DEPARTMENT OF INFORMATION TECHNOLOGY

LIST OF COURSES OFFERED FOR MINOR PROGRAM (R20)

Course code	Course Title	Contact hours/week				Credits
		L	T	P	Total	
20ITM1	Linux Essentials	3	1	0	4	4
20ITM2	Java Programming	3	1	0	4	4
20ITM3	Database Management System Concepts	3	1	0	4	4
20ITM4	Data Communications & Computer Networks	3	1	0	4	4
20ITM5	Object Oriented Analysis and Design Using UML	3	1	0	4	4
20ITM6	Web Design Using Django	3	1	0	4	4
20ITM7	Android Application Development	3	1	0	4	4

L	T	P	Cr.
3	1	0	4

B.Tech. - IT   **20ITM1-LINUX ESSENTIALS**

Prerequisites: NIL
Course Objectives: This course meant for the students who want to build their career in Linux System Administration domain. The student who completed this course possesses the fundamental knowledge and proven skills in the area of Linux Essentials.

COURSE OUTCOMES (COs): At the end of this course, the student will be able to
CO1   Demonstrate Linux Utilities. **(Knowledge-L1)**
CO2   Identify the Basics of using the Linux command line **(Understanding- L2)**
CO3   Create, Search and extract data from files in the home directory. **(Apply- L3)**
CO4   Familiarity in working with hardware components, server computers, networking configuration. **(Understand- L2)**
CO5   Understanding and manipulating file permissions and ownership settings. **(Knowledge-L1)**

UNIT-I

UNIT-I: The Linux Community and a Career in Open Source.
Linux Evolution and Popular Operating Systems, Major Open Source Applications, Open Source Software and Licensing, ICT Skills and Working in Linux.
The following is a partial list of the used files, terms and utilities:
- Debian, Ubuntu (LTS)
- CentOS, openSUSE, Red Hat, SUSE
- Linux Mint, Scientific Linux
- Raspberry Pi, Raspbian
- Android
- OpenOffice.org, LibreOffice, Thunderbird, Firefox, GIMP
- Nextcloud, ownCloud
- Apache HTTPD, NGINX, MariaDB, MySQL, NFS, Samba
- C, Java, JavaScript, Perl, shell, Python, PHP
- dpkg, apt-get, rpm, yum
- Copyleft, Permissive
- GPL, BSD, Creative Commons
- Free Software, Open Source Software, FOSS, FLOSS
- Open source business models
- Using a browser, privacy concerns, configuration options, searching the web and saving content
- Terminal and console
- Password issues
- Privacy issues and tools
- Use of common open source applications in presentations and projects

UNIT-II: Finding Your Way on a Linux System
Command Line Basics, Running help commands and navigation of the various help systems.
Using Directories and Listing Files, Creating, Moving and Deleting Files
The following is a partial list of the used files, terms and utilities:
- Bash
- echo
- history

- PATH environment variable
- export
- type
- man
- info
- Common options for ls
- Recursive listings
- cd
- . and ..
- home and ~
- /usr/share/doc/
- locate
- mv, cp, rm, touch
- mkdir, rmdir

UNIT-III: The Power of the Command Line.
Archiving Files on the Command Line, Searching and Extracting Data from Files, Turning
Commands into a Script.
The following is a partial list of the used files, terms and utilities:
- tar
- Common tar options
- gzip, bzip2, xz
- zip, unzip
- grep
- less
- cat, head, tail
- sort
- cut
- wc
- #! (shebang)
- /bin/bash
- Variables
- Arguments
- for loops
- echo
- Exit status

UNIT-IV: The Linux Operating System

Knowledge of major operating systems and Linux distributions. Familiarity with the components
that go into building desktop and server computers. Where various types of information are
stored on a Linux system. Querying vital networking configuration and determining the basic
requirements for a computer on a Local Area Network (LAN).

The following is a partial list of the used files, terms and utilities:
- GUI versus command line, desktop configuration
- Maintenance cycles, beta and stable
- Motherboards, processors, power supplies, optical drives, peripherals
- Hard drives, solid state disks and partitions, /dev/sd*
- Drivers
- ps, top, free
- syslog, dmesg
- /etc/, /var/log/
- /boot/, /proc/, /dev/, /sys/

- route, ip route show
- ifconfig, ip addr show
- netstat, ss
- /etc/resolv.conf, /etc/hosts
- IPv4, IPv6
- ping
- host

UNIT-V: Security and File Permissions.

Basic Security and Identifying User Types, Creating Users and Groups, Managing File
Permissions and Ownership, Special Directories and Files
The following is a partial list of the used files, terms and utilities:
- /etc/passwd, /etc/shadow, /etc/group
- id, last, who, w
- sudo, su
- /etc/passwd, /etc/shadow, /etc/group, /etc/skel/
- useradd, groupadd
- passwd
- ls -l, ls -a
- chmod, chown
- /tmp/, /var/tmp/ and Sticky Bit
- ls -d
- ln -s

TEXT BOOKS:

   1. Linux Essentials, 2nd Edition, *Author: Christine Bresnahan , Publisher: Sybex*

Reference Books:

   1. Linux Pocket Guide: Essential Commands Linux Pocket Guide is a book written by Jason
      Cannon. It provides an organized...

   2. The Linux Command Line The Linux Command Line is a book written by William
      Shotts. The author takes you from your...

   3. Linux for Beginners: An Introduction to the Linux Operating System and Command Line
      Linux for Beginners is a book...

   4. Linux Command Line and Shell Scripting Bible, 3rd Edition Linux Command Line and
      Shell Scripting Bible is a reference...

E-Books and Online Course Materials:
   1. Linux Essentials by CISCO Academy

	L	T	P	Cr.
B.Tech. - IT **20ITM2-JAVA PROGRAMMING**	3	1	0	4

Pre-requisites: Programming for Problem Solving Using C

Course Educational Objective: Concentrates on the methodological and technical aspects of software design and Programming based on OOP. Acquire the basic knowledge and skills necessary to implement object-oriented Programming techniques in software development through JAVA. Know about the importance of GUI based applications and the development of those Applications through JAVA. Get sufficient knowledge to enter the job market related to Web development

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

CO1: Understand Object Oriented concepts through constructs of JAVA. **(Understand - L2)**

CO2: Understand the concepts of Inheritance, Polymorphism Packages, and Interfaces in JAVA Programming. **(Understand - L2)**

CO3: Explore Exception handling and multi-threading concepts in JAVA Programming. **(Understand - L2)**

CO4: Develop GUI based applications using Event Handling using JAVA Programming.

(Apply - L3)

CO5: Design GUI based applications using JDBC Connectivity. **(Apply - L3)**

UNIT – I

OOP concepts – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object-oriented programming paradigms **Java programming** - History of Java, comments, data types, variables, constants, scope and lifetime of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow - block scope, conditional statements, loops, break and continue statements, simple java standalone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class.

UNIT – II
Inheritance &Polymorphism: Inheritance basics, using super keyword, multilevel hierarchy, Method overloading, Method overriding, Dynamic method dispatch, abstract class, Object class and final keyword.
Packages: Defining a package, Accessing a Package, Understanding CLASSPATH, importing packages, exploring java.util package (StringTokenizer, date classes).
Interfaces: Defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Differences between classes and interfaces

UNIT – III
Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes
Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern

UNIT – IV
Event Handling: Events handling mechanisms, Events, Event sources, Event classes, Event Listeners interfaces, Delegation event model, handling mouse and keyboard events, Adapter classes, Inner classes

UNIT – V
JDBC Introduction:
JDBC Architecture, Types of JDBC Drivers, The Connectivity Model, The java.sql package, Navigating the ResultSet object's contents, Manipulating records of a ResultSet object through User Interface , The JDBC Exception classes, Database Connectivity, Data Manipulation (using Prepared Statements, Joins, Transactions, Stored Procedures), Data navigation.

TEXT BOOKS
1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

REFERENCES

1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.

2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.

3. Thinking in Java, Bruce Eckel, Pearson Education

4. Programming in Java, S.Malhotra and S.Choudhary

	L	T	P	Cr.
B.Tech. - IT **20ITM3-DATABASE MANAGEMENT SYSTEM CONCEPTS**	3	1	0	4

Pre-requisite: Files Concept in Programming for Problem Solving Using C

Course Educational Objective:
This course enables the students to know about Basic concepts of DBMS, Database Languages, Database Design, and Normalization Process.
Course Outcomes (CO): At the end of this course, the student will be able to:
CO1: Demonstrate the Basic Components of Database Management System. **(Understand -L2)**
CO2: Design Entity-Relationship Diagrams for different applications.
(Apply –L3)
CO3: Examine the relational data model and various constraints. **(Apply- L3)**
CO4: Demonstrate Structured Query Language languages (SQL) to manage relational databases and perform various operations on the data. **(Apply- L3)**
CO5: Employ principles of normalization for effective database design & transaction management. **(Apply- L3)**

UNIT – I
Introduction: An overview of Database Management System, Database System Vs File System, database System Concepts and Three Schema Architecture, Data Models, Database Schema and Instances, Data Independence, Database Languages, Database Structure.

UNIT – II
Entity Relationship Model: ER model concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, and Reduction of an ER Diagrams to Tables.

UNIT – III
Relational Data Model: Relational Data Model Concepts, Integrity Constraints: Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints, and Relational Algebra.

UNIT – IV
Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data types and Literals, Insert, Update and Delete Operations, Tables, Views and Indexes, Nested Queries, Aggregate Functions, Joins, Unions, Intersection, Minus.

UNIT – V
Normalization: Functional Dependencies, Normal Forms - First, Second, Third Normal Forms, BCNF.

Transaction Management: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializability, Recoverability, Deadlock Handling.

TEXT BOOKS
1. Henry F. Korth, Abraham Silberschatz, S.Sudarshan, "Database System Concepts", McGrawHill, 6th edition, 2009.

REFERENCE BOOKS:
1. Raghu Ramakrishnan, JohanneseGehrke, ―Database Management System, McGrawHill, 3rd edition, 2000.

		L	**T**	**P**	**Cr.**
B.Tech. - IT	**20ITM4 - DATA COMMUNICATIONS & COMPUTER NETWORKS**	3	1	0	4

Pre-requisite: **NIL**

Course Educational Objective: The students will be able to Build an understanding of the fundamental concepts of computer networking and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Objectives:

CO1: Understand the layered network architecture. **(Understand –L2)**

CO2: Illustrate the services and techniques in physical layer. **(Understand –L2)**

CO3: Understand the functions of Data Link layer. **(Understand –L2)**

CO4: Analyze different Routing Protocols and acquire the knowledge in IP addressing. **(Understand –L2)**

CO5: Understand transport functions and different application layer protocols.

(Understand –L2)

UNIT- I
Introduction: Uses of Computer Networks – Network Hardware – Network Software – Reference Models – Network Standardization

Physical layer: Basics of Data Communication - Guided Transmission Media – Circuit Switching – Packet Switching – Comparison of Circuit Switching and Packet Switching

UNIT- II
Data Link Layer: Error Detection and Correction – Hamming Code, CRC, Flow control mechanism – Sliding Window Protocol – GoBack - N - Selective Repeat, Multiple Access Networks (IEEE 802.3)

UNIT-III
Network Layer: Routing Algorithms- Distance Vector Routing Protocol, Link state routing, Multi path routing, IPv4- IP addressing
UNIT-IV
Transport Layer: Transport Services, TCP , UDP– Congestion Control – QoS.

UNIT -V
Application Layer: DNS – Email – WWW – HTTP.

TEXTBOOKS

1. Andrew S Tanenbaum and David J. Wetherall, Computer Networks, Fifth Edition, Pearson Publisher, 2010.

REFERENCE BOOKS

1. Behrouz A Forouzan, Data communication and Networking, McGraw-Hill, Fifth Edition, New York, 2012.
2. Computer Networking: A Top-Down Approach Featuring the Internet, J.F. Kurose and K.W.Ross, 6th Ed., Pearson Education, 2012.
3. Data and Computer Communications, William Stallings, Pearson Education, 10th Ed, 2013.
4. Computer Networks: A Systems Approach, Larry Peterson and Bruce Davie, 5th Ed, TheMorgan Kaufmann Series, Elsevier, 2011.

		L	T	P	Cr.
B.Tech. - IT	**20ITM5-OBJECT ORIENTED ANALYSIS AND DESIGN USING UML**	3	1	0	4

Prerequisite   : Object oriented concepts in JAVA Programming

Course Educational Objective: To provide basics of object oriented analysis and design using UML, understand how the various models relate to each other and the importance of the software design process.

Course Outcomes: At the end of this course, the student will be able to
CO1: Understand the basic concepts of object and Elements of object model **(Understand -L2)**
CO2: Identify the design patterns to solve object oriented design problems   **(Understand -L2)**
CO3: Understanding the basic building blocks of UML, Class and object diagrams.
(Understand-L2)
CO4: Design Interaction diagrams for a given application. **(Analyze –L3)**
CO5: Design use case, activity, Implementation diagrams for any application **(Analyze –L3)**

UNIT - I
INTRODUCTION

The Object Model – Overview of Object Oriented system Development – Object Basic – Object – Oriented Systems Development Life Cycle.

Object Oriented Analysis Process: Identifying use cases: Introduction. Why Analysis is a Difficult Activity. Business Object Analysis: Understanding the Business Layer. Use-Case Driven Object-Oriented Analysis: The Unified Approach, Business Process Modelling, Use-Case Model, Developing Effective Documentation

UNIT – II
Unified Modeling Language (UML): Introduction, Static and Dynamic Models, Why Modeling? Introduction to the Unified Modeling Language, UML Diagrams

Static Modeling: UML Use Case Diagram- Use case descriptions- Actors and actor descriptions - Use case relationships: communication association, include, extend and Generalization, System Boundary, case study Via Net Bank ATM**.**

UNIT - III
Identifying Object Relationships, Attributes and Methods: Introduction, Associations, SuperSub Class Relationships, A-Part-of Relationships-Aggregation, Class Responsibility, Identifying Attributes and Methods. Class Responsibility, Defining Attributes by Analyzing Use Cases and Other UML Diagrams, Object Responsibility: Methods and Messages.

Static Modeling: UML Class Diagram: Class, interface, package, Relationships between classes and other Notations of Class Diagram, case study.

UNIT - IV
Dynamic Modeling (Behavioural Diagram):- UML Interaction Diagrams – UML Sequence Diagram: object, life line, Activation Bar, Types of Messages.

UML Collaboration Diagram: object, object Connection, Message with sequence numbers, case study
 UML State-Chart Diagram: object State, Initial/Final State, Simple/Complex Transitions. UML Activity Diagram: Activity State, Transition, Swim Lane, Initial state, Final State, Synchronization Bar, Branching, case study

UNIT - V
Implementation Diagrams – Component Diagram: Component, Dependency and Interface, Deployment Diagram: Node, Communication Association, case study

Model Management: Packages and Model Organization, UML Extensibility, UML MetaModel.

Designing Classes: Introduction, The Object-Oriented Design Philosophy, UML Object Constraint Language; Designing Classes: The Process, Class Visibility: Designing Well-Defined Public, Private, and Protected Protocols, Designing Classes: Refining Attributes, Designing Methods and Protocols, Packages and Managing Classes, case study.

TEXT BOOKS

1. Grady Booch, ―Object Oriented Analysis & Design with Applications‖, 2 Edition, Pearson Education 1999.
2. Ali Bahrami, ―Object Oriented Systems Development – Using the Unified Modeling Language‖. TGH International Editions, Computer Science Series, 1999.

REFERENCES

1. James Rumbaugh, Ivan Jacobson and Grady Booch, ―Unified Modeling Language Reference Manual‖, PHI, 1999.
2. Jacobson et al., the ―Unified Software Development Process‖. AW, 1999.
3. Tom Pender, ―UML Bible‖, John Wiley & Sons. 2003.
   https://onlinecourses.nptel.ac.in/noc22_cs55

	L	**T**	**P**	**Cr.**
B.Tech. - IT **20ITM7- WEB DESIGN USING Django**	3	1	0	4

Pre-requisite: NIL

Course Educational Objective: The Objective of the course is to implement web applications using python and Django frame work

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

CO1: Identify basic building blocks of python to solve mathematical problems.
 (Understand- L2)
CO2: Demonstrate concepts about built in data structures, regular expressions, and file handling.
(Understand - L2)
CO3: Understand the basic Web deployment and Dijango Frame Work
  (Understand - L2)
CO4: Demonstrate the usage of Http Mechanisms and Http Modelling   **(Apply - L3)**
CO5: Demonstrate the usage of Templates and Form Processing   **(Apply - L3)**

UNIT I
Introduction to Python: Usage of Python interpreter, Python Shell,
Indentation, Python Built-in types, Input-Output Statements, Identifiers and Literals.
python basic Operators, Python Membership Operators (in & not in), Python Identity Operators (is & is not)
Control flow: Conditional Statements - if, if-else, Nested if-else. Loops-While, For. Continue, break, and pass.

UNIT II
Built in data Structures: Creating and Accessing Elements in Lists, Tuples, Sets and Dictionaries, their built in functions
Regular Expression Operations: Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.
Files: Introduction to files, file operations- Read, write, and search

UNIT III
Dynamic web site basics: Communication: Http, Urls, Requests, Responses, rendering templets into html and other formats, Understanding MVC Architecture.
Dijango
Introduction: Introduction to frame work, overall Dijango Architecture, loose coupling and flexibility, Rapid development

UNIT – IV

URL, Http Mechanisms and Views: Introduction to URL confs, repalcing tuples with url, Using Multiple pattern Objects, Function Objects, Versus Function-Names,
Http Modelling: Request Objects, Response Objects, Middleware

UNIT-V
Templates and Form Processing: Templates- Understanding Contexts, Template Language syntax. Defining Forms, Filling out Forms,   Validation and cleaning, Form Display

TTEXTBOOK(S):
1.   Python Programming Using Problem Solving Approach, By Reema Thareja,
 Oxford Publication
2.   Django: Web Development with Python, By Samuel Dauzon, Aidas Bendoraitis, Arun Ravindran- Packt Publishing.

REFERENCE BOOKS:

1.   Python Web Development with Dijango, By Jeff Forcier, Paul Bissex, Wesley J Chun. Pearson Education
2.   Beginning Django Web Application Development and Deployment with Python By Daniel Rubio - Apress Publishing.

		L	T	P	Cr.
B.Tech. - IT	**20ITM7-ANDROID APPLICATION DEVELOPMENT**	3	1	0	4

Pre-requisite **:**   Java Programming

Course Educational Objective: This course introduces mobile application development on the Android platform. Students will be imparted with the skills for creating and deploying Android applications, with particular emphasis on components and concepts that define the Android platform. To develop skills required to produce and maintain a high-quality mobile software product. It will help to gain a breadth of knowledge for developing applications with the Android SDK and to know and execute principles and concepts of software requirements engineering, particularly as it relates to mobile software product development

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

CO1:   Examine Android Application, Activity and Fragments by using Android Studio. **(Understand – L2)**

CO2:   Apply User Interface Components in Android Application Development (**Understand – L2)**

CO3:   Experiment with Intents, Broadcasts and Action bars in Android Studio. **(Understand- L2)**

CO4:   Illustrate methods of accessing data in local databases **(Apply – L3)**

CO5:   Apply Notification Services, Location based services for the development of Android Applications. **(Apply – L3)**

Unit-1: Introduction to Android Platform and Android Studio
The Android Ecosystem, Android SDK Features, Development Framework – What's comes in the box, Android Software Stack, Android Run Time, Android Application architecture.
Developing with Android Studio – Android Studio features, Installing Android Studio, SDK, additional SDK components and updates, Creating your first android application, Android development tools.

Applications, Activities, and Fragments - Components of an Android Application, Android Application Life Cycle, Priority, and Process States, Android Activities, Creating Activities, The Activity Life Cycle, Fragments, Creating New Fragment, Fragment Life Cycle, Adding Fragments To Activities, Communicating Between Fragments And Activities.

Unit-II: Android User Interface
The Manifest, Build Files, and Resources - Introducing the Android Manifest, Configuring the Gradle Build, Creating Resources, Using Resources, Creating Resources for different languages and hardware

The User Interface: Three Key Layouts – Relative, Linear and Grid; FrameLayout and ConstraintLayout; **Playing with Views**- TextView, EditText, Button, ToggleButton, Switch, Checkbox, RadioButton, Spinner, Image Views, ImageButton, ScrollView, Toast.
ListViews and Adapters - building a part of Starbuzz app

Unit-III: Intents, Broadcasts and action bars
Intents – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Returning Results from Activities, Platform-Native Actions to Launch Activities, Creating Intent Filters to Receive Implicit Intents, Using Intents to Broadcast Events, Listening for Intent Broadcasts with Broadcast Receivers, Local Broadcast Manager, and Pending Intents. Creating a Pizza app with action bars or menus with styles and themes

Unit-IV: Data access using local databases.
SQLite Databases: Android comes with SQLite classes, The SQLite helper manages your database, Create the SQLite helper - Specify the database, Inside a SQLite database, insert(), update(), delete() methods; The StarbuzzDatabaseHelper code; What the SQLite helper code does, Upgrading the database.

Connecting to Databases: The SQLiteDatabase query() method, Cursors – code for getting a

Cursor, read a record from cursor, navigating cursors, getting cursor values, CursorAdapter, SimpleCursorAdapter, AsyncTask performs asynchronous tasks, The AsyncTask class.

Unit- V: Advanced Topics
Services: Services work behind the scenes, Create an intent service, logging messages, service in manifest file, start a service, onStartCommand(), Notification Service, Bound Services are more interactive, How binding works, ServiceConnection Class, Using Firebase Cloud Messaging, Using Alarms.

Location and Mapping: Introducing Google Play Services, Finding Device Location Using Google Location Services, Using The Emulator To Test Location-Based Functionality, "Where Am I" Example, Using The Legacy Platform Location-Based Services, Creating Map-Based Activities, Mapping where am I.

TEXT BOOKS:
1. Professional Android, 4th Edition by Ian Lake & Reto Meier, Published by Wrox , 2018.
2. Head First Android Development, by Dawn Griffiths & David Griffiths published by O'Reilly, 2015.

REFERENCE BOOKS:
1. Learn Android Studio 3 : Efficient Android App Development by Ted Hagos Published by Apress, 2018.