Government Polytechnic Mumbai

(Academically Autonomous Institute of Maharashtra Government)
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Programme: Computer Engineering **Sixth Semester** **With effect from 2018-19**

Course Code	Course Title	C/ O	Teaching Scheme				Credits	Examination Scheme					
			L	P	TU	Total		Theory		PR	OR	TW	Total
								TH	TS				
CO16410	Software Testing	C	03	02	--	05	05	70	30	--	50*	--	150
CO16411	Computer Security	C	03	02	--	05	05	70	30	50	--	--	150
CO16412	Data Analytics Using R	C	03	02	--	05	05	70#	30	50*	--	--	150
CO16413	Network Management & Administration	C	03	02	--	05	05	70	30	--	50*	--	150
CO16414	Robotics	Elective II	01	04	--	05	05	--	--	--	50***	50***	100
CO16415	Cloud Application							--	--	50	--	50	
CO16416	Multimedia And Animation												
CO16417	Linux Administration	C	01	02	--	03	03	--	--	--	--	50	50
CO16308	Project and Seminar Stage II	C	--	04	--	04	04	--	--	--	50*	50*	100
CO16420	** Industrial Training-II	C	--	02	--	02	02	--	--	--	25	25	50
Total			**14**	**20**	**--**	**34**	**34**	**280**	**120**	**150**	**175**	**175**	**900**

Abbreviations: C- Compulsory; O- Optional; L- Theory Lecture; P-Practical; TU-Tutorial; TH- Theory Paper; TS- Term Tests (02); PR-Practical Exam; OR-Oral Exam; TW- Term Work *Indicates assessment by Internal & External Examiners. # Indicates Online Examination. **indicates course to be completed during Winter Vacation after Third Semester ***applicable if it is offered

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Head of Department

Principal

Programme: **Diploma in Computer Engineering**												
Course Code: **CO16410**				Course Title: **Software Testing**								
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
03	**--**	**02**	**05**	**3 hrs**	**1 hr 15 min**	**--**	**70**	**30**	**--**	**50***	**--**	**150**
(*) indicates assessment by Internal and External examiners.												

Rationale:

Software Testing is the process of verifying a system with the purpose of identifying any errors, gaps or missing requirement versus the actual requirement. Software Testing is important because software bugs could be expensive or even dangerous. Learning this subject will help students to plan effective test approach and to find bugs in earlier phase of Software Development. Also this subject will introduce Automation testing which will utilize student's creativity to explore new ways to test a system, and thus student will spend less time as a tester and more time being the Quality Analyst.

Course Outcomes:

The student will be able to:

CO1	Learn various types and levels of Software Testing.
CO2	Develop the skills necessary to find the bugs.
CO3	Learn how to effectively plan the Test.
CO4	Use testing skills to test the software for Compatibility and Usability.
CO5	Use various automated testing tools for Testing the Software.

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Reference Books:

Sr. No.	Book Title	Author	Publication
01	Cryptography and Network Security	AtulKahate	Tata McGraw Hill
02	Computer Security Principles and Practices	William Stallings, Lawrie Brown	Pearson Education
03	Computer Security	Dieter Gollman	Wiley India Education (Second Edition)
04	Principles of Computer Security Security + and Beyond	Wm. Arthur Conkin Dwayne Williams Gregory B. White Roger L. Davis Chuck Cothren	McGraw Hill Technology Education international Edition 2005
05	Cryptography and Security	C K Shyamala, N Harini, Dr. T. R. Padmanabhan	Wiley India

Website:

1. http://www.pgpi.org/doc/pgpintro
2. http://www.emailtrackerpro.com
3. http://www.kmint21.com
4. http://www.jjtc.com/Steganography/tools.ht

Course Curriculum Development Committee:+

a. **Internal Faculty**
   1. Mrs. Rupali Molawade (Lecturer in Computer Engineering, Govt. Polytechnic, Mumbai)
   2. Mr. Bhavik Rana (Visiting Faculty, Computer Engineering Dept, Govt. Polytechnic, Mumbai)

b. **External Faculty**
   1. Mrs. S.Y.Birla (Lecturer in Information Technology, Govt. Polytechnic, Thane)

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Programme Code: CO												
Course Code: CO16412				Course Title: Data Analytics using R								
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
03	--	02	05	--	--	--	70#	30	50*	--	--	150
(*) indicates assessment by Internal and External examiners.												

Rationale :

Data Analytics is the process of examining data sets in order to draw conclusions about the information they contain, with the aid of specialized system and software. This course introduces the most popular data analytics tool 'R'. The R language is widely used among statisticians and data miners for developing statistical software and data analysis. 'R' is rapidly becoming a leading language in data science and statistics.

Course Outcomes :

The student will be able to:

CO1	Identify the job responsibilities in Data Science area.
CO2	Create and manipulate different R objects.
CO3	Perform different operations on R data structures.
CO4	Import data from various editors, database, web and manipulate it.
CO5	Show data in statistical form.
CO6	Develop application using object oriented capabilities of R.

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Course Contents

Topic No.	Contents
1.	**Introduction to Data Science** 1.1 Data Science Basics 1.2 Components of Data Science 1.2.1 Big Data 1.2.2 Data Mining 1.2.3 Data Analytics 1.2.4 Machine Learning 1.3 Problem Solving steps in Data Science 1.3.1 Collecting data 1.3.2 Pre-processing data 1.3.3 Analyzing data 1.3.4 Driving insights and generating reports 1.3.5 Taking decision based on insights 1.4 Job roles in Data Science Industry
2	**R Programming Fundamentals** 2.1 Overview of R Language 2.2 Features of R 2.3 Data types and Objects 2.3.1 Vectors 2.3.1.1 Vector operations 2.4 Working with variables 2.5 Operators 2.5.1 Arithmetic 2.5.2 Logical 2.5.3 Relational 2.5.4 Assignment 2.6 Control Structures 2.6.1 if-else 2.6.2 For loop 2.6.3 While loop 2.6.4 Repeat loop 2.6.5 Next, break 2.7 Functions in R 2.7.1 Built-in Function 2.7.2 User defined Function 2.7.3 Lazy Evaluation of function 2.8 Strings and Dates

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3	**Data Structures in R** 3.1 Lists 3.1.1 Operations and element manipulations 3.2 Matrices 3.2.1 Operations on elements in Matrix. 3.3 Arrays 3.3.1 Array Operations and elements manipulations 3.4 Factors 3.5 Dataframes 3.5.1 Data Reshaping 3.5.1.1 Joining columns and rows 3.5.1.2 Merge dataframes. 3.5.1.3 Melting and Casting
4	**Working with Data** 4.1 Writing and reading data objects to R file 4.2 Import and Export data to/from CSV file 4.3 Import and Export data to/from Excel file 4.4 Import data from Web and manipulate it 4.5 Database connectivity via ODBC 4.5.1 Import data, perform different operation on it 4.5.2 Export data to database 4.6 Import XML file. 4.6.1 Convert XML file to dataframe 4.7 Graphical data analysis 4.7.1 Pie chart 4.7.2 Bar Chart 4.7.3 Histogram 4.7.4 Boxplot 4.7.5 Line graph
5	**Advanced R programming** 5.1 Mean, Mode, Median 5.2 Regression 5.2.1 Linear Regression 5.2.2 Multiple Regression 5.3 Object oriented programming in R 5.3.1 S3 and S4 classes.

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List of Practical:-

Sr.No.	Experiment	Approx. Hours
1	Perform R program to 1) Create two vectors. 2) Perform various arithmetic, logical and relational operations on it.	2
2	Perform R Program to 1) Find factorial of given number. 2) Generate multiplication table for given number.	2
3	Develop R program script using *for, while* loop that 1) Prints the value of i from 1 to 10 and their square roots. 2) Prints Fibonacci series	2
4	Develop R program to create List that stores student marks. Perform following operations on List: 1) Print List. 2) Access marks from user specified position. 3) Find sum of all marks in List.	2
5	Develop R program to create 1) List and matrix. 2) Find the maximum and minimum values among all three with their index position.	2
6	Perform R program to create 1) List and Data frame containing numeric vector and matrices. 2) Perform different arithmetic operations on it.	2
7	Perform R program to create 1) Recursive functions. 2) Perform *trace* and *browse* operations on it.	2
8	Perform R program to create 1) Vector, matrix and factor in R. 2) Save all three objects using *save()* function. 3) Remove the matrix and again load it using *load()* function.	2
9	Develop R program to import and manipulate CSV file in notepad.	2
10	Develop R program to connect to database and manipulate data.	2
11	Develop R program to import data from web and manipulate it.	2
12	Develop R program to create Pie Chart, Bar Chart and Histogram for given vector.	2
13	Develop R program to:	2

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	1) Create S3 class and object. 2) Create S3 function.	
14	Develop R program to implement inheritance.	2
15	Mini Project	4
Total		**32**

Specification Table:

Unit No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	**Introduction to Data Science**	8	4	4		8
2.	**R Programming Fundamentals**	10	4	8	6	18
3.	**Data Structures in R**	10	4	8	6	18
4.	**Working with Data**	10	4	4	6	14
5.	**Advanced R programming**	10	4	8		12
	Total	**48**	**20**	**32**	**18**	70

Reference Books:

Sr. No.	Book Title	Author	Publication
01	R for beginners	SandipRakshit	Tata McGraw Hill
02	R for Data Analysis	Mike McGrath	

Course Curriculum Development Committee:

a. **Internal Faculty**
MrsVrushali Ashok Patil(Lecturer in Computer Engineering, Govt. Polytechnic, Mumbai)

b. **External Faculty**
Prof. H. D. Gadade (Asst. Professor in Computer Engineering, Government College of Engineering, Jalgaon)

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Programme Code: CO												
Course Code:CO16413				Course Title: Network Management & Administration								
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
03	--	02	05	3 hrs	1hr 15min	--	70	30	--	50*	--	150
(*) indicates assessment by Internal and External examiners.												

Rationale:

Computer networks are critical parts of almost every organization. Network and computer systems administrators are responsible for the day-to-day operation of these networks. They organize, install, and support an organization's computer systems, including LANs, WANs, network segments, intranets, and other data communication systems. Network management is the process of administering and managing computer networks. It includes fault analysis, performance management, provisioning of networks and maintaining the quality of service. The focus of the course is on principles, architectures, and protocols used in modern networked systems and provide concrete experience of the challenges through a series of lab exercises. This subject covers TCP/IP, ARP, ICMP, Application Layer Protocol configuration.

Course Outcomes:

After successfully completing the course students will be able to

CO1	List the layers of the TCP/IP model and describe the function of each layer
CO2	Identify the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;
CO3	Configure Static as well as Dynamic IP Addresses.
CO4	Configuration and use of various Protocol
CO5	Monitor network traffic for performance bottlenecks & give appropriate response.

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Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction to Network Protocols** **1.1 Transport control protocol (TCP)** 1.1.1 Protocol: Definition and Need of Protocol. 1.1.2 Protocol Suite: TCP/IP Architecture. 1.1.3 Standards of Communication: IETF, IEEE, ITU-T and PSTN 1.1.4 Layer wise protocol names and its Application **1.2 User Datagram Protocol (UDP)** 1.2.1 Introduction 1.2.2 The User Datagram Protocol Architecture 1.2.3 Format Of UDP Messages 1.2.4 Encapsulation And Protocol Layering
2	**Introduction to IP Addresses** 2.1 Introduction, Working, Structural diagram and Comparison of: IPv4, IPv6. IP v4 packet & addressing, IPv6 packet & addressing 2.2 Classfull & classless addressing, CIDR, Transition from IPv4 to IPv6, subnetting, supernetting, Loopback Address
3	**ARP Protocol** 3.1 Mapping Internet Addresses To Physical Addresses (ARP) 3.2 Introduction, The Address Resolution Problem, ARP Protocol Format. 3.3 Determining An Internet Address At Startup (RARP) 3.4 Introduction,. Reserve Address Resolution Protocol (RARP),
4	**ICMP Protocol** 4.1. Introduction, 4.2. The Internet Control Message Protocol, Error Reporting vs. Error Correction, 4.3. ICPM Message Delivery, ICPM Message Format 4.4. Connectionless Datagram Delivery 4.4.1. The Concept Of Unreliable Delivery, , 4.4.2. Connectionless Delivery System, 4.4.3. The Internet Datagram, Internet Datagram Options
5	**IP Routing** 5.1. Routing In An Internet, Direct And Indirect Delivery, 5.2. Table-Driven IP Routing, Next-Hop Routing, Default Routes, Host-Specific Routes, 5.3. Establishing Routing 5.4. Original Internet Architecture And Cores, Core Routers, Beyond The Core Architecture To Peer Backbones 5.5. Automatic Route Propagation, Vector Distance (Bellman – Ford) Routing, 5.6. Interior Routing Protocol (RIP, OSPF, Eigrp) 5.7. Gateway- To-Gateway Protocol (GGP), GGP Message Format, SPF Protocols.

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	5.8. Exterior Gateway Protocol (EGP), 5.9. Congestion And Datagram Flow Control, Source Quench Format, 5.10. Route Change Requests From Routers, Detecting Circular Or Excessively Long Routers, Reporting Other Problems, Clock Synchronization And Transit Time Estimation, 5.11. Information Request And Reply Messages
6	**Application Layer Protocol** 6.1 Working, Structural diagram and application of each Protocol: HTTP, HTTPS, FTTP, SMTP, SNMP, WWW, Telnet, NTP, DHCP, DNS.

Suggested Specifications Table with Hours and Marks (Theory):

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	**Introduction to Network Protocols**	08	2	4	6	12
2	**Introduction to IP Addresses**	10	2	4	6	12
3	**ARP Protocol**	08	2	4	6	12
4	**ICMP Protocol**	06	2	4	4	10
5	**IP Routing**	08	4	4	6	14
6	**Application Layer Protocol**	08	2	2	6	10
	Total	**48**	**14**	**22**	**34**	**70**

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: *This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.*

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List of experiments/Assignments: (any 12 experiments)

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	Installation and configuration of Linux-server OR Windows server 8/ latest and client	02
2	2	Create client-server network for 1+10 pc in your Lab using private IP Addresses form Class A,B,C. (IPv4) AND IPv6. Test and Verify Network Connectivity	02
3	2	Installation and configuration SQL-Server on client-server network	02
4	2	Create network using subnet mask to prepare small network inside larger network (logical grouping of connected network devices) (IPv4/IPv6)	02
5	3,5	Use of Address Resolution Protocol (ARP) Work connected network devices.(arp command) AND Use of ICMP protocol in Network . (icmp, ping command)	02
6*	4	Configure Virtual LAN and verify communication between two VLANs (int, vlan, Switchport mode)	02
7*	4	Configure NAT (Network address translation) (nat, ipnat inside source static)	02
8*	3	Remote loging in of one computer with another computer and device to device.(ssh for linux /telnet/ teamviewer, anydesk) and IOS up gradation using TFTP Server (Switch and Router)	02
9*	7	Tunneling of protocols GRE Tunnel Configuration	02
10*	6	Password Configuration and recovery on Virtual terminal (Switch, Router)	02
11*	7	Configure rip, eigrp, ospf routing protocol.(interface, router, network, showip route)	02
12*	8	Configuration of SMTP, SNMP protocol and email is to be sent and received by the SMTP server over the SMTP protocol. .	02
13*	8	Transfer the files from PC to PC using HTTP, (*Asymmetric request-response client-server* protocol is to be illustrated), FTP (transfer files from one host to another host over a TCP-based network, such as the LAN, Internet)	02
14*	8	Installation and configuration of Internet Information Services (IIS).	02
15*	8	Configuration and use of DHCP,DNS Server	02
16*	8	Configuration and use of WWW, Telnet	02
Total			**32**

*- Practical can be conducted using packet tracer /Network Simulater/ gns3, etc.

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Course Contents:

Unit No	Contents
1	**Introduction to Software Testing:** 1.1 Software Testing Background • What is a bug? • Why do bugs occur? • Cost of Bugs. 1.2 Introduction to Software Testing ,Definition of Software Testing, Role of Testing, Software Testing Myths. 1.3 Objectives of Testing 1.4 STLC(Software Testing Life Cycle) 1.5 What makes a good Software Tester 1.6 Software Testing Terms: Precision and Accuracy, Verification and Validation 1.7 Quality Assurance and Quality Control.
2	**Types of Software Testing:** 2.1White Box Testing : Classification of White Box Testing • Static Testing- Inspections, Structured Walkthroughs, Technical Review • Structural Testing- Code Functional Testing, Code Coverage Testing, Code Complexity Testing (Cyclomatic Complexity). 2.2 Black Box Testing: Techniques for Black Box Testing, Requirement Based Testing, Positive and Negative Testing , Boundary Value Analysis, Decision Tables, Equivalence Partitioning. 2.3 Grey Box Testing: Advantages and Disadvantages, Techniques used for Grey Box Testing. 2.4 Comparison of various Testing Types.
3	**Levels of Testing and Special Tests:** 3.1 Unit Testing: Driver, Stub. 3.2 Integration Testing: Decomposition Based Testing - Top-Down Integration, Bottom-Up Integration, Bi-Directional Integration. 3.3 System Testing: Recovery Testing, Security Testing, Performance Testing, Load Testing, Stress Testing, Usability Testing, Compatibility Testing. 3.4 User Acceptance Testing: Acceptance Criteria, Alpha Testing , Beta Testing. 3.5 Special Tests: Accessibility Testing ,Smoke Testing and Sanity Testing,

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References/ Books:

Sr. No.	Title	Author	Publisher
1	Data Communications and Networking (Forth Edition)	Behrouz A. Forouzan	Tata McGraw Hill
2	Computer Network	A.S. Tanenbaum	PHI
3	Computer Networking	Tularam M Bansod	Dreamtech,Wiley
4	Complete Reference Networking	Craig Zacker	Tata McGraw Hill

Course Curriculum Development Committee:

a. **Internal Faculty**: 1) Smt V M Aswar, I/C HODCO, G P Mumbai
2) Mr. Nilesh Kitke, Visiting Lecturer in Computer Engg.

b. **External Faculty:** Mrs. Suvarna Thakre, Thakur Polytechnic Mumbai

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Course Name:- Network Management & Administration **Course Code:-CO16413**

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	-	-	-	-	-	-	3	2
CO2	-	2	1	2	2	1	3	3	3	2
CO3	-	3	3	3	3	2	3	3	3	3
CO4	-	3	3	3	2	2	3	3	3	3
CO5	-	3	3	3	3	2	3	3	3	3

CO Vs PSO matrix

CO/PSOs		PSO1	PSO2	PSO3
CO1	List the layers of the TCP/IP model and describe the function of each layer	2	-	-
CO2	Identify the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;	3	3	3
CO3	Configure Static as well as Dynamic IP Addresses.	3	3	3
CO4	Configuration and use of various Protocol	3	3	3
CO5	Monitor network traffic for performance bottlenecks & give appropriate response.	3	3	3

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	**Introduction to Network Protocols**	CO1,CO2,
2	2	**Introduction to IP Addresses**	CO1, CO2,CO3, CO4,CO5
3	3	**ARP Protocol**	CO3,CO4,CO5
4	4	**ICMP Protocol**	CO3,CO4,CO5
5	5	**IP Routing**	CO3,CO4,CO5
6	6	**Application Layer Protocol**	CO1, CO2, CO3,CO4,CO5

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Programme Code: CO												
Course Code:CO16417				Course Title: Linux Administration								
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
01	--	02	03	--	--	--	--	--	--	--	50	50
(*) indicates assessment by Internal and External examiners.												

Rationale :

The Linux operating system is commonly found powering Internet and network servers. This course explores different ways that Linux can be deployed within an organization. With a strong emphasis on command line administration, students will learn how to manage user accounts, file systems, and processes while gaining hands-on experience installing, configuring, and administering a Linux system.

Course Outcomes:

The student will be able to:

CO1	Make appropriate decisions during the configuration process to create a properly functioning Linux environment.
CO2	Use programs and utilities to administer a Linux machine.
CO3	Explain how a Linux server can be integrated within a multi-platform environment.
CO4	Analyze the need for security measures for a Linux environment.
CO5	Identify the different uses and advantages of Linux in a business environment in order to participate in discussions regarding network servers and services.

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Topic No	Contents
1	**Installation & Hardware configuration** 1.1 Creating an Installation Diskette, Booting Linux Installation Program. basic Linux installation, OS installers : Ubuntu, KaliLinux etc 1.2 Partitioning Hard Drive(s), Setting up Swap Space, Choosing Partitions to Format, 1.3 Choosing Desired Packages to Install, Hardware Configuration, and Kick start, diskless clients , Live media , 1.4 Multi-boot with Other Operating Systems, 1.5 Downloading and Installing Linux Updates
2	**General System Administration Issues** 2.1 Root Account, Ownership of files and processes, changing root user , administrative commands , other administrative users sudo, syslog and log files, 2.2 Controlling the process, ps and TOP, 2.3 Creating User Accounts, Changing User Passwords , Disabling User Accounts, Removing User Accounts, 2.4 Linux Password & Shadow File Formats, 2.5 System Shutdown and Restart, Bootstrapping, Working with startup scripts
3	**Setting Up a Linux network** 3.1 TCP/IP protocol stack, Routing , ARP, 3.2 Adding a desk top to network, 3.3 DHCP ,DHCP software, DHCP working ,setting up DHCP server 3.4 Security issues: NAT ,IP forwarding 3.5 Proxy server working and setup 3.6 The hostname commands, Network configuration files, Network management and debugging issues 3.7 Working firewall, setting up firewall 3.8 Working with DNS and web server: DNS history, working, Configuring a DNS server, using DNS client, configuration files DNS, DNS databases, dynamic DNS, Working of web server, Configuring the Apache Web Server, virtual web hosting , configuration files , securing a web server.
4	**File and Service Sharing** 4.1 Samba Client Tools 4.2 Configuring a SAMBA server 4.3 Configuring an NFS server 4.4 Setting up an NFS Client 4.5 Printing in Linux: Building and installation, printing protocols, managing printers, Line Printer Daemon protocol, Commands, Usage .

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List of Practicals :-

Sr.No.	Experiment/Assignment	Approx. Hours
1	Installation of Linux operating system. a. Partitioning drives b. Configuring boot loader c. Network configuration d. Setting time zones e. Creating password and user accounts f. Shutting down	04
2	Introduction to Basic Linux Commands & Editors	04
3	Linux system administration a. Becoming super user b. Temporarily changing user identity with su command c. Using graphical administrative tools d. Administrative commands e. Administrative configuration files	04
4	Setting up Samba Server	02
5	Setting up Local area Network IP Addresses Classes & LAN Topology & Networking (TCP/IP) through manual (Statically) by using setup command or through Wizard.	02
6	Configuring DHCP server and client	02
7	Configure a DNS Server with a domain name of your choice.	02
8	Connecting to the internet a. Setting up linux as a proxy server b. Configuring mozilla or firefox to use as a proxy	02
9	Configuring Mail Server	02
10	Configure FTP on Linux Server. Transfer files to demonstrate the working of the same.	02
11	To add a printer with local ,ipp .etc protocol in Linux	02
12	Working with X-Windows A] Switching TO A Graphical Login B] Setup video card, monitor and mouse for the Xserver C] Change my default desktop to KDE D] Accessing X-window remotely. E] Installing TrueType fonts from my MS Windows partition? F] How do I Display and Control a Remote Desktop using VNC	02
13	Firewall & Security Configuration	02
	Total	**32**

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Reference Books:

Sr. No.	Book Title	Author	Publication
01	Linux System Administration	Tom Adelstein, Bill Lubanovic.	Wiley-India
02	Unix Commands	Sumitabha Das	O'Reilly Publications2002
03	Linux administration hand book	Evi Nemeth and others	Prentice Hall
04	Red Hat Linux 9 Bible	Christopher Negus	John Wiley & Sons

Reference Links:

1 http://linux-training.be/linuxsys.pdf

2. http://muresults.net/itacademic/manuals/LA.pdf

Course Curriculum Development Committee:

a. **Internal Faculty**

1. Mrs. R.V. Molawade(Lecturer in Computer Engineering, Govt. Polytechnic, Mumbai)
2. Mr. Nilesh Kitke(Visiting Faculty, Computer Engineering, Govt. Polytechnic, Mumbai)

b. **External Faculty**

Mrs. P.S.Mahajan(Lecturer in Computer Engineering, Govt. Polytechnic, Thane)

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Programme Code: CO												
Course Code: CO16414				Course Title: Robotics								
Compulsory / Optional: Optional												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
1	--	4	5	--	--	--	--	--	--	50	50	100
(*) indicates assessment by Internal and External examiners												

Rationale:

Robotics is a well-established and interdisciplinary field in engineering. Besides programming, Robotics also requires multidisciplinary skills. Nowadays Robotics is being incorporated at high school levels. So why should students at Diploma level not learn this?. This course aims at making students able to make robots to solve real life problems.

Course Outcomes:
Students will be able to

CO 1	Interface sensors with Arduino board.
CO 2	Make robots using Arduino board.
CO 3	Interface sensors with Raspberry Pi board. board.
CO 4	Make robots using Raspberry Pi board.
CO 5	Solve real life problems using Robotics.

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Course Contents

Unit No	Contents
1.	**Arduino** 1.1 Overview of Arduino 1.2 Electric Components and Connections 1.3 Types of Arduino Boards 1.4 Costing 1.5 Arduino UNO 1.6 Interfacing 1.7 Arduino UNO Components and IDE 1.8 First Arduino Program 1.9 Assembly Programming through Arduino 1.10 Mixed programming
2.	**Simulation Software for Arduino** 2.1 Autodesk Eagle 2.2 UnoArduSim 2.3 Proteus
3.	**Raspberry Pi** 3.1 Overview 3.2 Costing 3.3 Components of Raspberry Pi 3.4 Interfacing 3.5 Programming
4.	**Simulation Software for Raspberry Pi** Microsoft Raspberry Pi Simulator
5.	**Case Study** 5.1 Humanoid 5.2 ASIMO 5.3 Automated Ground Vehicle 5.4 Driverless Car 5.5 Mars Rover

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List of Experiments:

Sr. No.	Experiment/Assignment	Approx. Hours
1.	**Introduction to Arduino** 1.1 **Team**: Make teams of 4 students each in a batch. Each team will search different types of Arduino Boards and their applications. 1.2 **Pair**: Divide the teams into two pairs. Each pair will make a separate report on detailed specifications for any two Arduino Boards. 1.3 **Solo**: Every student will individually make a separate report on detailed specifications for the Arduino Board which was not chosen by them in Pair Phase. At the end every student will have reports on three Arduino Boards.	2
2.	**Getting Familiar with Arduino IDE** 2.1 Download and install Arduino IDE. 2.2 Explore options available in the IDE such as compile, upload, etc. 2.3 Use the programming structures viz. void setup(_) to encode pins of Arduino board and void loop() for logical coding. 2.4 Connect Arduino board to computer. 2.5 Identify the hardware components required for connections.	2
3.	3.1 Make an LED light up and blink using Arduino UNO Board. 3.2 Modify the circuit and program to make the LED blink when you push a button. 3.3 Make two LEDs light up alternatively and blink using Arduino UNO Board. 3.4 Modify the circuit and program to make the LEDs blink when you push a button.	4
4.	4.1 Make a 3 by 3 array of LEDs blink using Arduino UNO when you press a button. 4.2 Make a tricolor LED light up and blink using Arduino UNO Board	4
5.	5.1 Interface LDR sensor with Arduino UNO with a PUSH Button. 5.2 Interface Soil Moisture Sensor with Arduino UNO. 5.3 Interface Buzzer sensor with Arduino UNO.	8
6.	6.1 Interface IR sensor with Arduino UNO. 6.2 Interface PIR sensor with Arduino UNO. 6.3 Interface temperature sensor with Arduino UNO.	8
7.	Make a real-time temperature monitoring system using Arduino UNO and Scilab.	6

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8.	Control a Servo using Arduino UNO Scilab.	4
9.	Control a stepper motor using Arduino.	4
10.	Make a line following robot with Arduino board.	6
11.	Make a robotic arm controlled by Arduino board.	6
12.	Interface camera with Raspberry Pi board.	4
13.	Make a ball tracking robot using Raspberry Pi board.	6
14.	**Mini Project** (To be completed in teams of 4-5 students.) Students should choose a relevant topic for mini project. They should work in groups of four.	
15.	**Case Study** (To be completed in teams of 4-5 students.) iRobot ROOMBA Floor Cleaning Robot Make a brief report on IRobot ROOMBA regarding following aspects: **Objectives**: 1. Halt operation in presence of dynamic obstacle 2. Traverse the room while cleaning it. 3. Covers Oldest explored Area 4. Minimum repeat 5. Automatic recharge docking in case of low battery **Sensing** 1. Wheel Encoder: Tracks position and speed of beach wheel 2. IMU (Inertial Measurement Unit: Composition of Accelerometer (measures acceleration in specified direction, 3 number), Gyroscope (measures angular velocity along a specified axis 3 number), magnetometer (detects strength of magnetic field along a specified axis, 3 number) End Result is Orientation in 3 D space. 3. Obstacle Detectors (IR, SONAR, LASOR based, LIDAR, etc. **Software** 1. Localization 2. Mapping 3. Planning	
	Total	**64**

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	Regression Testing, Usability Testing. 3.6 Application Testing: Web based Testing. 3.7 Monkey Testing.
4	**Test Planning, Documentation and Bug Reporting:** 4.1 Test Plan: Goal of the Test Planning . 4.2 Test Planning Topics: Resource requirements , Tester Assignments , Test schedule ,Test Case. 4.3Test Case planning Overview: Test design, Test Case, Test Procedures, Test Case Organization & Tracking. 4.4 Requirement Traceability Matrix. 4.5 Getting bugs fixed, Bugs Life Cycle. 4.6 Bug Tracking System: Test Incident Report, Manual Bug Reporting and Tracking.
5	**Automated Tools :** 5.1 Limitations of Manual Testing and Need for Automated Testing 5.2 Advantages and Disadvantages of Using Tools 5.3 When to Use Automated Test Tools 5.4 Selecting a Testing Tool 5.5 Automated Test Tools: Selenium Webdriver, JUnit. 5.6 Features and importance of these Test Tools.

SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Introduction to Software Testing	08	4	6	2	12
2	Types of Software Testing	10	4	4	6	14
3	Levels of Testing and Special Tests	10	2	8	6	16
4	Test Planning, Documentation and Bug Reporting	12	4	6	6	16
5	Automated Tools	08	4	4	4	12
		48	**18**	**28**	**24**	**70**

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Web Resources

1. **https://www.arduino.cc/**
2. **https://www.arduino.cc/en/Main/Tutorials**
3. **https://www.raspberrypi.org/**

Course Curriculum Development Committee:

a. **Internal Faculty**
   1. Ms. Jijnasa S. Patil (Lecturer in Computer Engineering, Government Polytechnic, Mumbai)

b. **External Faculty**
   1. Mr. SurajBhosale, (Lecturer in IT, Government Polytechnic, Jalgaon)

c. **Industry Experts**
   1. Mr. Manoj M. Pawar, Associate Engineer, Virtusa Polaris Software Pvt. Ltd.

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Programme Code: CO												
Course Code: CO16415				Course Title: Cloud Application.								
Compulsory / Optional: Optional												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
01	--	04	05	--	--	--	--	--	50	--	50	100
(*) indicates assessment by Internal and External examiners.												

Rationale :

This course covers a series of current cloud computing technologies, including technologies for Infrastructure as a Service, Platform as a Service, Software as a Service, and Physical Systems as a Service. For different layers of the cloud technologies, practical solutions such as Google, Amazon, Microsoft, SalesForce.com, etc. are included.

Course Outcomes :

The student will be able to:

CO1	Illustrate various basic concepts related to cloud computing technologies
CO2	Identify various cloud-based solutions to meet a set of given requirements
CO3	Understand how to design and implement cloud based applications.
CO4	Demonstrate the Services of Cloud .
CO5	Implement Security in cloud.

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Unit No	Topics / Sub-topics
1	**Introduction To cloud computing** Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS / HAAS. Comparison among SAAS, PAAS, IAAS, Organizational scenarios of clouds, Administering & Monitoring cloud services, Benefits and limitations. Cloud Fundamentals i. Cloud Building Blocks ii. Understanding Public & Private cloud environments
2	**Cloud computing platforms:** Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Virtualization & Cloud: Definition ,Virtualization characteristics. Types of Virtualization & its benefits, Introduction to Various Virtualization OS - Vmware , KVM etc ,Managing virtualization, Virtualization in cloud ,Virtualization desktop and managing desktops in the cloud and security issues
3	**Cloud Storage** Storage basics, providers, Security, reliability, advantages, cautions, outages, theft, Cloud Storage Provider,Storage Security: Aspects of data security, data security mitigation, provider data and it's security.Implementing real time application over cloud Platform, Issues in Inter-cloud environments, QOS Issues in Cloud, Dependability, Data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment.
4	**Data Security** **Cloud computing security architecture:** Architectural Considerations-General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security Cloud computing **security challenges:** Virtualization security management- virtual threats, VM Security Recommendations, VMSpecific Security techniques, Secure Execution Environments and Communications in cloud.

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List of Practicals :-

Sr.No.	Unit Experiment/Assignment	Approx. Hours
1	Learn Cloud Computing and it's Architecture.	4
2	Write the Services of Cloud(SAAS/PAAS)	4
3	Write the Services of Cloud(IAAS/HAAS)	4
4	Install OpenStack and use it as Infrastructure as a Service.	4
5	Create and run virtual machines on open source OS [VirtualBox, VMWare Workstation]	4
6	Install an operating system in the virtual machine from template.	4
7	Add storage to create the new virtual disk.	6
8	Create and delete compute resources.	4
9	Learn various security techniques in cloud and implement it.	6
10	Implementation of identity management.	4
11	Implementation of User Management in Cloud.	6
12	Write a program for web feed	4
13	Learn Quality Of Service issues in Cloud.	6
14	Prepare case study for working of Google App engine	4
15	**Mini project.**	
Total		**64**

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Reference Books:

Sr. No.	Book Title	Author	Publication
01	Cloud Computing :A Practical Approach	J.Vette Toby J. Vette Robert Elsenpeter.	Tata McGraw Hill
02	Cloud Security And Privacy	Tim Malhar ,S.Kumarswammy S.Latif	O'REILLY
3	Virtualization, A beginners Guide	Danielle Ruest and Nelson Ruest	Tata McGraw Hill

Course Curriculum Development Committee:+

a. **Internal Faculty**
Mrs.Lokhande Vandana Shivaji(Lecturer in Computer Engineering, Govt. Polytechnic, Mumbai)

b. **External Faculty**
Mr Deepak Gaikar(Lecturer in Computer Engineering Department ,Rajiv Gandhi Institute of Technology Andheri, Mumbai,)

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Programme Code: Diploma in Computer Engineering												
Course Code: CO16416				Course Title: Multimedia and Animation								
Compulsory / Optional: Optional												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
01	--	04	05	--	--	--	--	--	50	--	50	100
(*) indicates assessment by Internal and External examiners												

Rationale:

Great advancements are being achieved in the field of multimedia. It has not been limited to Image processing but it has also been extended to audio, video, animation and 3D animation. Virtual reality, augmented reality and mixed reality will be the next stages in multimedia technology. To make the students aware of latest multimedia technology this course is being introduced in Diploma in Computer Engineering. This course focuses on the use of various open source software for design and development of different media.

Course Outcomes:

Students will be able to

CO 1	Know different types of Multimedia.
CO 2	Summarize basic concepts of Digital Images
CO 3	Demonstrate features and operations of Digital Audio.
CO 4	Demonstrate features and operations of Digital Video.
CO 5	Apply animation effects.

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Course Contents

(Course teacher should cover the course contents in the class as well as in lab hours. So that students can perform side by side while demonstrating the software.)

Unit No	Contents
1.	**Introduction to Multimedia** 1.1 Definition of Multimedia 1.2 Definition of Hypermedia 1.3 Objects of Multimedia: Text, Image, Audio, Video 1.4 Media Players: Image Viewers, Audio Players, Video Players 1.5 Brief overview of Multimedia File Formats 1.5.1 Image: bmp, jpg, jpeg, png 1.5.2 Audio: mp3, wma 1.5.3 Video:mp4, mp4a, mpeg, mkv 1.6 Applications of Multimedia
2.	**Digital Images** 2.1 Digital Images 2.2 Steps for Digital Image Processing 2.3 Human Visual Perception: Structure of Human Eye and Brightness Adaptation and Discrimination 2.4 Pixels and Coordinate System for Digital Images 2.5 Relationship between Pixels 2.6 Neighboring pixels, Adjacency, Connectivity, Regions, Boundaries 2.7 Number of Bits per Pixel, Aspect Ratio, Image Size 2.8 Black and White Images 2.9 Gray Scales and Gray Scale Images 2.10 Image Negative, Image Subtraction, Image Histogram 2.11 Color Models for Digital Images 2.11.1 RGB Model 2.11.2 YCbCr Model 2.12 Color Image Representation 2.13 Resolution 2.13.1 Pixel Resolution 2.13.2 Pixel Density 2.13.3 Screen Resolutions: SD, HD, Full HD, Ultra HD/ 4K, 8K
3.	**Digital Audio** 3.1 Audio Basics 3.2 Digital Audio 3.3 Analog to Digital Conversion of Audio 3.4 Characteristics of Audio: Amplitude, Wavelength, Frequency, Timbre 3.5 Noise in Audio, Signal to Noise Ratio (SNR), Noise Removal 3.6 Channels in an Audio file 3.7 Data Rates, bit rate, sampling rate/ frequency of an Audio 3.8 Calculating size of an Audio file using bit rate and frequency 3.9 Demonstration of Audacity

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4.	**Digital Video** 4.1 What is Video? 4.2 Digital Video Basics: Key Frames, Shot, Group, Scene, Video 4.3 Shot Boundaries 4.4 Frame rate, bit rate, Live streaming, progressive download 4.5 Animation Effects: Fade In, Fade Out, Wipe, Dissolve 4.6 Demonstration of OpenShot Open Source Video Editor 4.7 Screen casting: creating screen casts using Screencast-o-matic 4.8 Introduction to Open Broadcaster Software (OBS) Studio 4.9 Creating Videos and uploading them to YouTube under Creative Commons License
5.	**Animation** 5.1 Viewport 5.2 2D and 3D space and their representation 5.3 Coordinate systems: Homogeneous coordinates 5.4 Steps for creating an animated film.
6.	**Blender Tool for Animation** (Students are advised to watch the online course for Blender tool available on Spoken Tutorial web site. Link is provided in Web References below.) 6.1 Introduction to Blender tool: Hardware requirements for Blender 6.2 Download and install Blender tool 6.3 The concept of 3D Cursor 6.3.1 Using the 3D Cursor while Modeling/Animating 6.3.2 To add new objects to the 3D view in Blender using 3D cursor 6.3.3 The snapping options for 3D cursor in Blender 6.4 Moving in 3D Space 6.4.1 Keyboard and Mouse Controls to traverse in 3D 6.4.2 Change viewport Camera Orientation 6.4.3 To Pan the view 6.4.4 To Rotate in Blender Viewport 6.4.5 To zoom the view 6.5 Camera View 6.5.1 To change the location of the camera to get a new camera view 6.5.2 To roll the camera view 6.5.3 To pan the camera view 6.5.4 To dolly the camera view 6.5.5 To track the camera view 6.5.6 To select a new camera view using the fly mode 6.6 The Blender Interface 6.6.1 The parameters and tabs assigned to each window 6.6.2 To select an object in the 3D View and to move an object in X, Y and Z directions

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List of Programming Experiments:

Sr. No.	Unit No.	Experiment/Assignment	Approx. Hours
1.	1	**Survey of Open Source Multimedia Processing Software** 1.1 Search for Open Source Multimedia Processing Software on Internet. 1.2 Categorize the them into Image Processing, Audio Processing, Video Processing; All in one, etc. (Consider at least one software for each of the categories.) 1.3 e. g. GIMP, Synfig Studio, Audacity, OpenShot, Screencast-o-matic, OBS Studio, CamStudio, etc. 1.4 Note the hardware and software requirements for them. 1.5 Make a report of your survey. 1.6 Check whether any open source operating system (e. g. Ubuntu) is installed on your computer, if not install the same. 1.7 Install the software if not installed already which will be required for this course in your computer.	6
2.	2	Capture a color picture of a anyplace using a digital camera device and do the following: 2.1 Import the picture into your computer. 2.2 Note the properties of the picture like resolution, size, etc. 2.3 Resize it to increase or decrease the size. 2.4 Invert its Aspect Ratio. 2.5 Change the contrast and brightness. 2.6 Change the sharpness. 2.7 Crop the edges of the picture. 2.8 Make an Image Negative. Choose any topic in latest technology in Computer Science and make a poster for it using any open source Image editing software. Use your imagination at the fullest. Watch the online course on Synfig and GIMP on Spoken Tutorial. You can also follow any other free online course for similar open source software. Also follow the procedure as shown in the videos.	10
3.	3	**Audacity I** 3.1 Download and install latest version of Audacity. 3.2 Creating, saving and exporting an Audacity Project, 3.3 Import an Audio into the Project 3.4 Perform Mic Check. 3.5 Record a track in your voice. You can choose any topic to make a script to record. 3.6 Perform Audio Editing: Audio Clipping, Cutting, Copying, Pasting a clip 3.7 Apply effects: Inversion, Compression, Fade In Fade Out, Noise Removal	10

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		3.8 Split Stereo Track into two tracks viz. left and right. 3.9 Convert Stereo to Mono and Mono to Stereo 3.10 Change pitch, tempo and speed of an Audio 3.11 Make precise adjustments to the audio speed (tempo) while maintaining pitch in order to synchronize it with video or run for a predetermined length of time 3.12 Combine the track again to stereo after changes 3.13 Export the project to mp3 format.	
4.	3	**Audacity II (Creating Karaoke)** 4.1 Import a song of your choice into an Audacity Project. 4.2 Perform the steps to remove vocals from the track. 4.3 Export the track to mp3 format.	6
5.	4	**Video Editing using OpenShot** 5.1 Download and install OpenShot. 5.2 Import a video into OpenShot 5.3 Explore the various options in OpenShot. 5.4 Edit the video. Remove undesired clips. 5.5 Add suitable background music. 5.6 Apply different effects for different clips in the video. 5.7 Add some subtitles to the video.	10
6.	5, 6	**Blender Animation Tool** 6.1 Download and install Blender Tool 6.2 Use the 3D cursor to understand the viewport. 6.3 Add 3D objects like cube, hemisphere, etc. to the 3D view. (Add at least 4 objects.) 6.4 Roll, pan and dolly the Camera View. 6.5 Apply some animation effects to the objects you have added. 6.6 Apply transformations like translation, rotation, etc. to the objects. 6.7 Export the movie.	10
7.	All	**Mini Project I** 1. Choose any topic from any course in your curriculum. 2. Study the topic well and prepare a script for narration. 3. You can prepare a presentation or show a demo on any relevant software. 4. Make a screen cast of the presentation/ demo using Screencast-o-matic or OBS Studio. 5. You can record your narration along with the screen casting (or use your mobile phone to record the narration separately and add your audio to the video you created in 3 in OpenShot). 6. Try to give a professional touch to your video in OpenShot by clipping/ removing undesired part of audio/ video, adding some background music, animation, etc. 7. Sign into YouTube and upload your video on it under Creative Commons License. The video should not exceed 10 minutes.	6
8.	All	**Mini Project II** Create an animated movie of 5 minutes. You can choose any story for the	6

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Sr. No.	Unit	Experiment	Approx. Hours
1	1	Study Software testing concept, types & methods.	02
2	3,4	Design and write test cases for simple calculator application.	02
3	3,4	Design a set of test cases for college admission form.	02
4	3,4	Design a set of test cases for Social Site (Facebook) login form .	02
5	3,4	Design a set of test cases for Coffee Vending Machine.	02
6	3,4	Design a set of test cases for Flight Reservation System.	02
7	4	Study Bug Life Cycle and reporting bugs (Consider any Application)	04
8	2,5	Automate Microsoft Word Application.	02
9	2,5	Use of Testing tool like JUnit.	06
10	2,5	Use of Testing tool like Selenium Webdriver.	04
11	All	Design test cases for your project.	04
Total			**32**

Reference Books:

Sr. No.	Book Title	Author	Publication
1	Software Testing	Ron Patton	PEARSON
2	Software Testing: Principles and Practices	Srinivasan Desikan	PEARSON
3	Software Testing: Principles, Techniques and Tools	M. G. Limaye	Tata McGraw-Hill
4	Software Testing: Principles and Practices	Naresh Chauhan	Oxford

Course Curriculum Development Committee:

a. **Internal Faculty:**

Ms. Pooja S. Chame (Lecturer in Computer Engineering, Government Polytechnic Mumbai).

b. **External Faculty:**

1. Mr. Deepak Gaikar (Assistant Professor in Information Technology, Rajiv Gandhi College of Engineering, Mumbai).
2. Mr. Atul Mairale (HOD-IF, Kala Vidya Mandir Institute of Technology, Malad).

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		movie.	
9.	All	Students should enroll for any one of the following courses on Spoken Tutorial and should get a certificate for the same. 1. GIMP 2. Blender	
		Total	**64**

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Web Resources

1. https://www.audacityteam.org/help/documentation/
2. https://www.openshot.org/
3. https://obsproject.com/
4. https://screencast-o-matic.com/lp/screen-recorder-india-4/?utm_source=google&utm_medium=CPC&utm_campaign=India2&utm_term=free%20screen%20recording&gclid=EAIaIQobChMIgO-LrPrY3gIVjAsrCh2eOgdfEAAYASAAEgJJu_D_BwE
5. https://www.blender.org/features/
6. https://spoken-tutorial.org/tutorial-search/?search_foss=Blender&search_language=English

Course Curriculum Development Committee:

a. **Internal Faculty**
   1. Ms. Jijnasa S. Patil (Lecturer in Computer Engineering, Government Polytechnic, Mumbai)

b. **External Faculty**
   1. Mrs. Suraj Bhosale, (Lecturer in IT, Government Polytechnic, Jalgaon)

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Programme: **Diploma in Computer Engineering**									
Course Code: **CO16308**				Course Title: **PROJECT AND SEMINAR STAGE-II**					
Compulsory / Optional: **COMPULSORY**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	**--**	**04**	**04**	**--**	**--**	**--**	**50***	**50***	**100**
(*) indicates assessment by Internal and External examiners.									

Rationale:

This course explores the knowledge of design, experiment and analysis of the data. It develops ability to work on multidisciplinary areas also to identify, formulate, and solve engineering problems in view of economic, environmental & societal context.

Course Outcomes:

The student will be able to:

CO1	Work in Groups, Plans in work, Coordinate the work and develop leadership qualities.
CO2	To apply algorithmic strategies while solving problems.
CO3	To apply management principles and testing techniques
CO4	Practically implement the acquired knowledge.
CO5	Develop skills and innovative ideas to use latest technology in information technology.

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Course Contents:

Unit No	Contents
1	**ACITIVITY PLANS:** 1.1Project stage-I work decided in V semester shall be continued as Project in VI Semester. 1.2 Implementation of project modules 1.3 Testing of each module. 1.4 Assemble different modules. 1.5 Progressive presentation of work 1.6 The activities mentioned above should be monitored and guided by Project Guide every week during the contact hours provided for the same. 1.7 The Project also includes Seminar, with the aim to develop certain set of Communication skills. 1.8 Project diary should be maintained by the student and it should be checked by Project guide every week.
2	**IMPLEMENTATION** 2.1 Students should complete implementation of ideas given in synopsis/Abstract, So that project work should be completed before end of semester. 2.2 Implementation should be as per the design specified in stage-I 2.3 Project may involve design, implementation, data analysis within realistic constraints such as economic, environmental, social, ethical, health and safety. 2.4 Project should be tested after implementation. 2.5 In project implementation student should also follow the guidelines given by the guide.
3	**GUIDELINES FOR WRITING FINAL REPORT :** **Front page should contain following format** 1. Project title 2. Student names & roll no (Group wise) 3. Name of Project guide 4. Department **Second page onwards must contain following format** 1.Abstract 2. Introduction 3. Existing system problems 4.Requirement specification 5. Hardware requirements 6. Software requirements 7. Control flow diagram/ block diagram 8. References:- Report should be in following format Font type - Times new roman Font size (Heading 14 font(bold).content-12 font Alignment - justified. Line spacing -1.5 Header content - left side-name of department. right side - name of project Footer-page no(center)

Learning Resources:

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1. **Magazines:**

1.	IEEE Transactions Journals
2.	Computer Today
3.	PC Quest
4.	Data Quest
5.	Any Journal Related to Computer/information Technology/Electronics field.
6.	Computer World

1. **Website:**

Using any search engine, such as http://www.google.co.in the relevant information can be searched on the internet.

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Programme: **Diploma in Computer Engineering**									
Course Code: **CO16301**				Course Title: **PROJECT AND SEMINAR STAGE-I**					
Compulsory / Optional: **COMPULSORY**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	**--**	**04**	**04**	**--**	**--**	**--**	**50***	**--**	**50**
(*) indicates assessment by Internal and External examiners.									

Rationale:

In the flied of Computer Engineering various technologies (Software and hardware) needs to be integrated and proper paradigms need to be implemented to develop any kind of computer applications. Hence it becomes essential to enhance skills in developing industrial applications. This course is essential to understand the implementation of the system development process i.e. analyze, design, coding, debugging and testing. This will help the student to acquire skills and attitudes to work as a software developer.

Course Outcomes:

The student will be able to:

CO1	Work in Groups, Plans in work, Coordinate the work and develop leadership qualities.
CO2	Analyze the project requirement and research case studies.
CO3	Develop technical writing skills.
CO4	Practically implement the acquired knowledge.
CO5	Develop skills and innovative ideas to use latest technology in information technology.

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Course Contents:

Unit No	Contents
1	**AREA OF SELECTION FOR PROJECT** These are only guidelines; any innovative project ideas related to Information Technology may be included. 1. Advanced mobile applications. 2. Artificial intelligence and robotics. 3. Internet of things 4. Networking 5. Animation 6. Big data and data analytics. 7. Machine Learning. 8. Designing software for it applications. 9. Embedded System. 10. Instrumentation based it applications. 11. Interfacing of mobile devices with automated devices. 12. Image processing. 13. Biosystems & Computational biology. 14. Cyber security, Ethical Hacking. 15. Cloud Computing.
2	**ACITIVITY PLANS:** 1. Group formation of Students. 2. Literature survey and searching of topic Visits to Industries/Institutions/Market field(for industry sponsored projects) 3. Project topic selection 4. Define Problem statement for project work 5. Submission of synopsis: by each group (The candidate/group will select a project with the approval of the Guide (staff member) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages) 6. Progressive presentation of work 7. Decide Strategies Methodology to carry out project 8. Allocation of work responsibility to individual team 9. Collection of Data Survey Analysis 10. Prepare system design(Include DFD, UML Diagrams 11. Implementation of project modules 12. Progressive presentation of work The activities mentioned above should be monitored and guided by Project Guide every week during the contact hours provided for the same. The Project is also included with Seminar with the aim to develop certain set of communication skills. Project diary should be maintained by the student and it should be checked by project guide every week

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3	**GUIDELINES FOR WRITING SYNOPSIS REPORT :** Front page should contain following format 1. Project title 2. Student names & roll no (Group wise) 3. Name of Project guide 4. Department Second page onwards must contain following format 1.Abstract 2. Introduction 3. Existing system problems 4.Requirement specification 5. Hardware requirements 6. Software requirements 7. Control flow diagram/ block diagram 8. References:- Synopsis should be in following format Font type - Times new roman Font size (Heading 14 font(bold).content-12 font Alignment - justified. Line spacing -1.5 Header content - left side-name of department. right side - name of project Footer-page no(center)

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Learning Resources:

1. **Magazines:**

1.	IEEE Transactions Journals
2.	Computer Today
3.	PC Quest
4.	Data Quest
5.	Any Journal Related to Computer/information Technology/Electronics field.
6.	Computer World

1. **Website:**

Using any search engine, such as http://www.google.co.in the relevant information can be searched on the internet.

15-12-18

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Course Name:- Data Warehousing and Data Mining **Course Code:- CO16408**

CO vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	1	3	2	2	3	3
CO2	3	2	3	3	2	1	2	3	3	1
CO3	1	2	3	3	2	1	3	3	2	2
CO4	1	2	2	2	2	2	3	3	3	2
CO5	3	3	2	2	3	3	2	2	3	3

CO vs PSO matrix

CO/POs		PSO1	PSO2	PSO3
CO1	Get familiar with the fundamental concepts of data warehousing and OLAP	1	2	3
CO2	Illustrate OLAP operations.	3	3	2
CO3	Design and manage data storage using data warehousing.	2	3	2
CO4	Develop concepts and methods used for Data Mining .	3	2	3
CO5	Apply and Design Data Mining Techniques.	3	2	1

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	Introduction to Data Warehousing	CO1:Get familiar with the fundamental concepts of data warehousing and OLAP
2	2	Data Warehouse Components	CO1:Get familiar with the fundamental concepts of data warehousing and OLAP
3	3	OLAP in Data Warehouse	CO2: Illustrate OLAP operations. CO3:Design and manage data storage using data warehousing.
4	4	Introduction to Data Mining	CO4:Develop concepts and methods used for Data Mining .
5	5	Algorithms in Data Mining	CO5:Apply and Design Data Mining Techniques.

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Programme Code: CO												
Course Code:CO16411				Course Title: Computer Security.								
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits				Duration of Examination			Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
03	--	02	05	3 hrs	1hr 15min	--	70	30	50	--	--	150
(*) indicates assessment by Internal and External examiners.												

Rationale :

The aim of the course is to familiarise students with the basic problems of computer security. They will include the risks of information systems in the context of confidentiality, integrity and availability of information security policy development issues system, elements of cryptography, issues of electronic signatures and public key infrastructure, basic models of authentication, access control policies, security, communication protocols and application services.

Course Outcomes:

The student will be able to:

CO1	Identify the potential threats to confidentiality, integrity and availability of Computer Systems
CO2	Use cryptography algorithms and protocols to achieve Computer Security
CO3	Build systems that are more secure against attacks.
CO4	Apply security principles to secure Operating Systems and applications.

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Topic No	Contents
1	**Introduction to computer security and security trends.** 1.1 Definition of Computer Security, Need for security, Security basics: Confidentiality, Integrity, Availability, Accountability, Non-repetition. Example of Security, Challenges for security, Model for Security. 1.2 Risk and Threat Analysis: Assets, Vulnerability, Threats, Risks, Counter measures. 1.3 Threat to Security: Viruses and Worms, Intruders, Insiders, Criminal organizations, Terrorists, Information warfare ,Avenues of attack, steps in attack 1.4Security attacks: Active and Passive attacks, Denial of service, backdoors and trapdoors, sniffing, spoofing, man in the middle, replay, TCP/IP Hacking, encryption attacks, Keyloggers 1.5 Malware : Viruses, Logic bombs.
2	**Identification, Authentication and Operational Security** 2.1 User name and password, Managing passwords, choosing password. 2.2 Role of people in Security: Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized software/hardware, Access by Nonemployees, Security awareness, Individual User responsibilities 2.3 Access controls: Definition, principle, policies: DAC, MAC,RBAC. 2.4 Biometrics: finger prints, hand prints, Retina, patterns, voice patterns, signature and Writing patterns.
	Cryptography 3.1 Introduction : Cryptography, Cryptanalysis, Cryptology, Substitution techniques: Caesar's cipher, monoalphabetic and polyalphabetic, one-time pad. 3.2 Transposition techniques – Rail fence technique, simple columnar 3.3 Hashing – concept 3.4 Symmetric and asymmetric cryptography: Introduction to Symmetric encryption, Data Encryption Standard (DES),International Data Encryption Algorithm (IDEA),Advance Encryption Standard (AES-128).Asymmetric key cryptography : RSA (Rivest–Shamir–Adleman) algorithm, Diffie–Hellman key exchange (DH). 3.5 Digital Signature 3.6 Introduction to steganography

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4	**Computer Security Technology and Intrusion Detection** 4.1 Firewalls: Need for Firewall, limitations, and characteristics. Types of Firewall Hardware, Software, Packet filter, Proxy Server, Hybrid, Application gateways, circuit level gateway, Implementing Firewall, Kerberos. 4.2 Intrusion Detection: Intrusion detection systems (IDS), host based IDS, network based IDS, Honey pots. 4.3 Email security: Email security standards: Working principle of SMTP, PGP, S/MIME. 4.4Mobile Security:Mobile system architectures, Overview of mobile cellular systems, GSM and UMTS Security & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security. 4.5Securing Wireless Network: Overview of Wireless security, Scanning and Enumerating 802.11 Networks, Attacking 802.11 Networks, Attacking WPA protected 802.11 Networks, Bluetooth Scanning and Reconnaissance, Bluetooth Eavesdropping, Attacking and Exploiting Bluetooth, Zigbee Security, Zigbee Attacks
5	**Cyber Security** 5.1Introduction to Cyber Crimes – Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Mail Bombs, Bug Exploits, Cyber Crime Investigation 5.2Introduction Cyber Laws- Introduction to IT act 2000 and IT act2008, Introduction to the cyber laws. 5.3Cyber Forensics: Cyber Forensic Introduction ,Forensic Tools and Techniques, Investigating the Crime Scene ,Rules of Evidence
6	**Application, Web & Database Security** 6.1 Application hardening, application patches, web servers, active directory. 6.2 Web security threats, web traffic security approaches, Secure socket layer and transport layer security, secure Electronic transaction 6.3Database Security: SQL Injection, Web Application & SQL Injection, SQL Injection Prevention.

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Specification Table:

Unit No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	Introduction to computer security and security trends.	04	4	4		8
2.	Identification, Authentication and Operational Security	08	4	8		12
3.	Cryptography	12	4	4	8	16
4.	Computer Security Technology and Intrusion Detection	14	4	4	8	16
5.	Cyber Security	04	4	4		08
6.	Application, Web & Database Security	06	2	4	4	10
	Total	**48**	**22**	**28**	**20**	**70**

List of Practicals:-

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	1	Detect vulnerability which can allow null user and null session through pseudo account	2
2	2	Use keylogger to get confidential data.	2
3	3	Create Digital Signature document using Cryptool	2
4	3	Implement ceaser cipher &simple columnar techniques.	4
5	3	Encrypt & decrypt a plaintext using RSA algorithm.	2
6	3	Perform key exchange using DH algorithm	4
7	4	Filter packets according to protocol using any packet filtering tool.	2
8	4	Use Traceroute to get information about routers and firewalls.	2
9	4	Demonstrate buffer overflow attack.	4
10	4	Tracing of email origin using eMailTracePro utility	2
11	6	Perform SQLinjection on any website (HTMLget)	4
12	6	Tracing the path of an website/ web server using tracert utility	2
		Total	**32**

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