DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/B.Sc./CBC & GS/17/2024

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies/Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 08 April 2024 has accepted the following Syllabi under the Faculty of Science & Technology as per Choice Based Credit Grading System** as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc. Chemistry (Optional)	Vth & VIth semester
2.	B.Sc. Analytical Chemistry (Optional)	Vth & VIth semester
3.	B.Sc. Polymer Chemistry (Optional)	Vth & VIth semester
4.	B.Sc.Biochemistry (Optional)	Vth & VIth semester
5.	B.Sc.Dairy Science & Technology (Optional)	Vth & VIth semester
6.	B.Sc.Microbiology (Optional)	Vth & VIth semester
7.	B.Sc. Botany (Optional)	Vth & VIth semester
8.	B.Sc. Computer Science (Optional)	Vth & VIth semester
9.	B.Sc. Computer Science (Degree)	Vth & VIth semester
10.	B.Sc.Information Technology (Optional)	Vth & VIth semester
11.	B.Sc.Information Technology (Degree)	Vth & VIth semester
12.	Bachelor of Computer Application (Optional)	Vth & VIth semester
13.	Bachelor of Computer Application (Degree)	Vth & VIth semester

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar.
-431 004.
REF.NO.SU/2024/1786-94
Date:- 21.06.2024.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] **The Director, Board of Examinations & Evaluation,** Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Dr. Babasaheb Ambedkar Marathwada University
Chhatrapati Sambhajinagar - 431004(MS) India

Three Year Undergraduate Bachelor Degree Program In Science and Technology

B. Sc. (Information Technology)
(Degree)
III Year

Curriculum Structure and Scheme of Examination

Choice Based Credit System
(Effective from Academic Year 2024-25)

Dr. Babasaheb Ambedkar Marathwada University
Chhatrapati Sambhajinagar– 431004 (MS) India

Pattern of Question Paper (Theory)

B. Sc. (Information Technology) Semester ------

Course Code ----------

Paper Number ----------

Title of Paper ----------

Time : 1.30 Hrs. **Max Marks: 40**

N.B.

1. Attempt All Questions.
2. All questions carry equal marks.
3. Illustrate your answer with suitable labelled diagram.

Q.1. Multiple choice questions / Fill In the Blanks / Terms / Definition / One Line Answer questions. (10 Marks)

1)
2)
3)
4)
5)
6)
7)
8)
9)
10)

Q.2. Long answer question. (10 Marks)

OR

Long Answer question

Q.3. Long answer question (10 Marks)

OR

Short answer questions

a)
b)

Q.4. Short Notes on any TWO of the following:- (10 Marks)

a)
b)
c)
d)

Structure and Curriculum for
Bachelor of Computer Application (Science)

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Choice Based Credit System (CBCS) Curriculum
For
Faculty of Science and Technology

B. Sc. (Information Technology) Science Three Year Under Graduate Degree Program

Semester-V								
Course Type	Course Code	Course Title	Total Periods (Teaching Periods / Week)	Credits	Scheme of Examination			
					UA	IA	Max Marks	Min Marks
Discipline Specific Elective – I (DSE – 1A) 7 Credits	IT-511T	**DSE-1A (1)** Select any one Paper from(A1/B1) A1: Advance Java B1: Introduction to Cloud Computing	45 (3/per week)	2	40	10	50	20
	IT-512T	**DSE-1A(2)** Select any one Paper from(A2/B2) A2: IOT B2: Data Mining	45 (3/per week)	2	40	10	50	20
	IT-513P	**Lab Course** Lab based On DSE-1A(1)	45 (3/per week)	1.5	40	10	50	20
	IT-514P	**Lab Course** Lab based On DSE-1A(2)	45 (3/per week)	1.5	40	10	50	20
Discipline Specific Elective – II (DSE – 2A) 7 Credits	IT-521T	**DSE-2A (1)** Select any one Paper from(A1/B1) A1: Full Stack-Python B1: Adv. PHP	45 (3/per week)	2	40	10	50	20
	IT-522T	**'DSE-2A (2)** Select any one Paper from(A2/B2) A2: Android Application Development B2: Matlab programing	45 (3/per week)	2	40	10	50	20
	IT-523P	Lab Course (based on IT-521T)	45 (3/per week)	1.5	40	10	50	20
	IT-524P	Lab Course (based on IT-522T)	45 (3/per week)	1.5	40	10	50	20

Discipline Specific Elective – III (DSE – 3A) 7 Credits	IT-531T	**DSE-3A (1)** Select any one Paper from(A1/B1) A1: Software Project Management B1: Network Security	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	IT-532T	**DSE-3A (2)** Select any one Paper from(A1/B1) A2: Wireless Networking B2: Software Quality Assurance & Testing	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	IT-533P	Lab Course (based on IT-531 T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	IT-534P	Lab Course (based on IT-532 T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Skill Enhancement Course (SEC-3) 2 Credits	IT-541P	**SEC-3** (Any one skill to be chosen out of two) SEC-3(E): Aptitude and Reasoning SEC-3(F): Problem Solving & Decision Making	45 (3/per week)	**2**	-	**50**	**50**	**20**
		39 Periods/week		**23**	**520**	**130**	**650**	**260**
Total Credit for Semester V: 23 (Theory: 14 & Laboratory: 9)								

Structure and Curriculum for
Bachelor of Science in (Computer Science)

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Choice Based Credit System (CBCS) Curriculum

For

Faculty of Science and Technology

Course Structure and Scheme of Examination

B. Sc. (Information Technology) Science Three Year Under Graduate Degree Program

Semester-VI								
Course Type	Course Code	Course Title	Total Periods (Teaching Periods / Week)	Credits	Scheme of Examination			
					UA	IA	Max Marks	Min Marks
Discipline Specific Elective–IV (DSE – 1B) 7 Credits	IT- 611T	**DSE-1B (1)** Select any one Paper from(A1/B1) A1: Ethics and Cyber Law B1: Business Intelligence	45 (3/per week)	2	40	10	50	20
	IT-612T	**DSE-1B (2)** Select any one Paper from(A2/B2) A2: Introduction Artificial Intelligence B2: Data Warehouse	45 (3/per week)	2	40	10	50	20
	IT-613P	Lab Course (based on IT-611T)	45 (3/per week)	1.5	40	10	50	20
	IT-614P	Lab Course (based on IT-612T)	45 (3/per week)	1.5	40	10	50	20
Discipline Specific Elective–IV (DSE – 2B) 7 Credits	IT-621T	**DSE-2B (1)** Select any one Paper from(A1/B1) A1: Theory of Computation B1: Operation Research	45 (3/per week)	2	40	10	50	20
	IT-622T	**DSE-2B (2)** Select any one Paper from(A2/B2) A2: Power BI B2: Technical Writing	45 (3/per week)	2	40	10	50	20
	IT-623P	Lab Course (based on IT-621T)	45 (3/per week)	1.5	40	10	50	20
	IT-624P	Lab Course (based on IT-622T)	45 (3/per week)	1.5	40	10	50	20

Discipline Specific Elective–IV (DSE – 3B) 7 Credits	IT-631T	**DSE-3B (1)** Select any one Paper from(A1/B1) A1: Software Testing B1: Cyber Forensics	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	IT-632T	**DSE-3B(2) Major Project**	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	IT-633P	Lab Course (based on IT-631T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	IT-634P	**Seminar**	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Skill Enhancement Course (SEC-4) 2 Credits	IT-641P	Any one skill to be chosen out of two SEC-4(G): Digital Marketing SEC-4(H):): Leadership Skill Development	45 (3/per week)	**2**	**-**	**50**	**50**	**20**
		39 Periods/ week		**23**	**520**	**130**	**650**	**260**
Total Credit for Semester VI: 23 (Theory: 14 & Laboratory: 9)								

Important Note Regarding Skill Enhancement Courses

1. Skill Enhancement Courses have a significant theoretical component therefore theory workload is assigned to the course but the teaching of these courses should focus on practical application, with the goal of developing practical skills and knowledge as the final outcome.
2. There shall be no theory examination for Skill Enhancement Courses (SEC-1, SEC-2).
3. The evaluation of Skill Enhancement Courses should be entirely based on college internal assessment, meaning that the assessment will be carried out by the college's respective course in-charge, rather than by an external entity.
4. To assess the students' understanding and skills in Skill Enhancement Courses, they should demonstrate their acquired skill through hands-on experience, practical work, projects, and case studies. There should be one assessment for each unit and an additional assessment at the end of the semester.
5. Records of each assessment should be maintained by the college's respective course incharge and should be readily made available upon request.
6. At the end of the semester, the consolidated marks should be submitted to the University for Inclusion in the student's mark sheet, which will contribute towards their final grade.
7. The university should generate the mark list for Skill Enhancement Courses, similar to the internal assessment mark list. The mark list should be downloaded, filled with the consolidated marks of all assessments, and submit along with the internal marks list.



B.Sc. (Information Technology)

Semester - V

Course Code: IT-511T[A1]	**Course Title: Advanced Java**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Students should know Core java
2. Student s should have programming knowledge
3. Basic knowledge of database and networking

Objective:

On the completion of course, students will be able to -

1. Able to solve real world problems
2. Understanding the concept of database and networking
3. Can do client side and server side programming

Unit-I: (10 periods)

Multithreading - Life Cycle of a Thread, How to Create Thread, Sleeping a thread, Methods from Thread class. Thread Priority, Runnable interface

Event Handling – Event Handling mechanism, The delegation event model, Event Classes, Event Listener Interface,

Unit-II: (10 periods)

JDBC - Introduction, JDBC Driver, DB Connectivity Steps, Connectivity with Oracle, Connectivity with MySQL, Access without DSN, DriverManager, Connection Statement, ResultSet, PreparedStatement, CallableStatement

Unit- III: (10 periods)

Networking – Introduction to network, What is client and server, 3 tier architecture, Socket, Socket Programming, URL class, URLConnection class, Http URLConnection, InetAddress class, DatagramSocket class, Socket, ServerSocket

Unit-IV: (10 periods)

Servlet – What is Servlet, Web Terminology, Servlet API, Servlet Interface, Generic Servlet, Http Servlet, Servlet Life Cycle, Servlet Example, How servlet works?, ServletRequest, ServletResponse

Unit V: Tutorial and Assignment (5 periods)

In addition to CIA, Tutorial, Seminars, Assignment & Case Studies are to be given for the building proficiency in the course. (Respective Course in-charge should maintain the records for the same)

Textbook

1. JAVA The complete reference – 7th edition By Herbert Shieldt
2. Programming in java, S.Malhotra, S. Chaudhary, 2nd edition Oxford Univ. Press

Online Resources

1. www.javatpoint.com

Reference Book

1.Effective Java –Third edition by Joshua Bloch

Course Code: IT-513P	**Course Title: Lab Course(Based on IT-511T [A1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Students should know Core java
2. Student s should have programming knowledge
3. Basic knowledge of database and networking

Objective:

On the completion of course, students will be able to -

1. Able to solve real world problems
2. Understanding the concept of database and networking
3. Can do client side and server side programming

Specific Tool Used for Practical
Minimum JDK1.8 version

List of Practical

1. Write a java program to demonstrate multiple Threads.
2. Write a java program to set the different priorities to the Threads.
3. Write a java program to create Thread by using Runnable interface
4. Write a java program to "Welcome" after click a button
5. Write a java program to demonstrate MouseListener and MouseMotionListener events
6. Write a java program to connect Access database using DSN
7. Write a java program to connect Access database using URL
8. Write a java program to connect MySQL/Oracle database using URL
9. Write a java program to demonstrate client and server side sockets
10. Write a java program to demonstrate first servlet
11. Write a java program to use of jdbc in servlet

Course Code: IT-511T[B1]	**Course Title: Introduction to Cloud Computing**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Students should have programming skills
2. Student should have understanding of Databases
3. Student should have understanding of Operating Systems
4. Basic knowledge networking

Objective:

On the completion of course, students will be able to -

1. To understand the concepts in Cloud Computing and its Security
2. To understand the evolving computer model caned cloud computing.
3. To introduce the various levels of services that can be achieved by cloud.

Unit-I: (10 periods)

Cloud Computing Foundation: Introduction to Cloud Computing , Move to Cloud Computing, Types of Cloud, Working of Cloud Computing

Unit-II: (10 periods)

Cloud Computing Architecture : Cloud Computing Technology , Cloud Architecture , Cloud Modeling and Design, Virtualization : Foundation , Grid, Cloud and Virtualization , Virtualization and Cloud Computing. Cloud Computing and Security : Risks in Cloud Computing, Data Security in Cloud, Cloud Security Services

Unit- III: (10 periods)

Data Storage and Cloud Computing : Data Storage , Cloud Storage , Cloud Storage from LANs to WANs , Cloud Computing Services : Cloud Services , Cloud Computing at Work

Unit-IV: (10 periods)

Cloud Computing Tools : Tools and Technologies for Cloud ,Cloud Mashaps, Apache Hadoop, Cloud Tools. Cloud Applications, Moving Applications to the Cloud, Microsoft Cloud Services, Google Cloud Applications, Amazon Cloud Services, Cloud Applications

Unit V: Tutorial and Assignment (5 periods)

In addition to CIA, Tutorial, Seminars, Assignment & Case Studies are to be given for the building proficiency in the course. (Respective Course in-charge should maintain the records for the same)

Textbook

1. A.Srinivasan and J.Suresh, "Cloud Computing – A Practical Approach for Learning and Implementation", Pearson India Publications 2014.

References

1. Rajkumar Buyya, James Broberg, Andrzej , "Cloud Computing: Principles and Paradigms", Wiley India Publications 2011.
2. Arshdeep Bahga and Vijay Madisetti ,"Cloud Computing – A Hands on Approach", Universities Press (India) Pvt Ltd. 2014.

Online Resources

1. https://onlinecourses.nptel.ac.in/noc21_cs14/preview

Course Code: : IT-513P	**Course Title: Lab Course(Based on IT-511T [B1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Student should have programming knowledge
2. Basic knowledge of database and networking

Objective:

On the completion of course, students will be able to -

1. Able to solve real world problems
2. Understanding the concept of database and networking
3. Can do client side and server side programming

Specific Tool Used for Practical
Windows 10, Linux

List of Practical

1.Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.

2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.

3. Install Google App Engine. Create hello world app and other simple web applications using python/java.

4. Use GAE launcher to launch the web applications.

5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

6. Find a procedure to transfer the files from one virtual machine to another virtual machine.

7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

8. Install Hadoop single node cluster and run simple applications like wordcount.

Course Code: IT-512T[A2]	**Course Title: IOT**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of programming and electronics

Objective:

On the completion of course, students will be able to -

1. Understand the architecture and programming of Arduino and ESP32 microcontroller boards.
2. Learn to interface various sensors and actuators with Arduino and ESP32 boards.
3. Develop skills in programming and debugging microcontroller projects.
4. Explore wireless communication protocols and IoT applications with ESP32.
5. Design and implement real-world projects using Arduino and ESP32.

Unit-I: (10 periods)

Introduction to Arduino and ESP32 Microcontrollers, Arduino and ESP32 Development Environments Programming Basics: C/C++ for Microcontrollers, Digital and Analog Input/Output

Unit-II: (10 periods)

Sensors and Actuators (Temperature, Humidity, Light, Motion, etc.) , Interfacing Sensors and Actuators with Arduino and ESP32, Serial Communication and Data Logging, Timers and Interrupts

Unit- III: (10 periods)

ESP32 Wi-Fi and Bluetooth Connectivity, IoT Protocols (MQTT, HTTP, WebSockets), Cloud Integration and Data Visualization, OTA (Over-the-Air) Updates

Unit-IV: (10 periods)

Advanced Arduino and ESP32 Programming Techniques, Libraries and Third-Party Modules Project Design and Implementation, debugging and Troubleshooting

Unit V: Tutorial and Assignment (5 periods)

In addition to CIA, Tutorial, Seminars, Assignment & Case Studies are to be given for the building proficiency in the course. (Respective Course in-charge should maintain the records for the same)

Textbook

1. "Arduino Project Handbook" by Mark Geddes
2. "ESP32 Internet of Things Programming" by Anas Tashkandi

Online Resources

1. Arduino Project Hub: https://create.arduino.cc/projecthub
2. ESP32 Documentation: https://docs.espressif.com/projects/esp-idf/en/latest/

Reference Book

1."Exploring Arduino" by Jeremy Blum
2. "Programming ESP32 with Scripting Languages" by Alasdair Allan

Course Code: IT-513P	**Course Title: Lab Course(Based on IT-512T [A2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of programming and electronics

Objective:

1. Gain hands-on experience in programming Arduino and ESP32 boards.
2. Develop skills in interfacing various sensors and actuators.
3. Explore wireless communication and IoT applications with ESP32.
4. Design and implement real-world projects using Arduino and ESP32.
5. Practice debugging and troubleshooting techniques.

Specific Tool Used for Practical

- Arduino boards (e.g., Arduino Uno, Arduino Nano)
- ESP32 boards (e.g., ESP32 DevKit, ESP32-CAM)
- Sensors (temperature, humidity, light, motion, etc.)
- Actuators (LEDs, motors, relays, etc.)
- Arduino IDE and ESP32 development environments

1. Blinking an LED using Arduino and ESP32.
2. Reading data from a temperature and humidity sensor.
3. Controlling a servo motor with Arduino.
4.Implementing a simple home automation system with sensors and actuators.
5. Connecting an ESP32 board to a Wi-Fi network and transmitting data.
6. Sending sensor data from an ESP32 to a cloud platform (e.g., ThingSpeak)
7. Building a weather monitoring station with multiple sensors.
8. Implementing a smart home system with voice control using ESP32.
9. Exploring the MQTT protocol for IoT communication with ESP32.
10. Developing a pet feeder system with a mobile app interface using ESP32**.**

Course Code: IT-512T[B2]	**Course Title: Data Mining**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

Basic Statistics: Understanding statistical concepts.
Programming Skills: Proficiency in Python or R.
Database Management: Familiarity with SQL and databases.
Linear Algebra: Basic knowledge of matrices and vectors.

Objective:

1. Conceptual Understanding: Grasp the core concepts and principles of data mining.
2. Apply data mining algorithms to real-world datasets.
3. Assess and interpret the performance of data mining models.
4. Explore how data mining is used across different fields.
5. Understand the ethical implications of data mining practices.
6. Utilize data mining techniques to solve practical problems effectively.

Unit-I: Introduction to Data Mining **(10 periods)**

Overview of data mining concepts and process
Data preprocessing: cleaning, transformation, and reduction
Exploratory data analysis (EDA) techniques

Unit-II: Classification **(10 periods)**

Introduction to classification algorithms (e.g., decision trees, Naive Bayes, k-nearest neighbours)
Evaluation metrics for classification models
Practical exercises using classification algorithms

Unit-III: Association Rule Mining **(10 periods)**

Introduction to association rule mining
Apriori algorithm and its variants
Practical examples of association rule mining

Unit-IV: Clustering **(10 periods)**

Introduction to clustering algorithms (e.g., k-means, hierarchical clustering)
Evaluation metrics for clustering algorithms
Applications of clustering in various domains

Unit V: Tutorial and Assignment (05 periods)

Textbook

1. Introduction to Data Mining by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar

Online Resources

1. https://www.geeksforgeeks.org/data-mining/
2. https://www.javatpoint.com/data-mining

3. https://www.tutorialspoint.com/data_mining/

References:

1. Data Mining: Concepts and Techniques by Jiawei Han and Micheline Kamber
2. Mining of Massive Datasets by Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman

Course Code: IT-514P	**Course Title: Lab Course (based on IT-512T [B2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course **IT-512T [A2]**

(The teacher can make use of either of Python and R language or WEKA tool for lab sessions and can add few more practical based on each unit)

Practical No	Details
1	How would you handle missing values in a dataset? Provide an example and explain your approach.
2	Implement a basic data summarization technique using Python or R.
3	Apply data cleaning techniques to a dataset to handle noise. Explain the steps you took.
4	Use a dataset to demonstrate data integration and transformation methods.
5	Implement data reduction techniques to reduce the volume of a dataset. Evaluate the effectiveness of your approach.
6	Perform feature extraction on a dataset using Principal Component Analysis (PCA). Interpret the results.
7	Select relevant features from a dataset using the Chi-Square Test. Discuss the significance of the selected features.
8	Use the Apriori algorithm to find frequent itemsets in a transaction dataset. Interpret the results.
9	Mine association rules from a dataset and discuss the implications of the discovered rules.

10	Apply correlation analysis to a dataset and interpret the correlation coefficients.
11	Implement a basic classification algorithm (e.g., Naive Bayes) on a dataset. Evaluate its performance using appropriate metrics.
12	Use k-Nearest Neighbors (k-NN) algorithm for classification. Compare the results with the previous classification algorithm.
13	Train a simple neural network model (e.g., perceptron) for classification tasks. Discuss the advantages and limitations of neural networks.
14	Evaluate the accuracy of different classification models using confusion matrix, precision, and recall metrics. Compare the performance of the models.

Course Code: IT-521T[A1]	**Course Title: Full Stack Python**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
1. Basic Knowledge of Python

Objective:
1. Understand the fundamentals of full stack web development using Python.
2. Learn to build and deploy server-side applications using Python frameworks like Django
3. Develop client-side web applications using HTML, CSS, JavaScript
4. Integrate front-end and back-end components to create full-stack web applications.
5. Gain knowledge of databases, APIs, and deployment techniques.

Unit-I: **(10 periods)**

Introduction to Web Programming : What is client, server, browser, DOM object, Basic Tags, Lists ordered/ unordered, Images – browser support, loading, properties, Frames, Tables, Forms:- a. GUI Design, b. Components (HTML5), c. TextField, Password, TextArea, Radio Button, Check Box, Combo Box, e. Button, Submit, Reset, f. File

CSS: Introduction to CSS, Selectors, The Cascade and Inheritance, Properties, Applying Font Faces, Manipulating the Display of Text, Background colors and Images,Box model : Controlling Margins, Borders, Padding, Width, Height,Floating and Vertical Alignment, Styling Lists , Customizing Mouse Cursor, Opacity and Visibility, Positioning, Layout.

Unit-II: **(10 periods)**

Bootstrap : Introduction to CSS, Breakpoints, Grid System, Understanding classes – container / rows /cols, Collapse / dropdown, Navbar, Button group, Simple login form, Card / Modal / accordion / badges /, Responsive images

Java Script : Introduction to Java Script, Features, Datatypes, control statements, loops, functions, Events, Button events, Mouse Events, Key Events, JavaScript object, hierarchy, Window object - alert, confirm, prompt, Document object - open, close, Location object - href, protocol, file, url, History object - forward, back, length, Form object - accessing form controls, capturing values, Javascript objects - date, array, navigator, Validation - client side, Overriding - on submit event, Arrow functions, Spread operator / destructuring, Map, filter functions
Unit-III: (10 periods) **Django :** What is django and installation, Difference between Flask and Django, Create your first sample Django project, Difference between a App and a Project, Django Admin, Commands and Shell, Difference Between MVT and MVC, Understanding views, models, and urls, Django CRUDE operation using function, What is Render and relative, Import URL names as Links, Django templating, What is ORM?, Customize admin dashboard, Authentication system, Django sessions, Django REST, API's in POSTMAN, What is serializers?, Create a dynamic website, Deploy same application on one of cloud hosting platform, AWS OR GCP OR Azure
Unit-IV: (10 periods) **Flask :** What is flask,Routes and Views Function, The Request-Response Cycle,Cross-Site Request Forgery (CSRF) Protection, Form Classes, HTML Rendering of Forms, Form Handling in View, Redirects and User Sessions,Database Operations.
Unit V: Tutorial and Assignment (05 periods)

Textbook

1. "Python for Web Development" by Michael Herman
2. "Full Stack Python" by Michael Herman and Joao Varaj

Online Resources

1. Official Django Documentation: https://docs.djangoproject.com/
2. Official Flask Documentation: https://flask.palletsprojects.com/

Reference Book

1. "Django for Beginners" by William S. Vincent
2. "Full Stack React Projects" by Shama Hoque

Course Code: CA-523P	**Course Title: Lab Course(Based on IT-521T [A1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of python programming

Objective:

1. Gain hands-on experience in building full stack web applications using Python.
2. Develop server-side applications using Django or Flask.
3. Build client-side web applications using HTML, CSS, JavaScript.
4. Integrate front-end and back-end components to create full-stack web applications. 5. Practice deployment and hosting of web applications.

Specific Tool Used for Practical

Python, Django or Flask, HTML, CSS, JavaScript, Database (SQLite, PostgreSQL, or MongoDB)

List of Practical

(Minimum 10)

1. Create a simple web application using Django or Flask.
2. Create a web page for Login page using Django or flask
3. Create registration page using Django or Flask
4. Integrate the front-end with the back-end API.
5. Implement authentication and authorization in the web application.
6. Create a database and perform CRUD operations.
7. Build a e-commerce website with cart and checkout functionality.
8. Develop a real-time chat application.
9. Create a task management application with user roles.
10. Deploy the final project to a hosting platform.

Course Code: IT-521T[B1]	**Course Title: Advanced PHP**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisites

1. HTML and CSS
2. Basic Programming Concepts
3. Database Concepts

Objective:

1. Understanding PHP Basics
2. Building Dynamic Websites
3. Working with Forms and User Input
4. Database Integration
5. Session Management and Cookies

Unit-I: (10 periods)

Handling HTML Forms in PHP:

Creating HTML Form, Capture Data Sent, Handling: Empty form data, Multi-Value fields, Validating Form Data, Difference between GET and POST, Global and Environment Variables, Generating Web-form in PHP, Create Multi-step Form, Hidden fields, Redirecting the user.

Unit-II: (10 periods)

Cookies and user sessions in PHP:

State and Stateless Webpage, Cookies: Anatomy of cookies, Setting a cookies with PHP, Deleting a cookies, Creating Session Cookies, Query String: Working with Query String, Creating Query String. Session: Using PHP Session to Store Data: Creating a Session, Reading & Writing Session Data, Destroying a Session, Create a User Login System.

Unit-III: (10 periods)

Introducing Database and SQL:

Basics of MySql, Connecting to the Database Server, Creating Database, Creating Table. Retrieving data: Limit the number of results returned, Order and group results, Query multiple tables at once, Use various MySQL functions and other features to build more flexible queries Manipulating data from SQL with PHP: Inserting new records into tables using INSERT statements, changing field values within records with UPDATE statements, deleting records using DELETE statement

Unit-IV: (10 periods)

Introduction to MVC

Explanation of Model-View-Controller pattern

Roles of Model, View, and Controller components

Benefits of using MVC in web applications

Setting Up Development Environment

Installation and configuration of PHP, Apache/Nginx, and MySQL/MariaDB

Introduction to PHP frameworks that support MVC (e.g., Laravel, CodeIgniter, Symfony)

Unit V: Tutorial and Assignment (05 periods)

Text Books

1.Programming PHP, 4th Edition by Kevin Tatroe, Peter acIntyre Released March 2020 Publisher(s): O'Reilly Media, Inc.

2.Learning PHP, MySQL & JavaScript with JQuery, CSS & HTML, Robin Nixon.

Online Resources

1. https://www.w3schools.com/php
2. https://www.tutorialspoint.com/php/index.htm

Reference Book

1. Learn PHP 8: Using MySQL, JavaScript, CSS3, and HTML5 Paperback –October 2020 by Steve Prettyman
2. WordPress 5 Complete: Build Beautiful and Feature-rich Websites from Scratch, 7th Edition

Course Code: IT-523P	**Course Title: Lab Course(based on IT-521T [B1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Objective:

1. Understanding PHP Basics
2. Building Dynamic Websites
3. Working with Forms and User Input
4. Database Integration
5. Session Management and Cookies

Specific Tool Used for Practical : Xamp

List of Practical

(Minimum 10)

1. Create a simple HTML form and use PHP to capture and display the submitted data.
2. Implement form validation in PHP to check for empty form fields.
3. Create a form with multi-value fields (e.g., checkboxes, select dropdowns) and process the submitted data.
4. Explore the differences between GET and POST methods in form submission using PHP.
5. Use PHP to work with global and environment variables received from an HTML form.
6. Develop a multi-step form using PHP to capture data across multiple pages.
7. Utilize hidden fields in HTML forms and process them using PHP.
8. Implement a user redirection system based on form submission using PHP.
9. Create a stateless webpage and implement PHP to set, retrieve, and delete cookies.
10. Develop a login system using PHP sessions to authenticate users.
11. Explore working with query strings in PHP and passing data via URLs.
12. Use PHP sessions to store and manipulate user data across multiple requests.
13. Implement a user logout feature using PHP sessions.
14. Set up a MySQL database and establish a connection using PHP.
15. Create a PHP script to perform basic CRUD operations (Create, Read, Update,Delete) on a MySQL database table

Course Code: IT-522T[A2]	**Course Title: Android Application Development**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic Knowledge of Programming, Concepts of OOPS

Objective:

1. Run apps from Android Studio on both a device and an emulator.
2. Create and use activities in Android.
3. Use views to create your app's user interface.
4. Enable user interaction through click handlers.
5. Create layouts using the Android Studio layout editor, menus, ArrayAdapters
6. Run tasks in the background.
7. Save data in Android shared preferences, SQL database.

Unit-I: **(10 periods)**

Android SDK Features

Access to Android Hardware including Camera, GPS, and Accelerometer, Native Google Maps, Geocoding, and Location-Based Services, P2P Services with Google Talk, Extensive Media Support and 2D/3D Graphics, Optimized Memory and Process Management, The Dalvik Virtual Machine, Advanced Android Libraries.

Android Development Tools

Types of Android Applications, Hardware-Imposed Design Considerations, Users, Environment, The Android Emulator, Dalvik Debug Monitor Service (DDMS), The Android Debug Bridge (ADB).

Background Services, SQLite Database for Data Storage and Retrieval, Shared Data and Inter application Communication,

Unit-II: **(10 periods)**

Applications and Activities:

Application Manifest, Manifest Editor, Android Application Life Cycle Understanding Application Priority and Process States, Externalizing Resources, Fundamental Android UI Design: The Android Widget Toolbox, Layouts, Compound Controls, Custom Widgets and Controls, Android Menu System, Activity Menu, Intents, Broadcast Receivers, AdapterArrays Intents: Intents to Launch Activities, Intent Filters to Service Implicit Intents, Intent Filters for Plug-ins and Extensibility, Intents to Broadcast Events, Android-Supplied Adapters, Internet Resource.

Unit III: Advanced Development in Android: **(10 periods)**

Controlling Services, Threads, Customizing Toasts, Toasts in Worker Threads, Notification Manager, Triggering Notifications. Peer-to-Peer Communication: Android Instant Messaging, Sending &

Listening SMS. Accessing Android Hardware: Media APIs, Controlling Camera Settings, Sensor Manager, Accelerometer and Compass, Android Telephony, Bluetooth, Managing Network and Wi-Fi Connections. Advanced Android Development: Paranoid Android, AIDL to Support IPC for Services, Internet Services, Rich User Interfaces.
Unit-IV: **(10 periods)** **Data Storage, Retrieval, and Sharing** Creating and Saving Preferences, Retrieving Shared Preferences, Saving the Activity State, File Management Tools, Databases in Android: SQLite, Cursors and Content Values, Content Providers. Maps, Geocoding, and Location-Based Services: Location Providers, Geocoder, Map-Based Activities. Introduction to Kotlin.
Unit V: Tutorial and Assignment (05 periods)

Textbook

1. Android Application Development (O'Reilly)
2. Head First Android Development: A Brain-Friendly Guide Book by David Griffiths and Dawn Griffiths

Online Resources

1. https://developer.android.com/guide
2. https://www.tutorialspoint.com/android/index.htm

Reference Book

1. Learn Android App Development by Wallace Jackson

2. Android Application Development All-In-One for Dummies, 3ed by Barry Burd and John Paul Mueller | 1 January 2021

Course Code: IT-524P	**Course Title: Lab Course(Based on IT-522T [A2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic Knowledge of Programming, Concepts of OOPS

Objective:

1. Install Android studio
2. Create and use activities in Android.
3. Create layouts using the Android Studio layout editor.
4. Save data in Android shared preferences.
5. Save data in a local SQL database.

Specific Tool Used for Practical

Android Studio

List of Practical

(Minimum 10)

1. Write a program to display use of toast in android
2. Create an Android application to use a camera and capture image/video and display them on the screen
3. Create an application to open Bluetooth
4. Create an Android application to demonstrate implicit and explicit intents
5. Create an application to send email
6. Create an application to send notification using notification manager
7. Write a program to save shared preferences
8. Create an application to use Gridview for shopping cart application.
9. Create an Android application to demonstrate the different types of menus. a. Pop-up Menu b. Context Menu c. Option Menu
10. Write a program for storing and manipulating data from SQLite DataBase/Firebase

Course Code: IT-522T[B2]	**Course Title: Introduction to MATLAB**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. There are no maths or programming prerequisites but elementary skills in computer science will be useful

Objective:

1. This course is designed to give science students experience with the Matlab programming language.
2. Apply the skills to evaluate scientific problems. Understand basic concepts in computer science
3. Learn data structures (such as strings, matrices and arrays), data manipulation and presentation (loading data files, computing simple statistics and graphing data), and basic programming techniques

Unit-I: **(10 periods)**

Handling Data And Data Flow In MATLAB
Data Types, Creating Variables, Scalars, Vectors And Matrix Operations & Operators, Importing & Exporting Of Data ,File Input-Output

Unit-II: **(10 periods)**

File Editing And Debugging In MATLAB, Writing Script Files, Writing Function Files, Inserting Breakpoints And Debugging, Error Correction, MATLAB Graphics ISimple Graphics & Types, Plotting Functions, Creating And Editing Plots (2D & 3D) ,Handling Graphics

Unit III: MATLAB Programming **(10 periods)**

Conditional Statements, Iterative Statements, Flow Control, Efficient Coding Practices, Linear Algebra Polynomials, Curve Fitting , Differentiation & Integration

Unit-IV: MATLAB Graphics **(10 periods)**

Introduction To Graphical User Interfaces (GUI), GUI Tools , Creating Functioning GUIs, Introduction To MATLAB Toolboxes

Unit V: Tutorial and Assignment (05 periods)

Textbook

1. Matlab An Introduction With Applications 4Th Edition by Gilat A , John Wiley

Online Resources

1. https://www.tutorialspoint.com/matlab/index.htm
2. https://www.youtube.com/watch?v=R3_b2tRcocw

Reference Book

1.Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, Oxford publications.

2. MATLAB and Its Applications in Engineering, Book by Ashok K. Goel, Manoj Kumar Sharma, and Raj Kumar Bansal

Course Code: IT-524P	**Course Title: Lab Course(Based on IT-522T [B2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: **1.** None	
Objective: 1. Install MATLAB	
Specific Tool Used for Practical MATLAB	
List of Practical **(Minimum 10)** 1. To define & use variables, vectors, 2. Matrices & its functions in MATLAB. 3. To study various arithmetic operators and mathematical functions in MATLAB. 4. To create & use m-files. 5. Write a MATLAB program to plot the following continuous time and discrete time Signals. .i. Step Function ii. Impulse Function iii. Exponential Function iv. Ramp Function v. Sine Function 6. Write a MATLAB program to obtain linear convolution of the given sequences 7. Write a MATLAB program to perform amplitude-scaling, time-scaling and time-shifting on a given signal. 8. Write a MATLAB program to obtain Cross correlation of sequence x(n) and y(n) & autocorrelation of a sequence x (n) of the given sequences & verify the property 9. Write a MATLAB program to generate Fourier series of a Square Wave. 10. Write a MATLAB program to Calculate and plot using MATLAB Fourier Transform and Z-Transform of a given signal. 11. Write a MATLAB program to find the impulse response and step response of a system from its difference equation. 12. Compute and plot the response of a given system to a given input	

Course Code: IT-531T[A1]	**Course Title: Software Project Management**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Time, cost and quality are an essential part of the software organization to deliver a quality product, keeping the cost within the clients budget and deliver the project as per schedule.

Objective:

1. To understand the fundamental principles of software project management.
2. To understand the different methods and techniques used for project management.
3. To get a good knowledge of the issues and challenges faced while doing the software project management
4. To understand why majority of the software projects fails and how that failure probability can be reduced effectively

Unit-I: **(10 periods)**

- **Introduction to Software Project Management:**
  Introduction, Why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Project, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Setting Objectives,Project Success and Failure, What is Management? Management Control, Project Management Life Cycle
- **An Overview of Project Planning**

Introduction to Step Wise Project Planning,
Step 0: Select Project,
Step 1: Identify Project Scope and Objectives,
Step 2: Identify Project Infrastructure,
Step 3: Analyse Project Characteristics,
Step 4: Identify Project Products and Activities,
Step 5: Estimate Effort for Each Activity,
Step 6: Identify Activity Risks,
Step 7: Allocate Resources,
Step 8: Review/Publicize Plan,
Steps 9 and 10: Execute Plan/Lower Levels of Planning

Unit-II: **(10 periods)**

- **Project evaluation**
  Introduction to Strategic assessment – technical assessment - cost benefit analysis - cash flow forecasting – cost benefit evaluation techniques – risk evaluation.
- **Selection of an appropriate project approach**

Choice of process models, structured methods, rapid application development, waterfall model , spiral model - software prototyping, incremental delivery.

Unit-III: **(10 periods)**

- **Software Efforts estimation**

Introduction, where estimates done, problems with over and under estimates done, basics for software estimating, estimation techniques, function point analysis, COCOMO model.

- **Risk Management**

Introduction to Risk, categories of risk, frame work for dealing with risk, risk identification, risk assessment, risk planning, risk management, PERT Technique.

Unit-IV: **(10 periods)**

- **Monitoring and control**
  Framework creation, data collection, visualizing progress, monitoring of cost and prioritizing.
- **Software Quality**

Importance, The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product versus Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans.

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1. Software project management : Bob Hughes and Mike Cotterell - Fourth Edition - McGraw Hill
2. Software Project Management: Walker Royce - Addison Wesley.

Online Resources

1. http://tutorialspoint.com
2. https://www.javatpoint.com/software-project-management

Reference Book

1. Software project management : Dutt, Chandramouli, Pearson India
2. Software Project Management: A Concise Study 2Nd Ed.

Course Code: IT-533P[A1]	**Course Title: Lab Course based on IT-531T[A1]**
Total Credits: 1.5	**Marks: 50(UA: 40 + IA: 10)**
Periods: 3 per week (50 Minutes each)	

Sample List of Practicals

(The teacher can conduct three Practicals based on each unit as per their choice and feasibility)

Following steps of Software Project management can be studied on the basis of some project topics allotted to students.

1. REQUIREMENT GATHERING AND ANALYSIS.
2. DEVELOPMENT ENVIRONMENT.
3. SRS
4. ERD
5. DFD
6. USECASE DIAGRAM
7. ACTIVITY DIAGRAM
8. SEQUENCE DIAGRAM
9. CLASS DIAGRAM
10. FEASIBILITY STUDY

Course Code: IT-531T[B1]	**Course Title: Network Security**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of networking concepts
2. Familiarity with operating systems and computer architecture
3. Understanding of fundamental security principles.

Objective:

On the completion of course, students will be able to -

1. Understood the basic principle of network security
2. Identifies and assessment of network security risks and vulnerability
3. Evaluate and implement appropriate network security
4. Analyze and learn from real world network security case studies.

Unit-I: (10 periods)

Introduction to Network Security –

Overview of network security concepts, Security Goals- confidentiality, integrity, availability, Threat landscape and attach vectors, Risk assessment and management, Network architecture and design – secure network design principles, Segmentation and zoning, defense in depth strategies, Security consideration for wireless and mobile network

Unit-II: (10 periods)

Network perimeter Security – Firewalls and intrusion detection/prevention systems, Virtual private network,(VPN), Network Address Translation, Demilitarized zone (DMZ) design, Secure network protocols and services,

Unit- III: (10 periods)

Secure Network Protocols and Services- secure socket layer/transport layer security(SSL/TSL), secure shell(SSH), Domain name system security extension(DNSSES), Network time protocol security(NTPsec) **Intrusion Detection and Prevention System(IDPS) –** Host based and network based IDPS, signature-based and anomaly-based detection, Incident response and handling,

Unit-IV: (10 periods)

Wireless Network Security – Wi-Fi security protocols (WEP, WPA, WPA2, WPA3), Rouge access point detection, Wireless intrusion prevention system (WIPS), Securing mobile devices and applications. Case studies in Network Security – a) Analysis of real world security breaches b) Investigating network attack and incidents c) Lessons learned from notable security incidents.

Unit V: Tutorial and Assignment (5 periods)

In addition to CIA, Tutorial, Seminars, Assignment & Case Studies are to be given for the building proficiency in the course. (Respective Course in-charge should maintain the records for the same)

Textbook

1. "Network Security: Private Communication in a public world" by Charlie Kaufman, Radia Perlman, and Mike Speciner
2. "Firewalls and Internet Security: Repelling the Wily Jacker" by William R. Cheswick and Steven M. Bellovin

Reference Books

3. "Network Security Essentials: Applications and Standards" By William Stalling

Course Code: IT-533P[B1]	**Course Title: Lab Course(Practical based on IT-531T[B1]**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of networking concepts
2. Familiarity with operating systems and computer architecture
3. Understanding of fundamental security principles.

Objective:

On the completion of course, students will be able to -

1. Explain security concepts, Ethics in Network Security.
2. Identify and classify various Attacks and explain the same.
3. Distinguish and explain different protocol like SSL, TLS Vis-à-vis their applications
4. Discuss the effectiveness of passwords in access control. Explain firewall principles.

Specific Tool Used for Practical

List of Practical

1. Study of different wireless network components and features of any one of the Mobile Security Apps.
2. Study of the features of firewall in providing network security and to set Firewall Security in windows.
3. Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
4. Study of different types of vulnerabilities for hacking a websites / Web Applications.
5. Analysis the Security Vulnerabilities of E-commerce services.
6. Analysis the security vulnerabilities of E-Mail Application
7. Observing Static and Dynamic Routing
8. Configuring Ethernet and Serial Interfaces
9. Configuring a Default Route
10. Configuring Static Routes

Course Code: IT-532T[A2]	**Course Title: Wireless Networking**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of networking

Objective:

1. To study about Wireless networks, protocol stack and standards.
2. To study about fundamentals of 3G Services, its protocols and applications.
3. To study about evolution of 4G Networks, its architecture and applications

Unit-I: **(10 periods)**

Wireless Communication: Growth, History, Mobile Communications Fundamentals, Wireless Migration
First Generation (1G) : 1G System Architecture, MTSO Configuration, Cell Site Configuration, Handoff, Frequency reuse, Spectrum Allocation, 1G Systems.
Second Generation (2G) : Enhancements over 1G Systems, GSM, IS-136 System Description, IS-95 System Description, iDEN, CDPD

Unit-II: **(10 periods)**

Third Generation (3G) : UMTS Services, UMTS Air Interface, 3GPP Release 1999 Network Architecture, #GPP Release 5 All-IP Network Architecture, CDMA 2000 UTMS : UTMS Basic, WCDMA Air Interface, UTRAN Architecture, Handover, UTMS Core Network
CDMA2000: Radio and Network Components, Network Structure, Packet Data Transport Process Flow, Radio Network

Unit-III: **(10 periods)**

Voice-over-IP Technology: VoIP, Basic of IP Transport, VoIP Challenges, SIP, SS7, Quality Service GSM/GPRS/EDGE, TDMA, AMPS, LMDS, WiMAX, WiFi, PtP and PSCS : Network Design, Advantages and disadvantages of each.

Unit-IV: **(10 periods)**

Network Design Considerations: Traffic Forecasts, Build-ahead, Network Node Dimensioning Antenna System Selection : Base Station Antennas, Performance Criteria, Diversity, Installation Issues, dBi and dBd, Intelligent Antennas
UTMS System Design: Network Design Principles, CDMA200 Design methodology, Development Guidelines, Radio Elements, Requirements, Traffic Model Communication Sites: Types, Installation, Towers, In-building, Intermodulation, Isolation, Communication Site, 4G - 5G, 4G,5G architecture Radio access network, Core mobile network, Radio transmission

Unit V: Tutorial and Assignment **(05 periods)**

Reference Books

1. 3G Wireless Network by: Clint Smith, Daniel Collins McGraw-Hill

2. Wireless Network by P. Nicopolitidis M. S. Obaidat, Wiley India Pvt. Lts
3. Introduction to Wireless Systems by Bruce A. Black, Philip S. DiPiazza , Bruce A. Ferguson,
David R. Voltmer, and Frederick C. Berry
4. Wireless Telecommunications Systems and Networks, by Gary J. Mullett. ISBN-10: 1401886590; Publisher: Thomson Delmar Learning; 1 edition (September 6, 2005)

Online Resources

1. http://www.wirelesscommunication.nl/about.htm
2. http://www.pdfdrive.net/wireless-communication-fundamentals-introduction-aspects-of-mobilitye3310152.html
3. https://www.ukessays.com/essays/computer-science/fundamentals-of-cellular-communications-computerscience-essay.php

Course Code: IT-534P[A2]	**Course Title: Lab Course(Practical based on IT-532T[A2]**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

4. Basic knowledge of networking concepts
5. Familiarity with operating systems and computer architecture
6. Understanding of fundamental security principles.

Objective:

On the completion of course, students will be able to -

5. Explain security concepts, Ethics in Network Security.
6. Identify and classify various Attacks and explain the same.
7. Distinguish and explain different protocol like SSL, TLS Vis-à-vis their applications
8. Discuss the effectiveness of passwords in access control. Explain firewall principles.

List of Practical

1. Study of different wireless network components and features of any one of the Mobile Security Apps.
2. Study of the features of firewall in providing network security and to set Firewall Security in windows.
3. Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
4. Study of different types of vulnerabilities for hacking a websites / Web Applications.
5. Analysis the Security Vulnerabilities of E-commerce services.
6. Analysis the security vulnerabilities of E-Mail Application
7. Observing Static and Dynamic Routing
8. Configuring Ethernet and Serial Interfaces
9. Configuring a Default Route
10. Configuring Static Routes

Course Code: IT-532T|B2|	**Course Title: Software Quality Assurance & Testing**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: 11. Software Engineering	
Objective: On the completion of course, students will be able to - 1. To understand the basic view of software quality and quality factors. 2. To understand the Software Quality Assurance (SQA) architecture and the details of its components. 3. To understand how the SQA components can be integrated into the project life cycle. 4. To be familiar with the software quality infrastructure	
Unit -I: (10 Periods) Introduction to software Quality and Assurance, The software quality challenge, Software quality, Software quality factors, Management and its role in software quality assurance, Components of SQA, The components of the software quality assurance system – overview, Pre-project Software Quality Components, Contract review, Development and quality plans.	
Unit -II: (10 Periods) SQA Components in the Project Life Cycle and Strategies, Integrating quality activities in the project life cycle, Reviews, Software testing – strategies	
Unit -III: (10 Periods) Software Testing – Implementation: Software Quality Implementation, Assuring the quality of software maintenance components, Assuring the quality of external participants' contributions, CASE tools and their effect on software quality	
Unit -IV: (10 Periods) Software Quality Infrastructure Components Procedures and work instructions, Staff training and certification, Corrective and preventive actions, Documentation control, Software Quality Metrics, Software Quality metrics, Cost of Quality	
Unit V: Tutorial and Assignment (5 periods) In addition to CIA, Tutorial, Seminars, Assignment & Case Studies are to be given for the building proficiency in the course. (Respective Course in-charge should maintain the records for the same)	

Reference Books:-

1) Quality and Management Standards (ISO, CMMi, ISO/IEC, IEEE, EIA).
2) Kshirsagar Naik and Priyadarshi Tripathy, Software Testing & Quality Assurance-Theory and Practice, Wiley Student edition
3) William E. Perry, Effective Methods for Software Testing, WILLEY, . 3rd Edition
4) Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997.
5) M G Limaye, Software Testing, Tata McGraw-Hill Education, 2009

Course Code: IT-534[B2]	**Course Title: Lab Course(Practical based on IT-532T[B2]**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Sample List of experiments to be carried out based on the course IT**CA-521T [B1]**

(The teacher can make use of any software testing tool and can add few more practical based on each unit)

Part 1: Test Planning

a) Prepare Quality Plan for any Application like online shopping etc.

b) Prepare Test Plan for any Application like Railway Reservation System etc.

Output: Test plan and Quality Plan

Part 2: Software Testing

a) Create Test cases (Unit, Integration, System and Acceptance Test Cases) for Application

b) Perform manual testing using test case created and prepare test Metrics.

Part 3: Software Testing

Test automation – script creation and execution.

Tools: Selenium

1. Open URL in different browsers (Chrome, Firefox, IE)

2. Perform mouse hovers and other events

3. To take snapshots.

4. Getting current time-stamp

5. To Handle a drop-down.

6. Handling 2 3 steps at a time like Website Registration+login+logout at a time in single run.

7. To Upload File.

8. Storing and fetching data from excel (E.g Registration data)

9. Radio button selection.

10. Checkbox Selection

Course Code: IT-541P	**Course Title: (SEC-3E)Aptitude and Reasoning**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Fundamental knowledge of Mathematics	
Learning Objectives This course is designed to suit the need of the outgoing students and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning during various examinations and campus interviews.	
Learning Outcomes On successful completion of the course the students will be able to: • Understand the basic concepts of quantitative ability • Understand the basic concepts of logical reasoning Skills • Acquire satisfactory competency in use of reasoning • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.	
Unit -1 : Quantitative Ability: LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers	
Unit -2 : Quantitative Ability : Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance,Time & Work, Ratio and Proportion, Area	
Unit -3 : Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams	
Unit -4: Logical Reasoning: Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Seating Arrangement	
Unit -5 : Test and Tutorial	

Reference Books:

- A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
- Analytical and Logical reasoning By Sijwali B S
- Quantitative aptitude for Competitive examination By R S Agarwal
- Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4 th edition
- Quantitative Aptitude & Data Interpretation – Disha Expert
- Quantitative Aptitude for Competitive Examinations – Dinesh Khattar
- Fast Track Objective Arithmetic – Rajesh Verma
- Logical Reasoning and Data Interpretation for CAT by Pearson

Course Code: IT-541P	**Course Title: SEC-3(F) Problem Solving and Decision Making**
Total Credit: 2	Marks: 50 (IA: 50)
Periods: 3 per week (50 Minutes each)	

Prerequisites:

There are no prerequisites for this course

Learning Objectives

To understand the concepts of problem solving and decision making and their significance in personal and professional life.

1. To develop problem-solving skills, including defining problems, generating alternatives, evaluating options, and implementing solutions.
2. To cultivate decision-making abilities, including analyzing information, considering consequences, and choosing the best course of action.
3. To apply problem-solving and decision-making techniques to real-life scenarios.

Learning Outcomes

After Completion of the Course students will be able to

1. Identify and define problems effectively.
2. Generate and evaluate multiple solutions to a given problem.
3. Make informed decisions by considering various factors and potential outcomes.
4. Apply problem-solving and decision-making techniques in personal and professional contexts.

Unit -I: Introduction to Problem Solving and Decision Making (10 Periods)

- Understanding the concepts of problem solving and decision making
- Significance of effective problem solving and decision making in different contexts
- Historical perspectives on problem-solving methodologies

Unit -II: Developing Problem-Solving Skills (10 Periods)

- Steps in the problem-solving process: defining the problem, generating alternatives, evaluating options, implementing solutions
- Problem-solving techniques and tools
- Creative problem-solving methods
- Overcoming obstacles in problem solving

Unit -III: Enhancing Decision-Making Abilities (10 Periods)

- Rational decision making vs. intuitive decision making
- Decision-making models and frameworks
- Factors influencing decision making: cognitive biases, emotions, risk perception
- Ethical considerations in decision making

Unit -IV: Applying Problem Solving and Decision Making (10 Periods)

- Real-life case studies and scenarios for application of problem-solving and decision-making skills
- Group decision-making processes
- Strategies for effective implementation of decisions
- Evaluating the outcomes of decisions and adjusting strategies accordingly

Unit-V: Test and Tutorials

In addition to CIA, tutorials, seminars, assignments, and case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

Textbook

1. "Problem Solving 101: A Simple Book for Smart People" by Ken Watanabe

References:

1. "Decision Making For Dummies" by Dawna Jones and Pat Swanson
2. "Think Smarter: Critical Thinking to Improve Problem-Solving and Decision-Making Skills" by Michael Kallet
3. "Smart Choices: A Practical Guide to Making Better Decisions" by John S. Hammond, Ralph L. Keeney, and Howard Raiffa

E-Resources

1. https://www.mindtools.com/pages/main/newMN_TMC.htm
2. https://www.coursera.org/courses?query=problem%20solving%20and%20decision%20making

Course Assessment (Full 50 Marks Internal Assessment): To assess the skills acquired in a problem-solving and decision-making course, a combination of formative and summative assessment methods can be used:

1. Written Assignments
2. Discussions
3. Group Activities
4. Quizzes and Tests
5. Self-assessment
6. Peer Assessment
7. In-class Activities

Sample questions for assessment methods could include:

1. Written Assignments: Analyze a real-world problem and propose a solution, considering various alternatives and potential consequences.

2. Discussions: Debate the ethical implications of a decision made by a fictional character in a case study.

3. Group Activities: Work as a team to develop a strategy for resolving a complex business problem, considering different perspectives and potential risks.

4. Quizzes and Tests: True/False question: A rational decision-making process always leads to the best outcome.

5. Self-assessment: Reflect on your decision-making process in a recent personal or professional situation. What factors influenced your decision, and how could you improve your approach in the future?

6. Peer Assessment: Provide feedback on a classmate's proposed solution to a problem, evaluating the feasibility and effectiveness of their approach.

7. In-class Activities: Participate in a role-playing exercise where students take on different decision-making roles in a simulated scenario, and observe each other's strategies and outcomes.

By using a variety of assessment methods, students' problem-solving and decision-making skills can be effectively evaluated, ensuring they have the competencies required for success in both academic and professional settings.



B.Sc. (Information Technology)

Semester - VI

Course Code: IT-611T[A1] DSE-1B (1)	**Course Title: Ethics and Cyber Law**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
Understanding of Basic Legal Concepts, Awareness of Information Technology, Ethical Awareness, Legal and Technological Literacy.

Objective:
1. Understand the relationship Between Ethics and Cyber Law
2. Explore Ethical Challenges in Cyberspace
3. Examine Legal Frameworks for Cyberspace
4. Develop Skills for Ethical Decision Making
5. Understand Cybersecurity and Risk Management

Unit-I: **(10 periods)**

Introduction to Ethics and Cyber Law,Overview of Ethics and Morality, Importance of Ethics in Society and Professions, Introduction to Cyber Law, History and Evolution of Cyber Law, Ethical and Legal Principles in Cyberspace

Unit-II: **(10 periods)**

Definition and Scope of Cyber Law, Key Concepts: Cyberspace, Cybercrime, Cybersecurity, Cyber Ethics, Legal Framework: International, National, and Regional Cyber Laws, Jurisdiction and Enforcement of Cyber Laws, Rights and Responsibilities of Internet Users

Unit-III: **(10 periods)**

Intellectual Property & Security : Piracy, Insider Threat, Types of Cyber Crimes: Hacking, Cyber Terrorism, Cyber Fraud, Cyber Bullying, Identity Theft, etc., Cyber Security Measures: Firewalls, Antivirus Software, Secure Authentication, etc., Digital Forensics: Investigation and Prosecution of Cyber Crimes, Role of Government Agencies and Law Enforcement in Cyber Security

Unit-IV: **(10 periods)**

Law of Digital Contracts: The Essence of Digital Contracts, The System of Digital Signatures. The Role and Function of Certifying, Authorities, The Science of Cryptography, E-Governance Cyber Crimes and Cyber Laws.

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1.Godbole," Information Systems Security", Willey
2. Mark F Grady, FransescoParisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006

Online Resources
1. https://cyberlawinitiative.org/
2. https://www.eff.org/

Reference Book
1.Yadav, "Foundations of Information Technology", New Age, Delhi
2. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill

Course Code: IT-613P	**Course Title: Lab Course(Based on IT-611T[A1]**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. To effectively study and understand the subject of Ethics and Cyber Law, it is beneficial to have a strong foundation in several key areas.
2. Understanding of Basic Legal Concepts, Awareness of Information Technology, Ethical Awareness, Legal and Technological Literacy.

Objective:

1. Understand the relationship Between Ethics and Cyber Law.
2. Explore Ethical Challenges in Cyberspace
3. Examine Legal Frameworks for Cyberspace
4. Develop Skills for Ethical Decision Making
5. Understand Cybersecurity and Risk Management

Specific Tool Used for Practical

1. Practice Tests
2. Progress Tracking
3. Interactive Learning Resources

List of Practical (Minimum 10)

1. Define ethics and explain its relevance in the context of cyber law.
2. Describe the evolution of cyber law and its key principles.
3. Compare and contrast international, national, and regional cyber laws.
4. Explain the role of government agencies and law enforcement in regulating cyberspace.
5. Identify and classify different types of cyber crimes, such as hacking, phishing, and identity theft.
6. Explain the role of digital forensics in investigating and prosecuting cyber crimes.
7. Evaluate the ethical responsibilities of social media platforms and online service providers.
8. Study in detail about digital signature and working of digital signature.
9. Study in detail about digital contract and working of digital contract.
10. Differentiate between patents, copyrights, trademarks, and trade secrets, and explain their respective roles in protecting intellectual property.

Course Code: CA-611T[B1] DSE-1B (1)	**Course Title: Business Intelligence**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite: Basic understanding of computer technologies

Objective:

1. Introduction to concepts and components of Business Intelligence
2. Define how Business Intelligence will help an organization
3. Identify technological architecture that makes up BI systems

Unit I: **(10 periods)**

Business intelligence: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence
Decision support systems: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

Unit-II : **(10 periods)**

Mathematical models for decision making: Structure of mathematical models, Development of a model, Classes of models
Data mining: Definition of data mining, Representation of input data , Data mining process, Analysis methodologies. Data preparation: Data validation, Data transformation, Data reduction

Unit-III: **(10 periods)**

Classification: Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines
Clustering: Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering Models
Marketing models: Relational marketing, Sales force management, Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.
Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices

Unit-IV: **(10 periods)**

Knowledge Management: Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management

Artificial Intelligence and Expert Systems:Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems

Unit V: Tutorial and Assignment **(05 periods)**

Textbooks :

1. "E-commerce: Business, Technology, Society" by Kenneth C. Laudon and Carol Guercio Traver (Pearson Education).
2. "Electronic Commerce" by Gary P. Schneider (Cengage Learning).

Online Resources :

1. Coursera: "E-commerce: A Comprehensive Introduction" by the University of Illinois at Urbana-Champaign.
2. edX: "E-commerce and the Internet of Things" by the Massachusetts Institute of Technology (MIT).

Reference Book

1. "E-commerce 2020-2021: Business, Technology, and Society" by Kenneth C. Laudon and Carol Guercio Traver (Pearson Education).
2. "E-commerce: Principles and Practice" by Chaffey and Chadwick (Pearson Education).

Course Code: IT-613P	Course Title: Lab Course based on IT-611T[B1]
Total Credits: 1.5	**Marks: 50(UA: 40 + IA: 10)**
Periods: 3 per week (50 Minutes each)	

Sample List of Practical's but not limited to

(The teacher can conduct three Practical's based on each unit as per their choice and feasibility)

1. Building and evaluating classification models : logistic regression
2. Building and evaluating classification models : SVM
3. Implementing clustering techniques : k-means
4. Implementing clustering techniques: hierarchical
5. Marketing models: Relational marketing, Sales force management,
6. Developing a simple DSS for a given problem.
7. Analyzing a supply chain using optimization models.
8. Applying DEA to measure efficiency in business scenarios.
9. Creating a basic knowledge management system prototype.
10. Developing a basic Expert System for a specific domain.

Course Code: IT-612T [A2] DSE-1B (2)	Course Title: Introduction Artificial Intelligence

Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Prior programming experience in Python	
Objective: 1. The objective is to acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level.	
Unit I: **(10 periods)** Introduction: What is Artificial Intelligence? Foundations of AI, history, the state of art AI today.Intelligent Agents: agents and environment, good behavior, nature of environment, the structure of agents. Solving Problems by Searching: Problem solving agents, examples problems, searching for solutions, uninformed search, informed search strategies, heuristic functions.	
Unit-II : **(10 periods)** Beyond Classical Search: local search algorithms, searching with non-deterministic action, searching with partial observations, online search agents and unknown environments. Adversarial Search: Games, optimal decisions in games, alpha-beta pruning, stochastic games, partially observable games, state-of-the-are game programs.	
Unit-III: **(10 periods)** Logical Agents: Knowledge base agents, The Wumpus world, logic, propositional logic, propositional theorem proving, effective propositional model checking, agents based on propositional logic. First Order Logic: Syntax and semantics, using First Order Logic, Knowledge engineering in First Order Logic. Inference in First Order Logic: propositional vs. First Order, unification and lifting, forward and backward chaining, resolution.	
Unit-IV: **(10 periods)** Planning: Definition of Classical Planning, Algorithms for planning as state space search, planning graphs, other classical planning approaches, analysis of planning approaches, Time, Schedules and resources, hierarchical planning, Planning and Acting in Nondeterministic Domains, multiagent planning, Knowledge Representation: Categories and Objects, events, mental events and objects, reasoning systems for categories, reasoning with default information, Internet shopping world	
Unit V: Tutorial and Assignment **(05 periods)**	

Text Books

1.Artificial Intelligence: A Modern Approach, Stuart Russel and Peter Norvig, Pearson 3rd, 2015
2.A First Course in Artificial Intelligence Deepak Khemani TMH First 2017

Reference Books

1.Artificial Intelligence: A Rational Approach Rahul Deva Shroff publishers 1st 2018
2. Artificial Intelligence Elaine Rich, Kevin Knight and Shivashankar Nair TMH 3rd 2009
3. Artificial Intelligence & Soft Computing for Beginners Anandita Das Bhattacharjee SPD 1st 2013

Course Code: IT-614P	**Course Title: Lab Course(Based on IT-612T[A2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
Prior programming experience in Python

Objective: The objective is to acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level.

Specific Tool Used for Practical
Python programming

List of Practical but not limited to:(Minimum 10)

1. Implementing uninformed search algorithms , BFS.
2. Implementing uninformed search algorithms, DFS.
3. Designing heuristic functions and using A* for a given problem.
4. Developing a simple agent for the Wumpus world.
5. Propositional logic-based theorem proving using forward chaining.
6. Propositional logic-based theorem proving using backward chaining.
7. Solving planning problems using state-space search.
8. Implementing alpha-beta pruning for a game like tic-tac-toe.
9. Creating a small knowledge base in FOL and performing inference.
10. Case Study:A hospital implemented an AI system to assist doctors in diagnosing diseases based on medical images such as X-rays and MRI scans. However, some patients expressed concerns about the accuracy and reliability of the AI diagnoses. How can the hospital address these concerns?

Course Code: IT-612T [B2] DSE-1B (2)	**Course Title: Data Warehouse**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Computer programming skills, a background in data architecture	
Objective: 1. The objective of an DataWare housing course is to provide a single centralized source to store, manage and analyse information which can be easily accessible for the business.	
Unit I: **(10 periods)** **Concept of Data Warehousing(DW:** Need for Data Warehousing, Need & Characteristics of Strategic Information, Decision Support System: History Features & disadvantageous, Differentiation of Operational & informational System. Data warehousing: Definition & Advantage. **Data warehouse Building blocks**: Features, Data warehouse Applications, Types of Data warehouse, Differentiate DW and operational DB, Data Warehouses and Data Marts: Approaches, Overview of the Components, Metadata in Data Warehouse.	
Unit-II : **(10 periods)** **System Process:** Process Flow in Data Warehouse **Architecture:** Business Analysis Framework, 3 – tier DW Architecture, DW Models, Load Manager, Warehouse Manager, query Manager. **Multidimensional Data Models:** Data cube, Dimensional Modeling, Lattice of cuboids, DW schemas: Star schema, Snowflake schema, Fact Constellation, Schema Definition.	
Unit-III: **(10 periods)** **OLAP:** Definition, types of OLAPs, OLAP operations: roll-up, drill-down, slice and dice, pivot. Relational OLAP: Feature, Architecture, pro & cons. Multidimensional OLAP: Feature, Architecture, pro & cons.	
Unit-IV: Emerging Trends and Future of E-commerce **(10 periods)** Web-Enabled Data Warehouse, Web-Based Information Delivery, OLAP and the Web, Building a Web-Enabled Data Warehouse.	
Unit V: Tutorial and Assignment **(05 periods)**	

Text book

1. DATA WAREHOUSING FUNDAMENTALS: A Comprehensive Guide for IT Professionals,By, PAULRAJ PONNIAH, Wiley-Interscience Publication.

Reference Books:

1.Mastering Data Warehouse Design, By, Claudia Imhoff, Nicholas Galemmo, Jonathan G.Geiger, Wiley Publishing.
2.DWH tutorial from Tutorial Points.

Online Resources

Weblink: http://www.tutorialspoint.com/dwh/

Course Code: IT-614P	**Course Title: Lab Course(Based on IT-612T[B2]**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
Computer programming skills, a background in data architecture

Objective: The objective of an Dataware housing course is to provide a single centralized source to store, manage and analyse information which can be easily accessible for the business.

List of Practical but not limited to:(Minimum 10)

1. Analyze the need for strategic information in real-world cases.
2. Differentiate between operational and informational systems with examples.
3. Identify and discuss applications of data warehousing in industries.
4. Study the role and importance of metadata in DW environments.
5. Demonstrate the process flow in a data warehouse system using case studies or tools.
6. Design and explain a 3-tier architecture for a given DW scenario.
7. Create a dimensional model for a retail business use case.
8. Design and compare star schema, snowflake schema, and fact constellation schemas for the same dataset.
9. Build and visualize a data cube using a dataset with multiple dimensions.
10. Perform roll-up, drill-down, slice, dice, and pivot operations on a sample data cube.
11. Analyze and compare ROLAP and MOLAP for a given dataset, highlighting pros and cons.
12. Explore a web-enabled data warehouse and demonstrate its key features.
13. Create a basic web interface for data visualization in a warehouse.
14. Demonstrate OLAP operations using a web-based tool or software.
15. Develop a prototype of a web-enabled data warehouse with basic functionalities.

Course Code: IT-621T[A1] DSE-2B (1)	**Course Title:** Theory of Computation
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
1. Discrete Mathematics
2. Introduction to Programming

Objective

1. Understand the fundamental concepts and significance of the Theory of Computation in computer science.
2. Describe and analyze mathematical structures such as sets, relations, and functions, and apply them to model computational problems.
3. Explain the principles and properties of finite automata, including deterministic and nondeterministic models, and their applications in recognizing regular languages.
4. Define context-free grammars, context-free languages, and pushdown automata, and demonstrate their equivalence through various examples and transformations.
5. Apply the pumping lemma for context-free languages to analyze the structure and properties of context-free languages.

Unit-I: **(10 periods)**

Introduction & Automata Theory
Introduction to Theory of Computation (Goals & Applications)
Alphabets, Strings, Languages
Finite Automata (Deterministic and Non-deterministic)
Regular Expressions and their equivalence to Finite Automata

Unit-II: **(10 periods)**

Formal languages and automata
Formal languages and automata: basic definitions and concepts
Regular languages and regular expressions
Finite automata: deterministic and non-deterministic finite automata
Regular grammars and their equivalence with finite automata
Closure properties of regular languages

Unit-III: **(10 periods)**

Context-Free Languages and Pushdown Automata
Context-free grammars (CFGs) and their derivations
Parse trees and ambiguity in context-free grammars
Pushdown automata (PDA): definition and examples
Equivalence of CFGs and PDAs
Context-free languages and their closure properties
Pumping lemma for context-free languages and its applications

Unit-IV: **(10 periods)**

Formal Languages & Grammars

Formal Languages and Grammars: Introduction & Chomsky Hierarchy
Regular Grammars and their equivalence to Finite Automata
Context-Free Grammars (CFG) & Pushdown Automata (PDA)
Parsing Techniques for CFGs

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1. "Introduction to the Theory of Computation" by Michael Sipser
2. "Theory of Computer Science: Automata, Languages, and Computation" by K.L.P. Mishra & N. Chandrasekaran

Reference Book

1. "Computational Complexity: A Modern Approach" by Sanjeev Arora and Boaz Barak
2. "Automata and Computability" by Dexter C. Kozen

Course Code: IT-623P	**Course Title:** Lab Course (based on IT-621T[A1])
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
1.Discrete Mathematics
2. Introduction to Programming

Objective: 1.Understand the fundamental concepts and significance of the Theory of Computation in computer science.
2. Describe and analyze mathematical structures such as sets, relations, and functions, and apply them to model computational problems.
3. Explain the principles and properties of finite automata, including deterministic and nondeterministic models, and their applications in recognizing regular languages.
4. Define context-free grammars, context-free languages, and pushdown automata, and demonstrate their equivalence through various examples and transformations.
5. Apply the pumping lemma for context-free languages to analyze the structure and properties of context-free languages.

List of Practical but not limited to:(Minimum 10)

The subject teacher can conduct three Practical's or problems based on each unit as per their choice and feasibility

Course Code: IT-621T[B1] DSE-2B (1)	**Course Title: Operation Research**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Knowledge of Arithmetic, Basic Concepts of Algebra

Objective:

1. The Objective of the paper is to introduce the basic concepts of Operational Research and linear programming to the students.

Unit-I: **(10 periods)**

Basics of Operational Research: Origin & Development of Operational Research, Definition and Meaning of Operational Research, Different Phases of an Operational Research Study, Scope and Limitations of Operational Research, Mathematical Modeling of Real Life Problems.

Unit-II: **(10 periods)**

Linear Programming: Introduction to Linear algebra. Solution of a system of Linear Equations, Linear independence and dependence of vectors

Unit-III: **(10 periods)**

Concept of Basis, Basic Feasible solution, Convex sets. Extreme points, Hyperplanes and Halfspaces, Convex cones, Polyhedral sets and cones.

Unit-IV: **(10 periods)**

Linear Programming Problem Formulation, solution by Graphical Method, Theory of Simplex Method, Simplex Algorithm, Two phase Method

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1. F.S. Hillier. G.J. Lieberman: Introduction to Operations Research- Concepts and Cases, 9th Edition, Tata Mc-Graw Hill, 2010

2. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 9th Edition, 2010

Online Resources

1. https://www.bbau.ac.in/dept/UIET/EME-601%20Operation%20Research.pdf
2. https://www.coursera.org/learn/discrete-optimization

Reference Book

1. A. Ravindran, D. T. Phillips and James J. Solberg: Operations Research- Principles and Practice, John Wiley & Sons, 2005.

2. G. Hadley: Linear Programming. Narosa, Reprint, 2002.

Course Code:IT-623P Total credit:1.5	**Course Title :** Practical based on IT-621T[B1] Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Knowledge of Arithmetic, Basic Concepts of Algebra

Objective:

1. The Objective of the paper is to introduce the basic concepts of Operational Research and linear programming to the students.

List of Practical's: Use tools like Excel Solver or MATLAB for solving LPPs.

1. Formulate real-life problems into mathematical models.
2. Solve a system of linear equations using various methods (e.g., substitution, elimination).
3. Identify linear independence and dependence among a set of vectors.
4. Plot and verify properties of convex sets and identify extreme points.
5. Graphical visualization of hyperplanes and half-spaces.
6. Identify basis and compute basic feasible solutions for small linear systems.
7. Solve a linear programming problem (LPP) using the graphical method.
8. Construct initial simplex tables for given LPPs.
9. Solve an LPP using the simplex method step-by-step.
10. Apply the two-phase simplex method to solve an LPP.
11. Analyze and graphically interpret polyhedral sets and cones.
12. Verify properties of convex cones with suitable examples.
13. Solve and verify primal and dual LPPs.
14. Apply linear programming techniques to optimize a real-world scenario (e.g., transportation, production).

Course Code: IT-622T[A2] DSE-2B (2)	**Course Title: Power BI**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
1.Basic understanding of Excel, databases, and data analysis concepts

Objective:
1.Master data visualization in Power BI for effective communication of insights.
2.Develop skills in data modeling to accurately represent business scenarios.
3.Enhance analytical capabilities through DAX language for advanced calculations.
4.Design interactive dashboards with intuitive features for user-friendly exploration.

Unit-I: **(10 periods)**
Introduction to Power BI
Overview of Business Intelligence (BI) and its importance, Introduction to Power BI: history, features, and applications, Installation and setup of Power BI Desktop ,Overview of Power BI interface: ribbon, report view, data view, and model view.

Unit-II: **(10 periods)**
Data Transformation and Modeling, Understanding data types and relationships, Introduction to Power Query Editor: data transformation, cleaning, and shaping ,Data modeling basics: creating relationships between tables, managing relationships, Calculated columns and measures: introduction to DAX (Data Analysis Expressions) language.

Unit-III: **(10 periods)**
Visualization Techniques
Understanding the importance of data visualization , Overview of Power BI visualization types: charts, graphs, maps, etc, Customizing visuals: formatting, colors, titles, and legends, Introduction to Power BI themes and templates.

Unit-IV: **(10periods)**

Creating Interactive Dashboards and Reports, Design principles for creating effective dashboards. Creating interactive dashboards: adding filters, slicers, and bookmarks, Using Power BI report view: arranging visuals, creating report pages, Publishing and sharing Power BI reports: Power BI Service overview.

Unit V: Tutorial and Assignment **(05 periods)**
Regular assignments focusing on data cleaning, modeling, and visualization tasks using Power BI.

Textbook
1."M is for (Data) Monkey: A Guide to the M Language in Excel Power Query" by Ken Puls and Miguel Escobar.
2."The Definitive Guide to DAX: Business Intelligence with Microsoft Excel, SQL Server Analysis Services, and Power BI" by Marco Russo and Alberto Ferrari.

Reference Book
1."The Definitive Guide to DAX: Business Intelligence with Microsoft Excel, SQL Server Analysis Services, and Power BI" by Marco Russo and Alberto Ferrari.

Course Code: IT-624P	**Course Title: Lab Course(Based on IT-622T[A2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic understanding of Excel, databases, and data analysis concepts

Objective:

1.Master data visualization in Power BI for effective communication of insights.
2.Develop skills in data modeling to accurately represent business scenarios.
3.Enhance analytical capabilities through DAX language for advanced calculations.
4.Design interactive dashboards with intuitive features for user-friendly exploration.

Specific Tool Used for Practical

Power BI Desktop , Excel or R

List of Practical (Minimum 10)

1. Install Power BI Desktop and explore the user interface.
2. Import a sample dataset.
3. Import data from Excel and perform basic transformations.
4. Handle missing values and change data types.
5. Create relationships between tables.
6. Create bar and line charts to visualize data.
7. Create calculated columns and measures using DAX.
8. Calculate total sales and average sales per product
9. Design interactive dashboards with slicers and filters.
10. Implement drill-down functionality for detailed insights

Course Code: IT-622T[B2] DSE-2B (2)	**Course Title: Technical Writing**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:
Basic Writing Skills, Understanding of Technical Concepts, Research Skills, Ability to **Simplify** Complex Concepts, Communication Skills.

Objective

1. Master clear and accurate communication.
2. Develop diverse documentation skills.
3. Analyze audience needs effectively.
4. Ensure meticulous attention to detail.

Unit-I: **(10 periods)**

Overview of Technical Writing: Definition, purpose, and importance of technical writing Distinction between technical and non-technical writing,
Audience Analysis: Identifying and analyzing target audience characteristics, Tailoring content to meet audience needs and expectations

Unit-II: **(10 periods)**

Writing Process: Understanding the writing process: planning, drafting, revising, and editing, Techniques for generating ideas and organizing content effectively
Types of Technical Documents: Overview of common technical documents: manuals, reports, proposals, etc., Characteristics and purpose of each document type
Document Design and Formatting: Principles of document design: layout, typography, visuals, and formatting, Creating visually appealing and user-friendly documents

Unit-III: **(10 periods)**

Document Design and Formatting: Principles of document design: layout, typography, visuals, and formatting, Creating visually appealing and user-friendly documents,
Writing Style and Tone: Developing a clear and concise writing style, Maintaining a professional tone and voice in technical writing, Strategies for achieving clarity and precision in technical writing, Avoiding ambiguity, redundancy, and wordiness

Unit-IV: **(10 periods)**

Using Visuals in Technical Writing; Incorporating visuals (charts, graphs, diagrams) to enhance understanding, Guidelines for creating effective visuals and integrating them into documents,
Techniques for collaborating with team members on technical writing projects, Effective communication strategies for project coordination, Importance of revision and editing in the technical writing process, Strategies for revising and editing technical documents for clarity, accuracy, and coherence

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1. "Technical Communication" by Paul V. Anderson
2. "Technical Writing: Process and Product" by Sharon J. Gerson and Steven M. Gerson
3. "Technical Writing for Success" by Darlene Smith-Worthington and Sue
4. "Technical Communication Strategies for Today" by Richard Johnson-Sheehan
5. "The Essentials of Technical Communication" by Elizabeth Tebeaux and Sam Dragga

Online Resources

1. "Introduction to Technical Writing" by TechTotal Solutions: https://www.youtube.com/watch?v=xO7eTneL02I
2. "Technical Writing Basics" by TechWriterToday: https://www.youtube.com/watch?v=mCjcUwUzpX4

Reference Book

1. "Technical Writing: A Practical Guide" by P. Ramanujan and S. Valli
2. "A Handbook for Technical Writing" by Rashmi Puri and M. K. Raina
3. "Technical Writing: Process and Product" by Meenakshi Raman and Sangeeta Sharma
4. "Technical Writing: Understanding Indian Industries" by Ritu Raj Tyagi

Course Code: IT-624P	**Course Title: Lab Course(Based on IT-622T[B2])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Basic Writing Skills, Understanding of Technical Concepts, Research Skills, Ability to Simplify Complex Concepts, Communication Skills.	
Objective 1. Master clear and accurate communication. 2. Develop diverse documentation skills. 3. Analyze audience needs effectively. 4. Ensure meticulous attention to detail.	
List of Practical: The subject teacher can give case studies on each unit as per their choice and feasibility	

Course Code: IT-631T[A1] DSE-3B (1)	**Course Title: Software Testing**
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Prerequisite:

1. Basic knowledge of Software

Objective:

1. To understand the basics of testing
2. To learn the criteria for test cases.
3. To understand testing automation techniques.
4. To apply test metrics and measurements.

Unit-I: **(10 periods)**

INTRODUCTION

Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design.

Unit-II: **(10 periods)**

Test case Design Strategies

Using Black Box Approach to Test Case Design, Boundary Value Analysis, State based testing, Compatibility testing, user documentation testing, domain testing, Random Testing, Requirements based testing Using White Box Approach to Test design, Test Adequacy Criteria, static testing vs. structural testing, code functional testing.

Unit-III: **(10 periods)**

LEVELS OF TESTING

The need for Levels of Testing, Unit Testing, Integration testing, Scenario testing, Acceptance testing, Performance testing, Regression Testing, Internationalization testing, Ad-hoc testing, Alpha, Beta Testing, Usability and Accessibility testing, Configuration testing, Compatibility testing, Testing the documentation, Website testing.

Unit-IV: **(10 periods)**

TEST AUTOMATION

Software test automation, design and architecture for automation, Test metrics and measurements, project, progress and productivity metrics, Software Development Life Cycle (SDLC), V model, Waterfall model ,Agile model-Software Testing Life Cycle (STLC), Creating Test plan, Creating RTM, Reports using TestNG, Agile Testing, What is API?-Difference between API and Web services

Unit V: Tutorial and Assignment **(05 periods)**

Textbook

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing: Principles and Practices

2 Rajiv Chopra, Software Testing: Effective Methods, Tools and Techniques

Course Code: IT-633P	**Course Title: Lab Course(Based on IT-631T[A1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: 1. Basic knowledge of Software	
Objective: 1. To understand the basics of testing 2. To learn the criteria for test cases. 3. To understand testing automation techniques. 4. To apply test metrics and measurements.	
List of Practical: The subject teacher can give 3 practicals on each unit as per their choice and feasibility	

Course Code: IT-631T[B1] DSE-3B (1)	**Course Title:** Cyber forensics
Total Credit:02	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Fundamental concept of computers	
Objective: 1. Understand and utilize the fundamental concept of computers and digital and Cyber forensics 2. Students shall be prepared for various technologies/tools to combat and investigate computer and cyber crimes.	
Unit-I: **(10 periods)** Digital Investigation, Digital Evidence and Computer Crime , History and Terminology of Computer Crime Investigation,Technology and Law, The Investigative Process, Investigative Reconstruction, Modus Operandi, Motive and Technology, Digital Evidence in the Courtroom.	
Unit-II: **(10 periods)** Understanding information, Methods of storing data: number systems, character codes, record structures, file formats and file signatures, Word processing and graphic file formats, Structure and Analysis of Optical Media Disk Formats, Recognition of file formats and internal buffers, Extraction of forensic artifacts, understanding the dimensions of other latest storage devices, SSD Devices	
Unit-III: **(10 periods)** Computer Basics for Digital Investigators, Computer Forensic Fundamentals, Applying Forensic Science to computers, Computer Forensic Services, Benefits of Professional Forensic Methodology, Steps taken by computer forensic specialists. Standards, Guidelines and Best Practices, Handling the Digital Crime Scene.	
Unit-IV: **(10 periods)** Types of Computer Forensics Tools and Technology, Tools and Types of Military Computer Forensics Technology, Tools and Types of Law Enforcement Computer Forensic Technology,Tools and Types of Business Computer Forensic Technology	
Unit V: Tutorial and Assignment **(05 periods)**	

Text Book

Guide to Computer Forensics and Investigations,Bill Nelson, Amelia Phillips, Christopher Steuart Publisher Cengage Learning, 2018

Reference Book

Digital Forensic: The Fascinating World of Digital Evidences Paperback – 1 January 2016 by Nilakshi Jain, Dhananjay R. Kalbande

Online Reference

https://onlinecourses.swayam2.ac.in/cec20_lb06/preview

Course Code: IT-633P	**Course Title: Lab Course(Based on IT-631T[B1])**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	
Prerequisite: Fundamental concept of computers	
Objective: 1. Understand and utilize the fundamental concept of computers and digital and Cyber forensics 2. Students shall be prepared for various technologies/tools to combat and investigate computer and cyber crimes.	
List of Practical: The subject teacher can give 3 practical's on each unit as per their choice and feasibility	

Course Code: IT-632T	Course Title: DSE-3B(2) Major Project
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Pre-requisites : Software Engineering Software Testing, Programming / Coding language, RDBMS etc

OBJECTIVES:

1. To solve industrial (or society or research) problems.
2. To plan, schedule, and monitor the software project
3. Development, coding, and testing of a large project cohesively.
4. Documentation of project

Course Outline

Guidelines for Project

1. It is recommended that the team should be about 2-3 students.
2. The project should be free from plagiarism of any kind.
3. Internal guides (i.e. The regular faculty members) must be allocated to projects.
4. Project plan along with the division of work amongst teammates would have been prepared and got approved within a maximum of 5 days of the start of the project.
5. Coding standards should be followed meticulously. At the minimum, the code should be self documented, modular, and should use the meaningful naming convention.
6. It is advisable that object-oriented methodology is used with the reusability of classes and code, etc..
7. The output reports must include MIS reports, if applicable.
8. The documentation should include a chapter on "Learning during Project Work", i.e. "Experience of Journey during Project Duration".
9. It is strongly recommended that Data structure/Database design is included in the report. At least portions of code (preferably full code) are mandatory. The student may be asked to write the code related to the project during the examination.
10. If a student is compelled to follow certain instructions (by the external, i.e. organization's Guide) which he/she does not agree to, such a student must prepare a supplementary report to document his/her version and present it to the examiners if such a need arises.
11. Internal guides (i.e. The regular faculty members) must devote the time allocated as per the timetable to guide the students for the project. The time allocation will be in accordance with the scheme for the 6th semester project as given.
12. Internal guides should preferably visit external guide to track the project
13. Project document should be printed on both sides of paper.
14. Students are expected to upload project work on given web site as project repository of the department/institution.

Course Code: IT-634P	**Course Title: Seminar**
Total Credit: 1.5	Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)	

Guidelines for seminar

1. Seminar is to be independently delivered by each candidate.
2. The topic selected should be associated with current trends in computer field
3. A report is to be submitted before the presentation.
4. Presentation must be done using power point presentation/LibreOffice Impress/WPS Office Presentation.
5. The seminar presentation and the report are to be evaluated by the internal examiner of the department
6. Students are expected to upload the presentation and report on given web site as a repository of the Department.

Reference books:

1. Digital Marketing, S.Gupta, McGraw-Hill
2. Digital Marketing –Kamat and Kamat-Himalaya
3. Marketing Strategies for Engaging the Digital Generation, D. Ryan

Course Assessment (Full 50 Marks Internal Assessment)

Here are some potential assessments that could be used to evaluate understanding and practical skills for this course.

1. Introduction to Digital Marketing and its significance

Course Code: IT-641(SEC-4 G)	**Course Title: Digital Marketing**
Total Credits: 2	**Marks: 50(UA: 40 + IA: 10)**
Periods: 3 per week (50 Minutes each)	
Prerequisites: Student must know basics of concept of Digital marketing and SEO.	
Learning Objectives To understand the basic Concepts of Digital marketing and the road map for successful Digital marketing strategies.	
Unit 1: Fundamentals of Digital marketing & Its Significance, Traditional marketing Vs Digital Marketing, Evolution of Digital Marketing, Digital Marketing Landscape, Key Drivers, Digital Consumer & Communities	
Unit 2: The Digital users in India, Digital marketing Strategy- Consumer Decision journey, POEM Framework, Segmenting & Customizing messages, Digital advertising Market in India, Skills in Digital Marketing, Digital marketing Plan.	
Unit 3: Terminology used in Digital Marketing, PPC and online marketing through social media, Social Media Marketing, Keyword advertising, Google web-master and analytics overview, Affiliate Marketing, Email Marketing, Mobile Marketing	
Unit 4: Introduction to SEO, How Search engine works, SEO Phases, History Of SEO, How SEO Works, What is Googlebot (Google Crawler), Types Of SEO technique, Keywords, Keyword Planner tools.	
Unit 5: Test & Tutorials addition to CIA, Tutorials, Seminars, Assignments & Case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same.)	

Reference books:

1. Digital Marketing, S.Gupta, McGraw-Hill
2. Digital Marketing –Kamat and Kamat-Himalaya
3. Marketing Strategies for Engaging the Digital Generation, D. Ryan

Course Assessment (Full 50 Marks Internal Assessment)

Here are some potential assessments that could be used to evaluate understanding and practical skills for this course.

1. Introduction to Digital Marketing and its significance
2. Compare and Contrast between Traditional and Digital Marketing
3. Understanding the POEM Framework in Digital Marketing
4. Understanding the skills required in Digital Marketing

5. Introduction to PPC and Online Marketing through Social Media
6. Understanding Social Media Marketing in Digital Marketing
7. Email and Mobile Marketing in Digital Marketing
8. Introduction to SEO and its Phases in detail
9. Understanding types of SEO in Digital Marketing
10. Understanding SEO using Keyword Planner tool

Course Code: IT-641P (SEC-4 H)	**Course Title:** - Leadership Skill Development
Total Credit: 2	**Marks:** 50 (IA: 50)
Periods: 3 per week (50 Minutes each)	
Prerequisites: There are no prerequisites for this course	

Learning Objectives

To understand the concepts and theories of leadership.
To develop essential leadership skills, including communication, decision making, motivation, and conflict resolution.
To explore different leadership styles and their applications in various contexts.
To cultivate self-awareness and emotional intelligence as foundations for effective leadership.

Learning Outcomes

After Completion of the Course students will be able to

1. Demonstrate an understanding of leadership concepts, theories, and models.
2. Apply effective communication techniques in leadership roles.
3. Make informed decisions and solve problems as a leader.
4. Motivate and inspire individuals and teams towards shared goals.
5. Manage conflicts and navigate challenges in leadership positions.
6. Reflect on personal leadership strengths and areas for development.

Unit -I: Introduction to Leadership (10 Periods)

- Definition of leadership and its significance in personal and professional contexts
- Historical perspectives on leadership theories and models
- Traits vs. behaviors vs. situational approaches to leadership

Unit -II: Leadership Skills Development (10 Periods)

- Effective communication in leadership roles: listening, speaking, nonverbal communication
- Decision making and problem-solving techniques for leaders
- Motivation theories and strategies for inspiring individuals and teams
- Conflict resolution and negotiation skills for leaders

Unit -III: Leadership Styles and Applications (10 Periods)

- Different leadership styles: autocratic, democratic, transformational, servant leadership, etc.
- Situational leadership: adapting leadership styles to different contexts and followers
- Leading diverse teams and managing inclusivity in leadership

Unit -IV: Emotional Intelligence and Self-Awareness in Leadership (10 Periods)

- Understanding emotional intelligence and its role in effective leadership
- Self-awareness: assessing personal strengths, weaknesses, values, and leadership philosophy
- Managing emotions and building resilience as a leader
- Developing empathy and social skills in leadership roles

Unit-V: Test and Tutorials

In addition to CIA, tutorials, seminars, assignments, and case studies are to be given for building proficiency in the course. (Respective course in-charge should maintain the records for the same).

Textbook

1."Leadership: Theory and Practice" by Peter G. Northouse

References:

1. "The Leadership Challenge" by James M. Kouzes and Barry Z. Posner
2. "Primal Leadership: Realizing the Power of Emotional Intelligence" by Daniel Goleman, Richard Boyatzis, and Annie McKee
3. "Dare to Lead: Brave Work. Tough Conversations. Whole Hearts." by Brené Brown
4. "The 21 Irrefutable Laws of Leadership: Follow Them and People Will Follow You" by John C. Maxwell

E-Resources

1. https://www.ccl.org/leadership/education-resources/
2. https://www.ted.com/topics/leadership

Course Assessment (Full 50 Marks Internal Assessment): To assess the skills acquired in a leadership development course, a combination of formative and summative assessment methods can be used:

1. Written Assignments
2. Discussions
3. Leadership Case Studies
4. Quizzes and Tests
5. Leadership Reflection Papers
6. Peer Feedback and Assessment
7. Leadership Projects and Presentations

Sample questions for assessment methods could include:

1. Written Assignments: Analyze a case study of a successful leader and identify key leadership principles demonstrated.
2. Discussions: Debate the advantages and disadvantages of different leadership styles in a given organizational context.
3. Leadership Case Studies: Evaluate a real-world leadership challenge and propose strategies for resolution.
4. Quizzes and Tests: Multiple-choice question: Which leadership style is characterized by high consideration for followers' needs and low directive behavior? a) Autocratic b) Transformational c) Laissez-faire d) Transactional
5. Leadership Reflection Papers: Reflect on a personal leadership experience, discussing successes, challenges, and lessons learned.
6. Peer Feedback and Assessment: Provide constructive feedback on a peer's leadership presentation, focusing on strengths and areas for improvement.

Leadership Projects and Presentations: Develop a leadership development plan for a hypothetical organization, outlining strategies for enhancing leadership effectiveness and fostering a positive organizational culture.