GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: WEB AND NETWORK SECURITY
(COURSE CODE: 3361601)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	SIXTH

1. RATIONALE

The objective of the course is to enable the students to understand about the advances in network and web security. It covers the basic underlying concepts and techniques recently being used in the IT industry. After going through this course students will be able to understand public key cryptography as well as digital signature. They will also learn about various encryption algorithms using public key cryptography. They will also appreciate significant security mechanisms being employed for network and web security. Thus this course is an important course for IT engineers.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

- **Manage various Encryption Algorithms for Web Security Applications**
- **Apply Network security**

3. COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Describe importance of RSA Algorithm and Asymmetric cryptography.
ii. Explain Basic concept of Message Authentication Codes
iii. Explain basic concept of Web Security.
iv. Demonstrate use of digital signature
v. Apply Application level security on web browser
vi. Apply various parameters of antivirus and firewall security on network.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
4	0	2	6	70	30	20	30	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Public Key Crypto Systems**	1a. Describe the basics of Asymmetric cryptography	1.1 Asymmetric key cryptography: History and its overview
	1b. Explain the principles Of Public-Key Cryptosystems	1.2 Principles of pubic key cryptosystems. 1.2.1 Simplified working of public key cryptosystem: Secrecy. 1.2.2 Simplified working of public key cryptosystem: Authentication. 1.2.3 Simplified working of public key cryptosystem: Secrecy and Authentication. 1.3 Applications of Public Key cryptosystems. 1.4 Requirements for Public-Key Cryptography 1.5 Public-Key Cryptanalysis
	1c. Describe RSA Algorithm, its approach ,block diagram and security aspects	1.6 RSA algorithm: Description and explanation 1.7 General approach, block diagram and example for RSA. 1.8 The Security of RSA
Unit – II **MAC and Hash Functions**	2a. Explain Hash Functions , MD5 and basics of SHA	2.1 Applications of cryptographic Hash Functions. 2.2 Hash function based on block ciphers.(Block diagram and explanation only) 2.2.1 Rabin scheme. 2.3 Message Digest5 Hashing 2.4 Requirements for a cryptographic Hash function. 2.5 Secure Hash Algorithm (SHA) its overview. 2.5.1 Comparison of SHA parameters
	2b. Describe Message Authentication Code	2.6 Message Authentication: Requirements and Functions 2.6.1 Message Encryption 2.7 Message Authentication Code: Introduction and Requirements 2.8 Security of MAC 2.8.1 Brute-Force Attacks 2.8.2 Cryptanalysis
Unit – III **Network Security Application**	3a. Describe applications of Digital Signature. 3b.Demonstrate use of digital signature	3.1 Digital signatures: Definition and Properties. 3.1.1 Difference between conventional and digital signature. 3.1.2 Digital signature requirements and Applications. 3.2 Digital Signature Standard (DSS) Approach 3.3 Applications of Digital signatures.
	3b. Explain PGP and S/MIME Electronic Mail Security	3.4 Pretty Good Privacy(PGP): Operational Description, Confidentiality and Authentication, General format of PGP message

		3.5 S/MIME 3.5.1 MIME contents types.: 3.5.2 S/MIME functions:Concept,Introduction
	3c. Explain IP Security	3.6 IP Security Overview 3.6.1 Applications and benefits of IPsec. 3.6.2 IPsec documents. 3.6.3 IPsec Services.
Unit – IV **Web Security**	4a. Explain Web Security	4.1 Web Security Considerations. 4.1.1 Web security threats. 4.1.2 Web traffic security approaches. 4.2 Secure Socket Layer and Transport Layer Security 4.2.1 Overview of SSL Protocol Stack(diagram and explanation only) 4.3 HTTPS 4.3.1 Connection initiation. 4.3.2 Connection closure.
	4b. Apply Application level security on web browser	4.4 Basic Concept of Secure Electronic Transactions 4.5 SSL versus SET 4.6 D Secure Protocol
Unit - V **System Security**	5a. Explain Intrusion, Intrusion detection techniques and password management. 5b.Install and Configure an Antivirus Software	5.1 Intrusion 5.2 Classification of Intruders 5.3 Intrusion Detection techniques. 5.3.1 Statistical anomaly detection 5.3.2 Rule based detection. 5.4 Password Management 5.4.1 Password selection strategies. 5.5 Malicious software : Virus and Related Threats, Virus Countermeasures
	5c.Install and configure Firewall	5.6 Need of firewall. 5.7 Firewall characteristics. 5.8 Types of Firewall 5.8.1 Packet filtering firewall. 5.8.2 Application proxy firewall. 5.8.3 Circuit level proxy firewall.

6. 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
I	**Public Key Crypto Systems**	08	2	8	0	10
II	**MAC and Hash Functions**	12	4	8	4	16
III	**Network Security Application**	16	6	6	4	16
IV	**Web Security**	10	4	6	4	14
V	**System Security**	10	2	6	6	14
	Total	**56**	**18**	**34**	**18**	**70**

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Hrs. required
1	I	Prepare a 5 slides presentation of RSA, explaining its working and structure	02
2	II	1. Generate an executable file from a C compiler and generate its Message Digest Sum (MD5) sum. Note down the MD5. 2. Change the above C program with a minor modification and again generate its executable. Check the MD5 of the new file. Verify the MD5 of both the files. 3. Take 5 different application executables and check their MD5 in similar manner. Reference : (www.md5summer.org/download.html). You can alternatively use online MD5 generator.	02
3	II	1. Generate an executable file from a C compiler and generate is Secure Hash Algorithm (SHA-256, SHA-512) sum. Note down the SHA values. 2. Change the above C program with a minor modification and again generate its executable. Check the SHA 256 and 512 of the new file. Verify the SHA values of both the files. 3. Take 5 different application executables and check their SHA values. Reference: (http://www.xorbin.com/tools/sha256-hash-calculator). You can download the desktop based SHA generator	02
4	II	Prepare a chart/model Message Authentication Codes(MACs)	02
5	III	Prepare a chart /model to explain the importance of Digital Signature	02
6	III	Install Wireshark tool for packet capture.	02
7	III	Inspect IP packets and identify source and destination IP using the wireshark tool	02
6	IV	Prepare a Chart and/or presentation on SSL Protocol Stack.	02
8		1. Download Avast free AV or Clam AV open source. Check the updates of the anti malware.	04

		2. Identify you operating system. Update the OS and identify updates.	
9		Prepare a presentation on 3D authentication for monetary transactions (SET)	02
10	V	Install and configure an Antivirus for Network security	04
11		Install and configure few features of Firewall for Network security	04
12	V	Inspect the firewall at your department in CWN. Understand its functionality, identify the important configuration parameters for the same.	04
		(Total Practical Hours)	**34**
NOTE: Perform any of the practical exercises for total minimum of 28 hours from above list depending upon the availability of resources so that skills required for most of the outcomes in the all units are developed.			

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

- Seminar (student would prepare seminar on security features adopted by some reputed companies/banks etc to protect their websites and data)
- Students would use power point presentations in above seminar and there would be group discussions on the strengths and weakness of the security features adopted by the concern company.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
ii. Arrange expert lectures by IT experts working for security of websites and data of some reputed financial company or bank etc.
iii. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.
iv. Application for practical will be assigned to the students by the subject faculty and Students will work in a group of 3 maximum.
v. Group Discussion and presentation of relevant websites
vi. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck. Assignment can be given based on above topics.

10. SUGGESTED LEARNING RESOURCES

A) **List of Books**

S. No.	Title of Book	Author	Publication
1	Cryptography and Network Security	William Stallings	Pearson

2	Cryptography and Network Security	Forouzon	Mc Graw Hill
3	Network Security Essentials.	William Stallings	Pearson
4	Network Security: Private Communication in a Public World	CharlieKaufman	Prentice Hall
5	Cryptography Theory and Practice	Douglas R. Stinson	

B) **List of Software/Learning Websites**

- Download MD5 Application www.md5summer.org/download.html
- Download Wireshark Tools https://www.wireshark.org/tools/
- SecTools.Org: Top 125 Network Security Tools http://sectools.org/
- SHA-256 hash calculator http://www.xorbin.com/tools/sha256-hash-calculator
- Firewall Analyzer http://www.manageengine.com/products/firewall/?gclid=CO_Zh4DwtcICFYUrjgodx1cA9g&gclsrc=aw.ds

Electronic Teaching Slides (Power Point Slides)- CD/DVD

- RSA
- PKCS
- PGP
- Digital Signature
- Firewall

Laboratory Charts

- Asymmetric key Encryption
- Authentication
- DSS approach

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

i). Prof. Manoj Parmar ,Incharge Head(IT),G P Himmatnagar.
ii). Prof. Manish D. Patel, Incharge Head (IT), RCTI,Ahmedabad.
iii). Mr. Sunil Paryani, Lecturer (IT), G P Himmatnagar.
iv). Ms. Darshna M. Trivedi,Lecturer (IT), RCTI Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr.K.James Mathai,** Associate Professor, Department of Computer Engineering & Applications.
- **Prof (Mrs.) Priyanka Tripathi,** Associate Professor, Department of Computer Engineering & Applications.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: ADVANCE JAVA PROGRAMMING
(COURSE CODE: 3360701)

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering/ Information Technology	Sixth

1. RATIONALE

This course provides the knowledge necessary to understand java and develop dynamic web pages using java server page (JSP). It covers the basic underlying concepts and techniques recently used in the IT industry. After going through this course student will be able to do Web Development and Desktop Application Development.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

- **Develop Graphical User Interface applications in JAVA, Servlet and JSP"**

3. COURSE OUTCOMES (Cos)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Develop Java Applet Programming using various techniques
ii. Develop applications using Abstract Window Toolkit
iii. Update and retrieve the data from the databases using JDBC-ODBC.
iv. Develop server side programs using Servlets.
v. Develop Java Server Pages applications using JSP Tags.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	4	7	70	30	40	60	200

Legends: L - Lecture; **T -** Tutorial/Teacher Guided Student Activity; **P -** Practical;
C - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit - I Java Applets	1a. Explain concept of applet life cycle 1b. Differentiate applet and application	1.1 Applet Programming : local and remote applets, difference between applet and application, applet life cycle, developing executable applet code
	1c. Develop code for simple Java applets 1d. Explain applet tag and its parameter 1e. Use the methods of the applet and component classes required for a basic applet	1.2 Web Page Design : applet tag, adding applet to HTML file, running the applet, passing parameter to applet, various methods and component classes to develop basic applet
Unit -II Abstract Window Toolkit (AWT)	2a. Describe the classes in the AWT package that relate to the applet class	2.1 Abstract Window Toolkit(AWT): classes hierarchy, windows fundamentals 2.2 Frame Windows : creating a frame window in applet, canvas, creating windows program
	2b. Describe the AWT graphics explain controls and how to apply them in the container	2.3 Graphics-AWT Controls: Labels, TextField, Push buttons 2.4 Layout Managers (Flow Layout, Border Layout, Grid Layout, Card Layout) 2.5 Developing Graphical User Interface using Swing: JApplet,JLabel,JTextField, JButton,JCheckBox, JRadioButton, JComboBox, Menus
	2c. Develop simple programs using event class and event listener interface	2.6 Event Classes: MouseEvent Class , ActionEvent Class, WindowEvent Class 2.7 Event Listner Interface: MouseListener, ActionListener, WindowListener and KeyListner
Unit – III Java Data Base Connectivity (JDBC)	3a. Describe the basics of JDBC and its connectivity	3.1 Two-Tier Database Design, Three-Tier Database Design 3.2 The JDBC API: The API components, database operations like creating tables, CRUD(Create, Read, Update, Delete) operations using SQL
	3c.Explain different types of JDBC drivers and their advantages and disadvantages	3.3 JDBC- advantages and disadvantages 3.4 JDBC drivers

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	3d. Develop program using JDBC to query a database and modify it	3.5 JDBC-ODBC bridge 3.6 Develop java program using JDBC
Unit IV Servlets	4a. Describe life cycle of servlet	4.1 The life cycle of a servlet 4.2 The Java Servlet Development Kit 4.3 The Simple Servlet: create and compile servlet source code, start a web browser and request the servlet, example of echo servlet and deployment in tomcat server
	4b.Develop program using javax.servlet package	4.5The javax.servlet Package: reading database/table records and displaying them using servlet
Unit V Java Server Pages (JSP)	5a. Explain the architecture of JSP and its life cycle 5b. Develop simple programs using Java Server Pages tags	5.1 Relation of Applets and Servlets with JSP 5.2 JSP Scripting Elements 5.3 JSP Expressions 5.4 Difference between JSP and Servlet 5.5 JSP Declarations 5.6 Simple JSP program to fetch database records

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (Theory)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1.	Java Applets	09	4	4	4	12
2.	Abstract Window Toolkit (AWT)	12	6	8	7	21
3.	Java Data Base Connectivity (JDBC)	05	4	4	4	12
4.	Servlets	08	5	5	5	15
5.	Java Server Pages (JSP)	08	2	3	5	10
	Total	**42**	**21**	**24**	**25**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes in psychomotor domain are listed as practical. However, if these practical are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*
Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Develop an applet that draws a circle. The dimension of the applet should be 500 x 300 pixels. The circle should be centered in the applet and have a radius of 100 pixels. Display your name centered in a circle.(using drawOval() method)	2
2		Draw ten red circles in a vertical column in the center of the applet.	2
3		Built an applet that displays a horizontal rectangle in its center. Let the rectangle fill with color from left to right.	2
4		Develop an applet that display the position of the mouse at the upper left corner of the applet when it is dragged or moved. Draw a 10x10 pixel rectangle filed with black at the current mouse position.	2
5		Develop an applet that contains one button. Initialize the label on the button to “start”, when the user presses the button, which changes the label between these two values each time the button is pressed.	2
6		Develop an applet that uses the mouse listener, which overrides only two methods which are mousePressed and mouseReleased.	2
7	II	Develop a program that has only one button in the frame, clicking on the button cycles through the colors: red->green->blue and so on. One color changes per click.(use getBackGround() method to get the current color)	4
8		Develop an program that contains three check boxes and 30 x 30 pixel canvas.The three checkboxes should be labeled “Red”, “Green”,”Blue”. The selection of the check boxes determine the color of the canvas. For example, if the user selects both “Red” and “Blue”, the canvas should be purple.	2

9		Create an application that displays a frame with a menu bar. When a user selects any menu or menu item, display that selection on a text area in the center of the frame	2
10		Develop a program that draws two sets of ever-decreasing rectangles one in outline form and one filled alternately in black and white.	4
11	III	Develop a database application that uses any JDBC driver	4
12		Develop a Graphical User Interface that performs the following SQL operations: a) Insert b) Delete c)Update.	4
13		Develop a program to present a set of choice for user to select a product and display the price of product.	4
14	IV	Develop a simple servlet program which maintains a counter for the number of times it has been accessed since its loading, initialize the counter using deployment descriptor.	4
15		Create a web form which processes servlet and demonstrates use of cookies and sessions.	4
16	V	Develop a simple JSP program for user registration and then control will be transfer it into second page.	4
17		Develop a simple JSP program for user login form with static and dynamic database	4
18		Develop a JSP program to display the grade of a student by accepting the marks of five subjects.	4
		Total Hours	**56**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

i. Understanding of advance JAVA programming.
ii. Demonstrate advance JAVA programming in real world.
iii. Develop a program with real world application
iv. Develop mini projects
v. Solve real time industry problems through advance JAVA programming.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Faculty should demonstrate the features of Advance Java for clear understanding of the students
ii. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
iii. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.
iv. Group Discussion and presentation of relevant websites
v. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck.

10. SUGGESTED LEARNING RESOURCES

(A) List of Books*

Sr No.	Title of Book	Author	Publication
1	Complete Reference Java 2	Herbert Schildt	TMH
2	Core Java Volume-I Fundamentals	Cay S. Horstmann Gary Cornell	Pearson
2	Swing: A Beginner's Guide	Herbert Schildt	TMH
3	Java Programming Cook Book	Herbert Schildt	MGH
4	Unleashed Java 2 Platform	Jamie Jaworski	Sams Techmedia
5	Java Programming	Sachin Malhotra, Saurabh Choudhary	Oxford
6	Introduction to Java Programming	Y. Daniel Liang	Pearson
7	Web Technology with Advanced Java	Soumadip Ghosh	University Press
8	Java Enterprise Edition A Practical Approach	B. Mohamed Ibrahim	University Press
9	Java Swing	Obert Eckstein, Marc Loy, Dave Wood	O'Reilly Media
10	Java 2 Intermediate to Advanced User Guide for Technicians	Benjamin Aumaille	Firewall Media

*Preferably Latest editions

(B) List of Major Equipment/Materials

Hardware: Desktop Computer P-IV processor or higher
Software: jdk1.2 or higher version, BlueJ, NetBeans , Eclipse

(C) List of Software / Learning Websites

i. **Java Applets**
http://docs.oracle.com/javase/tutorial/deployment/applet/index.html
ii. **Introduction to GUI Programming**
http://math.hws.edu/javanotes/c6/index.html
iii. **Creating a GUI using AWT**
http://www.tutorialspoint.com/awt/
iv. **Creating GUI using Java Swing**
https://docs.oracle.com/javase/tutorial/uiswing/
v. **JDBC Database Access**
https://docs.oracle.com/javase/tutorial/jdbc/
vi. **Servlet Technologies**
http://www.oracle.com/technetwork/java/index-jsp-135475.html
vii. **Java Server Pages**
http://www.oracle.com/technetwork/java/javaee/jsp/index.html

viii. **The Java EE 6 Tutorial**
https://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. P. P. Kotak**, H. O. D Computer Department, A. V. P. T. I., Rajkot
- **Prof. R. M. Shaikh**, H.O.D Computer Department, K. D. Polytechnic, Patan
- **Prof. K. N. Raval**, H.O.D Computer Department, R. C. Technical Institute, Ahmedabad
- **Prof. R. M. Shah**, Sr. Lecturer in Computer Technology, Government Polytechnic, Ahmedabad.
- **Prof .(Ms.) A. S. Galathiya**, Lecturer Computer, R C Technical Institute, Ahmedabad.
- **Prof. H. J. Prajapati**, Lecturer (IT), Government Polytechnic, Himatnagar.
- **Prof.A. J. Shah**, Lecturer IT, L.J Polytechnic, Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Shailendra Singh,** Professor Head, Dept. of Computer Engineering and Applications
- **Dr M A Rizvi,** Associate Professor, Dept. of Computer Engineering and Applications

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

COURSE TITLE: ANDROID APPLICATION DEVELOPMENT

(COURSE CODE: 3361602)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	SIXTH

1. RATIONALE

Mobile Application development is becoming need of the day as webpage development was about ten years ago. Most companies are developing their mobile applications so that customers may interact with them on mobiles itself. Android is most popular mobile operating system of today. Android application development course is therefore designed to enable the diploma information technology students to build mobile applications on this platform. This course covers the basics of Android along with required programming codes for developing necessary programming skills for mobile applications. Thus this course is an important course for IT students with possibilities of self employment.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

- **Develop GUI based mobile applications with Eclipse Android SDK on open source Android and propriety platforms with database connectivity.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Understand the concept of open source mobile development
- Describe Android architecture frame work.
- Design Android UI Layout
- Develop event driven programs.
- Develop applications using menus and dialog boxes

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	**Major Learning Outcomes** (in cognitive domain)	**Topics and Sub-topics**
Unit – I **Android OS : Concepts**	1a. Explain the concept of Open source mobile technology	1.1 Mobile technology : Overview of Android - An Open Platform for Mobile development 1.2 Open Handset Alliance 1.3 Use Android for mobile app development 1.4 Android Marketplaces 1.5 Android Development Environment setup 1.6 Android development Framework - Android-SDK, Eclipse Emulators / Android AVD. 1.7 Creating & setting up custom Android emulator 1.8 Android Project Framework and its applications
Unit II **Android Architecture**	2aDescribe Android architecture framework	2.1 Linux Kernel 2.2 Libraries 2.3 Android Runtime 2.4 Application Framework 2.5 Applications 2.6 Android Startup and Zygote 2.7 Android Debug bridge 2.8 Android Permission model 2.9 Android Manifest File
Unit – III **Android Activities and UI Design**	3a. Design Android UI Layout	3.1 Android application components Intent**,** Activity, Activity Lifecycle, Broadcast receivers, Services and Manifest 3.2 Create Application and new Activities 3.3 Expressions and Flow control, Android Manifest 3.4 Simple UI -Layouts and Layout properties • Fundamental Android UI Design • Introducing Layouts • Creating new Layouts • Drawable Resources • Resolution and density independence (px,dp,sp)
	3b. Use GUI Objects to develop applications	3.5 XML Introduction to GUI objects viz. • Push Button • Text / Labels • EditText • ToggleButton • WeightSum • Padding

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		• Layout Weight
Unit – IV **Advanced UI Programming**	4a. Develop event driven Programming in Android	4.1 Event driven Programming in Android (Text Edit, Button clicked etc.) 4.2 Creating a splash screen 4.3 Android Activity Lifecycle 4.4 Introduction to threads in Android
Unit – V **Toast, Menu, Dialog, List and Adapters**	5a. Develop application with menus and dialog boxes	5.1 Menu: Custom Vs. System Menus 5.3 Creating and Using Handset menu Button (Hardware) 5.4 Android Themes, Dialog, create an Alter Dialog 5.5 Toast in Android, List & Adapters 5.6 Android Manifest.xml File
Unit - VI Working with Database	6a. Develop applications with database	6.1 SQLite: Open Helper and create database 6.2 Open and close a database

6. 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
I	Android OS: Concepts	04	4	4	2	10
II	Android Architecture	06	6	4	2	12
III	Android Activities and UI Design	10	4	5	7	16
IV	Advanced UI Programming	10	4	2	4	10
V	Toast, Menu, Dialog, List and Adapters	08	4	4	6	14
VI	Work with Database	04	2	4	2	08
	Total	**42**	**22**	**25**	**23**	**70**

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note*: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development*

*of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*
Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit	Practical Exercises (outcomes in psychomotor domain)	Approx. Hours Required
1.	I	Create "Hello World" application to "Hello World" in the middle of the screen in the red color with white background.	4
2.	II	Create sample application with login module.(Check username and password), validate it for login screen or alert the user with a Toast.	4
3.	II	Create and validate a login application using username as Email ID else login button must remain disabled.	2
4.	III	Create and Login application and open a browser with any one search engine.	2
5.	III	Create an application to display "Hello World" string the number of times user inputs a numeric value. (Example. If user enters 5, the next screen should print "Hello World" five times.)	4
6.	III	Create spinner with strings from the resource folder (res >> value folder). On changing spinner value, change image.	4
7.	III	Create an application to change screen color as per the user choice from a menu.	4
8.	III	Create an application that will display toast (Message) at some regular interval of time.	4
9.	IV	Create a background application that will open activity on specific time.	4
10.	IV	Create an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayed below.	4
11.	IV	Create an UI listing the diploma engineering branches. If user selects a branch name, display the number of semesters and subjects in each semester.	4
12.	V	Use content providers and permissions by implementing read phonebook contacts with content providers and display in the list.	4
13.	V	Create an application to call a phone number entered by the user the Edit Text.	4
14.	VI	Create an application that will create database to store username and password.	4
15.	VI	Create an application to insert, update and delete a record from the database.	4
	Total Hours		**56**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

i. Design sample GUI
ii. Present the developed application on a mobile device
iii. Present paper in a Seminar on Open Source Technology

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Faculty should demonstrate an Open source technology specifically java and should give some clear understanding of mobile technology using some simulation or pictorial representation.
ii. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
iii. Arrange expert lectures by IT experts working professionally in the area of applications development.
iv. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.
v. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck.
vi. Arrange an application development competition by making groups of four students each and award the winning group. Give publicity to this competition at institute/city level.

10. SUGGESTED LEARNING RESOURCES

A) List of Books

Sr. No.	Title of Book	Author	Publication
1	Professional Android 2 Application Development	Reto Meier	Wiley India Pvt Ltd
2	Beginning Android	Mark L Murphy	Wiley India Pvt Ltd
3	Professional Android	Sayed Y Hashimi and Satya Komatineni	Wiley India Pvt Ltd

Suggested Readings

1. Android Studio Development Essentials by Neil Smyth
2. The Definitive Guide to SQL Lite by Michael Owens

B) List of Major Equipment/ Instrument with Broad Specifications

- Computer System with latest configuration
- Internet
- Open Source Software
- Android Open Source Project, Android SDK, Eclipse Environment

C) Additional Resources of Android that can be used for conducting Practical as well as case studies

- Developing Andriod Apps- Udacity https://www.udacity.com/course/ud853
- Build your firs App http://developer.android.com/training/basics/firstapp/index.html
- Android App Development Tutorial http://www.codelearn.org/android-tutorial
- ADT Plugin http://developer.android.com/tools/sdk/eclipse-adt.html
- Installing the Eclipse Plugin http://developer.android.com/sdk/installing/installing-adt.html
- Eclipse Download https://www.eclipse.org/downloads/

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- Parvez Faruki, I/C Head and Lecturer, IT, Sir BPTI Bhavnagar
- Amit Shah, Lecturer, Information Technology, L.J Polytechnic, Ahmedabad

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K. James Mathai,** Associate Professor, Department of Computer Engineering and Applications.
- **Dr. Priyanka Tripathi,** Associate Professor, Department of Computer Engineering and Applications.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: WEB DESIGNING USING PHP AND MYSQL
(COURSE CODE: 3361603)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	SIXTH

1. RATIONALE

PHP is a powerful tool for making dynamic and interactive database driven web pages. PHP is the widely-used as efficient open source technology. The students of diploma in Information Technology as web developers would be able to write dynamic interactive web based applications such as for online banking, ticket/hotels booking sites, E-Commerce using PHP and MYSQL database. After mastering this course they may work as self employed web page developer.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency**:**

- **Develop interactive web based application using PHP and MySQL**

3. COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Create small programs using basic PHP concepts.
ii. Apply In-Built and Create User defined functions in PHP programming.
iii. Design and develop a Web site using form controls for presenting web based content.
iv. Debug the Programmes by applying concepts and error handling techniques of PHP.
v. Create dynamic Website/ Web based Applications, using PHP, MySQL database

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Introduction to PHP**	1a. Identify relationship between Apache, MySQL and PHP 1b. State steps to Install & test web server 1c. State Steps to Configure Apache to use PHP	1.1 Configuration of PHP, Apache Web Server, MySQL and Open Source 1.2 Relationship between Apache, MySQL and PHP(AMP Module) 1.3 Installing PHP for (Windows, Wamp server , XAMP server),
	1d. Create simple PHP page using PHP structure and Syntax. 1e. List and state use of PHP variables, data types . 1f. Describe use of PHP Operators. 1g. Apply control structures in programming 1h. State the steps to use different types of array in given application 1i. State the steps to create user defined functions	1.4 PHP Structure and Syntax 1.5 Creating PHP pages 1.6 Rules of PHP syntax 1.7 Integrating HTML with PHP 1.8 Constants , Variables: Static and Global Variable 1.9 Conditional Structure and Looping, PHP operators 1.10 Arrays, constructs 1.11 User Defined function, argument function, variable function, Return function, default argument, variable length argument
Unit – II Working with In Built Functions	2a. Apply various InBuilt Variable, String, MATH, Date, Array, File Functions in programming	2.1 Variable Function: (gettype, settype, isset, strval, floatval, intval,print_r) 2.2 string function: (Chr, ord, strtolower, strtoupeer, strlen, ltrim, rtrim, trim, substr, strcmp, strcasecmp, ctrops, strops, stristr, str_replace, strrev, echo, print) 2.3 MATH functions: (Abs, ceil, floor, round, fmod, min, max, pow, sqrt, rand) 2.4 Date function: (Date, getdate, setdate, checkdate, time, mktime) 2.5 Array Function: (Count, list, in_array, current, next, previous, end, each, sort, array_merge, array_reverse) 2.6 File function:

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		(Fopen, fread, fwrite, fclose)
Unit – III **Working with data and forms**	3a. State the steps to Create an input form 3b.State the steps to use Using PHP $_Get and $_Post, $_Request method for a given application	3.1 Reading data using Form Controls (Text Fields, Text Areas, CheckBoxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps, File Uploads, Buttons) 3.2 Submitting form values, using $_*Get* and $_*Post* Methods, $_REQUEST 3.3 Accessing form inputs with *Get/Post* functions 3.4 Combining HTML and PHP codes together on single page, Redirecting the user
Unit - IV Session, Cookies and Error Handling	4a. Use cookie to store and retrieve data 4b. Use querystring to transfer data 4c. Create session variable and handle session 4d. Handle runtime errors through exception handling	4.1 Setting a cookie with PHP, Deleting a cookie 4.2 Creating session cookie 4.3 Working with the query string Creating query string 4.4 Session 4.5 Starting and Destroying session 4.6 Working with session variables , Passing session IDs 4.7 Error Types in PHP 4.8 Exception Handling in PHP
Unit - V Database Connectivity using MYSQL	5a. Describe/ State MySQL structure and Syntax 5b. Discuss types of MySQL tables and storage engines 5c. Apply/Use various MySQL commands on database 5d. State steps to connect with database using PHP and MYSQL 5e.Write MySQL commands to Insert, Update, Delete records 5f. Describe steps for hosing a Website using ‘C’ panel and Filezilla software	5.1 Concepts and Installation of MySQL 5.2 MySQL structure and syntax 5.3 Types of MySQL tables and Storage engines 5.4 MySQL commands 5.5 Integration of PHP with MySQL 5.6 Connection to the MySQL Database 5.7 Creating and DeletingMySQL database usingPHP 5.8 Updating, Inserting, Deleting records in the MySQL database 5.9 Hosting Website (Using ‘C’ panel, Using Filezilla Software)

6. 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
I	**Introduction to PHP**	6	4	4	2	10
II	**Working With Functions**	6	4	6	4	14
III	**Working with DATA and Forms**	9	2	6	6	14
IV	**Cookie, Session and Error Handling**	9	4	8	4	16
V	**Database Connectivity using MYSQL**	12	2	6	8	16
	Total	**42**	**16**	**30**	**24**	**70**

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note*: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of* ***Course Outcomes*** *related to affective domain. Thus over all development of* ***Programme Outcomes*** *(as given in a common list at the beginning of curriculum document for this programme) would be assured.*

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hours. Required
1.	I	Write a PHP script to display Welcome message.	2
2.		Write a PHP script to demonstrate arithmetic operators, comparison operator, and logical operator.	2
3.		Write PHP Script to print Fibonacci series.	2
4.		Write PHP Script to generate result and display grade.	2
5.		Write PHP Script to find maximum number out of three given numbers.	2
6.		Write PHP Script for addition of two 2x2 matrices.	2
7.	II	Write PHP script to demonstrate Variable function.	2
8.		Write PHP script to obtain 5! Using function	2
9.		Write PHP script to demonstrate string function.	2
10.		Write PHP script to demonstrate Date functions.	2
11.		Write PHP script to demonstrate Math functions.	2
12.		Write PHP script to demonstrate Array functions.	2

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hours. Required
13.		Write PHP script to demonstrate File functions.	2
14.	III	Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.	2
15.		Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.	2
16.	IV	Write two different PHP script to demonstrate passing variables through a URL.	2
17.		Write two different PHP script to demonstrate passing variables with sessions.	2
18.		Write PHP script to demonstrate passing variables with cookies.	2
19.		Write a program to keep track of how many times a visitor has loaded the page.	2
20.		Write an example of Error-handling using exceptions.	2
21.	V	Write a PHP script to connect MySQL server from your website.	2
22.		Write a program to read customer information like cust_no, cust_name, Item_purchase, and mob_no, from customer table and display all these information in table format on output screen.	2
23.		Write a program to edit name of customer to “Bob” with cust_no =1, and to delete record with cust_no=3.	2
24.		Write a program to read employee information like emp_no, emp_name, designation and salary from EMP table and display all this information using table format.	2
25.		Create a dynamic web site using PHP and MySQL.	8
		TOTAL	**56**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

i. Prepare power point presentation showing relation between PHP, APACHE and MYSQL.
ii. Develop sample web based Application using PHP and MYSQL and present the same.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
ii. Arrange expert lectures by IT experts working professionally in the area of webpage development.
iii. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.

iv. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck.

v. Arrange a webpage development competition by making groups of four students each and award the winning group. Give publicity to this competition at institute/city level.

10. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book	Author	Publication
1	Beginning PHP and MySQL, 4th Edition	W. Jason Gilmore	Apress, 2010
2	PHP: The Complete Reference	Steven Holzner	McGraw-Hill, 2008
3	Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition	Robin Nixon	O'reilly Media , 2014
4	Teach yourself PHP, MySQL and Apache All in One , 5th Edition	Julie C. Meloni,	Pearson Education, 2012

B) List of Major Equipment/ Instrument with Broad Specifications

1. Computer System with latest configuration, Server with latest specification, broadband or leased line connection
2. Multimedia Projector

C) List of Software/Learning Websites

Software: WAMP server / XAMPP server, 'C' Panel, Text Editor

i. http://www.codecademy.com/tracks/web ,
ii. http://www.codecademy.com/tracks/php
iii. http://www.w3schools.com/PHP
iv. http://www.tutorialpoint.com
v. .http://www.homeandlearn.co.uk

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Mrs. Rikita Dhaval Parekh, Lecturer (IT), Government Polytechnic For Girls, Ahmedabad**
- **P.V.Garach, , Lecturer (IT), Government Polytechnic For Girls, Ahmedabad**

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K. James Mathai,** Associate Professor, Dept. of Computer Engineering and Applications.
- **Dr. Shailendra Singh,** Professor and Head, Dept. of Computer Engineering and Applications.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: DATA MINING AND WAREHOUSING
(COURSE CODE: 3361604)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	SIXTH

1. RATIONALE

Data mining and warehousing are the essential components of decision support systems for the modern day industry and business. These techniques enable the knowledge worker to make better and faster decisions. The objective of this course is to introduce the student to various Data Mining and Data Warehousing concepts and techniques. A database perspective of an open source application is used throughout the course to introduce principles, algorithm, architecture, design and implementation of data mining and data warehousing techniques. Learning this course would improve the employment potential of students in the information management sector.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competencies:

- **Apply techniques, data pre-processing, OLAP of data mining and warehousing using open source tools.**

3. COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Describe the concept of Data Mining & its attributes
- Apply the concept of data mining components and techniques in designing data mining systems.
- Solve basic Statistical calculations on Data
- Describe the aspect of data pre-processing
- Explain the concept of Data Cleaning & Integration
- Explain decision Trees and clustering
- Install and Configure WEKA Tool
- Demonstrate WEKA Explorer, Mining techniques and Attribute Relation File Format (ARFF).
- Compare various Data Mining techniques available in WEKA

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; **T -** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C -** Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Fundamentals of data mining**	1a. Describe the concept of Data Mining	1.1 Data mining: History, strategies, techniques, applications, challenges of data mining, Future of data mining
	1b. Describe types of Data	1.2 Types of Data 1.2.1 Database Data 1.2.2 Data Warehouses 1.2.3 Transactional Data 1.2.4 Other Kinds of Data
Unit – II **Objects, Attributes, & Statistical Description of Data**	2a. Explain Mining techniques and Attribute Relation File Format (ARFF).	2.1 Data Attribute 2.1.1 Nominal Attributes 2.1.2 Binary Attributes 2.1.3 Ordinal Attributes 2.1.4 Numeric Attributes 2.1.5 Discrete versus Continuous Attributes
	2b. Solve basic Statistical calculations on Data	2.2 Mean, Median, and Mode 2.3 Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range using WEKA
Unit – III **Data Preprocessing**	3a. Describe the aspect of data preprocessing	3.1 Preprocess the Data 3.2 Major Tasks in Data Preprocessing
	3b. Explain the concept of Data Cleaning & Integration	3.2 Data Cleaning 3.2.1 Missing Values 3.2.2 Noisy Data 3.2.3 Data Cleaning as a Process 3.3 Data Integration 3.3.1 Entity Identification Problem 3.3.2 Redundancy and Correlation Analysis 3.3.3 Tuple Duplication 3.3.4 Data Value Conflict Detection and

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		Resolution 3.3.5 Use WEKA for cleaning and integration
Unit – IV **Classification**	4. Explain decision Trees and clustering	4.1 Decision tree: ID3 4.2 Probability based solving 4.3 Concepts of Clustering 4.4 Using WEKA for classification and clustering
Unit - V **Data Warehouse & OLAP Technology**	5a. Apply the concept of Data Ware housing using WEKA solution	5.1 Data Warehouse 5.2 Differences between Operational Database Systems and Data Warehouses 5.3 Enterprise Warehouse, Data Mart, and Virtual Warehouse
Unit - VI **Data Mining Tool: WEKA**	6. Install and Configure WEKA Tool	6.1 Basic of WEKA 6.1 Installing WEKA 6.2 WEKA data file format 6.3 Data visualization in WEKA 6.4 Data filtering 6.5 Using the concepts of data mining with WEKA

6. 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
I	Fundamentals of data mining	4	4	4	2	10
II	Objects, Attributes, & Statistical Description of Data	8	4	6	4	14
III	Data Preprocessing	9	4	6	4	14
IV	Classification	8	2	4	4	10
V	Data Warehouse & OLAP Technology	8	4	4	4	12
VI	Data Mining Tool: WEKA	5	2	3	5	10
	Total	**42**	**20**	**27**	**23**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	UNIT	Practical Exercises (Outcomes in Psychomotor Domain)	Approx Hours. Required
1.	II	Demonstrate the use of ARFF files taking input and diplay the output of the files.	2
2.	II	Create your own excel file. Convert the excel file to .csv format and prepare it as ARFF files.	2
3.	III	Preprocess and classify Customer dataset. http://archive.ics.uci.edu/ml/	4
4.	III	Perform Preprocessing, Classification techniques on Agriculture dataset. (http://archive.ics.uci.edu/ml/)	4
5.	III	Preprocess and classify Weather dataset. http://archive.ics.uci.edu/ml/	4
6.	III	Perform data Cleansing of customer dataset. http://archive.ics.uci.edu/ml/ , www.kdnuggets.com/**datasets/**	4
7.	IV	Perform Clustering technique on Customer dataset. http://archive.ics.uci.edu/ml/	2
8.	IV	Perform Clustering technique on Agriculture dataset. http://archive.ics.uci.edu/ml/	2
9.	IV	Perform Clustering technique on Weather dataset. http://archive.ics.uci.edu/ml/	2
10.	IV	Classify the dataset using decision tree. www.kdnuggets.com/**datasets/**	6
11.	V	Perform Association technique on Customer dataset. http://archive.ics.uci.edu/ml/, www.kdnuggets.com/**datasets/**	2
12.	V	Perform Association technique on Agriculture dataset. http://archive.ics.uci.edu/ml/, www.kdnuggets.com/**datasets/**	2
13.	V	Perform Association technique on Weather dataset.	2

S. No.	UNIT	Practical Exercises (Outcomes in Psychomotor Domain)	Approx Hours. Required
14.	VI	Compare various Data Mining techniques available in WEKA	6
15.	VI	Apply filters on the customer dataset using WEKA.	2
16.	VI	Install and Configure WEKA Tool	6
17.	VI	Demonstration of Weka Explorer, Mining techniques and Attribute Relation File Format (ARFF). http://archive.ics.uci.edu/ml/	4
		Total Practical Hours	56

Practical Examination can be conducted based on one of the Data mining dataset given at http://archive.ics.uci.edu/ml/, www.kdnuggets.com/**datasets**/. Viva can be conducted based on the understanding of various classification, clustering, warehousing and data mining techniques

8. SUGGESTED LIST OF STUDENT ACTIVITIES

i. Student should do as much practice as possible on related software to develop the mastery.
ii. Students in groups should visit different business organisation where data mining and warehousing is done and should study the methods and software in use. Moreover each group should study that for what purpose data mining is carried out and how mined data is used. All groups should prepare reports on their study and present in class. These presentations should generate group discussions.
iii. Search the net and find out different data mining and warehousing techniques and software being used.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
ii. Arrange expert lectures by IT experts working professionally in the area of data mining and warehousing.
iii. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.
iv. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck.
v. Custom excel dataset can be created which can be used for data mining.

10. SUGGESTED LEARNING RESOURCES

A) List of Books

Sr. No.	Title of Book	Author	Publication
1	Data Mining Concepts and Techniques	Jiawei Han and Micheline Kamber	Kaufmann Publishers, 2011
2	Data Mining Techniques	Arun K Pujari	Orient Longman Publishers
3	Fundamentals of Data Warehouses	M.Jarke, M Lenzerni	
4	Principles of Data Mining	David Hand, Heikki Mannila, Padhraic Smyth,	PHI
5	Data Mining:Methods and Techniques	A B M Shawkat Ali, Saleh A, Wasimi	CENGAGE Learning

B) List of Major Equipment/ Instrument with Broad Specifications

Latest computers in sufficient numbers

C) List of Software/Learning Websites

1. **WEKA**: WEKA is an open source application that is freely available under the GNU general public license agreement. Originally written in C the WEKA application has been completely rewritten in Java and is compatible with almost every computing platform. It is user friendly with a graphical interface that allows for quick set up and operation.

   WEKA is a computer program that was developed at the University of Waikato in New Zealand for the purpose of identifying information from raw data gathered from agricultural domains. WEKA supports many different standard data mining tasks such as data preprocessing, classification, clustering, regression, visualization and feature selection.

2. **XLMiner**: XLMiner is a comprehensive data mining add-in for Excel. XLMiner can be used to mine data available in Excel worksheets. It includes capabilities that allow a miner to work with partitioning, neural networks, classification and regression trees, association rules, nearest neighbors, etc. With is ease of use and learning, XLMiner serves to be the perfect candidate tool to wet your feet in Data Mining as a novice miner. http://dataminingtools.net

   XLMiner can work with large data sets which may exceed the limits in Excel. A standard procedure is to sample data from a larger database, bring it into Excel to fit a model, and, in the case of supervised learning routines, score output back out to the database. In the standard edition of XLMiner, this feature is supported for Oracle, SQL Server and Access databases.

3. Data Mining Tutorial http://www.tutorialspoint.com/data_mining/

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Parvez Faruki,** I/C Head, Information Technology, Sir BPTI, Bhavnagar.
- **Prof. Darshan M. Tank**, In-charge Head of Department, Information Technology, Lukhdhirji Engineering College (Diploma), Morbi
- **Prof. Hardik Patel,** Lecturer, Information Technology Dept, BPTI, Bhavnagar.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K. James Mathai,** Associate Professor, Dept. of Computer Engineering and Applications.
- **Prof. Priyanka Tripathi,** Associate Professor, Dept. of Computer Engineering and Applications.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

DATABASE ADMINISTRATION

(Code: 3361605)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	SIXTH

1. RATIONALE

Information Management is a growing area, where lots of jobs are available. Competency in database administration is the key requirement for any information manager. This course attempts to develop skills in the area of database administration. After learning this course students would be able to design, edit, manage and maintain databases, and administer them professionally. They will also be able to write simple and advanced PL/SQL code blocks for transaction processing, using life cycle in developing applications. This course is therefore an important course for students who want to be Information Managers.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

- Manage a database system using transaction processing and locking granularity concepts.
- Developing application using simple and advanced PL/SQL code blocks for transaction processing and implement life cycle.

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i). Execute SQL queries related to Transaction Processing & Locking using concept of Concurrency control.
ii). Demonstrate use of Database Object.
iii). Understand database implementation life cycle and information system organization.
iv). Apply user creation and other administrative techniques.
v). Develop simple and advanced PL/SQL code.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Advanced SQL**	1a. Implement Transaction Control and Data Control Language	1.1 Transactional Control: Commit, Save point, Rollback 1.2 DCL commands : Grant and Revoke
	1b. Explain types of Locks 1c. Test the locks on database	1.3 Types of locks : i. Row level locks ii. Table level locks iii. Shared lock iv. Exclusive lock v. Deadlock
	1d. Practice using various Database Objects	1.4 Synonym : Create synonym 1.5 Sequences: Create and alter sequences 1.6 Index : Unique and composite
	1e. Describe different types views and test it on a database	1.7 Views : Create/Replace, Update and alter views
Unit– II **PL / SQL and Triggers**	2a. Describe the fundamentals of the PL/SQL programming language	2.1 Basics of PL / SQL 2.2 Data types 2.3 Advantages
	2b.Use different Control Structures 2c. Write and execute PL/SQL programs in SQL*Plus	2.4 Control Structures 1. Conditional 2. Iterative 3. Sequential
	2d. Implement Concepts of exception handling	2.5 Exceptions: Predefined Exceptions, User defined exceptions
	2e. Implement procedure, function, cursor in Package	2.6 Cursors: Static (Implicit & Explicit), Dynamic 2.7 Procedures & Functions 2.8 Packages : Package specification, Package body, Advantages of package

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	2f. Describe the various types of triggers 2g. Write, code, test and debug various types of triggers	2.9 Fundamentals of Database Triggers 2.10 Creating Triggers 2.11 Types of Triggers : Before, after for each row, for each statement
Unit– III Database Design And Implementation	3a. Information System and organization 3b. Database design and implementation	3.1 Database Application Life Cycle 3.2 Conceptual Database application i. Design ii. Retrieve transaction iii. Update Transaction iv. Mixed Transaction 3.3 Logical and Physical Database Design i. Response Time ii. Space Utilization iii. Transaction Throughput
Unit– IV Transaction Processing	4a. Analyse various concurrency control methods	4.1 Transaction concepts 4.2 Concurrency 4.3 Methods for Concurrency control i. Locking Methods ii. Timestamp methods iii. Optimistic methods
Unit– V Database Administrator	5a. Implement user creation and execute authentication mechanism	5.1 Types of Oracle Database Users 5.2 User Creation and management 5.3 Tasks of a Database Administrator 5.4 Submitting Commands and SQL to the Database 5.5 About Database Administrator Security and Privileges 5.6 Database Administrator Authentication 5.7 Creating and Maintaining a Password File 5.8 Data Utilities

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – 42 Hours)			
			R Level	U Level	A Level	Total
1.	Advanced SQL	10	8	2	8	18
2.	PL / SQL and Triggers	10	8	4	8	20
3.	Database Design and Implementation	6	4	4	2	10
4.	Transaction Processing	8	4	4	4	12
5.	Database Administration	8	4	2	4	10
	Total	**42**	**28**	**16**	**26**	**70**

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note*: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of* ***Course Outcomes*** *related to affective domain. Thus over all development of* ***Programme Outcomes*** *(as given in a common list at the beginning of curriculum document for this programme) would be assured.*
Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

Example Practical list is followed with this suggested list of exercises

Unit No.	Practical/Exercises (Outcomes in Psychomotor Domain)	Hrs.
I	Perform queries for DCL Commands and Locks	4
I	Implement authorization, authentication, privileges on Database.	4
I	Perform queries to Create synonyms, sequence and index	4
I	Perform queries to Create, alter and update views	4
II	Implement PL/SQL programmes using control structures	4
II	Implement PL/SQL programmes using Cursors	4
II	Implement PL/SQL programmes using exception handling.	4

II	Implement user defined procedures and functions using PL/SQL blocks	4
II	Perform various operations on packages.	4
II	Implement various triggers	4
IV	Develop code for transaction processing	4
V	Create User database Creation	6
V	Apply various mechanism of Database Administration	6
	TOTAL	**56**

*** Practical examination can be conducted based upon the experiments suggested and/or implemented by students at the institute. Oral exam can be based upon the concepts of the topics covered in the syllabus.**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

i. Prepare power point presentation for different database objects.
ii. Design database which can be used in the course on .net programming
iii. The created procedures and functions in pl/sql packages should be used in ADO.net concepts of .net programming.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Concepts should be introduced in classroom input sessions and by giving demonstration through projector.
ii. Arrange expert lectures by IT experts working professionally in the area of database administration.
iii. More focus should be given on practical work which will be carried out in laboratory sessions. If possible some theory sessions may be conducted in labs so that theory and practice can go hand in hand.
iv. Faculty should allow students to use their creativity and let them struggle to learn on their own during practical sessions. However, faculty should remain around the students and should help them when they are stuck.
v. Arrange a Database Administration System competition by making groups of four students each and giving them a real life problem for database administration and award the best design. Give publicity to this competition at institute/city level.

10. SUGGESTED LEARNING RESOURCES

(A) List of Books:

Sr. No.	Title of Books	Author	Publication
1	Database Systems Concepts, design and Applications	Singh, S. K.	Pearson Education, New Delhi, 2012
2	Sql/ Pl/SQL	Bayross, Ivan	BPB
3	An Introduction to Database Systems	Date, C. J.	Pearson Education, New Delhi, 2012
4	Database System Concepts,	Korth, Henry	MGH

(B) List of Major Equipment/Materials

i. Computer System with latest configuration and memory
ii. Multimedia Projector

(C) List of Software/Learning Websites

i. Software: Oracle 10e/11g express edition
ii. DBMS:http://nptel.iitm.ac.in/video.php?subjectId=106106093
iii. SQL Plus Tutorial: http://holowczak.com/oracle-sqlplus-tutorial/
iv. DatabaseTutorials:http://www.roseindia.net/programming-tutorial/Database- Tutorials
v. http://service.felk.cvut.cz/courses/X36SQL//cviceni/plsql/pdf/
vi. SQL Basic Concepts: http://www.w3schools.com/sql/
vii http://docs.oracle.com/cd/E11882_01/server.112/e10897/em_manage.htm

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- Nandu Fatak, Lecturer Information Technology, Sir BPTI Bhavnagar.
- Rahul Pancholi, Lecturer IT, and Computer, L J Polytechnic, Ahmedabad.
- Bhaskar Patel, Head, Information Technology, BSPP Kherva.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr.K.James Mathai**, Associate Professor, Computer Engineering & Applications, NITTTR Bhopal
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