Government Polytechnic Mumbai

(Academically Autonomous Institute of Maharashtra Government)

49, Ali Yawar Jung Marg, Kherwadi, Bandra (E)

Programme: Information Technology   **Fifth Semester**   **With effect from June 2018**

Course Code	Course Title	Teaching Hours				Credits	Examination Scheme					
		L	P	TU	Total		Theory		PR	OR	TW	Total
							TH	TS				
IT16309	Information Security	3	---	---	3	3	70	30	---	---	---	100
CO16501	Software Engineering	3	---	---	3	3	70	30	---	---	---	100
IT16314	Advanced Java Programming	3	4	---	7	7	70#	30	50*	---	---	150
IT16310	Linux Operating System	3	2	---	5	5	70	30	50*	---		150
IT16401 (Optional 1)	Python Programming											
CO16403 (Optional 1)	Advance Database Technology	3	2	---	5	5	70	30	50*	---	---	150
IT16402 (Optional 1)	Microcontroller and Embedded Systems											
IT16312	Project and Seminar Stage-1	---	4	---	4	4	---	---	---	50*	---	50
IT16311	Advanced Web Technology	---	4	---	4	4	---	---	50*	---	50	100
IT16313	Industrial Training (During Summer Break after 4th Semester)	---	4	---	4	4	---	---	---	50*	50	100
	TOTAL	15	20	---	35	35	350	150	200	100	100	900

Abbreviations: 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 External Examiner / Online Examination

# Indicates assessment by External Examiner / Online Examination

Academic Coordinator
(Dr. R. A. Patil)

Academic Co-ordinator
G. P. Mumbai

Approved Copy

Head of Department
(Information Technology)

Principal
Government Polytechnic Mumbai

Programme : **Diploma in Information Technology**	
Course Code:**IT16309**	Course Title: **Information Security**
Compulsory / Optional: **Compulsory**	

Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	-	3	70(3 Hrs)	30	--	--	---	100

*Assessment by External Examiner

Rationale:

Information security is one of the most important and relevant areas of computing today. It is essential to understand the various threats to secure computing and the basic security design principles and techniques developed to address these threats to confidentiality, integrity and availability. This course will introduce basic cryptography, fundamentals of computer/network security, risks faced by computers and networks, security mechanisms and secure systems design principles. It focuses on concepts and methods associated with planning managing and auditing security at all levels including networks.

Course Outcomes:
Student should be able to:

CO1	Comprehend the history of computer security and how it evolved into information security
CO2	Describe the need of information security to the students
CO3	Solve encryption and decryption algorithms
CO4	Classify and analyze techniques of encryption, key management in security and its importance.
CO5	Describe cyber laws and cyber security

Course Content Details:

Unit No	Topics / Sub-topics

1	**Introduction**
	
	1.1 Computer Security Concepts
	   ➢ Definition of Computer Security
	   ➢ The Challenges of Computer Security
	
	1.2 The OSI Security Architecture
	
	1.3 Security Attacks
	   ➢ Passive Attacks
	   ➢ Active Attacks

Approved Copy

Academic Co-ordinator
G. P. Mumbai

	1.4 Security Services
	▷ Authentication
	▷ Access Control
	▷ Data Confidentiality
	▷ Data Integrity
	▷ Nonrepudiation
	▷ Availability Service
	1.5 Security Mechanisms
	1.6 A Model for Network Security
2	**Classical Encryption Techniques**
	2.1 Symmetric Cipher Model
	▷ Cryptography
	▷ Cryptanalysis and Brute-Force Attack
	2.2 Substitution Techniques
	▷ Caesar Cipher
	▷ Monoalphabetic Ciphers
	▷ Playfair Cipher
	▷ Hill Cipher
	▷ Polyalphabetic Ciphers
	▷ One-Time Pad
	2.3 Transposition Techniques
	2.4 Steganography
3	**Symmetric Key Encryption**
	3.1 Stream Ciphers & Block Ciphers
	3.2 The Data Encryption Standard
	▷ DES Encryption
	▷ DES Decryption
	3.3 Triple DES
	3.4 Advanced Encryption Standard(AES) General Structure
	3.5 Modular Arithmetic
	3.6 Euclid's Algorithm

Approved Copy

Academic Co-ordinator
G. P. Mumbai

4	**Public-Key Cryptography**
	4.1 Public-Key Cryptosystems
	4.2 Applications for Public-Key Cryptosystems
	4.3 Requirements for Public-Key Cryptography
	4.4 RSA Algorithm
	4.5 Hash Algorithms: MD5 message digest algorithm
	4.6 Secure Hash Algorithm
5	**Digital Signatures & public key management**
	5.1 Digital Signatures
	▷ Properties
	▷ Attacks and Forgeries
	▷ Digital Signature Requirements
	▷ Direct Digital Signature
	5.2 Distribution Of Public Keys
	▷ Public Announcement of Public Keys
	▷ Publicly Available Directory
	▷ Public-Key Authority
	▷ Public-Key Certificates
	5.3 Public-Key Infrastructure
	5.4 X.509 Certificates
	5.5 Self-signed Certificate
	5.6 Introduction to Kerberos
	5.7 Introduction to PGP & S/MIME protocol
6	**Cyber Crime & Security**
	6.1 Introduction to Cyber Crimes – Hacking, Cracking, Viruses, Worms, Malware, Spyware, Trojans , Ransomware, phishing, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Mail Bombs, Bug Exploits, Cyber Crime Investigation
	6.2 Introduction Cyber Laws- Introduction to IT act 2000 and IT act 2008, Introduction to the cyber laws, Ethical Hacking
	6.3 COBIT framework

Approved Copy

Academic Co-ordinator
G. P. Mumbai

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	6	4	4	2	10
2	Classical Encryption Techniques	7	2	4	6	12
3	Symmetric Key Encryption	9	4	4	6	14
4	Public-Key Cryptography	8	4	4	4	12
5	Digital Signatures & public key management	9	4	6	4	14
6	Cyber Crime & Security	6	2	4	2	8
	Total	45	20	26	24	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.

References/ Books:

Sr. No.	Book Title	Author	Publication
1	Cryptography And Network Security Principles And Practice Fifth Edition	William Stallings	Prentice Hall
2	Information Security Principles and Practices	Mark Merkov & Jim Breithaupt	Pearson
3	Cryptography and Information Security	V.K.Pachghare	Prentice Hall India
4	Information Security and Cyber laws	Saurabh Sharma	Vikas Publishing House

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Websites References:-
1. https://www.tutorialspoint.com/itil/information_security_management.htm
2. https://wanguolin.github.io/assets/cryptography_and_network_security.pdf
3. http://nptel.ac.in/courses/106105162/
4. http://www.infosecawareness.in/cyber-laws-india
5. http://www.cyberlawsindia.net/

Course Curriculum Development Committee:

a. Internal Faculty

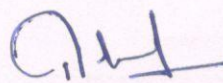Ms. M. S. Arade (Lecturer, Information Tech, Govt. Polytechnic Mumbai)

Ms. N. A. Wankhade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)
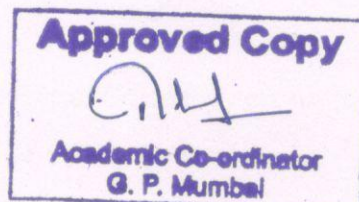
b. External Faculty

Ms. Pooja Chelani (Lecturer, Computer Engineering., Govt. Polytechnic Pen)

Mr. Krantikumar Arade (Senior Specialist - CRM at Hitachi Solutions Pune Pvt Ltd.)

Academic Coordinator   **Head of Department**   **Principal**
(Dr. R. A. Patil)   **(Information Technology)**   **Govt. Polytechnic Mumbai**

Approved Copy
Academic Co-ordinator
G. P. Mumbai

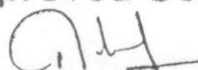| Programme : **Diploma in Computer Engineering**									
Course Code: **CO16501**				Course Title: **Software Engineering**					
Compulsory / Optional: **Compulsory.**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
03	--	--	03	70(3 Hrs)	30	--	--	--	100

Rationale:

Software Engineering is an engineering discipline that is concerned with all aspects of software production. Further it is the systematic application of scientific and technological knowledge, methods and experience to the design, implementation, testing and documentation of software. This course intends to develop a systematic, disciplined approach to the development, operation and maintenance of software and help students to get acquainted with latest trends in Software Engineering.

Course Outcomes: Students will be able to

CO1	Explain Principles of Software Engineering
CO2	Apply Analysis Principles to S/W Project Development.
CO3	Apply Design Principles to S/W Project Development.
CO4	Write Project Management flow.
CO5	Describe basics of software Quality Assurance and Maintenance.

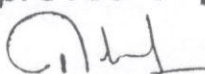Approved Copy

Academic Co-ordinator
G. P. Mumbai

Course Contents:

Unit No.	Contents
1	**Overview of Software Engineering** 1.1 Definition of Software 1.2 Types, Characteristics and Applications of Software 1.3 Software Engineering- Definition, Need 1.4 Relationship between System Engineering and Software Engineering 1.5 Software Engineering- A Layered Approach 1.6 Software Development Generic Process Framework- Software Process, Software Product, Software Work-Product, Typical Umbrella Activities, Identifying A Task Set.

2	**Prescriptive Process Models and Agile Methodology**
	
	 2.1 Personal and Team Process Models
	       (PSP and TSP)
	 2.2 Prescriptive Process Models: The Waterfall Model, V model, Incremental Process Model, Evolutionary Process Model: Prototyping.
	 2.3 Agile Software Methodology:
	      2.3.1 What is Agile Methodology
	      2.3.2 Difference between Prescriptive and Agile Process Model
	      2.3.3 Agility Principles
	      2.3.4 Agile Testing Methodology
	      2.3.5 Agile Process Model: Scrum
	      2.3.6 Scrum Process Flow
	      2.3.7 Introduction to Agile Tools: IceScrum
	
	 2.4 Introduction to DevOps

3	**Software Engineering Practices**
	
	 3.1 Software Engineering Practices- Definition, Importance.
	 3.2 Core Principles of Software Engineering
	 3.3 Communication Practices
	      3.3.1 Concept, Need of Communication,
	      3.3.2 Statements and meaning of each Principle.
	 3.4 Planning Practices
	        3.4.1 Concept, Need of planning,

Approved Copy

Academic Co-ordinator
G.P. Mumbai

	3.4.2 Statements and meaning of each Principle.
	
	3.5 Modeling Practices
	    3.5.1 Concept of Software Modeling
	    3.5.2 Analysis Modeling
	           Flow oriented Modeling(DFD, Data Dictionary, Decision Tables)
	           Scenario based Modeling(What is Use Case, Purpose of Use Case, Use Case Diagram and its components)
	    3.5.3 Design Modeling
	          Definition of Design
	          Qualities of a Good Design
	          Design Constraints.
	
	3.6 Construction Practices
	    3.6.1 Concept of Software Construction
	    3.6.2 Coding(Brief Introduction)
	    3.6.3 Validation(Brief Introduction)
	    3.6.4 Testing(Brief Introduction)
	
	3.7 Software Deployment
	    3.7.1 Concept of Delivery Life Cycle, Support Cycle and Feedback Cycle
	    3.7.2 Deployment Principles
	
	3.8 SRS (Software Requirements Specification)
	    3.8.1 Concept of SRS
	    3.8.2 General Format of SRS
	    3.8.3 Need of SRS
	    3.8.4 Case Study

4	**Software Project Management**
	
	4. 1 The Management Spectrum –the 4 Ps and their Significance
	4. 2 Project Scheduling- Concept, Principles and Techniques(Gantt Chart, PERT, CPM,WBS)
	4. 3 Ways of Project Tracking
	4. 4 Risk Management
	    4.4.1 Concept of Software Risks
	    4.4.2 Types of Software Risks
	4. 5 Risk Assessment
	    4.5.1 Risk Identification
	    4.5.2 Risk Analysis
	    4.5.3 Risk Prioritization
	
	4.6 Risk Control
	    4.6.1 RMMM Strategy

Approved Copy

Academic Co-ordinator

5	**Software Testing and Quality Assurance**

5. 1 Software Testing Fundamentals

5. 2 Testing Life-Cycle

5. 3 Testing Strategies

      5.3.1   Verification and Validation

      5.3.2   Defect Management

             Defect Life Cycle

             Bug Reporting

5. 4 Alpha and Beta Testing

5. 5 Introduction to White-Box and Black-Box Testing

5. 6 Software Quality Assurance- Definition and Activities for SQA

5. 7 Software Quality Factors.(McCall's)

5. 8 Quality Evaluation Standards

6	**Software Maintenance**

6. 1 Software Maintenance Definition

6. 2 Maintenance Characteristics and Activities

      6.2.1   Corrective, Adaptive, Perfective, Preventive

6.3 Estimating Software Maintenance Cost

6.4 Maintenance Side Effects

6.5 Reverse Engineering and Re-Engineering

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	Overview of Software Engineering	7	4	4	2	10
2	Prescriptive Process Models and Agile Methodology	8	4	6	2	12
3	Software Engineering Practices	10	6	4	6	16
4	Software Project Management	8	6	4	2	12
5	Software Testing and Quality Assurance	8	6	4	2	12
6	Software Maintenance	4	4	4	-	8
	TOTAL	45	30	26	14	70

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Reference Books:

Sr. No.	Book Title	Author	Publisher
1	Software Engineering- A Practitioner's Approach	Roger S. Pressman	Tata McGraw Hill
2	Software Engineering Concepts	Richard Fairly	McGraw Hill
3	Fundamentals of Software Engineering	Rajib Mall	Prentice Hall of India
4	A Concise Introduction to Software Engineering	Pankaj Jalote	Springer
5	Software Engineering	Jawadekar	Wiley India
6	Information Technology Project Management	Jack T. Marchewka	Wiley India

Web References:

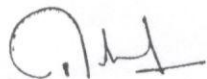http://www.win.tue.nl/~wstomv/edu/2ip30/references/
https://www.tutorialspoint.com/software_engineering/

Course Curriculum Development Committee:

Internal Faculty:

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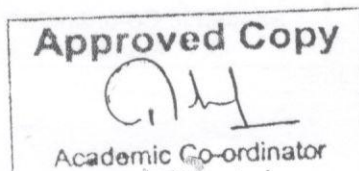
External Faculty:

Mrs. Asawari Shiposkar (L and T Institute of Technology, Mahape ,Mumbai)

Academic Coordinator
(Dr. R. A. Patil)

Head of Department
(Computer Engineering)

Principal
Govt. Polytechnic Mumbai

Approved Copy

Academic Co-ordinator

Course Name:-Software Engineering

Course Code:- CO16501

CO Vs PO matrix

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

CO Vs PSO matrix

	CO/POs	PSO1	PSO2	PSO3
CO1	Learn and Understand the Principles of Software Engineering	3	2	2
CO2	Apply Analysis Principles to S/W project Development	3	2	3
CO3	Apply Design Principles to S/W project Development	3	2	3
CO4	Understand Project Management Flow.	2	3	3
CO5	Learn basics of Software Quality Assurance and Maintenance	3	2	3

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	Overview of Software Engineering	CO1: Learn and Understand the principles of Software Engineering
2	2	Prescriptive Process Models and Agile Methodology	CO1: Learn and Understand the principles of Software Engineering
3	3	Software Engineering Practices	CO2: Apply Analysis principles to S/W project Development. CO3: Apply Design principles to S/W project Development.
4	4	Software Project Management	CO4: Understand Project Management flow.
5	5	Software Testing and Quality Assurance	CO5: Learn basics of software Quality Assurance and Maintenance.
6	6	Software Maintenance	CO5: Learn basics of software Quality Assurance and Maintenance.

Approved Copy

Programme: Diploma in Information Technology									
Course Code: IT16314				Course Title: Advanced Java Programming					
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
03	--	04	07	70#	30	50*	--		150

*Assessed by External Examiner
Online examination.

Rationale: Working with programmable languages like C, C++, VC++ and Visual Basics, programmer finds a tedious job for writing a large number of instructions for designing and creating a tool, whereas Java has its own predefined tools. A programmer works faster with Java to create complicated applications. Therefore, computer professionals must learn advanced features of Java programming.

Course Outcomes: Student should be able to

CO1	Design simple and event based GUI forms using JavaFX
CO2	Create small network programs
CO3	Interface back end and front end
CO4	Build java beans and spring programs.
CO5	Build small programs as per design patterns
CO6	Build servlets programs.

Course Content Details:

Unit No	Topics/ Sub-topics

1	**Network Programming**
	1.1 The Networking Classes and Interfaces
	1.2 InetAddress
	     1.2.1 Factory Methods
	     1.2.2 Instance Methods
	1.3 Inet4Address and Inet6Address
	1.4 TCP/IP Client Sockets
	1.5 URL

Approved Copy

Academic Co-ordinator
G. P. Mumbai

	1.5.1URLConnection
	1.5.2 The URI Class
	1.6 Cookies
	1.7 TCP/IP Server Sockets
	1.8 Datagrams
	1.8.1 DatagramSocket
	1.8.2 DatagramPacket
	1.8.3 A Datagram Example
2	**Java Data Base Access**
	2.1 Introduction
	2.2 JDBC Drivers
	2.3.1 JDBC-ODBC Bridge
	2.3.2 Native API, partly Java
	2.3.3 Middleware, Pure Java
	2.3.4 Pure Java Driver
	2.3 Java architecture
	2.3.1 Database client/server methodology
	2.3.2 Two-Tier Database Design
	2.3.3 Three-Tier Database Design
	2.2 The JDBC API
	2.2.1The API Components
	2.2.1 Security Considerations
	2.4 A JDBC database example
	2.4.1 Loading drivers
	2.4.2 Making a connection
	2.4.3 Execute SQL statement
	2.4.4 Retrieving Result.
	2.4.5. Exception Handling.
	2.5 Introduction to Hibernate
3	**Servlets**
	3.1 Background
	3.2 The Life Cycle of a Servlet
	3.3 Servlet Development Options
	3.4 Using Tomcat
	3.5A Simple Servlet
	3.5.1 Create and Compile the Servlet Source Code
	3.5.2 Start Tomcat
	3.5.3 Start a Web Browser and Request the Servlet
	3.6 The Servlet API
	3.7 The javax.servlet Package
	3.8 Reading Servlet Parameters
	3.9 The javax.servlet.http Package
	3.9.1The HttpServletRequest Interface
	3.9.2 The HttpServletResponse Interface
	3.9.3 The HttpSession Interface
	3.9.4 The Cookie Class
	3.9.5 The HttpServlet Class
	3.10Handling HTTP Requests and Responses
	3.10.1 Handling HTTP GET Requests
	3.10.2 Handling HTTP POST Requests
	3.11 Using Cookies
	3.12 Session Tracking

4	**Introduction to JavaFX GUI Programming**
	4.1 Introduction to AWT and Swing.
	4.2 JavaFX Basic Concepts
	4.2.1 The JavaFX Packages
	4.2.2 The Stage and Scene Classes
	4.2.3 Nodes and Scene Graphs
	4.2.4 Layouts
	4.2.5 The Application Class and the Life-cycle Methods
	4.2.6 Launching a JavaFX Application
	4.3 A JavaFX Application Skeleton
	4.4 Compiling and Running a JavaFX Program
	4.5 The Application Thread
	4.6 A Simple JavaFX Control Label, Buttons and Events
	4.6.1 Event Basics
	4.6.2 Demonstrating event handling.
	4.7 Drawing Directly on Canvas.
5	**Introducing JavaFX Controls**
	5.1 Using Image and ImageView
	5.1.1 Adding an Image to a Label
	5.1.2 Using an Image with a Button
	5.2 ToggleButton
	5.3 RadioButton
	5.3.1 Handling Change Events in a Toggle Group
	5.3.2 An Alternative Way to Handle Radio Buttons
	5.4 CheckBox
	5.5 ListView
	5.6 ListView Scroll Bars
	5.7 Enabling Multiple Selections
	5.8 ComboBox
	5.9 TextField
	5.10 ScrollPane
	5.11 TreeView
	5.12 Introducing Effects and Transforms
	5.12.1 Effects
	5.12.2 Transforms
	5.12.3 Demonstrating Effects and Transforms
	5.13 Adding Tooltips
	5.14 Disabling a Control
6	**Introducing JavaFX Menus**
	6.1 Menu Basics
	6.2 An Overview of MenuBar, Menu, and MenuItem
	6.2.1 MenuBar
	6.2.2 Menu
	6.2.3 MenuItem

	6.3 Create a Main Menu 6.4 Add Mnemonics and Accelerators to Menu Items 6.5 Add Images to Menu Items 6.6 Use RadioMenuItem and CheckMenuItem 6.7 Create a Context Menu 6.8 Create a Toolbar 6.9 Put the Entire MenuDemo Program Together
7	Java Beans and Spring 7.1 What is java bean? 7.2 The java beans API 7.3 The java bean example. 7.4 Introduction to Spring. 7.5 Spring - Environment Setup. 7.6 Spring – hello World example. 7.7 Introduction to RMI.

8	**Introduction to Design Patterns**
	8.1 What is Pattern? Why do we need patterns?
	8.2 Design Pattern classification
	8.2.1 Creational
	Example:
	  - Factory Pattern
	  - Singleton Pattern
	8.2.2 Structural
	Example:
	 - Adapter Pattern
	 - Decorator Pattern
	8.2.3 Behavioral
	Example:
	- Iterator Pattern
	- Strategy Pattern
	- Template Pattern

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	Network Programming	5	2	4	2	8
2	Java Data Base Access	5	2	4	4	10
3	Servlets	6	4	4	2	10
4	Introduction to JavaFX GUI Programming	6	2	2	4	8
5	Introducing JavaFX Controls	5	4	2	2	8
6	Introducing JavaFX Menus	8	4	2	4	10
7	Java Beans	5	4	2	2	8
8	Introduction to Design Patterns	5	2	2	4	8

		Total	45	24	22	24	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.

List of Experiments/ Assignments:

Sr. No.	Unit	List of Experiments	Approx. Hours	CO
1.	1.	Write a program that demonstrates TCP/IP based communication between client and server.	2	2
2.	1.	Write a program that demonstrates UDP based communication between client and server.	2	2
3.	1.	Write a program to demonstrate the use of URLs and URL Connection class for communication.	4	2
4.	2.	Write an Application program to make connectivity with database using JDBC API	4	3
5.	2.	Write an Application program to send queries through JDBC bridge & handle the result	4	3
6.	3.	Write servlet demonstrating GenericServlet class.	4	6
7.	3.	Write a servlet to demonstrate HTTPServlet class using doGet() and doPost() method.	4	6
8.	4.	Write a program to design a form using Java FX controls.	4	1
9.	4.	Write a program to demonstrating event handling.	4	1
10.	5.	Write a program to design a form using Java FX menus.	4	1
11.	6.	Write a program to design a form using Java Fx treeview.	4	1
12.	7.	Write a program using simple java bean.	2	4
13	7.	Write a program for hello world using Spring.	4	4
14.	8.	Write a program using Behavioral type design pattern of your choice	4	5
15.	8.	Write a program using Structural type design pattern of your choice	4	5
16.		Mini Project	6	1,2,3,4,5,6
		Total	**60**	

Approved Copy

Academic Co-ordinator
G. P. Mumbai

References & Books:

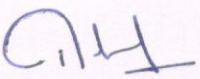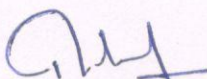| Sr.No.	Name Of Book	Author	Publisher
1	The Complete Reference Java 10th edition	Herbert Schildt	Mc. Graw Hill
2	Hungry Minds- Java Data Access	Todd M. Thomas	Professional Mindware
3	Head First Design Patterns	Eric Freeman	O'Reilly

Course Curriculum Development Committee:

a. **Internal Faculty**

Ms. Namrata A Wankhade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)

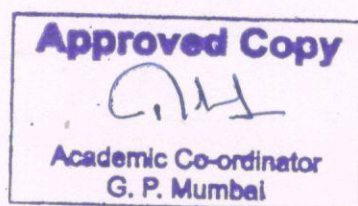Ms. Madhuri S. Arade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)

b. **External Faculty**

Ms. Anuradha Manakshe (Principal Software Engineer at Podium Data Inc, Lowell, Massachusetts - 01852, United States.)

Academic Coordinator
(Dr. R. A. Patil)

Head of Department
(Information Technology)

Principal
Govt. polytechnic Mumbai

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Programme : **Diploma in Information Technology**								
Course Code:**IT16310**				Course Title: **Linux Operating System**				
Compulsory / Optional: **Compulsory**								

Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	2	5	70(3 Hrs)	30	50*	--	---	150

*Assessment by External Examiner

Rationale:

An Operating System remains the soul of any computer. Now a day's open source software movement is becoming noteworthy. Open-source software (OSS) is a type of computer software with its source code made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose.

Linux Operating System is Open source and freely distributed O.S. Apart from the fact that it's freely distributed, Linux's functionality, adaptability and robustness makes it highly suitable for server platform. The course aims at providing knowledge of Linux file system, commands and shell essentials.

Course Outcomes:

Student should be able to:

CO1	Compare between open source and proprietary operating system
CO2	Install and Configure Linux O.S.
CO3	Analyse Linux file system structure.
CO4	Implement various commands of Linux operating system.
CO5	Use of vi editor with its commands.
CO6	Write and execute programs using shell scripting

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction** 1.1 Review of operating system concepts 1.2 History of GNU Project & Open Source Software Movement 1.3 History of Unix and Linux Operating system

Linux Operating System

Approved Copy

Academic Co-ordinator
G. P. Mumbai

IT16310

	1.4 UNIX Vs Linux and MS--Windows Vs Linux
	1.5 Distributions of Linux operating system and their features
	1.6 Role of Linux system as server workstation and desktop.
	1.7 Linux Software Repositories
2	**Linux Partitioning System**
	2.1 Types of Partitions -Root partition, Swap partition and all other Linux Partitions,
	2.2 Partitioning tools-Fdisk, Disk druid and GParted, KDE Partition Manager
	2.3 Mounting file systems
	2.4 Installation of Linux, Dual Booting, GRUB Boot Loader.
	2.5 System startup and shut down of Linux, Password Techniques & Shadow Password
3	**Linux Desktop Environment System**
	3.1 Concept of X-window, X-server
	3.2 Accessing Your Linux System
	➤ The Display Managers: GDM and KDM
	➤ Switching Users
	➤ Accessing Linux from the Command Line Interface
	3.3 The GNOME and KDE Desktops
	➤ KDE
	➤ GNOME
	➤ Starting a GUI from the Command Line
	3.4 Desktop Operations
	➤ Desktop Themes
	➤ Fonts
	➤ Configuring Your Personal Information Sessions
	➤ Using Removable Devices and Media
	➤ Installing Multimedia Support: MP3, DVD, and DivX
4	**Linux File System**
	4.1 Linux File structure, I Node Structure
	4.2 Listing, Displaying, and Printing Files: ls, cat, more, less, and lpr
	4.3 Managing Directories: mkdir, rmdir, ls, cd, and pwd

	4.4 Moving Through Directories
	4.5 Referencing the Parent Directory
	4.6 File and Directory Operations: find, cp, mv, rm, and ln
	4.7 Archiving and Compressing Files
	➢ Archiving and Compressing Files with File Roller
	➢ Archive Files and Devices: tar
	4.8 File Compression: gzip, bzip2, and zip .
5	**Linux commands & vi Editors**
	5.1 Processes in Linux and their overall working and states
	5.2 process control Commands
	5.3 General purpose commands
	5.4 Communication Commands, Help commands.
	5.5 The vi Editor: vi Command, Input, and Line Editing Modes
	5.6 Creating, Saving and Quitting a File in vi
	5.7 vi Editing Commands: Common Operations
6	**Linux Shell Scripts and Programming**
	6.1 Different shells in Linux, Comparison between Different Shells.
	6.2 Features and use of Bash shell
	6.3 Redirection of Standard output/input
	➢ Redirectors
	➢ Pipes
	➢ Filters
	6.4 Shell Programming
	➢ Variables in Linux
	➢ User defined variables & Rules for Naming variable name
	➢ Writing shell scripts and Executing shell scripts
	➢ Quotes in Shell Scripts
	➢ Shell Arithmetic
	➢ Command Line Processing (Command Line Arguments)
	➢ Exit Status
	➢ Filename Shorthand or meta Characters (i.e. wild cards)
	6.5 Programming Commands
	➢ echo command
	➢ Decision making in shell script (i.e. if command)

	➤ test command or [expr]
	➤ Loop in shell scripts
	➤ The case Statement
	➤ The read Statement

Suggested Specifications Table with Hours and Marks (Theory):

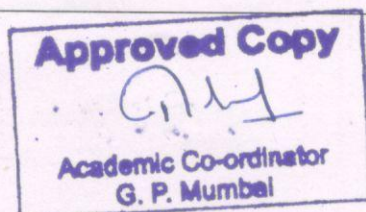| Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Introduction	6	2	6	2	10
2	Linux Partitioning System	7	2	4	4	10
3	Linux Desktop Environment System	6	4	4	2	10
4	Linux File System	8	2	4	6	12
5	Linux commands & vi Editors	8	4	4	6	14
6	Linux Shell Scripts and Programming	10	4	4	6	14
	Total	**45**	**18**	**26**	**26**	**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.

List of experiments/Assignments: (Minimum 10 experiments should be performed)

Sr. No.	Unit	List of Experiments	Appro x. Hours	Co
1	1	Installation of Linux operating system.	2	2
2	4	Execute file and directory manipulation commands – ls, cd, pwd, dir, touch, cat, mkdir, rmdir, rm, mv, cp, head, tail, diff, comm, lpr, chmod, ln, cmp	2	3.4
3	4	Execute text processing and communication commands – tr, wc, cut, paste, sort, grep, who, who am I, mesg, talk, wall, write, news, mail.	2	4

4	5	Use of general purpose and process commands—ps, exit, kill, wait, sleep, bc, date, time, cal, clear, banner, su, man, adduser, deluser	2	4
5	5	Use of vi editor and editor commands.	2	5
6	6	Write a shell script to see current date, time, username, and current directory.	2	6
7	6	Write a shell script to print no's as 5,4,3,2,1 using while loop.	2	6
8	6	Write a shell script that will add two no's, which are supplied as command line argument, and if this two no's are not given display error message.	2	6
9	6	Write a shell script to find out biggest number from given three nos. Nos are supplies as command line argument. Print error if sufficient arguments are not supplied.	2	6
10	6	Write a shell script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument	2	6
11	6	Write a shell script to change file permissions as read only to other users for file security.(Take input file name as command line argument)	2	6
12	6	Write a shell script to display all executable files, directories and zero sized files from current directory	2	6
13	6	Write a shell script, using case statement to perform basic math operation as follows 1. + addition 2. – subtraction 3. x multiplication 4. / division	2	6
14	6	Write a menu driven shell script which will print the following menu and execute the given task. 1. Display calendar of current month 2. No of process currently running (foreground , background) 3. Sleeping of any process for some seconds. 4. Broadcasting of message to other terminals	2	6
15	4 to 6	Write script called sayHello, put this script into your startup file called .bash_profile, the script should run as soon as you logon to system, and it print any one of the following message Good Morning Good Afternoon Good Evening , according to system time	2	6
		Total	30	

Approved Copy

Academic Co-ordinator
G. P. Mumbai

References/ Books:

Sr. No.	Book Title	Author	Publication
1	Linux: The Complete Reference[Sixth Edition]	Richard Petersen	Tata Mc Graw Hill
2	Linux command line and shell scripting	Richard Blum	Willey India
3	Guide to Linux Installation & Administration	Nicholos wells	Prentice Hall of India
4	Mastering LINUX	Arman danesh	John Wiley & Sons (Asia) Pvt. Ltd.

Websites References :-

1. http://www.ee.surrey.ac.uk/Teaching/Unix/
2. https://www.tutorialspoint.com/unix/index.htm
3. https://www.kau.edu.sa/files/830/files/60761_linux.pdf
4. http://www.learnshell.org/
5. http://nptel.ac.in/courses/106108101/20
6. http://nptel.ac.in/courses/117106113/

Course Curriculum Development Committee:

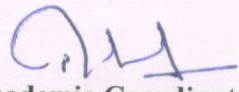a. **Internal Faculty**

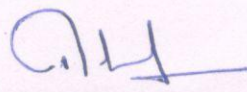 Ms. M. S. Arade (Lecturer, Information Tech, Govt. Polytechnic Mumbai)

  Ms. N. A. Wankhade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)
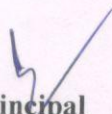
b. **External Faculty**

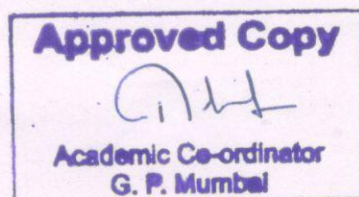 Ms. Pooja Chelani(Lecturer, Computer Engineering., Govt. Polytechnic Pen)

  Mr. Krantikumar Arade(Senior Specialist - CRM at Hitachi Solutions Pune Pvt Ltd.

Academic Coordinator
(Dr. R. A. Patil)

Head of Department
(Information Technology)

Principal
Govt. Polytechnic Mumbai

Approved Copy
Academic Co-ordinator
G. P. Mumbai

Programme : **Diploma in Information Technology**								
Course Code:**IT16401**				Course Title: **Python Programming**				
Compulsory / Optional: **Optional 1**								
Teaching Scheme and Credits				Examination Scheme				
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	2	5	70(3 Hrs)	30	50*	--	---	150

*Assessment by External Examiner

Rationale: Working with programmable languages like C, C++, VC++ and Visual Basics, programmer finds a tedious job for writing a large number of instructions for designing and creating a tool, whereas Python has its own predefined tools and it is very easy to understand. A programmer works faster with Python to create complicated applications. Therefore, computer professionals must learn python programming.

Course Outcomes:

Student should be able to:

CO1	Understand basics of python programming
CO2	Build small programs for decision making statements
CO3	Validate the fields using regular expression
CO4	Understand file handling
CO5	Create GUI forms
CO6	Design Database connectivity
CO7	Understand OOP concepts in python

Course Content Details:

Unit No	Topics / Sub-topics

1	**Introduction to Python**
	1.1 What is Python?
	1.2 Components of Python program
	    1.2.1 Operators
	    1.2.2 Numbers
	    1.2.3 Strings
	    1.2.4 Arrays
	    1.2.5 Sets
	    1.2.6 Lists — Changeable Sequences of Data,
	    1.2.7 Tuples — Unchanging Sequences of Data,
	    1.2.8 Dictionaries — Groupings of Data Indexed by Name,
	    1.2.9 Object storage
	    1.2.10 Type conversion
	    1.2.11 Assignment statements
	    1.2.12 Print statements
	1.3 Introduction to in built libraries.

2	**Decision Making and Functions**
	2.1 decision making statements
	2.2 decision making and looping statement
	2.3 break statement
	2.4 functions
3	Object Oriented Concepts in Python programming
	3.1 Creating a Class
	3.1.1 Self Variables
	3.1.2 Types of Methods
	3.2 Constructors
	3.3 Inheritance
	3.4 Polymorphism
	3.6.1 Operator Overloading
	3.6.2 Method Overloading & Overriding
	3.5 Exception Handling
	3.7.1 Errors in a Python Program
	3.7.2 Exceptions
	3.7.3 Types of Exceptions
	3.7.4 The Except Block
	3.6 Multithreading.
4	**Python Regular Expressions**
	4.1 Powerful pattern matching and searching
	4.2 Power of pattern searching using regex in python
	4.3 Real time parsing of networking or system data using regex
	4.4 Password, email, url validation using regular expression
	4.5 Pattern finding programs using regular expression
5	**File Handling**
	5.1 Types of Files in Python
	5.2 Opening a File
	5.3 Closing a File
	5.4 Knowing Whether a File Exists or Not
	5.5 Working with Binary Files
	5.6 Appending Text to a File
	5.7 Understanding read functions, read(), readline() and readlines()
	5.8 Understanding write functions, write() and writelines()
	5.9 Manipulating file pointer using seek
	5.10 File Exceptions
6	**GUI Programming and Databases**
	6.1 GUI Programming:
	6.1.1 Writing a GUI with Python
	6.1.2 GUI Programming Toolkits
	6.1.3 Creating GUI Widgets with Tkinter
	6.1.4 Creating GUI using Turtle
	6.1.5 Creating Layouts, Radio Buttons and Checkboxes, Dialog Boxes.
	6.5 Database Access:
	6.5.1 Python's Database Connectivity
	6.5.2 Types of Databases Used with Python
	6.5.3 Mysql database Connectivity with Python
	6.5.4 Performing Insert , Deleting & Update operations on database

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 Python	6	2	6	2	10
2	Decision Making and Functions	7	2	4	4	10
3	Object Oriented Concepts in Python programming	8	4	4	4	12
4	Python Regular Expressions	6	2	4	4	10
5	File Handling	8	4	4	6	14
6	GUI Programming and Databases	10	4	4	6	14
	Total	45	18	26	26	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.

List of experiments/Assignments: (Minimum 10 experiments should be performed)

Sr. No.	Unit	List of Experiments	Approx. Hours	CO
1	1	Write python programs to understand Expressions, Variables,Basic Math operations, Strings: Basic String Operations & String Methods. (Minimum Three Programs based on math operations, Strings)	2	1
2	1	Develop programs to learn different types of structures (list, dictionary, tuples, arrays) in python.	2	1
3	1	Develop a program using built in libraries.	2	1
4	2	Develop programs to understand the control structures of python (minimum 4 programs on decision making and looping)	2	2
5	3	Write python programs to understand classes and objects. (minimum 2 programs to create classes and objects)	2	7

Approved Copy

Academic Co-ordinator
G. P. Mumbai

6	3	Write a python program to implement multiple inheritances.	2	7
7	3	Develop programs for method overloading and overriding.	2	7
8	3	Develop programs to understand working of exception handling.	2	7
9	4	Develop programs to validate the fields using regular expressions in python.	2	3
10	5	Write python programs to understand different File handling operations i) Create a file ii) Copy contents from one file to another file.	2	4
11	5	Write python programs to delete a file/ folder.	2	4
12	6	Draw graphics using Turtle.	2	5
13	6	Develop programs to learn GUI programming using Tkinter Write python programs to understand GUI designing and database operations (Minimum 3 programs based on GUI designing using Tkinter, Mysql database creation & Database connectivity with DML)	2	5,6
14	3	Develop chat room application using multithreading.	2	7,6
15	6	Mini Project	2	1,2,3,4,5,6,7
		Total	30	

References/ Books:

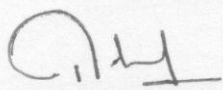| Sr. No.	Book Title	Author	Publication
1	Python: The Complete Reference	Martin C Brown	McGraw Hill Publication
2	Learning Python	Mark Lutz, David Ascher	O'Reilly Publication
3	Core Python Programming	Dr. R. Nageswara Rao	Dreamtech Press.

Course Curriculum Development Committee:
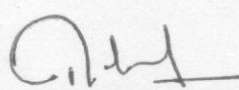   **Internal Faculty**

        Ms. M. S. Arade (Lecturer, Information Tech, Govt. Polytechnic Mumbai)

        Ms. N. A. Wankhade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)
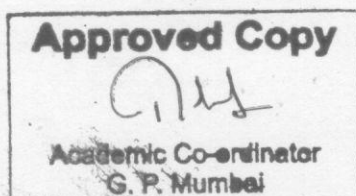
    External Faculty

        Mr. Abhijit A. Wankhade (Principal Business Solutions Archtect Cleagoals Company

    Montreal, Canada)

Academic Coordinator
(Dr. R. A. Patil)

Head of Department
(Information Technology)

Principal
Govt. Polytechnic Mumbai

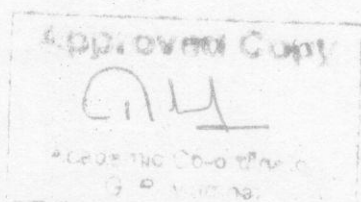| Programme : Diploma in Computer Engineering											
Course Code: CO16403				Course Title: Advanced Database Technology.							
Compulsory / Optional: Compulsory											
Teaching Scheme and Credits				Duration of Examination			Examination Scheme				
TH	TU	PR	Total	TH	TS	PR	TH	TS	PR	OR	TW	Total
03	---	02	05	3Hrs	1Hr 15min	---	70	30	50*	---	---	150
(*) indicates assessment by Internal and External examiners.											

Rationale:

A key component of information systems is its database management system. This course encompasses the study of advance technologies in database. It introduces a non-relational database solution to work with semi-structured or unstructured data. This course helps students enhance their skills & competencies to implement database systems using advanced technologies.
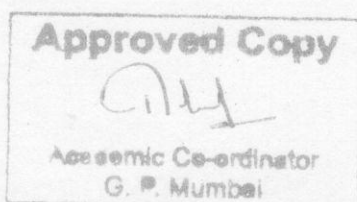
Course Outcomes:

The student will be able to:

CO1	Understand the concept of non-relational database system.
CO2	Understand the concept of data modeling in MongoDB.
CO3	Execute different MongoDB operations and methods.
CO4	Execute advanced database operations on collection.
CO5	Understand the concept of Distributed database system.
CO6	Understand the concept of Multimedia Databases.

Topic No	Contents

1	**Non-relational database system**
	1.1 Relational (RDBMS) Vs. Non-relational database system (NoSQL).
	    1.1.1 Structured vs. unstructured data.
	1.2 Introduction to NoSQL.
	    1.2.1 Types of NoSQL.
	        1.2.1.1 Key Oriented.
	        1.2.1.2 Column Oriented.
	        1.2.1.3 Graph Oriented.
	        1.2.1.4 Document Oriented.
	    1.2.2 Advantages of NoSQL.

2	**Introduction to MongoDB**
	2.1 MongoDB overview.
	    2.1.1 MongoShell
	    2.1.1 Features
	    2.1.2 MongoDB vs. SQL database.
	    2.1.3 Advantages of MongoDB.
	2.2 MongoDB schema design and Data Modeling
	    2.2.1 Reference document.
	    2.2.2 Embedded document.
	2.3 MongoDBDatatypes
	2.4 Data Relationships
	    2.4.1 One to One
	    2.4.2 One to Many
	    2.4.3 Many to Many

3	**MongoDB Operations**
	3.1 Basic operations in MongoDB
	    3.1.1 Create and Drop Database.
	    3.1.2 Create and Drop Collection.
	3.2 MongoDBDatatypes
	3.3 MongoDB CRUD Operations.
	    3.3.1 Create.
	    3.3.2 Read
	    3.3.3 Update
	    3.3.4 Delete
	3.4 Methods in MongoDB
	    3.4.1 Projection
	    3.4.2 Limit
	    3.4.3 Sort
	    3.4.4 Save
	    3.4.5 Gridfs

4	**Advanced MongoDB** 4.1 Indexing 4.1.1 Types of index 4.2 Aggregation 4.3 Replication 4.4 Sharding 4.5 Database backup 4.6 Database restore

5	**Distributed databases**
	 5.1 Introduction
	 5.2 Distributed database system vs. Centralized database system.
	 5.3 Features
	 5.4 Classification
	    5.4.1 Homogeneous
	    5.4.2 Heterogeneous
	 5.5 Architecture
	    5.5.1 Client –Server
	    5.5.2 Peer to Peer
	 5.6 Distributed data storage
	    5.6.1 Fragmentation
	       5.6.1.1 Horizontal
	       5.6.1.2 Vertical
	       5.6.1.3 Hybrid
	    5.6.2 Replication
	 5.7 Advantages.
	 5.8 Disadvantages

6	**Multimedia databases.** 6.1 Introduction 6.2 Contents of MM database. 6.3 Types of data 6.4 Data types in MM database 6.5 Design Goals 6.6 MM database architecture 6.7 Applications

SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	Non relational database system	6	4	4		8
2.	Introduction to MongoDB	8	4	8		12
3.	MongoDB Operations	10	4	4	6	14
4.	Advanced MongoDB	8	2	4	6	12
5.	Distributed databases	10	4	4	6	14
6.	Multimedia databases	6	2	8		10
	Total	48	20	32	18	70

List of Practical:

Sr. No.	Unit	Experiment/Assignment	Approx. Hours
1	2	Installation of MongoDB.	2
2	3	Create and Delete database and collection in MongoDB.	2
3	3	Perform CRUD-Create, Read, Update and Delete operations on collections.	2
4	3	Implementation of different MongoDB methods on document.	4
5	4	Implementation of Aggregate operations on document.	2
7	4	Implementation of Indexing on a document.	4
8	4	Create a database backup in MongoDB.	2
9	4	Restore Backup data in MongoDB.	4
10	4	Implement Replication operation on document.	4
11	5	Perform Fragmentation operation on database.	4
12	6	Store multimedia data such as audio, images in database.	2

Reference Books:

Sr. No.	Book Title	Author	Publication
01	MongoDB- a Definitive Guide	Kristina Chodorow	O'REILLY
02	Data Modeling for MongoDB	Steve Hoberman	Technics Publications
03	Principals of distributed database systems.	M. Tamer Ozsu; Patrick Valduriez	Springer

Course Curriculum Development Committee:
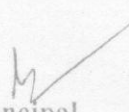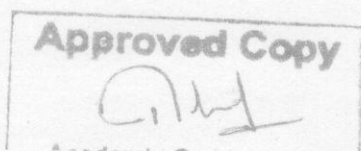
a. **Internal Faculty**

   Smt. Vrushali A. Patil (Lecturer in Computer Engineering, Govt. Polytechnic, Mumbai)

b. **External Faculty**

   Smt. Megha G. Yawalkar (Lecturer in Computer Engineering, Govt. Polytechnic, Pune)

Academic Coordinator   Head of Department   Principal
                              (Computer Engineering)   Govt. Polytechnic Mumbai

Approved Copy

Course Name :- Advanced Database Technology
Course Code :- CO16403

CO Vs PO matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	1	2	2	1	2	2	2	2	3
CO 2	3	2	3	3	1	1	1	2	2	3
CO 3	3	3	3	3	1	1	1	2	1	3
CO 4	3	3	3	3	2	2	2	3	1	3
CO 5	3	3	3	3	1	2	2	2	1	3
CO 6	3	3	3	3	1	2	1	3	1	3

CO Vs PSO matrix

Table CO/POs		PSO1	PSO2	PSO3
CO1	Understand the concept of non-relational database system.	2	2	2
CO2	Understand the concept of data modeling in MongoDB.	3	3	3
CO3	Execute different MongoDB operations and methods.	3	3	3
CO4	Execute advanced database operations on collection.	3	3	3
CO5	Understand the concept of Distributed database system.	3	3	3
CO6	Understand the concept of Multimedia Databases.	3	3	3

Unit Number and COs

Sr. No.	Unit No.	Topic Title	COs
1	1	Non relational database system	CO 1: Understand the concept of non-relational database system
2	2	Introduction to MongoDB	CO 2 : Understand the concept of data modeling in MongoDB.:
3	3	MongoDB Operations	CO 3: Execute different MongoDB operations and methods
4	4	Advanced MongoDB	CO 4: Execute advanced database operations on collection.
5	5	Distributed databases	CO 5: Understand the concept of Distributed database system.
6	6	Multimedia databases	CO 6: Understand the concept of Multimedia Databases.

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Programme : **Diploma in IT / CO**								
Course Code:**IT16402**				Course Title: **Microcontroller and Embedded System**				
Compulsory / Optional: **Optional 1**								
Teaching Scheme and Credits				Examination Scheme				
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	-	2	5	70 (3 Hrs.)	30	50*			150

Rationale:

In today's computerized world, we are surrounded by the embedded systems such as washing machine, microwave oven, DVD player, Mobile phone, I-pod and so on. Out of millions of processor manufactured every year, nearly 95% processors are used in embedded system. Embedded system deals with computer hardware with software embedded in it. The embedded system design is with or without OS. Most of them are real time embedded system. Application specific processor in to single chip has given the added dimension to the embedded system that are multiprocessor system on a single chip called as system on chip (Soc) and are smart as well as highly sophisticated. Due to tremendous growth of embedded system in recent years, students need to be familiar with its design aspects as well as programming of real time embedded system.
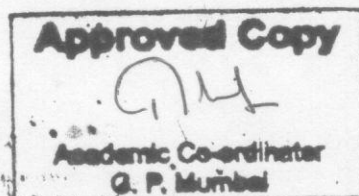
Course Outcomes:
After the completion of the course, student will be able to

CO1	Explain architecture and describe the pin configuration of microcontroller 8051.
CO2	Develop embedded program in C
CO3	Interface various devices to microcontroller
CO4	Design and development of small embedded systems.
CO5	Understand the concept of real time operating system

Course Content Details:

Unit No	Topics / Subtopics
1	**INTRODUCTION:** 1.1 Differentiate Microprocessor and Microcontroller 1.2 Evolution of microcontroller 1.3 Block diagram of Microcontroller 1.4 Common features of Microcontroller 1.5 Applications of Microcontroller

Approved Copy
Academic Co-ordinator
G. P. Mumbai

2	**MICROCONTROLLER 8051:** 2.1 Architecture of 8051: ALU, PC, DPTR, PSW, Internal RAM, Internal ROM, Latch, SFRs, General purpose registers, Timer/Counter, Interrupt, Ports 2.2 Pin diagram of 8051 and functions of each pin. 2.3 Memory Organization of 8051: Program and Data memory Map, External Memory Addressing and Decoding Logic of 8051 2.4 I/O Ports structure: Port 0, Port 1, Port2, Port 3.

3	**PROGRAMMING MICROCONTROLLER WITH C**
	3.1 Software development Tools: Operation and selection, Integrated development environment (IDE), cross compiler
	3.2 Embedded C Vs Assembly language
	3.3 Programming with C
	    3.3.1 Input / Output operation
	    3.3.2 Bit / Byte operations
	    3.3.3 Arithmetic and logical operations on data
	    3.3.4 Time /delay routines
	    3.3.5 Timer / Counter operations
	    3.3.6 Generation of patterns on port lines
	    3.3.7 Serial communication
	3.4 Execution of program using cross compiler like Keil, IDE, SPJ

4	**COMMUNICATION PROTOCOLS AND I/O INTERFACING** 4.1 Need of communication interface in embedded system 4.2 Serial communication protocol: I2C, CAN, USB, serial peripheral interface (SPI), Synchronous serial protocol (SSP) 4.3 Parallel communication protocol: PCI, PCI-X 4.4 Wireless communication protocol: Bluetooth, Zigbee, IEEE802.11 4.5 Interfacing keys, LEDs, and relay and its programming with C 4.6 Interfacing matrix keyboard and its programming with C 4.7 Interfacing LCD and its programming with C 4.8 Interfacing ADC and its programming with C 4.9 Interfacing DAC and its programming with C for generation of different patterns 4.10 Interfacing stepper motor and its programming with C
5	**EMBEDDED SYSTEM DESIGN** 5.1 Embedded system: Introduction, block diagram, applications, advantages and disadvantages 5.2 Classification of Embedded system 5.3 Design Metrics / Specifications / characteristics of Embedded system: Processor power, memory, operating system, reliability, performance, power consumption, unit cost, size, flexibility, maintainability, correctness and safety
6	**REAL TIME OPERATING SYSTEM** 6.1 Operating system, functions of operating system 6.2 Architecture of Real time operating system

6.3 Scheduling architecture

6.4 Multitasking

6.5 Share data problem

6.6 Task synchronization and mutual exclusion

6.7 Starvation, Deadlock, multiple process

6.8 Inter task communication

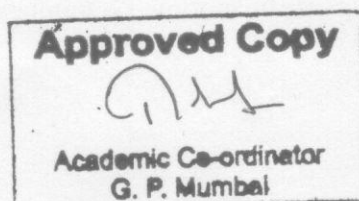**Suggested Specifications Table with Hours and Marks (Theory):**

Unit No	Topic Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Introduction	02	02	02		04
2	Microcontroller 8051	09	06	08		14
3	Programming microcontroller with C	08	02	02	10	14
4	Communication protocols and I/O interfacing	10		04	14	18
5	Embedded system design	08		04	06	10
6	Real time operating system	08		04	06	10
	Total	45	10	24	36	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.*

List of Practicals :-Any Ten

Sr. No.	Title of the Experiment	CO
1	Develop and execute C language program for arithmetic operations (addition, subtraction, multiplication and division)	CO2
2	Develop and execute C language program to arrange numbers in ascending and descending orders	CO2
3	Develop and execute C language program to transfer a block of data	CO2
4	Develop and execute C language program to blink LED connected on port pin	CO3
5	Develop and execute C language program to generate square wave on port of 8051	CO3
6	Develop and execute C language program to read status of key and turn ON/OFF a LED connected to port pins of 8051	CO3

7	Develop and execute C language program to ON / OFF a bulb through a relay connected to port pin of 8051	CO3
8	Interface 16 x 2 LCD to 8051. Develop and execute C program to display string on it.	CO3
9	Develop and execute C language program to transfer a message "Government Polytechnic Mumbai" serially at baud rate 4800, 8 bit data, 1 stop bit.	CO3
10	Interface 4 x 4 matrix keyboard and 16 x 2 LCD to 8051, Develop and execute C program to read and display key code on LCD	CO4
11	Interface 8 bit ADC and 16x2 LCD to 8051. Develop and execute C program to read and display data of ADC on LCD	CO4
12	Interface 8 bit DAC to 8051. Develop and execute C program to generate square, ramp and triangular waveform.	CO4
13	Interface stepper motor to 8051. Develop and execute C program to rotate stepper motor with different speed in clockwise and anticlockwise direction.	CO4

Reference Books:

Sr. No.	Book Title	Author	Publication
1	The 8051 Microcontroller and Embedded system	Muhammad Ali Mazidi	Prentice Hall
2	Fundamentals of Microprocessor and Microcontroller	B. Ram	Dhanpat Rai
3	The 8051 Microcontroller Architecture, programming and applications	Kenneth J. Ayala	Thomson
4	Embedded system Architecture Programming and design	Rajkamal	McGraw Hill
5	Embedded / Real time systems concept, design & programming	Dr. K. V. K. K. Prasad	Dreamtech Press

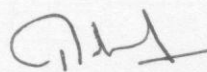**Course Curriculum Development Committee:**

Internal Faculty

Dr. R. A. Patil (Sel. Grade Lecturer, Electronics Engineering, Govt. Polytechnic Mumbai)

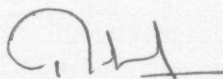Prof. Vivek Patil (Lecturer, Electronics Engineering, Govt. Polytechnic Mumbai)

Prof. Nagargoje (Lecturer, Electronics Engineering, Govt. Polytechnic Mumbai)
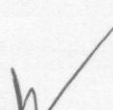
External Faculty

Dr. Uday Khot (Lecturer, Electronics Engineering, St. Francis Institute of technology, Mumbai)

Academic Coordinator	**Head of Department**	**Principal**
(Dr. R. A. Patil)	(Information Technology)	Govt. Polytechnic Mumbai

Course Name:-Microcontroller and Embedded System   **Course Code:-IT16402**

CO Vs PO matrix

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

CO Vs PSO matrix

	CO/PSOs	PSO1	PSO2	PSO3
CO1	Explain architecture and describe the pin configuration of microcontroller 8051.	1	1	
CO2	Develop embedded program in C	3	1	
CO3	Interface various devices to microcontroller	3	3	1
CO4	Design and development of small embedded systems.	1	2	3
CO5	Understand the concept of real time operating system	2	3	.

Unit Number and COs

Sr. No.	Unit No.	Topics	COs
1	1	Introduction	CO1
2	2	Microcontroller 8051	CO1
3	3	Programming microcontroller with C	CO2
4	4	Communication protocols and I/O interfacing	CO3
5	5	Embedded system design	CO4
6	6	Real time operating system	CO5

Government Polytechnic Mumbai

Programme : **Diploma in Information Technology**								
Course Code: **IT16312**				Course Title: **PROJECT AND SEMINAR STAGE - I**				
Compulsory / Optional: **COMPULSORY**								
Teaching Scheme and Credits				Examination Scheme				
				TH	TS	PR	OR	TW	Total
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	--	04	04	--	--	--	50*	--	50

*Assessment by External Examiner

RATIONALE:

In the field of Information Technology 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 skill 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 students to acquire skills and attitudes to work as a software developer.

COURSE OUTCOMES:

Student will be able to

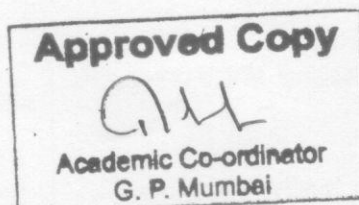| CO1	Work in Groups, Plan the work, Coordinate the work and develop leadership qualities
CO2	Analyse the project requirements and research case studies.
CO3	Develop technical writing skills
CO4	Practically implement the acquired knowledge.
CO5	Develop skills and innovative ideas to use latest technology in Information Technology.

COURSE CONENT DETAILS :

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 analaytics
   7. Machine Learning.
   8. Designing software for IT Application
   9. Electronic Data Processing
   10. Instrumentation based IT Application
   11. Interfacing of mobile devices with Automated Devices.
   12. Image processing
   13. Biosystems & Computational Biology
   14. Cyber Security

IT16312

2. ACTIVITY PLAN :

Sr No	Activity	Week No
1	Group formation (**Maximum no of students are 3 in single group**)	1
2	Literature survey and searching of topic Visits to Industries / Institutions / Market field(for industry sponsored projects)	2
3	Project topic selection	3
4	Define Problem statement for project work	4
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)	5
6	Progressive presentation of work	6
7	Decide Strategies/Methodology to carry out project	7
8	Allocation of work responsibility to individual/team	8
9	Collection of Data /Survey/Analysis	9
10	Prepare system design(Include DFD, UML Daigrams)	10
11	Implemtation of project modules.	11,12,13,14
12	Progressive presentation of work	15

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.
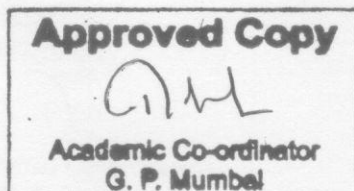
3. GUIDELINES FOR WRITING SYNOPSIS REPORT:

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

Approved Copy

Academic Co-ordinator
G. P. Mumbai

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)

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

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

Course Curriculum Development Committee:

a. **Internal Faculty**

Dr. R. A . Patil   (Lecturer, Electronics Engineering, Govt. Polytechnic Mumbai)

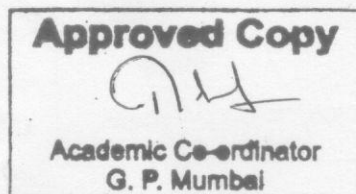Ms. M. S. Arade (Lecturer, Information Tech, Govt. Polytechnic Mumbai)

b. **External Faculty**

Ms. Pooja Chelani(Lecturer, Computer Engineering., Govt. Polytechnic Pen)

Academic Coordinator

**Head of Department
(Information Technology)**

**Principal
Govt. Polytechnic Mumbai**

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Programme : **Diploma in Information Technology**							
Course Code:**IT16311**				Course Title: **Advanced Web Technology**			
Compulsory / Optional: **Compulsory**							
Teaching Scheme and Credits				Examination Scheme			
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	--	4	4	--	--	50*	--	50	100

*Assessment by External Examiner

Rationale:

The course of advanced web technology has been developed to facilitate acquisition of the open source programming language required in IT industry today. PHP is a powerful tool for making dynamic and interactive Web pages. PHP is the widely-used, free, and efficient alternative to competitors such as Microsoft's ASP. PHP is an HTML-embedded scripting language. Much of its syntax is borrowed from C, Java and Perl with a couple of unique PHP-specific features thrown in. The goal of the language is to allow web developers to write dynamically generated pages quickly.
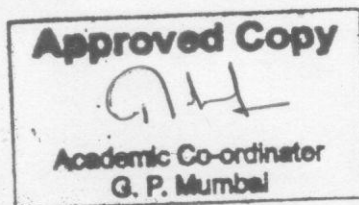
Course Outcomes:
Student should be able to:

CO1	Describe the concepts of constants, variables, data types and operators
CO2	Develop programs using input and output operations
CO3	Develop program using different looping and branching statements.
CO4	Implement programs using string, array and OOPs concept.
CO5	Code & maintain small PHP web based applications.
CO6	Introduce power of relational databases using MySQL
CO7	Implement programs using files, XML with PHP

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Course Content Details:

Unit No	Topics / Sub-topics
1	**Introduction** 1.1 Introduction to PHP , PHP Evolution, PHP Uses 1.2 PHP Vs. Other Scripting Languages, PHP vs. ASP, PHP vs. JAVA, PHP vs. Perl. 1.3 PHP Installation 1.4 PHP Language Basic - Statements, comments, Literals, Data Types, Variables, Scope of Variable, Constants,. 1.5 Operators & expression 1.6 Control flow , Decision making and loops
2	**Strings and Array** 2.1 Strings: String Function, Converting to String, Converting from String, Formatting Text Strings. 2.2 Arrays: One Dimensional Arrays, Multidimensional Arrays, Initializing Arrays, Handling Array with Loops, PHP Array Function.
3	**Functions and Object Oriented Programming** 3.1 Functions : Creating functions in PHP, Passed by Value, Passed by Reference, working with references , PHP variable functions, Recursive functions. 3.2 Classes and Objects, 3.3 Setting access to properties and method 3.4 Constructors, destructors 3.5 Inheritance, overloading methods , overriding methods 3.6 Exception Handling

4	**Handling HTML Forms , Sessions & Cookies**
	
	 4.1 Working of HTML Forms
	
	 4.2 Capturing Form Data with PHP
	
	     ➢ Super global Array: $_GET, $_POST, $_REQUEST
	
	     ➢ Handling Empty Form Fields
	
	 4.3 Dealing with Multi - Value Fields
	
	 4.4 Generating Web Forms with PHP

Approved Copy

Academic Co-ordinator
G. P. Mumbai

	4.5 Storing PHP Variables in Forms
	4.6 Redirecting after a Form Submission
	4.7 Introduction to regular expression
	4.8 Saving State with Query Strings
	4.9 Working with Cookies
	4.10 Using PHP Sessions to Store Data
5	**File Handling**
	5.1 Files Operations: Open, Close, Read, Write, Navigate, Copy, Delete, Rename, Append
	5.2 Getting file size, File exist or not ,locking files, Parsing files
	5.3 Operations on Directory: Add, Delete, Read Directories
	5.4 Uploading Files from Clients, Uploading Files with POST
6	**Working with Database**
	6.1 Some essential SQL
	6.2 Creating a MYSQL Database
	6.3 Creating a new table
	6.4 Putting data into database
	6.5 Accessing the database in PHP
	➢ Connecting to the database server
	➢ Connecting to the database
	➢ Reading , Display the table data
	➢ Closing the connection
	6.6 Updating a Database
	➢ Inserting new items in the database
	➢ Deleting records
	➢ Inserting new tables
7	**Working with XML**
	7.1 What Is XML
	7.2 XML Document Structure
	➢ Major Parts of an XML Document
	➢ XML Syntax Rules

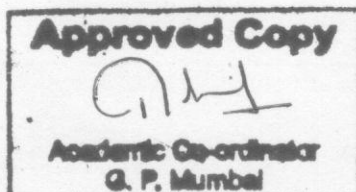| |
|---|
| ➢ Using XML Elements and Attributes |
| ➢ Valid XML Documents: DTDs and XSDs |
| 7.3 Reading XML Documents with PHP |
| ➢ How XML Parser Works |
| ➢ Creating a New Parser |
| ➢ Creating Event Handlers |
| ➢ Parsing the XML Document |
| ➢ Dealing with Parse Errors |
| 7.4 Writing and Manipulating XML Documents with PHP |

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					
2	Strings and Array					
3	Functions and Object Oriented Programming					
4	Handling HTML Forms , Sessions & Cookies	Not Applicable				
5	File Handling					
6	Working with Database					
7	Working with XML					
	Total					

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.

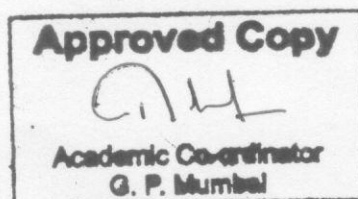## List of experiments/Assignments: (Minimum 10 experiments should be performed)

(Use HTML 5.0 for practical's)

Sr. No.	Unit	List of Experiments	Approx. Hours	CO
1	1	Installing and Configuring XAMPP or WAMPP Web Server	2	1,2
2	1	Write a script that creates a variable and assigns an integer value to it, then adds 1 to the variable ' s value three times, using a different operator each time. Display the final result to the user.	2	2
3	1	Write a script that creates two variables and assigns a different integer value to each variable. Now make your script test whether the first value is a. equal to the second value b. greater than the second value c. less than or equal to the second value d. not equal to the second value and output the result of each test to the user	4	2,3
4	1	Write a script that counts from 1 to 10 in steps of 1. For each number, display whether that number is an odd or even number.	4	2,3
5	2	Write a PHP script to a) transform a string all uppercase letters. b) transform a string all lowercase letters. c) make a string's first character uppercase. d) make a string's first character of all the words uppercase.	4	4
6	2	Write a program to make use of arrays.	4	4
7	2	Write a PHP script that uses a recursive function to display the factorials of the integers 0 to 10.	4	4

8	3	Write a Calculator class that can store two values, then add them, subtract them, multiply them together, or divide them on request. For example:
		    $calc = new Calculator(3, 4);
		    echo $calc- > add(); // Displays "7"
		    echo $calc- > multiply(); // Displays "12"
			4	4

9	3	Create another class, CalcAdvanced , that extends (inherits from) the Calculator class.
		
		CalcAdvanced should be capable of storing either one or two values:
		    $ca = new CalcAdvanced(3);
		    $ca = new CalcAdvanced(3, 4);
		CalcAdvanced should also add the following methods:
		    pow() that returns the result of raising the first number (the base) to the power of the second number
		    sqrt() that returns the square root of the first number
		    exp() that returns e raised to the power of the first number
			4	4

10	4	Create a script that displays a form allowing the user to select one of three Amazon stores — amazon.com , amazon.ca, and amazon.co.uk — and then jumps to the	4	5

		relevant store based on the user ' s choice.		
11	4	Write a script that uses cookies to remember how long ago a visitor first visited the page. Display this value in the page, in minutes and seconds.	4	5
12	5	Create a PHP application that can be used to find a particular directory by name when given a top – level directory to search. Make the application look through the given directory, as well as all directories under the given directory.	4	7
13	6	Write out an SQL statement that creates a table called members in your mydatabase database to store information about the members of a book club. Store the following data for each person.(Use MYSQL) first name, last name, age, and the date they joined the club. Create more SQL statements to insert five imaginary people into this table: ➢ Sai , aged 31, joined September 3, 2006 ➢ Nia , aged 19, joined January 7, 2007 ➢ Saarth , aged 23, joined August 19, 2007 ➢ Nirmayi, aged 20, joined June 11, 2007 ➢ Durva , aged 36, joined March 3, 2006	4	6
14	6	Write a PHP script to query the table you created in Exercise 14, displaying the details of all club members under 25 years of age.	4	6
15	7	Write a program using xml with php	4	7
16	1 to 7	Prepare Mini project which include all the content of course	4	1 to 7
		Total	**60**	

References/ Books:

Sr. No.	Book Title	Author	Publication
1	Beginning PHP 5.3	Matt Doyle	Wiley Publishing, Inc
2	Php: The Complete Reference	Steven Holzner	Tata McGraw-Hill Education
3	Professional PHP4	Argerich, choi, Egervari	SPD, Calcutta
4	PHP for Absolute Beginners	Jason Lengstorf	Apress

Approved Copy

Academic Co-ordinator
G. P. Mumbai

Websites References:-

1. www.php.net
2. www.w3schools.com
3. http://index-of.es/PHP/
4. https://www.w3resource.com/php-exercises/php-string-exercise-3.php

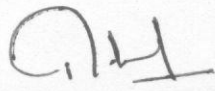**Course Curriculum Development Committee:**

a. Internal Faculty

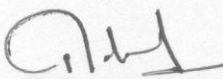Ms. M. S. Arade (Lecturer, Information Tech, Govt. Polytechnic Mumbai)

Ms. N. A. Wankhade (Lecturer in Information Technology, Govt. Polytechnic Mumbai)

b. External Faculty

Ms. Pooja Chelani(Lecturer, Computer Engineering., Govt. Polytechnic Pen)

Mr. Krantikumar Arade(Senior Specialist - CRM at Hitachi Solutions Pune Pvt Ltd.)

Academic Coordinator
(Dr. R. A. Patil)

Head of Department
(Information Technology)

Principal
Govt. Polytechnic Mumbai

Approved Copy

Academic Co-ordinator
G. P. Mumbai