

**Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon**



**Choice Based Credit System (CBCS)
Syllabus For
T.Y.B.Sc.
Information Technology
(With effect from June 2020)**

**Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
T.Y.B.Sc. (Information Technology)
(w.e.f. June-2020)**

Structure

Semester – V

Discipline	Course Type	Course Code	Course Title	Credits	Hours/Week (Clock Hours)	Total Teaching hours	Marks (Total 100)	
							CA	UA
DSC	Core I	IT - 501	System Programming	3	3	45	40	60
	Core II	IT – 502	Database Management System	3	3	45	40	60
	Core III	IT – 503	Software Engineering	3	3	45	40	60
	Core IV	IT – 504	Cyber Law & IT Act	3	3	45	40	60
DSC Skill Enhancement Course (SEC)	Skill Based	IT – 505	Android Application Development - I	3	3	45	40	60
DSC Elective Course	Elective Course (Any One)	IT – 506 (A)	Elective –A Programming in PHP - I	3	3	45	40	60 60
		IT – 506 (B)	Elective –B JAVA Programming-I					
DSC	Core (Practical)	IT – Lab - 507	Lab on Android Application Development - I	2	4 (per batch)	60	40	60
		IT – Lab 508	Lab on System Programming	2	4 (per batch)	60	40	60
		IT – Lab 509	Elective –A Lab on Programming in PHP - I	2	4 (per batch)	60	40	60
			Elective –B Lab on JAVA Programming –I					
Non Credit Audit Course	Elective Audit Course (Any One)	AC – 501 (A)	NSS	No Credit	2	30	100	-----
		AC – 501 (B)	NCC					
		AC – 501 (C)	Sport					

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T.Y.B.Sc. (Information Technology)
(w.e.f. June-2020)**

Structure

Semester – VI

Discipline	Course Type	Course Code	Course Title	Credits	Hours/Week (Clock Hours)	Total Teaching hours	Marks (Total 100)	
							CA	UA
DSC	Core I	IT - 601	Operating System	3	3	45	40	60
	Core II	IT – 602	R -DBMS	3	3	45	40	60
	Core III	IT – 603	Computer Network	3	3	45	40	60
	Core IV	IT – 604	Theoretical Computer Science	3	3	45	40	60
DSC Skill Enhancement Course (SEC)	Skill Based	IT – 605	Android Application Development - II	3	3	45	40	60
DSC Elective Course	Elective Course (Any One)	IT – 606 (A)	Elective –A Programming in PHP - II	3	3	45	40	60 60
		IT – 606 (B)	Elective –B JAVA Programming- II					
DSC	Core (Practical)	IT– Lab - 607	Lab on Android Application Development - II	2	4 (per batch)	60	40	60
		IT – Lab 608	Lab on RDBMS	2	4 (per batch)	60	40	60
		IT – Lab 609	Elective –A Lab on Programming in PHP - II	2	4 (per batch)	60	40	60
			Elective –B Lab on JAVA Programming II					

Semester - V

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North Maharashtra University, Jalgaon
T. Y. B. Sc. (Information Technology)
(w.e.f. June -2020)
DSC (UG-IT-501) System Programming
Semester-V

Total lectures: 45
Total Marks: 90

Course Objectives:

- To understand use and development of software tools.
- To understand the design structure of Assembler and macro preprocessor
- To understand the design structure of compiler
- To understand the functions of linkers and loaders

Course Outcomes: Students are able to:

- Understand details about system software
- To do basic system program like development of editors lexical analyzers etc
- Students are familiar with language processing activities- functions of translators, loader and linkers

Unit-1 Introduction [L: 05, M: 10]

- 1.1 Types of program – System program and Application program
- 1.2 Difference between system programming and application programming.
- 1.3 Goal of system software
- 1.4 components of system software
- 1.5 View of system software

Unit-2 Software Tools [L: 05, M: 10]

- 2.5 What is a Software Tools?
- 2.6 Software Tools for Program Developments
- 2.7 Editors
- 2.8 Debug Monitors
- 2.9 Programming Environments

Unit-3 Overview of Language Processors [L: 5, M:12]

- 3.1 Programming Languages and Language Processors
- 3.2 Language Processing Activities
- 3.3 Fundamentals of Language Processing

Unit-4. Assembler [L:10,M:16]

- 4.1 Definition.
- 4.2 Features of assembly language, advantages
- 4.3 Statement format, types of statements
- 4.4 Constants and Literals.
- 4.5 Advanced assembler directives
- 4.6 Design of assembler – Analysis Phase and Synthesis Phase.
- 4.7 Overview of assembly process
- 4.8 Pass Structure of Assembler – One pass, two pass assembler.

- 4.9 Problems of One-pass assembler
- 4.10 Design of Two-pass Assembler

Unit-5. Macro and Macro Preprocessor [L: 05, M: 14]

- 5.1 Macro Definition and Call
- 5.2 Macro Expansion
- 5.3 Nested Macro Calls
- 5.4 Tables used in Macro
- 5.5 Advanced Macro Facilities
- 5.6 Design of Macro Preprocessor

Unit-6. Compiler [L: 10, M:14]

- 6.1. What is Compiler?
- 6.2. Scanning and Parsing
 - 6.2.1. Programming Language Grammars
 - 6.2.2. Scanning
 - 6.2.3. Parsing
- 6.3. Language Processors Development Tools

Unit-7. Linkers and Loaders [L: 05, M: 14]

- 7.1 Introduction
- 7.2 Relocation and Linking Concepts
- 7.3 Self Relocating Programs
- 7.4 Linking for Overlays
- 7.5 Dynamic Linking
- 7.6 Loaders

References:

1. D.M. Dhamdhere, "Systems Programming", ISBN : 9780071333115, Tata McGraw-Hill Education, 2011
2. D.M. Dhamdhere, "Systems programming and operating system". ISBN: 978-0074635797, Tata McGraw Hill Education Private Limited
3. John Donovan, "System programming.", ISBN: 978-0-07-46

**Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
DSC (UG-IT-502): Database Management System
Semester-V
Total lectures: 45**

Total Marks: 90

Course Objectives

- To understand the fundamental concepts of database.
- To understand user requirements and frame it in data model.
- To understand creations, manipulation and querying of data in databases.

Course Outcomes

On completion of the course, student will be able to–

- Solve real world problems using appropriate set, function, and relational models.
- Design E-R Model for given requirements and convert the same into database tables.
- Use SQL.

Content

- 1. Introduction of DBMS** **L 12: M 16**
 - 1.1. Overview, Definition
 - 1.2. Types of DBMS
 - 1.3. Describing & storing data (Data models (relational, hierarchical, network)),
 - 1.4. Levels of abstraction, data independence,
 - 1.5. Queries in DBMS (SQL: DDL, DML, DCL, TCL), Users of DBMS, Advantages of DBMS
- 2. Conceptual Design (E-R model)** **L 10 : M 16**
 - 2.1. Overview of DB design,
 - 2.2. ER data model (entities, attributes, entity sets, relations, relationship sets) ,
 - 2.3. Conceptual design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary)
- 3. Relational data model** **L 10 : M 18**
 - 3.1. Relations (concepts, definition),
 - 3.2. Conversion of ER to Relational model ,
 - 3.3. Integrity constraints (key, referential integrity, general constraints)
 - 3.4 Codd's Rules, Functional Dependency, Data Normalization (1NF, 2NF, 3NF, BCNF)
- 4. Relational algebra** **L 08 : M 15**
 - 4.1. Preliminaries
 - 4.2. Relational algebra (selection, projection, set operations, renaming, joins, division)
- 5. Database Implementations** **L-08 M:12**
 - 5.1 Database security
 - 5.2 Database integrity
 - 5.3 Transaction Concept
 - 5.4 Transaction State
 - 5.5 Transaction Properties (ACID)

6. Concurrency control, Backup & recovery:-

L-09 M-12

- 6.1 LockBased protocol,
- 6.2 Timestamp-Based protocol
- 6.3 Log base Recovery
- 6.4 Shadow Paging
- 6.5 Differed Updates.

Reference Books:-

1. Database System Concepts- Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw- Hill, 4th Edition / 5th Edition.
2. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
3. Database System Concepts – Alexis Leon & Mathews Leon, Vikas Publication House Ltd, New Delhi.

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North Maharashtra University, Jalgaon
T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
DSC (UG-IT-503)Software Engineering
Semester-V

Total lectures: 45
Total Marks: 90

Course Objective:

This paper helps to understand

- What is software and the process in development of software.
- It gives detailed knowledge about various models and requirements needed in developing software.
- It also elaborates the concepts of designing, testing & quality about software.

Course Outcomes:

After completion of the course:

- Students are able to perform the E-R Diagram, DFD, Data dictionary, Decision tree about software.
- They can also design the software in learned language using the course content.
- Get the knowledge of types of testing & how testing is performed in industry.

1. Introduction to Software Engineering

L-8 M-12

- 1.1 Software and Software Engineering
- 1.2 Evolution of Software
- 1.3 Software Characteristics
- 1.4 Software Applications
- 1.5 Software Myths
- 1.6 Software Process
- 1.7 Software Development Life Cycle (SDLC)

2. Software Development Model

L-8 M-14

- 2.1 Waterfall Model
- 2.2 Prototyping Model
- 2.3 Incremental Development Model
- 2.4 RAD model
- 2.5 Spiral Model

3. Requirement Analysis and Specification

L-8 M-12

- 3.1 Requirements Engineering
- 3.2 Fact finding Techniques
- 3.3 Introduction to Types of Requirement Modeling
- 3.4 Data Modeling Concepts- Data Objects, Data Attributes & Relationship.

4. Design Engineering

L-7 M-14

- 4.1 Characteristics of good Software Design
- 4.2 Design Concepts- Architecture, Modularity, Information Hiding
- 4.3 Cohesion & Coupling

- 4.4 Decision Table & Decision Tree
- 4.5 Data flow Diagram
- 4.6 Data Dictionary

5. Software Coding & Testing

L-7 M-12

- 5.1 Coding standards & Guidelines
- 5.2 What is testing?
- 5.3 Testing Activities
- 5.4 Black box testing
- 5.5 White box testing
- 5.6 Introduction to Debugging Approaches – Brute force Method, Backtracking, Case Elimination Method, Programming Slicing

6. Software Quality

L-7 M-12

- 6.1 What is Quality?
- 6.2 Software Quality - Garvin's quality dimensions, Mc Calls quality factors, ISO 9125 quality factors
- 6.3 Elements of Software Quality Assurance
- 6.4 ISO 9000 & Certification

References –

1. Roger S. Pressman , “Software Engineering a Practitioners Approach”, ISBN 13: 9780071267823, 7 th edition, McGraw Hill International Edition.
2. Rajib Mall , “Fundamental of Software Engineering”, ISBN- 978-81-203- 3819-7 3 RD Edition, , PHI Learning Private Limited.

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T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
DSC (UG-IT-504)Cyber Law and IT ACT
Semester-V

Total lectures: 45
Total Marks: 90

Course Objective:

This paper helps to understand

- Awareness about Cyber world & different cyber-crimes.
- This paper gives knowledge about IT Act to prevent cyber-crimes.
- It elaborates about IPR & terms about IPR.

Course Outcomes:

After completion of the course:

- Students get aware about different cyber-crimes can be done intentionally or unintentionally; so they can avoid or stop them from happening.
- Students understand the provision made by Indian government about Cyber-crime.

Unit 1. Basic Terms and Introduction

L-12 M-15

- 1.1 Cyber world, Cyber Space, Cybernetics, Electronic Data Interchange (EDI).
- 1.2 E-governance, E-commerce.
- 1.3 B2B, B2C, & C2B, C2C, G2B (Government to Business), G2C (Government to Citizens)

Unit 2. Cyber Crime

L-12 M-15

- 2.1. Concept of Cyber Crimes – Categories of cyber crime, Types of Cyber crimes.
- 2.2 Viruses, worms, software piracy.
- 2.3 Web jacking, Web Defacement, Cyber Stalking, Cyber Pornography.
- 2.4 Hacking, Phishing, e-fraud, threatening email, Cyber Terrorism.

Unit 3. Cyber Laws and Security

L-12 M-20

- 3.1 Introduction to Cyber Law
- 3.2 Definition, Objective of Cyber Law – Need and Scope
- 3.3 Copyright issues in Cyberspace, Data encryption, Cryptography, Digital Signatures.
- 3.4 Password, Encrypted smart card, Bio-metric, firewall.
- 3.5 Information Security Management System and other Security Compliances.

Unit 4. Information Technology Act

L-12 M-20

- 4.1. Background of Information Technology Act 2000
- 4.2. Preliminary, Definitions, amendments.
- 4.3 Authentication of electronic records, Legal recognition of electronic records.
- 4.4 Legal recognition of digital signatures, Attribution, Regulation of Certifying Authorities.
- 4.5. Acknowledgment and Dispatch of electronic records.
- 4.6. Secure records and secure digital signatures,
- 4.7. Functions of controller, Duties of Subscribers, Penalties and Offences.

Unit 5. Intellectual Property Rights

L-12 M-20

- 5.1 Introduction
- 5.2 Objective of copyright
- 5.3 Requirement and meaning of copyright
- 5.4 Copyright as bundle of rights, Framing
- 5.5 Linking and infringement
- 5.6 Information technology act related to copyright

Reference Books:

- 1) Cyber Laws Dr Gupta &Agrawal , Premier publishing Company
- 2) VivekSood , “Cyber Law simplified”, ISBN: 9780070435063,Tata MaGraw-Hill
- 3) S.R. Sharma , “Nature of Cyber Laws”, ISBN: 9788126115402, Anmol Publications
- 4) S.R. Sharma , “Dimensions of Cyber Crime”,ISBN: 9788126115419 , Anmol Publications

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T. Y. B. Sc. (Information Technology)
(w.e.f. June -2020)
DSC (UG-IT-505) Android Application Development– I
Semester-V

Total lectures: 45
Total Marks: 90

Course Objectives:

- The course is designed to provide Basic knowledge of Android.
- To learn how to design and program android applications.
- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To develop simple android mobile system for simple real world application.

Course Outcome: At the end of the course, the student will be able to

- Explain basic principles of android programming language
- Describe Android platform, Architecture and features.
- Design User Interface and develop activity for Android App.
- Use Intent, Broadcast receivers and Internet services in Android App.

Unit – 1 Introduction to Android

L: 5 M: 10

- 1.1 Overview of Mobile Platform development
- 1.2 History of Mobile Application Development
- 1.3 History of Android
- 1.4 Features of Android
- 1.5 Architecture of Android
- 1.6 Android SDK Overview
- 1.7 Creating first Hello word Android Application

Unit – 2 Activities, Fragments and Intents

L: 10 M: 20

- 2.1 Introduction to Activities.
- 2.2 Activity Lifecycle
- 2.3 Introduction to Intents
- 2.4 Linking Activities using Intents
- 2.5 Calling built-in applications using Intents
- 2.6 Introduction to Fragments
- 2.7 Lifecycle of Fragment
- 2.8 Add Dynamic Fragments
- 2.9 Interaction between Fragments

Unit – 3 Android User Interface**L: 10 M: 20**

- 3.1 Introduction
- 3.2 Understanding the Component of a Screen
 - 3.2.1 Views and ViewGroups
- 3.3 Adapting to Display Orientation
- 3.4 Managing Changes to Screen Orientation
- 3.5 Utilizing Action Bar

Unit – 4 Designing Your User Interface with Views**L: 10 M: 20**

- 4.1 Basic Views
 - 4.1.1 TextView, Button, ImageButton, EditText, CheckBox,
 - 4.1.2 ToggleButton, RadioButton, and RadioGroup Views,
 - 4.1.3 ProgressBar View, AutoCompleteTextView View,
- 4.2 Using Picker Views
 - 4.2.1 TimePicker View,
 - 4.2.2 DatePicker View
- 4.3 List Views to Display Long Lists
 - 4.3.1 ListView View
 - 4.3.2 Spinner View
- 4.4 Specialized Fragments
 - 4.4.1 ListFragment,
 - 4.4.2 DialogFragment,
 - 4.4.3 PreferenceFragment

Unit – 5 Android Images and Menus L: 10 M: 20

- 5.1 Android Image Views
 - 5.1.1 Gallery and ImageView views,
 - 5.1.2 Image Switcher
 - 5.1.3 Grid View
- 5.2 Android Menus with Views
 - 5.2.1 Helper methods,
 - 5.2.2 Options Menu,
 - 5.2.3 Context Menu

References:

1. Professional Android™ Application Development Wrox Publications, Reto Meier *ISBN: 978-0-470-34471-2*
2. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
3. Beginning Android Programming with Android Studio, 4ed by J. F. DiMarzio
4. Android Application Development (With Kitkat Support), Black Book by Pradeep Kothari, Kogent Learning Solutions Inc.

**Kavayitri Bahinabai Chaudhari
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T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
DSC (UG-CS-506 A):Elective A - Programming in PHP - I
Semester-V**

**Total lectures:45
Total Marks: 90**

Objectives:

- To understand Core-PHP concepts, Server Side Scripting Language
- To acquaint knowledge of Object oriented in PHP.

Outcomes:

- To Design dynamic and interactive Web pages.
- PHP framework for effective design of web applications.

Unit – 1 Introduction to PHP

L: 05 M: 10

- Web architecture
- Web Server (xamp Server, apache server)
- Web Browser
- Introduction to Web Development
- Introduction to PHP
- Features & Drawbacks of PHP,
- How PHP Works?
- Version of PHP.
- PHP Installation,
- PHP Configuration (php.ini, httpd.conf)

Unit – 2 PHP Language Basics

L: 10 M: 15

- Lexical Structure of PHP
 - Structure & Syntax of PHP
 - PHP with HTML
 - Comments
 - Data Types
 - Variables
 - Operator
- Flow Control Statements
 - Conditional Statements
 - Looping Statements
 - Exit, Return, Die, Include and Require Statements

Unit – 3 PHP Array

L: 05 M: 10

- Indexed Vs Associative arrays
- Multidimensional arrays
- Storing data in arrays

- Extracting multiple values
- Converting between arrays and variables
- Traversing arrays
- Sorting arrays
- Different array function in PHP

Unit – 4 PHP Function and String

L: 10 M: 20

- Introduction to Function
 - Defining and Calling a function
 - Scope of variables in function
 - Function Parameters
 - Returning Values from a function
 - Recursive Functions
- Introduction to String
 - Types of strings in PHP
 - Printing functions
 - Comparing strings
 - Manipulating and Searching strings
- Regular Expressions

Unit – 5 Web Techniques

L: 05 M: 15

- Introduction
- HTTP Basics
- Processing Forms
 - Methods (Get and Post Method)
 - Parameters (\$_GET and \$_POST)
 - Self-Processing Pages
 - File Uploads
 - Form Validation
- Maintaining State
 - Cookies
 - Sessions
 - Combining Cookies and Sessions

Unit – 6 Object-Oriented PHP

L:10 M: 20

- Introduction and Benefits of OOPs
- Creating a Class
- Creating an Object
 - Adding a Method
 - Adding a Properties
 - Visibility (Public, Private and Protected)
- Constructor and Destructors
- Inheritance (Extending a class)
- Abstract classes, Final classes
- Interfaces
- Exception handling

References Books:

1. Beginning PHP and MySQL, 3rd Ed., W. Jason Gilmore, A press Publication.
2. PHP 5.1 for Beginners, Ivan Bayross and Sharnam Shah, SPD Publication
3. Beginning PHP5 Dave Mercer et al. Wrox Press
4. PHP for Beginners [Book] / auth. Ivan Bayross, Sharanam Shah, THE X Team. - [s.l.] : SPD.
5. Steven Holzner, «HTML Black Book», Dreamtech press.
6. Web Technologies, Black Book, Dreamtech Press

Websites:

1. <http://www.php.net.in>
2. <http://www.w3schools.com>
3. <http://www.tutorialpoints.com>

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T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
Elective B
DSC (UG-IT-506B): JAVA Programming I
Semester-V

Total lectures: 45
Total Marks: 90

Course Objectives:

- To learn Object Oriented Design with JAVA
- Ability to write computer program to solve specific program
- To handle abnormal termination of a program using exception handling

Course Outcomes:

- Get knowledge of JDK environment
- Explore polymorphism using method overloading and method overriding
- Understand the different aspects of hierarchy of classes and their extensibility
- Understands the concept of streams and files
- Write programs for handling run time errors using exceptions

Unit-1 Introduction to JAVA

[L-04M-08]

- 1.1 History of Java
- 1.2 Comparison of Java and C++
- 1.3 Features - Simple, Object Oriented Distributed, Robust, Secure, Architecture neutral, Portable, Interpreted, High Performance, Multithreading, dynamic.
- 1.4 Java and Internet
- 1.5 JDK Environment (Java, Javac, Applet Viewer, Javadoc)

Unit-2 Basics of JAVA

[L-04M-10]

- 2.1 Variables, Data Types, Casting, Operators
- 2.2 Compiling and running java program,
- 2.3 Command line arguments.
- 2.4 Accepting input from console (Using BufferedReader class, Scanner)
- 2.5 Arrays

Unit-3 Objects and Classes

[L-08M-14]

- 3.1 Introduction – Classes and Objects
- 3.2 Data members, methods
- 3.3 Types of Constructors
- 3.4 Overloading
- 3.5 Packages
- 3.6 Access modifier
- 3.7 Inner classes

Unit-4 Functions in JAVA**[L-07M-16]**

- 4.1 String functions - Concatenation, Substring, String editing, Testing for Equality,
- 4.2 Character extraction functions – CharAt, getChars, getByte
- 4.3 Formatting functions
- 4.4 Date and Time functions using GregorianCalendar Class.

Unit-5 Inheritance**[L-10 M-20]**

- 5.1 Inheritance- Inheritance Hierarchy, Super class, Overriding, Polymorphism
- 5.2 Use of final keyword related to method and class
- 5.3 Interfaces
- 5.4 Wrapper classes
- 5.5 Reflection - 'Class'
- 5.6 Use of abstract class and abstract methods

Unit-6 Exception Handling**[L-06M-10]**

- 6.1 Dealing with errors - Types of exceptions
- 6.2 Exception Handling Mechanism
- 6.3 Catching Exceptions.
- 6.4 Creating user defined exception

Unit-7 Streams and Files**[L-06M-12]**

- 7.1 String class and StringBuffer Class
- 7.2 Using the File class
- 7.3 Stream classes-Byte Stream classes , Character Stream Classes
- 7.4 Creation of files
- 7.5 Reading/Writing characters and bytes
- 7.6 Handling primitive data types
- 7.7 Random Access files

References:

1. Cay's Horstmann and Gary Cornell, "Core Java Volume -1 Fundamentals", ISBN: 81-7808-277-2
2. E. Balaguruswamy, "Programming with Java – A primer", ISBN: 978-0-07-061713-1
3. Herbert Schildt, "The complete reference JAVA-2", ISBN: 978-0-07-049543-2, Fifth Edition, (TMH)
4. Java 6 Programming Black Book

Kavayitri Bahinabai Chaudhari
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T. Y. B. Sc. (Information Technology)
(w.e.f. June-2020)
DSC UG-IT-507
LAB on Android Application Development - I
Semester-V

1. Installation and setup of java development kit (JDK), setup android SDK, setup eclipse IDE, setup android development tools (ADT) plugins, create android virtual device.
2. Create “Hello World” application. That will display “Hello World” in the middle of the screen using TextView Widget in the red color.
3. Create first activity to accept information like first name, last name, date of birth, email-id and display all information on second activity when user click on submit button.
4. Create sample application with login module.(Check username and password) On successful login, Change TextView “Login Successful”. And on failing login, alert user using Toast “Login fail”.
5. Create login application where you will have to validate username and passwords till the username and password is not validated, login button should remain disabled.
6. Create the simple calculator, perform appropriate operations.
7. Create application to demonstrate date and time picker.
8. Create application to demonstrate the grid view.
9. Create application to demonstrate menus.

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(w.e.f. June-2020)
DSC UG-IT-508: LAB on System Programming

Semester-V

1. To create line editor with features like create a new file, open existing file, Append in the file, Save and print file as well as to insert, delete, copy & move Lines in the file.
2. Write a program to isolate each lexical unit of source program statement and Create Descriptor.
3. Write lexical analyzer to remove blanks and tabs.
4. Write lexical analyzer to deleting comments.
5. Simulate CPU for SMAC0 (Small Computer)
6. SMAC0 Programming:-
 1. Addition of two numbers
 2. Subtraction of two numbers,
 3. Multiplication of two numbers
 4. Division of two numbers
 5. Find MOD
 6. GCD of two numbers
 7. LCM of two numbers
 8. Factorial of given number
 9. Square & Cube of given number.
 10. Fibonacci series

(Do not use op-codes for MULT, MOD and DIV operation)
7. Interrupt handler in C
(Keyboard interrupt should be disabled and alt-C should be used to toggle CAPS Lock and alt- N should be used to toggle NUM lock)

Instruction: Practical examination slip consists of two assignments. Each assignments carry equal marks.

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(w.e.f. June-2020)**

Elective A

**DSC (UG-IT-509 A): Lab on Programming in PHP - I
Semester-V**

1. Design web pages using HTML that will contain online admission forms.
2. Write PHP scripts that demonstrate fundamentals PHP.
3. Write PHP script that will display grade based on criteria given below using the marks obtained in T.Y.Bsc. Examination.
 - a. Distinction (70 and above)
 - b. First Class (60 - 69)
 - c. Pass (40 - 59)
 - d. Fail (below 40)
4. Write a PHP script to demonstrate different String functions.
5. Write a PHP script to use Functions (Call by Value, Call by reference).
6. Write a PHP script to Demonstrate OOPS Concept in PHP.
7. Write a PHP script to demonstrate Exception Handling.
8. Write a PHP script to demonstrate Form Data Handling using Get and Post methods.
9. Write a PHP script to store, retrieve and delete cookies on your local machine.
10. Write a PHP script to store, retrieve and delete data using session variables.

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**Elective B
DSC (UG-IT-509B): Lab on JAVA Programming I
Semester-V**

1. Write a simple program in Java to print first fifty primenumber.
2. Write a program in Java to print factorial of given number using recursion
3. Write a program in Java to print Fibonacci seriesin given series
4. Write a program in Java to demonstrate command line arguments.
5. Write a program in Java to create student information using array
6. Write a program in Java to implement user defined package.
7. Write a program in Java to implement default & parameterized constructor.
8. Write a program in Java to demonstrate various operations on string functions.
9. Write a program in Java to demonstrate wrapper classes
10. Write a program in Java to demonstrate class.
11. Write a program in Java to implement inheritance.
12. Write a program inJava to demonstrate inner class.
13. Write a program in Java to demonstrate reflection.
14. WriteaprograminJavatodemonstrateexceptionhandling.
15. Write a program in Java to demonstrate text stream object that take input from user & write it into text file.

Semester –VI

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(w.e.f. June-2020)
DSC (UG-IT-601):Operating System
Semester-VI**

**Total lectures: 45
Total Marks: 90**

Objectives:

- To understand Operating system concepts and services.
- To understand the concept of a CPU scheduling, memory management, Disk Drum Scheduling and deadlock.

Outcomes:

- Students should familiar with Operating System Services.
- Understand CPU scheduling algorithms, memory Management Techniques, Disk Drum Scheduling algorithms, Deadlock preventions and avoidance.
- Introduction to android operating systems – its architecture, applications and uses.

Unit 1.Introduction

L:04M:08

- 1.1 What is an operating system?
- 1.2 Types of Operating System
- 1.3 Services of Operating System
- 1.4 Functions of operating system.

Unit 2.CPU scheduling

L:10M:16

- 2.1 Multiprogramming Concepts
- 2.2 Basic Concept of CPU scheduling: CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher
- 2.3Performance criteria's
- 2.3 Scheduling Algorithms:FCFS, SJF, Priority scheduling, Round-robin scheduling
- 2.4 Multilevel queues, multilevel feedback queue

Unit 3.Memory Management L: 10M: 20

- 3.1 Logical versus Physical Address space
- 3.2 Swapping
- 3.3 Multiple partition allocation MFT , MVT
- 3.4 Paging
- 3.5 Segmentation
- 3.6Virtual Memory Management – Background, Demand paging

Unit 4. Disk and Drum Scheduling

L:06M:18

- 4.1 First Come first serve scheduling
- 4.2 Shortest Seek Time First Scheduling
- 4.3 SCAN Scheduling
- 4.4 C-SCAN Scheduling

Unit 5 Deadlocks L:10M:18

- 5.1 Concept of Deadlock
- 5.2 Deadlock Characterization
- 5.3 Deadlock Prevention
- 5.4 Deadlock Avoidance
- 5.5 Deadlock Detection
- 5.6 Recovery from Deadlock

Unit 6 Overview of Android Operating systemL:05 M:10

6.1 What is android operating system.

6.2 Android Architecture

6.3 Features of Android operating system

6.4 Applications of android operating system

6.5 What is Google play store

Reference books:

1. Peterson Silberschatz, "Operating system concepts", ISBN: 0-201-35251-6, Addison Wesley, 1ST Edition
2. Andrew S. Tanenbaum, "Modem operating system", ISBN: 81-203-0974-X, P .H.I. New Delhi 3.
3. Achyut S. Godbole, "Operating Systems" ISBN: 9780070702035, McGraw Hill Education, 2010, Third Edition
4. .Marko Garaenta, "Learning Android ,Oreilly ", ISBN: 978-1449319236, O'Reilly, second edition
- 5 Mike Wolfson, "Android developers tools ,Essential,Oreilly" ISBN:978-1

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DSC (UG-IT-602):Relational Database Management Systems
Semester-VI

Total lectures: 45
Total Marks: 90

Prerequisites

- Basic Knowledge of DBMS
- Knowledge of SQL Queries
- Basics of relational design
- Basics of ER model

Course Objectives

- To teach fundamental concepts of RDBMS (PL/PgSQL)
- To teach database management operations
- Be familiar with the basic issues of transaction processing and concurrency control
- To teach data security and its importance

Course Outcomes

On completion of the course, student will be able to–

- Design E-R Model for given requirements and convert the same into database tables.
- Use database techniques such as SQL & PL/SQL.
- Explain transaction Management in relational database System.
- Use advanced database Programming concepts

Unit 1 INTRODUCTION TO RDBMS [L : 5 M: 10]

- Introduction to RDBMS,
- Introduction to Open Source software PostgreSQL,
- Installation of open source software PostgreSQL on Windows and Linux,
- Data types of PostgreSQL

Unit 2 DATABASE AND TABLE OPERATIONS [L : 05 M: 10]

- Database Operations - 1.Creating a Database 2.Dropping the Database
- Table Operations – 1. Create 2. Alter3. Drop

Unit 3 SQL – STATEMENTS, OPERATORS, FUNCTIONS [L : 10 M: 20]

- Statements - SELECT, INSERT, UPDATE, DELETE
- Null value and Default value

- Operators - Arithmetic, Logical, Comparison, Bitwise, Relational
- Functions - Aggregate functions, Date and Time functions, String functions
- Clauses:- where, order by, AND, OR, Between, Like, CASE, Distinct, Group by, Having

Unit 4 VIEW, JOIN and DATA CONSTRAINTS in SQL [L : 10 M: 20]

- **Constraints** - Data Integrity, Entity Integrity
- **Keys** - PRIMARY KEY, UNIQUE, FOREIGN KEY, CHECK, Not Null
- **Views** - Create, Alter, Drop
- **Join** - Joins, Cross Join, Inner Join, Outer Join, Self-Join
- **Subqueries** -Subqueries as Constants, Subqueries as Correlated Values, Subqueries as Lists of Values, NOT IN and Subqueries with NULL Values, Subqueries Returning Multiple Columns
- **Statement** - MERGE Statement
- **Set operations**-UNION, EXCEPT, and INTERSECT
- **Clauses** -ANY, ALL, and EXISTS Clauses

Unit 5 TRANSACTION COMMANDS , INDEX AND SEQUENCE[L : 5 M: 10]

- **Transaction commands**-Commit, Rollback
- **Indexing** -Creating an Index, Unique Indexes
- **Sequences**- Creating Sequence, using nextval(), currval() and setval()

Unit 6 PL/PGSQL - SQL PROCEDURAL LANGUAGE[L : 15 M: 20]

- **Introduction to PL/PGSQL**-Advantages of PL/PGSQL, structure of PL/PGSQL, basic Statements and control structures
- **Function** -Creating functions, Removing functions
- **Cursors**-Creation of Cursors, Using Cursors, Looping
- **Triggers**-Introduction, Triggers Vs constraints, DML Triggers, DDL Triggers
- **Error handling** -Introduction Error Handling, RAISE Statement

REFERENCE BOOKS:

- Bruce Momjian , PostgreSQL Introduction and Concepts, Addison.Wesley, ISBN 0-201-70331-9
- NEIL MATTHEW AND RICHARD STONES , **Beginning Databases with PostgreSQL, From Novice to Professional, Second Edition**, ISBN (pbk): 1-59059-478-9

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DSC (UG-IT-603): Computer Network
Semester-VI

Total lectures: 45
Total Marks: 90

Course Objective:

This paper helps to understand

- How network works? & types of networks & its applications.
- It helps to understand the various models.
- It helps to understand various layers & their functionality.
- It get the idea of how cryptography works.

Course Outcomes:

After completion of the course:

- Students understand the information exchange done across the network with the help of OSI & TCP/IP models.
- Student understands how errors are captured & handled in network.
- Student understands various attack & its prevention techniques.

Unit-1 Introduction to Computer Network and Network Model

L-8 M- 12

- 1.1 What is Computer Network?
- 1.2 Application of Computer Networks
- 1.3 Transmission Mode, Network Structure
- 1.4 Network Topologies
- 1.5 ISO OSI Reference Models, TCP / IP Reference Model & their Comparison.

Unit-2 Physical Layer

L-8 M- 15

- 2.1 Guided Media:
 - 2.1.1 Twisted Pair
 - 2.1.2 Coaxial Cable
 - 2.1.3 Fiber Optics
 - 2.1.4 Satellite Communication
 - 2.1.5 Microwave Communication
 - 2.1.6 Submarine Cables.
- 2.2 Unguided Media
 - 2.2.1. Electromagnetic Spectrum
 - 2.2.2. Radio Transmission
 - 2.2.3. Microwave Transmission
 - 2.2.4. Infrared & Millimeter Waves
 - 2.2.5. Light wave Transmission

Unit 3 The Data link Layer

L-8 M- 15

- 3.1 Services Provided to Network Layer
- 3.2 Framing, Error Control , Flow Control

3.3 Error Detection – Redundancy, Parity Check, Checksum & CRC

3.4 Error Correction – Hamming Code.

Unit 4 The Network Layer

L-7 M- 18

4.1 Logical Addressing

4.1.1 IP v4 Addresses - Address Space - Classful Addressing - Classless Addressing

4.2. Routing Algorithm

4.2.1. Shortest Path

4.2.2. Multicast Routing

4.3. Congestion Control

4.3.1. Introduction to Congestion Control

4.3.2. Deadlocks

Unit-5 Transport Layer

L-7 M- 15

5.1 Process to Process Delivery

5.1.1 Client-Server Paradigm

5.1.2 Multiplexing and Demultiplexing

5.1.3 Connectionless v/s Connection Oriented Services

5.1.4 Reliable v/s Unreliable Transmission

5.2 UDP and TCP

5.2.1 UDP – Operations and uses

5.2.2 TCP – Services and features

Unit-6 Cryptography and Public key Infrastructure

L-7 M-15

6.1 Introduction:

6.1.1 Cryptography, Cryptanalysis, Cryptology, Substitution

6.1.2 Techniques: Caesar’s cipher, Monoalphabetic and Polyalphabetic,

6.1.3 Transposition techniques – Rail fence technique, Simple Columnar

6.2 Public key infrastructures:

6.2.1 basics, digital certificates, certificate authorities, registration authorities,

Digital Signature.

Reference Books: -

1. Andrew S.Tanenbaum , “Computer Networks “ ISBN: 978-0130661029, Prentice Hall, Fourth Edition .
2. Behrouz A. Forouzan , “Data Communication & Networking”, ISBN: 978- 0071232418 , McGraw Hill Higher Education , Third Edition 3.
3. U.D. Black , “Data Communication & Distributed Networks”, ISBN: 9780835913416, Published by Prentice-Hall, Englewood Cliffs, N.J., 1987 , Second Edition ,
4. AtulKahate , “ Cryptography and Network Security “ Edition 3, McGraw Hill.

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DSC (UG-IT-604) Theoretical Computer Science
Semester-VI

Total lectures: 45
Total Marks: 90

Course Outcome

- 1) Understanding the use of Sets, Relations and Graphs.
- 2) Understand Languages in TCS.
- 3) Introduction of Regular Languages and Expressions.
- 4) Understanding Pumping Lemma and its applications.
- 5) Explore the knowledge of Pushdown Automata.
- 6) Understanding Normal Forms with Examples.
- 7) Understanding Turing Machine.

Unit-1. Mathematical Preliminaries

[L-04 M-12]

- 1.1 Symbol, Alphabet, String, Formal Language, Operation on languages
- 1.2 Sets, Relations
 - 1.2.1 Sets and Subsets
 - 1.2.2 Relations
 - 1.2.3 Closure of Relations
- 1.3 Graphs & Trees
 - 1.3.1 Graphs
 - 1.3.2 Trees
- 1.4 Principal of Induction
 - 1.4.1 Method of Proof by Induction

Unit-2. Finite Automata

[L-14 M-20]

- 2.1 Definition of Automata
- 2.2 Why study Automata Theory?
 - 2.2.1 Introduction to finite Automata
 - 2.2.2 Structural representations
 - 2.2.3 Automata and Complexity
- 2.3 Descriptions of Finite Automata, Transition Systems, Transition Functions
- 2.4 Deterministic Finite Automata (DFA)
- 2.5 Nondeterministic Finite Automata (NFA)
- 2.6 The Equivalence of DFA and NFA
- 2.7 Minimization of DFA
- 2.8 Finite Automata with ϵ -Moves
- 2.9 Melay and Moore Machines: Definition and Examples
- 2.10 Applications of Finite Automata

Unit-3. Regular Expressions & Regular Sets

[L-08 M-16]

- 3.1 Regular Expressions
- 3.2 FA & Regular Expressions
 - 3.2.1 Convert Regular Expression to FA
 - 3.2.2 Construct FA from Regular Expression
- 3.3 Pumping Lemma for Regular Sets and applications

Unit-4. Context Free Grammars

[L-10 M-18]

- 4.1 Introduction to Context Free Grammars
- 4.2 Derivation Trees
 - 4.2.1 Ambiguity in CFG
- 4.3 Simplification of Context Free Grammars
 - 4.3.1 Useless Symbols
 - 4.3.2 Null Production
 - 4.3.3 Unit Production
- 4.4 Normal forms for CFG
 - 4.4.1 Chomsky Normal Form (CNF)
 - 4.4.2 Greibach Normal Form (GNF)

Unit-5 Pushdown Automata

[L-04 M-12]

- 5.1 Basic Definitions
- 5.2 Types of PDA
- 5.3 Acceptance by Pushdown Automata
- 5.4 PDA and Context Free Language

Unit-6 Turing Machine

[L-05 M-12]

- 6.1 Introduction
- 6.2 Turing Machine Model
- 6.3 Representation of Turing Machine
- 6.4 Design of Turing Machine

References:

1. John E. Hopcraft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages & Computations", ISBN: 978-0321455369, Pearson publication, Third edition
2. K. L. P. Mishra, N. Chandrasekaran, "Theory of Computer Science", ISBN: 9788120329683, Published by Prentice-Hall of India Pvt.Ltd, Third edition.
3. Daniel A. Cohen, "Introduction to Computer Theory", ISBN: 978-0471137726, John Wiley & Sons; 2nd Revised edition edition.
4. Smita Rajpal, "Theory of Automata and Formal Languages", Galgotia Publications, ISBN: 1234027054
5. <http://nptel.ac.in/>

- Android.Graphics.Canvasclass
- Android.Graphics.Paint class

Unit – 4Databases - SQLite L: 10 M: 20

- Introduction to SQLite
- SQLiteOpenHelper and SQLiteDatabase
- Creating, Opening and Closing Database
- Working with Cursor – Insert, Update and Delete
- Building and executing queries

Unit – 5Messaging and E-mail L: 05 M: 15

- SMS messaging
 - Sending SMS Messages
 - Getting Feedback after Sending a Message
 - Receiving SMS Message
- Sending E-mail

Unit – 6Locations – Based Services and Google Map L: 10 M: 15

- Google Maps
 - Maps API Key
 - Displaying the Maps
 - Displaying Zoom Control
 - Changing Views
- Getting Location Data
- Monitoring a Location

References:

1. Android SQLite Essentials by Sunny Kumar Aditya , Vikash Kumar Karn ISBN-10-1783282959
2. Professional Android™ Application Development Wrox Publications, Reto Meier *ISBN: 978-0-470-34471-2*
3. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
4. Beginning Android Programming with Android Studio, 4ed by J. F. DiMarzio
5. Android Application Development (With Kitkat Support), Black Book by Pradeep Kothari, Kogent Learning Solutions Inc

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Elective A
DSC (UG-IT-606 A):Programming in PHP - II
Semester-VI

Total lectures: 45

Total Marks: 90

Unit – 1 Advanced PHP

L: 05 M: 15

- Emailing in PHP
- Sending Free SMS to Mobile
- Loading PHP application on web server By FTP.
- Web services

Unit –2 Files and directories

L:10 M: 15

- Working with files and directories
- Opening and Closing files,
- Coping,renaming and deleting a file
- Reading and writing characters in file
- Reading entire file
- Working with directories

Unit –3 PHP with MySQL

L:10 M:20

- Introduction to MySQL
- Interaction between PHP and MySQL
- Connecting to a Database
- Error Checking
- Execute DDL Statements
- Execute DML Statements

Unit –4 Ajax with PHP

L:10 M: 15

- Introduction Of Ajax
- How AJAX Works
- Steps of AJAX Operation
- Ajax object in Different Browser

Unit –5 CMS Technology in PHP

L:10 M: 25

- Introduction of CMS
- What is Joomla?
- Installation of joomla
- Steps of Joomla installation & Configuration

- Various Managers in Joomla
- Installing an plug-in/extension

References Books:

1. Beginning PHP and MySQL, 3rd Ed., W. Jason Gilmore, A press Publication.
2. PHP 5.1 for Beginners, Ivan Bayross and Sharnam Shah, SPD Publication
3. Beginning PHP5 Dave Mercer et al. Wrox Press
4. PHP for Beginners [Book] / auth. Ivan Bayross, Sharanam Shah, THE X Team. - [s.l.] : SPD.
5. Murach's PHP and MySQL by Joel Murach& Ray Harris
6. Learning PHP, MySQL, JavaScript, & CSS: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon

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**Elective B
DSC (UG-IT-606B): JAVA Programming II
Semester-VI**

Total lectures: 45

Total Marks: 90

Course Objectives:

- **To design User Interface using Swing and AWT**
- **Learn the advanced concept of java**
- **To aware about the applet programming**

Course Outcomes:

- Program using graphical user interface with Swing classes
- Handle different kinds of events generated while handling GUI components
- Create programs using menus and dialog boxes
- Program to create applets
- Understand advanced java concepts like JDBC, Java Beans

Unit-1 GRAPHICS Programming

[L-08 M-14]

- 1.1 Introduction- frames, framelayouts
- 1.2 Displaying information in a frame, Graphics objects and paint componentmethod
- 1.3 Text andFonts, Colors
- 1.4 Drawing Shapes, FillingShapes
- 1.5 Paint mode andImages.

Unit-2 Event Handling

[L-10M-18]

- 2.1 EventHandling Mechanism
- 2.2 Concept: AWT, Swing, Difference between AWT and Swing.
- 2.2 The AWT eventhierarchy
- 2.3 Event handling summary- event sources and listener, adapterclasses.
- 2.4 Low level events - Focus, window, keyboard, mouseevents.
- 2.5 Multicasting

Unit-3 User Interface Components Using SWING

[L-10M-18]

- 3.1 Introduction to layout management - Panels, Border Layout, GridLayout,
- 3.2 Text Input- Text Field, Text Area, Passwordfield
- 3.3 Labels andButtons
- 3.4 Making choices - Check boxes, Radio buttons, List, Comboboxes

Unit-4 Menu and Dialog Box

[L-08M-14]

- 4.1 Menus - Buildingmenus
- 4.2 Menuevents,
- 4.3 Popuptmenu,
- 4.5 Keyboard mnemonics and Accelerators, enabling and disablingmenus
- 4.6 Dialog boxes - opening dialogs using inbuilt dialogbox

Unit-5 APPLETS

[L-05 M-13]

- 5.1 Introduction to applet

5.2 Converting application to applets

5.3 Life cycle of applet

5.4 Applet tag, Param Tag

Unit-6 IntroductionToAdvancedJAVA

[L-04 M-13]

6.1 Collections

6.2 Interfaces- List,Set

6.3 Classes- Array List,Vector

6.4 Database connectivity -JDBC

6.5 Introduction to JavaBeans- Servlets, Java Server Pages(JSP)

References:

1. Cay's Horstmann and Gary Cornell , "CoreJavaVolume 2", ISBN: 978-0-13- 708160-8, 9TH edition, published by PrenticeHall
2. E. Balaguruswamy , "Programming with Java – A primer", ISBN:978-0-07-061713-1
3. Herbert Schildt, "The complete reference JAVA-2", ISBN: 978-0-07-049543-2, Fifth Edition,(TMH)
4. Java Programming BlackBook.
5. Buyya, Selvi, Chu, , "Object Oriented Programming with Java", ISBN: 978- 0070678835, Tata McGraw Hill Education2010

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**DSC UG-IT-LAB-607 LAB on Android Application Development - II
Semester-VI**

1. Create an android application to demonstrate threading.
2. Develop an application for working with Notifications
3. Develop an application for working with graphics and animation.
4. Develop an application for working with audio.
5. Develop an application for working with video.
6. Develop an application for connecting to the internet and sending email.
7. Develop an application for working with location based services.
8. Design a simple android application using SQLite.
9. Create table Customer (id, name, address, phno). Create Application for performing the following operation on the table. (using SQLite database)
 - i) Insert New Customer Details. ii) Show All the Customer Details

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DSC (UG-IT-Lab 608): Lab on RDBMS

Use of PostgreSQL 11

1. To create one or more tables with following constraints, in addition to the first two constraints (PK & FK)
 - a. Check constraint
 - b. Unique constraint
 - c. Not null constraint
2. To drop a table, alter schema of a table, insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)
3. To query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]
4. To query table, using set operations (union, intersect)
5. To query tables using nested queries (use of 'Except', exists, not exists, all clauses)
6. To create views
7. To create Stored Procedure
 - A Simple Stored Procedure
 - A Stored Procedure with IN, OUT and IN/OUT parameter
8. Stored Function
 - A Simple Stored Function
 - A Stored Function that returns
 - A Stored Function recursive
9. Cursors
 - A Simple Cursor
 - A Parameterize Cursor

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Elective A

DSC (UG-IT-609 A): Lab on Programming in PHP - II
Semester-VI

1. Write a PHP Script to Sending Email to your friend.
2. Write a PHP Script to Sending SMS to your friend.
3. Write a PHP Script to Sending Email to your friend.
4. Write a PHP program to read a directory name and extension form user. Display the files with specified extension from that directory.
5. Write a PHP program to read Flat file‘Student.dat‘ that has student details as roll no, name, m1,m2,m3 as mark of three subjects. Display the data from the file in tabular format. Also display total and percentage of each student.
Datfile : student.dat
1 Ajay 50 20 80
2 Vijay 30 80 60
6. Write a PHP Script to copy content in one file to another.
7. Design a database in MYSQL using PHP. Create table in database. Store, Update, Delete and Retrieve data from the table. Display the data from the table.
8. Installation and setup of Joomla.
9. Design a sample Website using Joomla to demonstrate
 - Creating user
 - Changing default template or themes.
 - Create a new menu and new page.
 - Joomla plugins.

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Elective B
DSC (UG-IT-509 B): Lab on JAVA Programming II
Semester-VI

1. Write a program in Java to display messages in various fonts in a frame
2. Write a program in Java to draw various geometric shapes like circle, line, rectangle etc.
3. Write a program in Java to demonstrate paint mode.
4. Write a program in Java to demonstrate window events.
5. Write a program in Java to demonstrate Mouse events.
6. Write a program in Java to demonstrate Keyboard events. (key pressed, key released)
7. Write a program in Java to demonstrate multicasting
8. Write a program in Java to demonstrate user interface component list boxes and combo box.
9. Write a program in Java to demonstrate user interface component radio button and check box.
10. Write a program in Java to demonstrate menus as interface component.
11. Write an Applet to display human face.
12. Write a program in Java to demonstrate Java Applet with parameter
13. Write a program in Java to demonstrate collection interfaces. (List and Set).