **Cryptography**<br>4.1 History & Applications of Cryptography<br>4.2 Tools and techniques of Cryptography<br>4.3 Classical Cryptography-Substitution Ciphers-permutation Ciphers-Block Ciphers-<br>4.4 DES- Modes of Operation- AES-Linear Cryptanalysis | 10 | 15 | CO3 |
| 5 | **Introduction to Public key Cryptography**<br>5.1 Number theory- The RSA Cryptosystem and Factoring<br>5.2 Integer- Attacks on RSA-<br>5.3 The ELGamal Cryptosystem-<br>5.4 Digital Signature Algorithm<br>5.5 Elliptic Curves Cryptography-<br>5.6 Key management – Session and Interchange keys, diffie_hellman Key exchange and generation-PKI | 8 | 10 | CO3 |

| | | | | |
|---|---|---|---|---|
| 6 | **Applications of security**<br>6.1 Email security-SMIME, PGP<br>6.2 Ip security- IPSEC architecture, IPSEC services, IPSEC security association, ESP Transport and tunnelling.<br>6.3 SSL protocol | 6 | 10 | CO4 |
| | **TOTAL** | **48** | **70** | |

**7. LISTOF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS**

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

| Sr. No. | Title/Aim | Approx. Hrs required | COs |
|---|---|---|---|
| 1. | Implementation of any steganography algorithm | 2 | CO1 |
| 2. | Generation of prime nos | 2 | CO2 |
| 3. | Finding GCD and random no generator | 2 | CO2 |
| 4. | Study of Eulers theorem | 2 | CO2 |
| 5. | Study of ELGamal Cryptosystems | 2 | CO3 |
| 6. | Implementation of Encryption algorithms substitution ciphers | 2 | CO3 |
| 7. | Implementation Block cipher | 2 | CO3 |
| 8. | IMPLENETATION OF elliptic curve cryptography | 2 | CO3 |
| 9. | Implement RSA | 2 | CO3 |
| 10. | Implementation of DES s-box p- box | 4 | CO3 |
| 11. | Implementation of E-mail security protocols | 2 | CO4 |
| 12. | Implementation of diffie_hellman key exchange | 2 | CO4 |
| 13. | IMPLEMENTATION OF email security PGP | 2 | CO4 |
| 14. | Implementation of IPsec | 2 | CO4 |
| 15. | Implementation of AES | 2 | CO4 |
| 16. | Assignment on E-commerce Security | - | CO1 |
| | Total | 32 | |

**8. IMPLEMENTATION STRATEGY (PLANNING)**

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides

## 9. LEARNING RESOURCES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | "Cryptography and Network Security: Principles and Practices" | William Stallings | Third Edition, Pearson Education, 2006. |
| 2. | Computer Security art and science | Matt Bishop | Second Edition, Pearson Education, 2002 |
| 3. | Introduction to Cryptography with Coding Theory | Wade Trappe and Lawrence C. Washington | Second Edition, Pearson Education, 2007 |
| 4. | Introduction to Modern Cryptography | Jonathan Katz, and Yehuda Lindell | CRC Press, 2007 |

## 10. WEB REFERENCES

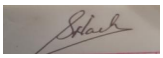
1. http://www.cs.vu.nl/~ast/books/ds1/08.pdf
2. http://study.com/directory/category/Computer_Sciences/Information_Technology_Management/Information _Systems_Securit y.html
3. https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/data-and-system-security-measures.html
4. http://searchsecurity.techtarget.com/tip/Defining-authentication-system-security-weaknesses-to-combat-hackers

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Sr.No. | TOPIC | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|
| | | R Level | U Level | A Level | Total Marks |
| 1. | Information Security Concepts | 5 | 5 | - | **10** |
| 2. | Security Threats and Vulnerabilities | 5 | 5 | - | **10** |
| 3. | Cryptography fundamentals | 5 | 5 | 5 | **15** |
| 4. | Cryptography / | 2 | 3 | 10 | **15** |
| 5. | Introduction to Public key Cryptography | 2 | 3 | 5 | **10** |
| 6. | Applications of security | 2 | - | 8 | **10** |
| **TOTAL** | | 21 | 21 | 28 | **70** |

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**
NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12. **COURSE EXPERT COMMITTEE MEMBERS**

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | Internal | Mr. J.S.Kulkarni |  |
| 2 | Internal | Mrs. Swapna Naik |  |
| 3 | Internal | Ms. Priti P.Bokariya |  |
| 4 | External | Dr. Nandini Chaudhary<br>Organization : J.T. Mahajan College of Engineering |  |

## 1. COURSEDETAILS

| | |
|---|---|
| **Programme: CSE / IT** | **Semester: VI** |
| **Course: Entrepreneurship Development** | **Group: M** |
| **Course Code: EDC198928** | **Duration:16 Weeks** |

## 2. TEACHINGAND EXAMINATIONSCHEME

| Scheme of Instructions and Periods per W | | | | | Examination Scheme and Maximum Marks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory Hrs L | Practical Hrs P | Drawing Hrs D | Tutorial Hrs T | Credits (L+P+D+T) | Theory Paper Duration and marks (ESE) | | SSL | TA | TH | TW | PR | OR | TOTAL |
| | | | | | Hours | Marks | | | | | | | |
| 03 | - | -- | -- | 03 | | - | - | - | - | 50 | -- | 50 | 100 |

## 3. COURSE OBJECTIVE

With wide use of World Wide Web and mobile application, ample opportunity created for diploma engineers to start enterprises in the sector marking and IT services. This course aims to develop Entrepreneur skill in order to start small enterprise.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain industry identified competencies: create Business idea and important aspects of the business through various teaching learning experiences

- **Develop Entrepreneurship traits**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to:

| CO No. | COURSE OUTCOME | Bloom's LEVEL |
|---|---|---|
| CO1 | Identify Entreprenural traits and business opportunity | Remember |
| CO2 | Develop Comprehensive business plan | Understand |
| CO3 | Use the information to prepare project report for business venture | Understand, Apply |
| CO4 | Prepare Plan to manage Enterprise | Apply |
| CO5 | Use an appropriate marketing strategy | Apply |

## 6. COURSE CONTENTS

| Sr.No. | Topics/Sub-Topics | Hours | Cos |
|---|---|---|---|
| 1 | **Venture Development:**<br>1.1 Introduction of entrepreneurship<br>1.2 Small Scale industries<br>1.3 Traits of successful Entrepreneur<br>1.4 SWOT analysis<br>1.5 Business structure<br>**1.6** Scope for Entrepreneur Local and Global market<br>1.7 Internet based Business | 8 | CO1 |
| 2 | **Finance For Enterprise & Financial Statement**<br>2.1 Source of finance<br>2.2 Fixed capital & working capital<br>2.3 Short term and long term source<br>2.4 Balance sheet Profit & Loss Account<br>2.5 Financial ratio<br>2.6 Concept of audit | 10 | CO2 |
| 3 | **Product/ service Development**<br>3.1 Selection of product /services<br>3.2 Innovation management<br>3.3 Process Selection<br>3.4 Market Study procedures<br>3.5 Getting the information from Stake holders /Govt agency / Other agencies<br>3.6 Making the project proposal | 8 | CO2 |
| 4 | **Support System**<br>4.1 Support system – Government agencies: MCED, NI –MSME,<br>4.2 Support agencies for entrepreneurship guidance, Training, Registration,Technology and Quality control<br>4.3 Breakeven point, Return on Investment and return on sales.<br>4.4 Goods and Services Tax. | 8 | CO3 |
| 5 | **Managing Enterprises**<br>5.1 Unique Selling Proposition (USP)<br>5.2 Preparing strategies of handling business<br>5.3 Quality assurance<br>5.4 Risk Management<br>5.5 Incubation Centre | 6 | CO4 |

| | | | |
|---|---|---|---|
| **6** | **Marketing Strategy**<br>6.1 Importance of marketing<br>6.2 marketing management<br>6.3 soft skill<br>6.4 pricing and costing<br>6.5 marketing mix<br>6.6Distribution channel | 8 | CO5 |
| | **TOTAL** | 48 | |

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of 7 assignments and corresponding CO attained are specified here:

| Sr. No. | Title of Assignments | COs |
|---|---|---|
| 1 | TO submit the profile summary of a successful entrepreneur | CO1 |
| 2 | To identify entrepreneur trait and Generate business ideas which suits to traits | CO1 |
| 3 | TO survey on ecommerce business and turn over and revenue model and prepare a report | CO1 to CO5 |
| 4 | Study of Balance Sheet | CO4 |
| 5 | Selection of Product/ Services | CO2 |
| 6 | Preparation of Detailed Project Report | CO3 |
| 7 | Preparation of Business plan for a small enterprise | CO1 to CO5 |

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Minimum no of practical/assignments/drawings etc.
2. Industry visit
3. Guest/Expert lectures
4. Case study

## 9. LEARNING RESOURSES

| Sr. No. | Title Of Book | Author | Publication |
|---|---|---|---|
| 1. | Dynamics of Entrepreneurial Development and Management | Shri Vasant Desai | Himalaya Publication Mumbai |
| 2. | Entrepreneurship Development | Shri S S Khanna | S. Chand And Company |
| 3. | Small Scale Industries and Entrepreneurship | Shri Vasant Desai | Himalaya Publication |
| 4. | Entrepreneurship | Shri J. Saboo | Himalaya Publication |

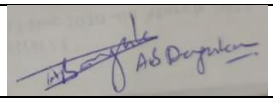
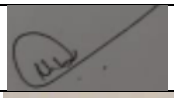
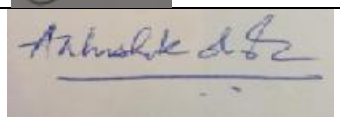
## 10. WEB REFERENCES

i) https://www.toppr.com/guides/business-studies/entrepreneurship-development/process-of-entrepreneurship-development/

ii) https://my.msme.gov.in/MyMsmeMob/MsmeProjectProfile/Home.htm

iii) https://www.ediindia.org/

## 11. COURSE EXPERT COMMITTEE MEMBERS

| Sr. No. | | NAME | SIGNATURE |
|---|---|---|---|
| 1 | **Internal** | **Mr Abhijeet Dongaonkar** |  |
| 2 | **Internal** | **Mr Janardan S. Kulkarni** |  |
| 3 | **Internal** | **Mrs Neeta Kadukar** |  |
| 4 | **External** | **Mr. Abhishek Chande,**<br>**Business Development Manager**<br>Organization Raheja Hospitality |  |

# Committees

## I.1 Managing Council (MC)

| | | |
|---|---|---|
| Representatives of Shri Vile ParleKelavani Mandal | | Shri Amit Balwant Sheth, Chairman<br>Shri Nayan Patel<br>Shri Hiten V.Parekh<br>Shri Asoke Basak<br>Dr.Madhav N.Welling<br>Dr.Sharad Mhaiskar<br>Dr.D.J.Shah |
| Member,Industry Representative | | Mr, Hemant Minocha ,MD,Rajiv Plastics,Mumbai |
| Representatives of Government | | |
| Representative of the State Government | | Dr.Abhay Wagh<br>Director,<br>Directorate of Technical Education,<br>Maharashtra State, |
| Representative of the Maharashtra State Board of Technical Education | | Dr.Vinod Mohitkar<br>Director,<br>Maharashtra State Board of Tech.Education |
| Representative of Central Government | | Shri P.N.Jumle<br>Director,<br>Board of Apprenticeship Training (W.R.) |
| Representative of the All India Council for Technical Education | | Dr. Ajeet Singh,<br>Regional Officer& Assistant Director,All India Council for Technical Education (WesternRegion) |
| Expert Members nominated by the State Government/AICTE | | ---------- |
| Ex-Officio –Secretary-Principal | | Dr.M.Z.Shaikh |

## I.2 Board of Studies (BOS)

| Sr. No. | Name | Designation & Organisation | BOS Designation |
|---|---|---|---|
| 1. | Dr.(Mrs) Shubha Pandit | Principal,K.J.Somaiya Engg.College,Mumbai | Chairman |
| 2. | Dr.Vinod Mohitkar | Director, MSBTE | Member |
| 3. | Dr. M.Z.Shaikh | Principal, S.B.M.Polytechnic | Member |
| 4. | Mrs.Neeta Kadukar | Vice Principal and Head, Information Technology Department,SBM Polytechnic | Member |
| 5. | Shri Dhirajkumar Pandirkar | Chief Engineer, MHADA, Mumbai | Member |
| 6. | Shri B.R.Patel | Director, Procem Consultant (Alumni), Mumbai | Member |
| 7. | Dr. A.V.Bhonsale | Rtd. Principal, Vidyavardhini College of Engineering, Vasai | Member |
| 8. | Shri Sunil Kangane | Director, Invotech, (Alumni), Mumbai | Member |
| 9. | Shri Ricky Uchil | Vice President, Adani Electricity Mumbai | Member |
| 10. | Shri Apurva Patel | Director, Exult Industries Ltd. Mumbai | Member |
| 11. | Shri V.M.Joshi | Adjunct Faculty. Swami Vivekananda Institute of Technology, Mumbai | Member |
| 12. | Shri Paresh Haria | General Manager PCS Technology, Mumbai | Member |
| 13. | Shri Hemant Minocha | Managing Director, Rajiv Plastics, Mumbai | Member |
| 14. | Prof.E.Narayanan | Ex-Faculty DJSCOE, Mumbai | Member |
| 15. | Shri Ramesh Vulavala | Rtd, HOD DJSCOE, Mumbai | Member |
| 16. | Dr.D.J.Shah | Ex-Principal SBMP | Member |
| 17. | Shri Milind Kamat | General Manager, Toyo Engg. Ltd., Mumbai | Member |
| 18. | Shri Harinder Salwan | Managing Director, Tircom Multimedia Pvt. Ltd. Mumbai | Member |
| 19. | Shi Ashih Tapiawala | Trainer, Vibrant Bootcamp, (Alumni) Mumbai | Member |
| 20. | Shri Ashok Mehta | Ex-Principal SBM Polytechnic | Invitee |

| | | | |
|---|---|---|---|
| 21. | Shri Vinod B.Vanvari | Head, Civil Engg.Dept. SBM Polytechnic | Member |
| 22. | ShriA.K.Chore | Head, Mechanical Engg.Deptt. SBM Polytechnic | Member |
| 23. | Shri N.D.Adate | I/c. Head, Electrical Engg.Deptt. SBM Polytechnic | Member |
| 24. | Mrs.A.A.Kulkarni | Head, Electronics Deptt. SBM Polytechnic | Member |
| 25. | Shri D.M.Karad | Head, Plastics Engg.Deptt. SBM Polytechnic | Member |
| 26. | Shri R.D.Shimpi | Head, Chemical Engg. Deptt. SBM Polytechnic | Member |
| 27. | Shri J.S.Kulkarni | Head, Computer Engg.Deptt. SBM Polytechnic | Member |
| 28. | Shri Abhijit Dongaonkar | Lecturer, IT SBM Polytechnic | Member |
| 29. | Shri S.T.Khelkar | Controller of Exam. SBM Polytechnic | Member |
| 30. | Shri Gajanan Badwe | Lecturer, Mechanical (TPO) SBM Polytechnic | Member |
| 31. | Shri L.B.Deshpnade | Lecturer, Electronics SBM Polytechnic | Convenor |

## I.3 Programme wise committee (PBOS)

| Sr. No. | Name & Office address | PBOS Designation |
|---|---|---|
| 1 | Mr. Harinder Salwan<br>Tricom Multimedia Pvt Ltd., Mumbai<br>Business Phone / Fax: +91 22 2891 7099 / 2893 2737 / 2893 6622 / 2893 8483<br>Email - md@tricom.in | Chairman |
| 2 | Mr. Ashish Tapiawala<br>Vibrant e-Technologies Pvt. Ltd., Mumbai.<br>Mobile - 09867297260<br>Email - ashisht@yahoo.com | Member (Industry) |
| 3 | Mr. Milind Ugale<br>Infinite IT Solutions Pvt. Ltd.,<br>Mumbai<br>Mobile - 09820121654<br>Email - milind.ugaley@gmail.com | Member (Industry) |
| 4 | Mr. Rahul Kashyap<br>RISK Advisory Services, Mumbai<br>Mobile -09619261911<br>Email -rahulkashyap0201@gmail.com | Member (Industry) |
| 5 | Mr. Devang Parekh<br>Accenture India, Mumbai<br>Mobile - 09820891487<br>Email - devang0704@gmail.com | Member (Alumni) |
| 6 | Mr. Jay Mehta<br>BlackCurrant Apps LLP, Mumbai<br>Mobile - 09699818273<br>Email - jay@blackcurrantapps.com | Member (Alumni) |
| 7 | Dr. Subhash Shinde<br>LT College of Engineering,<br>Navi Mumbai.<br>Mobile – 09594170066<br>Email – skshinde@rediffmail.com | Member (Academia ) |

## I.4 PROGRAMME CURRICULUM DEVELOPMENT COMMITTEE

### Institute Level Curriculum Development Cell

| Sr. No. | Name of the Faculty | Designation |
|---|---|---|
| 1 | Dr. M.Z.Shaikh,Principal | Chairman |
| 2 | Mrs. Neeta Kadukar, Vice-Principal and Head, IT Dept. | Member |
| 3 | Shri V.B.Vanvari, Head, Civil Engg.Dept. | Member |
| 4 | Shri A.K.Chore, Head, Mechanical Engg.Dept. | Member |
| 5 | Shri N.D.Adate,I/C Head, Electrical Engg.Dept. | Member |
| 6 | Mrs. A.A.Kulkarni, Head, Industrial and Digital Elex.Dept. | Member |
| 7 | Shri D.M.Karad, Head, Plastics Engg.Dept. | Member |
| 8 | Shri R.D.Shimpi, Head, Chemical Engg.Dept. | Member |
| 9 | Shri J.S.Kulkarni, Head, Computer Engg.Dept. | Member |
| 10 | Shri A.B.Dongaonkar, Lecturer, IT Dept. | Member |
| 11 | Mrs.K.P.Bhave,Lecturer,Chemistry Dept. | Member |
| 12 | Shri G.J.Badwe,Training and Placement Officer | Member |
| 13 | Shri S.T.Khelkar,Controller of Examinations | Member |
| 14 | Shri L.B.Deshpande,Lecturer,Electronics Dept. | Member Secretary |

### Department Level Committee (Department CO-Ordinators)

| Sr. No. | Name of the Faculty | Designation |
|---|---|---|
| 1 | Shri S. N. Ranshur | Lecturer, Civil Engineering |
| 2 | Shri A. S. Shukla | Lecturer, Mechanical Engineering |
| 3 | Shri D. G. Rajmandai | Lecturer, Electrical Engineering |
| 4 | Ms. P. J. Nikhade | Lecturer, Industrial/Digital Electronics |
| 6 | Shri S. A. Kamble | Lecturer, Plastics Engineering |
| 5 | Shri M. M. Belwalkar | Lecturer, Chemical Engineering |
| 7 | Shri P. H. Shah | Lecturer, Computer Engineering |
| 8 | Shri P. D. Rathod | Lecturer, Information Technology |

# Course-wise Curriculum Development Committee - SCHEME 2019

## Department of Computer Engineering

### SEMESTER I

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | EMT198901 | Engineering Mathematics | Mr. Pratik Shah | Mrs. Priti Bokariya | - | Mr. Umang Patel |
| 2 | APH198902 | Applied Physics | Mrs. Swapna Naik | Mrs. Priti Bokariya | Mrs. Abhilasha More | Mr. Manoj Jaiswar |
| 3 | CMS198903 | Communication Skills | Mrs. Radhika Patwardhan | Mrs. Prachi Arora | Mrs. Geetha S. | Ms. Shweta Salian |
| 4 | ENG198904 | Engineering Graphics | Mrs. Neha More | Mr. Pankaj Rathod | Mrs. Rupali Pawar | Dr. Rajesh Patil |
| 5 | FCS198905 | Fundamentals of Computing System | Mrs. Radhika Patwardhan | Mrs. Rupali Pawar | Mrs. Abhilasha More | Mr. Vaibhav M. Palve |
| 6 | CWP198906 | Workshop & Practice | Mr. Janardan S. Kulkarni | Mr. Abhijit Dongaonkar | Mr. Siddhesh Masurkar | Mr. Anil Gurav |
| 7 | WSD198907 | Website Designing | Mr. Manish R. Solanki | Mrs. Abhilasha V. More | Mrs. Naha More | Mr. Harinder Salwan |

### SEMESTER II

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | AMT198908 | Applied Mathematics | Mr. Pratik Shah | Mrs. Priti Bokariya | - | Mr. Umang Patel |
| 2 | EVS198909 | Environmental Studies | Mrs. Swapna Naik | Mrs. Radhika Patwardhan | Mrs. Sharyu Kadam | Mr. Vivek Shantaram Dhadam |
| 3 | DLS198910 | Development of Life Skills | Mrs. Geetha S. | Mrs. Prachi Arora | Mrs. Radhika Patwardhan | Mrs. Shweta Salian |
| 4 | BEX198911 | Basic Electronics | Mr. Abhijit Dongaonkar | Mrs. Prachi Arora | Mr. Pankaj Rathod | Mr. Umang Patel |
| 5 | PRC198912 | Programming in C | Mrs. Radhika Patwardhan | Mrs. Priti Bokariya | Mr. Manish R. Solanki | Mr. Chirag Desai |
| 6 | BEE190801 | Basics of Electrical Engineering | Mrs. Swapna Naik | Mr. Siddhesh Masurkar | Mrs. Rupali Pawar | Mr. Vijay Pawar |
| 7 | PCA190802 | PC Architecture | Mrs. Prachi Arora | Mrs. Krishna Bhatt | Mr. Siddhesh Masurkar | Mr. Rushabh Udani |

## SEMESTER III

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | FCN190803 | Fundamentals of Computer Network | Mrs. Prachi Arora | Mrs. Rupali Pawar | Mr. Siddhesh Masurkar | Mr. Siddhesh Vaidya |
| 2 | DEX198913 | Digital Electronics | Mrs. Prachi Arora | Mr. Pankaj Rathod | Mr. A.B. Dongaonkar | Mr. Umang Patel |
| 3 | CPP198914 | Programming in C++ | Mr. Manish Solanki | Mr. Pratik Shah | Ms. Priti Bokariya | Mr. Siddhesh Vaidya |
| 4 | DST198915 | Data Structure | Mrs. Radhika Patwardhan | Ms. Priti Bokariya | Mr. Pankaj Rathod | Ms. Ekta Shah |
| 5 | SPR190804 | System Programming | Mrs. Abhilasha More | Ms. Neha More | Ms. Sharyu Kadam | Prof. Bhavesh Panchal |
| 6 | EUP190805 | Event Driven & UI Programming | Mrs. Radhika Patwardhan | Mrs. Geetha S. | Mrs. Rupali Pawar | Mr. Vinod More |

## SEMESTER IV

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | FOS198916 | Fundamentals of Operating System | Mr. J. S. Kulkarni | Mrs. Radhika Patwardhan | Mrs. Swapna naik | Mr. Sanjay Deshmukh |
| 2 | MBS190806 | Microprocessor based Systems | Ms. Sharyu Kadam | Mrs. Krishna Bhatt | Mr. Manish Solanki | Dr. Prasad S. joshi |
| 3 | DBS198917 | Database Management System | Mrs. Swapna naik | Mr. Manish Solanki | Mr. A.B. Dongaonkar | Dr Nandini Chaudhary |
| 4 | PRP198918 | Programming in Python | Mr. A.B. Dongaonkar | Mr. Manish Solanki | Ms. Priti Bokariya | Ms. Ekta Shah |
| 5 | HCI198919 | Human Computer Interface | Mr. J. S. Kulkarni | Mrs. Radhika Patwardhan | Mrs. Swapna naik | Mr. M. Dhangar |
| 6 | CGR198920 | Computer Graphics | Mrs. Radhika Patwardhan | Ms. Priti Bokariya | Mr. Pankaj Rathod | Mr. Manish Salve |
| 7 | SPT190819 | Summer Inplant Training/Internship | Mr. J. S. Kulkarni | Mrs. Prachi Arora | Mr. Siddhesh Masurkar | Mr. Harinder Salwan |

## SEMESTER V

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | NWA198921 | Network Administration | Mrs. Swapna naik | Mrs. Krishna Bhatt | Mrs. Prachi Arora | Dr. Pratik Kanani |
| 2 | EMS190811 | Embedded System | Mr. Siddhesh Masurkar | Mrs. Krishna Bhatt | Ms. Sharyu Kadam | Dr. Prasad S. joshi |
| 3 | PHA190807 | Python for Hardware Applications | Mr. Siddhesh Masurkar | Mrs. Krishna Bhatt | Ms. Sharyu Kadam | Dr. Prasad S. joshi |
| 4 | LXA190808 | Linux Administration | Mr. J. S. Kulkarni | Mr. Manish Solanki | Mrs. Rupali Pawar | Ms. Heena Sarvaiya |
| 5 | MCC190809 | Mobile Computing | Mr. Pratik Shah | Mr. Pankaj Rathod | Ms. Neha More | Mr. Ashish Taldeokar |
| 6 | DBA190810 | Database Administration | Mr. A.B. Dongaonkar | Mrs. Geetha S. | Mr. Pankaj Rathod | Mr. Samip Kalamkar |
| 7 | PHP198922 | Web Development using PHP | Mr. Manish Solanki | Ms. Priti Bokariya | Mr. Pratik Shah | Mr. Sandeepraj Bhandari |
| 8 | SDM190812 | Software Development Methodologies | Mrs. Radhika Patwardhan | Mr. Manish Solanki | Mrs. Geetha S. | Mr. Bhalerao Moreshwar H. |
| 9 | TWT190813 | Technical Writing and Tools | Mr. J. S. Kulkarni | Mrs. Prachi Arora | Mrs. Geetha S. | Dr. Ramesh Vulavala |
| 10 | IPP198923 | IT Innovative Project & Practices | Mrs. Neeta Kadukar | Mr. J. S. Kulkarni | Mr. A.B. Dongaonkar | Dr M. M. Chandane |

## SEMESTER VI

| Sr. No | Course Code | Course Name | Course Expert Committee Member Internal | | | Course Expert External |
|---|---|---|---|---|---|---|
| 1 | STT190814 | Software Testing and Tools | Mrs. Abhilasha More | Ms. Sharyu Kadam | Mrs. Krishna Bhatt | Ms. Sayali Kadam |
| 2 | ANA190815 | Advanced Network Administration | Mrs. Prachi Arora | Mrs. Swapna naik | Mrs. Abhilasha More | Dr. Pratik Kanani |
| 3 | PRO190816 | Project | Mr. A.B. Dongaonkar | Mr. J. S. Kulkarni | Mrs. Neeta Kadukar | Dr. Bhavesh Patel |
| 4 | CLD198924 | Cloud Application Development | Mrs. Neeta Kadukar | Mr. J. S. Kulkarni | Mr. Pratik Shah | Mr. Tejas Shah |
| 5 | DWM198925 | Data ware Housing & Mining | Mr. A.B. Dongaonkar | Mrs. Geetha S. | Mr. Pankaj Rathod | Mr. Vaibhav Vasani |
| 6 | HTE190817 | Hacking Techniques & Ethics | Mr. Siddhesh Masurkar | Mrs. Prachi Arora | Mr. J. S. Kulkarni | Mr. Danish Khatri |
| 7 | GDD198926 | Game Design and Development | Mrs. Swapna naik | Mr. Manish Solanki | Mr. A.B. Dongaonkar | Dr Nandini Chaudhary |
| 8 | IOT198927 | IOT and Applications | Mr. J. S. Kulkarni | Mr. Siddhesh Masurkar | Ms. Sharyu Kadam | Mr. Dev Savla |
| 9 | SYS190818 | System Security | Mr. J. S. Kulkarni | Mrs. Swapna naik | Ms. Priti Bokariya | Dr. Nandini Chaudhary |
| 10 | EDC198928 | Entrepreneurship Development | Mr. A.B. Dongaonkar | Mr. J. S. Kulkarni | Mrs. Neeta Kadukar | Mr. Abhishek Chande |

CDC Co-Ordinator

(Department)

Head of the Department

POLYTECHNIC * SHRI BHAGUBHAI MAFATLAL * MUMBAI 400 056

# Certificate

The curriculum of the programme has been modified in the year 2019, as per the

Provision made in curriculum development process of Shri Bhagubhai Mafatlal Polytechnic,Mumbai.

This is the **outcome based Curriculum of Diploma in Computer Engineering programme**, which shall be implemented from academic year 2019-20.

Verified by

Department Level CDC Representative
S.B.M.Polytechnic, Mumbai.

Head of Department
Computer Engineering
S.B.M.Polytechnic, Mumbai.

Incharge, Curriculum Development Cell
S.B.M.Polytechnic, Mumbai.

Principal
S.B.M.Polytechnic, Mumbai.

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC * MUMBAI 400 056.

## APPENDIX – I

## CERTIFICATE OF BENCHMARKING OF CURRICULUM

# vibrant etechnologies pvt. ltd.

*Certificate of Benchmarking of Curriculum*

*Is hereby granted to*

*Diploma in Computer Engineering Department*

**SHRI BHAGUBHAI MAFATLAL POLYTECHNIC**

**The curriculum of Diploma in Computer Engineering is covering various thrust areas such as Systems, Applications, Network, Management, Programming, Embedded Systems, Emerging Trends & Technologies in Computing, Web Technology, Cloud Technology, Project Development & Soft Skills which fulfill industry requirements. The program qualifies the student to be absorbed as a Database Administrator, Programmer, System Network Administrator, Web Application Developer & Customer Support as per curriculum objectives (w.e.f. 2020 designed syllabus onwards) & state government guidelines for academic autonomous Diploma Courses of S.B.M. Polytechnic.**

**Therefore, the curriculum is as per industry standards.**

**For Vibrant eTechnologies Put. Ltd.**

**Ashish Tapiawala**
**Managing Director**

1A, Sukhmani Building, Above Archie's Gallery, V.P. Road, Andheri (W), Mumbai-400058
Tel.: 91-22-26286701/5066
Email : info@vibrantetech.com Website : www.vibrantetech.com



SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

**TRICOM MULTIMEDIA PRIVATE LIMITED**
Regd. Off. 1's 5, Jay Maheshwar, Bapu Bagwe Road, Dahisar West, Mumbai – 400 068.
Tel / Fax : 2893 2737 / 2893 6622 / 2891 7000 * CIN : U72300MH2010PTC199113
Email : sales@tricom.in * Web : www.tricom.in

*Certificate for Benchmarking of Curriculum*
*Is hereby granted to*
*Diploma in Computer Engineering Department*

## SHRI BHAGUBHAI MAFATALAL POLYTECHNIC

*The curriculum of Diploma in Computer Engineering is covering various thrust areas such as Systems, Applications, Network, Management, Programming, Embedded Systems, Emerging Trends & Technologies in Computing, Web Technology, Project Development & Soft Skills which fulfill industry requirements. The programme qualifies the student to be absorbed as a Service Technician Programmer as per curriculum objectives (w.e.f. 2020 designed syllabus onwards & state government guidelines for academic autonomous Diploma Courses of S.B.M. Polytechnic.*

*Therefore the curriculum is as per industry standards.*

**For Tricom Multimedia Private Limited**

**Harinder Salwan**
**Managing Director**

Your single point destination for getting Software Compliant.

**THE MULTIMEDIA TRENDSETTERS**

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

DATE:26th
December 2020

Blackcurrant Labs Pvt Ltd.

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## Acknowledgement for Benchmarking of Curriculum of Diploma in Computer Engineering

## offered by Shri Bhagubhai Mafatlal Polytechnic

**The curriculum of Diploma in Computer Engineering is updated and and at-par with various practiced technologies in the industry that foster skills of Software Development, Project Management and other soft skills that fulfill industry requirements.**

**The syllabus qualifies the student to be absorbed as a Service Technician Programmer as per curriculum objectives (w.e.f 2020 designed syllabus onwards & state government guidelines for academic autonomous Diploma Courses of S.B.M. Polytechnic. Therefore the curriculum is as per industry standards.**

**Jay Mehta,**
**Managing Director & CEO,**
**Blackcurrant Labs Pvt. Ltd.**

Blackcurrant Labs Pvt. Ltd.
203, Techno IT Park, New Link Rd, near Eskay Resort, Borivali West, Mumbai, Maharashtra 400091. - contact@blackcurrantapps.com - +91 9699818273



SHRI BHAGUBHAI MAFATLAL POLYTECHNIC * MUMBAI 400 056.

## APPENDIX-II

**PROGRAMME - COMPUTER ENGINEERING**
**MAPPING MATRIX OF PO'S, PSO's AND CO'S:**
**Semester - I**

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Engineering Mathematics EMT198901 | C101.1 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C101.2 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C101.3 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C101.4 | 3 | 2 | | | | | 1 | 1 | 1 |
| | Avg. of C101 | 3 | 2 | | | | | 1 | 1 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Applied Physics APH198902 | C102.1 | 3 | | | 1 | | | | 1 | |
| | C102.2 | 3 | 2 | | 2 | | | | 1 | |
| | C102.3 | 3 | | | | | | | 1 | |
| | C102.4 | 3 | 1 | | 2 | | | | 1 | |
| | C102.5 | 3 | 3 | | 2 | | | | 1 | |
| | C102.6 | 3 | 2 | | 2 | | | | 1 | |
| | Avg. of C102 | 3 | 2 | | 1.8 | | | | 1 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Communication Skills CMS198903 | C103.1 | 3 | | | | | 1 | 1 | 1 | 1 |
| | C103.2 | 3 | 1 | | | | 1 | 1 | 1 | 1 |
| | C103.3 | 2 | | | | | 1 | 1 | 1 | 1 |
| | C103.4 | 3 | | | 1 | | 1 | 1 | 1 | 1 |
| | C103.5 | 3 | 1 | | | | 2 | 2 | 1 | 1 |
| | Avg. of C103 | 2.8 | 1 | | 1 | | 1.2 | 1.2 | 1 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Engineering Graphics ENG198904 | C104.1 | 3 | | | 1 | | | 1 | 1 | |
| | C104.2 | 3 | | 1 | 1 | | | 1 | 1 | |
| | C104.3 | 2 | | 1 | | | | 1 | 1 | |
| | C104.4 | 2 | | 1 | | | | 1 | 1 | |
| | Avg. of C104 | 2.5 | | 1 | 1 | | | 1 | 1 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Fundamentals of Computing System FCS198905 | C105.1 | 3 | | | | | | 1 | 1 | 1 |
| | C105.2 | 3 | 1 | | 1 | | | 1 | 2 | 1 |
| | C105.3 | 3 | | | | | | 1 | 1 | 1 |
| | C105.4 | 1 | | | 1 | | | 1 | 1 | |
| | Avg. of C105 | 2.5 | 1 | | 1 | | | 1 | 1.25 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Workshop & Practises CWP198906 | C106.1 | 3 | | | 1 | | | | 1 | 1 |
| | C106.2 | 3 | | | 1 | | | | 1 | 1 |
| | C106.3 | 3 | 1 | | | | | 1 | 1 | 1 |
| | C106.4 | 3 | 1 | | 1 | | | 1 | 1 | 1 |
| | Avg. of C106 | 3 | 1 | | 1 | | | 1 | 1 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Web Designing WSD198907 | C107.1 | 3 | | | | | 1 | 1 | 3 | |
| | C107.2 | 3 | | 3 | | | 1 | 1 | 3 | |
| | C107.3 | 3 | | 3 | | | 1 | 1 | 3 | |
| | C107.4 | 3 | 2 | 3 | | | 1 | 1 | 3 | |
| | Avg. of C107 | 3 | 2 | 3 | | | 1 | 1 | 3 | |

**Semester - II**

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Applied Mathematics AMT198908 | C108.1 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C108.2 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C108.3 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C108.4 | 3 | 2 | | | | | 1 | 1 | 1 |
| | C108.5 | 3 | 2 | | | | | 1 | 1 | 1 |
| | Avg. of C108 | 3 | 2 | | | | | 1 | 1 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Environment Studies EVS198909 | C109.1 | 2 | | | | 3 | | 1 | | 1 |
| | C109.2 | 2 | | | | 3 | | 1 | | 1 |
| | C109.3 | 2 | | | | 3 | | 1 | | 1 |
| | C109.4 | 2 | | | | 3 | | 1 | | 1 |
| | C109.5 | 2 | | | | 3 | | 1 | | 1 |
| | Avg. of C109 | 2 | | | | 3 | | 1 | | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Development of Life Skills DLS198910 | C110.1 | 2 | 1 | | | | 2 | 2 | 1 | 1 |
| | C110.2 | 2 | 1 | | | | 2 | 2 | 1 | 1 |
| | C110.3 | 2 | 1 | | | | 3 | 2 | 1 | 1 |
| | C110.4 | 2 | 1 | | | | | 2 | 1 | 1 |
| | Avg. of C110 | 2 | 1 | | | | 2.33 | 2 | 1 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Basics Electronics BEX198911 | C111.1 | 3 | | | | | | | 1 | |
| | C111.2 | 3 | | | | | | 1 | 1 | |
| | C111.3 | 3 | | | | | | 1 | 1 | |
| | C111.4 | 3 | | | | | | | 1 | |
| | Avg. of C111 | 3 | | | | | | 1 | 1 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Programming in C PRC198912 | C112.1 | 3 | 1 | 1 | 1 | | | 1 | 3 | |
| | C112.2 | 3 | 1 | 1 | 1 | | | 1 | 3 | |
| | C112.3 | 3 | 1 | 1 | 1 | | | 1 | 3 | |
| | C112.4 | 3 | 1 | 2 | 1 | | | 1 | 3 | |
| | Avg. of C112 | 3 | 1 | 1.25 | 1 | | | 1 | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Basics of Electrical Engineering BEE190801 | C113.1 | 3 | | | | | | | 2 | |
| | C113.2 | 3 | | | | | | | 2 | |
| | C113.3 | 3 | 2 | | 2 | | | | 2 | |
| | C113.4 | 3 | | | | | | | 2 | |
| | Avg. of C113 | 3 | 2 | | 2 | | | | 2 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| PC Architecture PCA190802 | C114.1 | 3 | | | | | | 2 | 2 | |
| | C114.2 | 3 | | | | | | 2 | 2 | |
| | C114.3 | 3 | | | | | | 2 | 2 | |
| | C114.4 | 3 | | | 2 | | | 2 | 2 | |
| | Avg. of C114 | 3 | | | 2 | | | 2 | 2 | |

**Semester – III**

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Fundamentals of Computer Netwrok FCN190803 | C201.1 | 3 | | | | | | | | 3 |
| | C201.2 | 3 | | | | | | | | 3 |
| | C201.3 | 3 | 1 | 1 | | | | | | 3 |
| | C201.4 | 2 | 2 | 3 | 1 | | | | | 3 |
| | Avg. of C201 | 2.75 | 1.5 | 2 | 1 | | | | | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Digital Electronics DEX198913 | C202.1 | 3 | | | | | | | 2 | |
| | C202.2 | 2 | 1 | | 1 | | | | 2 | |
| | C202.3 | 2 | 1 | | | | | | 2 | |
| | C202.4 | 3 | | 1 | | | | 1 | 3 | |
| | Avg. of C202 | 2.5 | 1 | 1 | 1 | | | 1 | 2.25 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Programming in c++ CPP198914 | C203.1 | 3 | 1 | 1 | 1 | | 1 | 1 | 3 | |
| | C203.2 | 3 | 1 | 1 | 1 | | 1 | 1 | 3 | |
| | C203.3 | 3 | | | | | 1 | 1 | 3 | |
| | C203.4 | 3 | 1 | 1 | 1 | | 1 | 1 | 3 | |
| | C203.5 | 3 | | | | | 1 | 1 | 3 | |
| | Avg. of C203 | 3 | | 1.4 | 2 | | | | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Data Structure DST198915 | C204.1 | 2 | 1 | | | | | 2 | 3 | 1 |
| | C204.2 | 3 | 1 | 2 | | | | 1 | 3 | 1 |
| | C204.3 | 3 | 1 | | | | | 1 | 3 | 1 |
| | C204.4 | 3 | 2 | 2 | | | | 2 | 3 | 1 |
| | Avg. of C204 | 2.75 | 1.25 | 2 | | | | 1.5 | 3 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| System Programming SPR190804 | C205.1 | 3 | | | | | | | 2 | |
| | C205.2 | 3 | | | | | | | 2 | |
| | C205.3 | 3 | 2 | | 1 | | | 1 | 2 | |
| | C205.4 | 3 | | | | | | | 2 | |
| | Avg. of C205 | 3 | 2 | | 1 | | | 1 | 2 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Event Driven & UI Programming EUP190805 | C206.1 | 3 | 1 | 1 | 2 | | | 1 | 3 | |
| | C206.2 | 3 | 2 | 2 | 2 | | | 1 | 3 | |
| | C206.3 | 2 | 2 | 2 | 2 | | | 1 | 3 | |
| | C206.4 | 3 | 2 | 2 | 2 | | | 1 | 3 | |
| | C206.5 | 3 | 2 | 2 | 2 | | | 1 | 3 | |
| | Avg. of C206 | 2.8 | 1.8 | 1.8 | 2 | | | 1 | 3 | |

**Semester – IV**

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Fundamentals of Operating System FOS198916 | C207.1 | 3 | 1 | | 1 | | 1 | 1 | 3 | |
| | C207.2 | 3 | 2 | | | | 1 | 1 | 3 | |
| | C207.3 | 3 | | | | | 1 | 1 | 3 | |
| | C207.4 | 3 | | | | | 1 | 1 | 3 | |
| | C207.5 | 3 | | | | | | | 3 | |
| | Avg. of C207 | 3 | 1.5 | | 1 | | 1 | 1 | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Microprocessor based system MBS190806 | C208.1 | 3 | 1 | | 2 | | | 2 | 3 | |
| | C208.2 | 3 | | | | | | 1 | 3 | |
| | C208.3 | 3 | 2 | 2 | 1 | | | 2 | 3 | |
| | C208.4 | 3 | | | | | | 1 | 3 | |
| | Avg. of C208 | 3 | 1.5 | 2 | 1.5 | | | | 1.5 | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Database Management System DBS198917 | C209.1 | 3 | | | | | | | | 3 |
| | C209.2 | 2 | 2 | 3 | 2 | | | | | 3 |
| | C209.3 | 2 | 3 | 1 | 2 | | | | | 3 |
| | C209.4 | 3 | | | | | | | | 2 |
| | Avg. of C209 | 2.5 | 2.5 | 2 | 2 | | | | | 2.75 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Programming in Python PRP198919 | C210.1 | 2 | | | | | 1 | 2 | 3 | 1 |
| | C210.2 | 3 | 2 | 1 | 1 | | 1 | 2 | 3 | 1 |
| | C210.3 | 3 | 2 | 1 | 1 | | 1 | 2 | 3 | 1 |
| | C210.4 | 3 | 2 | 1 | 1 | | 1 | 2 | 3 | 1 |
| | C210.5 | 3 | 2 | 2 | 1 | | 2 | 2 | 3 | 1 |
| | Avg. of C210 | 2.8 | 2 | 1.25 | 1 | | 1.2 | 2 | 3 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Human Computer Interface HCI198919 | C211.1 | 1 | | | 1 | | | | 3 | |
| | C211.2 | 2 | 1 | 2 | 1 | | | | 3 | |
| | C211.3 | 2 | 1 | 3 | 2 | | | | 3 | |
| | C211.4 | 2 | 2 | 3 | 2 | | | | 3 | |
| | Avg. of C211 | 1.75 | 1.33 | 2.66 | 1.5 | | | | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Computer Graphics CGR198920 | C212.1 | 2 | | | | | | | 1 | |
| | C212.2 | 3 | 1 | 2 | | | | | 3 | |
| | C212.3 | 2 | 1 | 2 | | | | | 2 | |
| | C212.4 | 2 | 2 | 2 | | | | | 2 | |
| | C212.5 | 2 | | | | | | | 1 | |
| | Avg. of C212 | 2.2 | 1.33 | 2 | | | | | 1.8 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Summer Inplant Training/ Intership SPT190819 | C213.1 | | 3 | 2 | 1 | 2 | | | 3 | 3 |
| | C213.2 | 1 | | | | | 2 | 3 | 3 | 3 |
| | C213.3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 |
| | C213.4 | | | | | 3 | 2 | 3 | 3 | 3 |
| | Avg. of C213 | 1 | 2 | 1.5 | 1 | 2 | 2 | 3 | 3 | 3 |

## Semester – V

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Network Administration NWA198921 | C301.1 | 2 | | 1 | 1 | | | 2 | | 2 |
| | C301.2 | 3 | 1 | | | 1 | | | | 3 |
| | C301.3 | 3 | 2 | 2 | 2 | | 1 | 2 | | 3 |
| | C301.4 | 3 | | 1 | 2 | | | 2 | | 3 |
| | Avg. of C301 | 2.75 | 1.5 | 1.33 | 1.66 | 1 | 1 | 2 | | 2.75 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Embedded Systems EMS190811 | C302.1 | 3 | | | | | | | 3 | |
| | C302.2 | 3 | 2 | 2 | 2 | | | | 3 | |
| | C302.3 | 3 | | | | | | | 3 | |
| | C302.4 | 3 | | | | | | | 3 | |
| | C302.5 | 3 | | | | | | | 3 | |
| | Avg. of C302 | 3 | 2 | 2 | 2 | | | | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Python for Hardware Application PHA190807 | C303.1 | | | 2 | 2 | | | | 3 | |
| | C303.2 | 2 | | | | | | | 3 | |
| | C303.3 | 1 | 2 | | 2 | | | | 3 | |
| | C303.4 | | | 2 | 3 | 1 | | 1 | 3 | |
| | Avg. of C303 | 1.5 | 2 | 2 | 2.33 | 1 | | 1 | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Linux Administration LXA190809 | C304.1 | 3 | | | 1 | | 1 | 1 | | 3 |
| | C304.2 | 3 | | | 2 | | | 1 | | 3 |
| | C304.3 | 3 | 1 | 1 | 2 | | | 2 | | 3 |
| | C304.4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | | 3 |
| | C304.5 | 3 | | 2 | 2 | | | 1 | | 3 |
| | Avg. of C304 | 3 | 1.5 | 1.66 | 1.8 | 2 | 1.5 | 1.4 | | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Mobile Computing MCC190809 | C305.1 | 3 | | | | | | 1 | 3 | |
| | C305.2 | 3 | | | 1 | | 1 | 2 | 1 | |
| | C305.3 | 3 | 1 | | | 1 | | | 2 | 1 |
| | C305.4 | 3 | 1 | 3 | 2 | | 2 | 2 | 3 | |
| | Avg. of C305 | 3 | 1 | 3 | 1.5 | 1 | 1.5 | 1.66 | 2.25 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Database Administration DBA190810 | C306.1 | 3 | | | | | | | | 3 |
| | C306.2 | | | | 3 | | | | | 3 |
| | C306.3 | | 3 | 1 | 2 | | | | | 3 |
| | C306.4 | | 2 | 1 | | | | | | 3 |
| | Avg. of C306 | 3 | 2.5 | 1 | 2.5 | | | | | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Web Development using PHP PHP198922 | C307.1 | 3 | | 1 | 1 | | | | 3 | |
| | C307.2 | 3 | | 1 | 3 | | | | 3 | |
| | C307.3 | 3 | | 2 | 3 | | | | 3 | |
| | C307.4 | 3 | | 3 | 2 | | 2 | 1 | 3 | |
| | Avg. of C307 | 3 | | 1.75 | 2.25 | | 2 | 1 | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Software Development Methodologies SDM190812 | C308.1 | 2 | 3 | 2 | | | | | 3 | |
| | C308.2 | 3 | 3 | 2 | | | | 1 | 3 | |
| | C308.3 | 3 | | | 3 | | 2 | 1 | 3 | |
| | C308.4 | 3 | 2 | | | | | 1 | 2 | |
| | Avg. of C308 | 2.75 | 2.66 | 2 | 3 | | 2 | 1 | 2.75 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Technical Writing and Tools TWT190813 | C309.1 | 2 | | | | | | | 2 | |
| | C309.2 | 2 | | | | | | | 2 | |
| | C309.3 | | | | 2 | | | | | 2 |
| | C309.4 | | | | 2 | | | | | 2 |
| | Avg. of C309 | 2 | | | 2 | | | | 2 | 2 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| IT Innovative Project & Practices IPP198923 | C310.1 | 2 | 2 | 2 | | 1 | | 2 | 3 | 3 |
| | C310.2 | 1 | | 1 | | | 2 | 2 | 2 | 2 |
| | C310.3 | | 1 | | 1 | | 2 | 2 | 2 | 2 |
| | C310.4 | | | 1 | | 1 | 2 | 2 | 3 | 3 |
| | Avg. of C310 | | | | | | | | | |

**Semester – VI**

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Software Testing and Tools STT190814 | C311.1 | 2 | | | 1 | | | | | 1 |
| | C311.2 | 1 | 1 | | 2 | | | | | 1 |
| | C311.3 | 1 | 1 | | 2 | | | | | 1 |
| | C311.4 | 1 | 1 | 3 | 3 | | | 2 | | 1 |
| | Avg. of C311 | 1.25 | 1 | 3 | 2 | | | 2 | | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Advanced Network Administration ANA190815 | C312.1 | 3 | 1 | | 2 | | | 1 | 1 | 3 |
| | C312.2 | 3 | | | 1 | | | | | 3 |
| | C312.3 | 3 | 1 | 2 | | | | 2 | | 3 |
| | C312.4 | 3 | 1 | | 2 | 2 | | 2 | 1 | 3 |
| | Avg. of C312 | 3 | 1 | 2 | 1.66 | 2 | | 1.66 | 1 | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Project PRO190816 | C313.1 | 1 | 3 | | | 2 | 2 | 1 | 3 | 3 |
| | C313.2 | | 2 | | | | 3 | 1 | 3 | 3 |
| | C313.3 | | 2 | 3 | 3 | | 3 | 3 | 3 | 3 |
| | C313.4 | | | | 1 | | 3 | 1 | 3 | 3 |
| | Avg. of C313 | 1 | 2.33 | 3 | 2 | 2 | 3.66 | 1.5 | 3 | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Cloud Application Development CLD198924 | C314.1 | 3 | 1 | 1 | 1 | | 1 | 2 | 3 | 1 |
| | C314.2 | 3 | 1 | 3 | 2 | 1 | 2 | 2 | 3 | |
| | C314.3 | 3 | 1 | 1 | 2 | 1 | | 1 | 3 | 1 |
| | C314.4 | 3 | | | | | | 1 | 3 | |
| | Avg. of C314 | 3 | 1 | 1.66 | 1.66 | 1 | 1.5 | 1.5 | 3 | 1 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Data ware Housing & Mining DWM198925 | C315.1 | 2 | | | | | | | | 1 |
| | C315.2 | 2 | | 2 | 3 | | | 1 | | 3 |
| | C315.3 | 2 | 2 | 3 | 2 | | | 1 | | 3 |
| | C315.4 | 2 | 2 | | | | | 1 | | 2 |
| | Avg. of C315 | 2 | 2 | 2.5 | 2.5 | | | 1 | | 2.25 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Hacking Techniques & Ethics HTE190817 | C316.1 | | 3 | 1 | | | | | | 3 |
| | C316.2 | | 2 | | 3 | | | | | 3 |
| | C316.3 | 1 | 2 | | 3 | | | | | 3 |
| | C316.4 | | | | 3 | | | | | 3 |
| | C316.5 | | 3 | | | | | | | 3 |
| | Avg. of C316 | 1 | 2.5 | 1 | 3 | | | | | 3 |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Game Design and Development GDD198926 | C317.1 | 3 | | | | | | | 3 | |
| | C317.2 | 3 | | 2 | 2 | | | | 3 | |
| | C317.3 | 3 | | 2 | 2 | | | | 3 | |
| | C317.4 | 3 | | 1 | | | | | 3 | |
| | Avg. of C317 | 3 | | 1.66 | 2 | | | | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| IOT and Applications IOT198927 | C318.1 | 1 | 3 | | | | | | 3 | |
| | C318.2 | | | 2 | 3 | | | | 3 | |
| | C318.3 | 2 | | 1 | | | | | 3 | |
| | C318.4 | | | | 3 | | | | 3 | |
| | Avg. of C318 | 1.5 | 3 | 1.5 | 3 | | | | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| System Security SYS190818 | C319.1 | 2 | 3 | | | | | 1 | 3 | |
| | C319.2 | 3 | | 3 | | | | 1 | 3 | |
| | C319.3 | 3 | 1 | 3 | 2 | | | 1 | 3 | |
| | C319.4 | 2 | 3 | | | | | 1 | 3 | |
| | Avg. of C319 | 2.5 | 2.33 | 3 | 2 | | | 1 | 3 | |

| Course Name and Code | Course Outcomes | Programme Outcomes | | | | | | | Programme Specific Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 |
| Entrepreneurship Development EDC198928 | C320.1 | 3 | 1 | | | 2 | 1 | 2 | 2 | 2 |
| | C320.2 | 3 | 2 | 2 | | 1 | 1 | 2 | 3 | 3 |
| | C320.3 | 3 | | | 1 | | | 1 | 1 | 1 |
| | C320.4 | 3 | 1 | | 1 | | 1 | 1 | 2 | 2 |
| | C320.5 | 3 | 1 | 1 | | 1 | | 1 | 1 | 1 |
| | Avg. of C320 | | | | | | | | | |