

# **BANGLADESH INSTITUTE OF MANAGEMENT**

4 Sobhanbag, Mirpur Road, Dhaka-1207



## **POST-GRADUATE DIPLOMA IN COMPUTER SCIENCE**

**Session:2025-2026**

**SYLLABUS**

**Part I and II**

## Subjects and Credits

Part I			Part II		
No	Name of Subjects	Credits	No	Name of Subjects	Credits
1	Data Structure and Algorithm	3	1	Web based Software Development	3
2	Structured Programming Language – C	3	2	Fundamentals of AI	3
3	Linux System Administration	3	3	Mobile Application Development (Java Platform)	3
4	Computer Networks	3	4	Cyber Security & Emerging technologies	3
5	Data Analytics with Python and Power BI	3	5	Software Engineering	3
6	Viva-Voce	1.5	6	Term Paper a) Term Paper Proposal Presentation b) Term Paper Presentation c) Term Paper Evaluation	3
			7	Viva-Voce	1.5

## Evaluation Criteria

Class Attendance: 10%  
Class Test: 20%  
Midterm Exam: 30%  
Final Exam: 40%

## Grade Point

Numerical Grade	Letter Grade (LG)	Grade Point (GP)
80% or above	A+	4.00
75% to <80%	A	3.75
70% to <75%	A-	3.50
65% to <70%	B+	3.25
60% to <65%	B	3.00
55% to <60%	B-	2.75
50% to <55%	C+	2.50
45% to <50%	C	2.25
40% to <45%	D	2.00
<40%	F	0.00

## Attendance Marks

Attendance (%)	Marks
90% - 100%	10
80% - 89%	09
70% - 79%	08
60% - 69%	07
50% - 59%	06
30% - 49%	03
Below 30%	00

# PART I

**Subject: Data Structure and Algorithm**

**Full Marks: 100**

**Credits: 03**

**Session: 36**

Session	Topics
1-2	<b>Basic concepts</b> Data Structures notation Notation Search Efficiency
3-4	<b>Elementary data structures</b> Arrays
5-6	Records Points
7-8	<b>Lists</b> Linked lists Stacks Queues
9-10	<b>Trees</b> Binary trees – array representations
11-12	Binary trees-record presentations General tree representations
13-14	<b>Introduction to algorithm</b>
15-16	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>
<b>Mid-Term</b>	
17-18	<b>Introduction and interpolation</b>
19-20	<b>Recursion</b>
21-22	<b>Case Study</b>
23-24	<b>Searching</b> Searching lists
25-26	Searching arrays
27-28	Searching trees
29-30	Hashing
31-32	<b>Sorting</b> Insertion (sequential) sort
33-34	Bubble Sort Quick sort
35-36	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Subject: Structured Programming Language-C****Full Marks: 100****Credits: 03****Session: 36**

<b>Session</b>	<b>Topics</b>
<b>1-2</b>	<b>Introduction</b> C as General Purpose, Structured, High Level Man Machine Language Structure of a simple C Program Editing and running simple C Program
<b>3-4</b>	<b>Fundamentals</b> Character Set, Identifiers and Keywords Data Types Constants and Variables
<b>5-6</b>	Expressions Statements Symbolic Constants
<b>7-8</b>	<b>Operations and Expression</b> Arithmetic Operations Unary Operators Logical Relational Operators and Connectives
<b>9-10</b>	Assignment Operators Conditional Operators Bit-wise Operators Library Functions
<b>11-12</b>	<b>Data Input/Output</b>
<b>13-14</b>	<b>Control Statements</b> The while statements The do-while statements The for statements Nested loops The if-else statements The break statements The continue statements The switch statements The go to statements The comma operators
<b>15-16</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>

Session	Topics
<b>Mid-Term</b>	
<b>17-18</b>	<b>Arrays and Pointers</b> Declaration and simple use of Pointers Pointers and Arrays
<b>19-20</b>	<b>Structures</b> Defining a Structure
<b>21-22</b>	<b>Structures</b> Defining a Structure
<b>23-24</b>	Manipulating Structures
<b>25-26</b>	Manipulation of a linked-list
<b>27-28</b>	<b>Functions</b> General form of a function definition Simple use of functions
<b>29-30</b>	Public and local function Functions, Arrays and Recursive Procedures Functions, Structures and Pointers
<b>31-32</b>	<b>Data Files</b> Opening and closing a data files Working with the text files Creating and Displaying data files and structures
<b>33-34</b>	Case Study
<b>35-36</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Subject: Linux System Administration****Full Marks: 100****Credits: 03****Session:36**

<b>Session</b>	<b>Topics</b>
<b>1-2</b>	Introduction to Linux
<b>3-4</b>	Linux File Systems
<b>5-6</b>	Installation of Linux
<b>7-8</b>	Partitioning
<b>9-10</b>	Installation DNS Server
<b>11-12</b>	Configuring DNS Server
<b>13-14</b>	Installation Mail Server Configuring Mail Server
<b>15-16</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>
<b>Mid-Term</b>	
<b>17-18</b>	Installation
<b>19-20</b>	Configuring Proxy Server
<b>21-22</b>	Installation FTP Server
<b>23-24</b>	Configuring FTP Server
<b>25-26</b>	Installation and Configuring DHCP Server
<b>27-28</b>	Configuring Devices in Linux
<b>29-30</b>	Printing with Linux
<b>31-32</b>	Linux System Administration
<b>33-34</b>	Scripting. Case Study
<b>35-36</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Subject: Computer Networks**

**Full Marks: 100**

**Credits: 03**

**Session: 36**

<b>Session</b>	<b>Topics</b>
<b>1-2</b>	<b>Introduction to Data Communication</b> <ul style="list-style-type: none"><li>• Data &amp; Information</li><li>• Data Communication</li><li>• Characteristics of Data Communication</li><li>• Data Communication Model</li><li>• Future of Data Communication</li></ul>
<b>3-4</b>	<b>Data Communication Systems</b> <ul style="list-style-type: none"><li>• Communication Functionality</li><li>• Communication Data Flow</li><li>• Data Transmission</li><li>• Type of Data Transmission</li></ul>
<b>5-6</b>	<ul style="list-style-type: none"><li>• Modulation<ul style="list-style-type: none"><li>• Analog Modulation</li><li>• Digital Modulation</li></ul></li><li>• Modulation Uses in Communication</li><li>• How Modulation works</li></ul>
<b>7-8</b>	<b>Networking Basics</b> <ul style="list-style-type: none"><li>• Computer Network System</li><li>• Classification of Computer Networks</li><li>• Network Topology</li><li>• Standard in Networking</li><li>• Standard Organization in the Field of Networking</li></ul>
<b>9-10</b>	<b>Network Architecture &amp; Model</b> <ul style="list-style-type: none"><li>• OSI Model and Importance of the OSI Model</li><li>• How the OSI model works</li><li>• OSI VS. TCP/IP Model</li><li>• Hardware &amp; Software Components of Computer Network</li><li>• Workgroup, Client-Server Network &amp; Type of Clients</li><li>• Work Group and Client-Server Architecture</li><li>• Intranet, Extranet, Internet</li></ul>
<b>11-12</b>	<b>Communication Media</b> <ul style="list-style-type: none"><li>• Types of Communication Media</li><li>• Communication Media &amp; Terminology in Computer Networks</li></ul> Wired Infrastructure: Twisted Pair & Fiber Optics
<b>13-14</b>	<ul style="list-style-type: none"><li>• Wireless Infrastructure: AP, Router, LAN Controller</li><li>• Managed vs Un-Managed Wireless Infrastructure</li><li>• Small Form-factor Pluggable (SFP) Interface</li></ul>
<b>15-16</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>

Session	Topics
<b>Mid-Term Exam</b>	
17-18	<b>LAB Practice</b> <ul style="list-style-type: none"> <li>• Installation of Structure LAN System</li> <li>• Configuring Wireless LAN</li> </ul>
19-20	<b>IP Addressing &amp; Network Protocols</b> <ul style="list-style-type: none"> <li>• Protocols and Elements of a Protocol</li> <li>• Networking Protocols (TCP/IP, STP, RSTP, MSTP, LACP, VRRP, DNS, FTP, SMTP, HTTP, HTTPS, IMAP, POP3, etc)</li> <li>• Common TCP Ports and its uses</li> </ul>
21-22	<ul style="list-style-type: none"> <li>• IP Addressing and Subnetting</li> <li>• Advantages of IPv6 over IPv4</li> <li>• L3 Ethernet Switches vs Routers</li> <li>• Firewall vs UTM</li> </ul>
23-24	<b>Network Security</b> <ul style="list-style-type: none"> <li>• Key Concepts in Network Security</li> <li>• Types of Network Security</li> <li>• Network Security &amp; Importance of Network Security</li> <li>• Essential Network Security Strategies</li> </ul>
25-26	<ul style="list-style-type: none"> <li>• Common Network Security Threats &amp; commonly used Tools</li> <li>• How Firewalls Enhance Network Security</li> <li>• Best Practices for Strong Network Security</li> <li>• Future of Network Security</li> </ul>
27-28	<b>Mobile Communication</b> <ul style="list-style-type: none"> <li>• The Basic Concept of Mobile Communication</li> <li>• How Mobile Phone Communication Works?</li> <li>• The Evolution of Mobile Network</li> <li>• Difference Between 4G and 5G Communication</li> </ul>
29-30	<b>Advanced Network Security and Switching Concepts</b> <ul style="list-style-type: none"> <li>• Virtual Local Area Networks or Virtual LANS (VLANs)</li> <li>• Demilitarized Zone (DMZ) and its Application</li> <li>• VPN and How it works</li> <li>• Importance of Packet Buffer, Switching Capacity,</li> <li>• Forwarding Rate, Memory, etc for selecting an Ethernet Switch</li> </ul>
31-32	<b>Planning &amp; Designing</b> <ul style="list-style-type: none"> <li>• Requirement Analysis of an Integrated IP Infrastructure</li> <li>• Designing of an Enterprise Wired IP Infrastructure</li> <li>• Designing of an Enterprise Managed Wireless IP Infrastructure</li> </ul>
33-34	<b>LAB Practice</b> <ul style="list-style-type: none"> <li>• Configuring Switch &amp; Router</li> <li>• Configuring VPN &amp; VLAN</li> <li>• Configuring Firewall &amp; UTM</li> <li>• Policy based Users Management</li> </ul>
35-36	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Subject: Data Analytics with Python and Power BI****Full Marks: 100****Credits: 03****Session:36**

<b>Session</b>	<b>Topics</b>
<b>01–02</b>	<b>Module-1: Introduction to Data Analytics and Tools:</b> <ul style="list-style-type: none"><li>• What's Data Analytics? Types of Analytics.</li><li>• Data Analytics Lifecycle: From Collection to Decision Making.</li><li>• Importance of Insights for business Growth.</li><li>• Real-life analytics case study walkthrough.</li><li>• Overview of Python &amp; Power BI Tools.</li></ul>
<b>03–04</b>	<b>Module-2: Databases and Relational Concepts using SQL:</b> <ul style="list-style-type: none"><li>• What is a database?</li><li>• Types: Relational vs non-relational. Which RDBMS to select?</li><li>• Tables, Primary Keys, Foreign Keys, ER Diagrams.</li></ul>
<b>05–06</b>	<ul style="list-style-type: none"><li>• What is SQL? Why it's essential for analytics?</li><li>• SQL Basics: Data Retrieval and Filtering.</li></ul>
<b>07–08</b>	<ul style="list-style-type: none"><li>• Aggregation, Grouping and Joins.</li><li>• Subqueries in SQL.</li></ul>
<b>09–10</b>	<b>Module-3: Data Handling &amp; Exploration with Python:</b> <ul style="list-style-type: none"><li>• Python Basics</li><li>• Python Basics</li></ul>
<b>11–12</b>	<ul style="list-style-type: none"><li>• Introduction to Pandas and Data Frames.</li><li>• Data Cleaning and Pre-Processing.</li></ul>
<b>13–14</b>	<ul style="list-style-type: none"><li>• Data Transformation and Feature Engineering.</li><li>• Data Transformation and Feature Engineering.</li><li>• Reshaping Data (Grouping, Merging, Joining).</li><li>• Reshaping Data (Grouping, Merging, Joining).</li></ul>
<b>15–16</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>
<b>Mid-Term</b>	
<b>17–18</b>	<b>Module-4: Data Visualization using Python:</b> <ul style="list-style-type: none"><li>• Data Visualization package explained.</li><li>• Seaborn for Statistical Data Visualization.</li></ul>
<b>19–20</b>	<ul style="list-style-type: none"><li>• Seaborn for Statistical Data Visualization.</li><li>• Styling and Customization of visualization.</li></ul>
<b>21–22</b>	<b>Assignment:</b> <ul style="list-style-type: none"><li>• Analyze a public dataset and create a visualization report using matplotlib and seaborn.</li></ul>

Session	Topics
23–24	<b>Module-5: Data Visualization with Power BI:</b> <ul style="list-style-type: none"> <li>• Connecting to data sources (CSV, Excel, Databases)</li> <li>• Cleaning &amp; transforming data using Power Query.</li> </ul>
25–26	<ul style="list-style-type: none"> <li>• Data Modelling.</li> <li>• Basic visuals: bar, pie, line, maps, cards.</li> <li>• Visual filters, slicers, and drill-throughs.</li> <li>• Interactive dashboards and storytelling.</li> </ul>
27–28	<b>Assignment:</b> <ul style="list-style-type: none"> <li>• Create a dynamic dashboard and explain Insights.</li> </ul>
29–30	<b>Module-6: Data Aggregation, DAX, and Power BI Analytics:</b> <ul style="list-style-type: none"> <li>• Understanding DAX (Data Analysis Expressions) and calculated fields.</li> <li>• Filtering, Context, and CALCULATE().</li> </ul>
31–32	<ul style="list-style-type: none"> <li>• Time Intelligence Functions and Period Analysis.</li> <li>• KPIs, Trend Dashboards, and Best Practices.</li> </ul>
33–34	<b>Assignment:</b> <ul style="list-style-type: none"> <li>• Create a dynamic dashboard using DAX and explain Insights.</li> <li>• Capstone Project Guidance</li> </ul>
35–36	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Reference books:**

1. Storytelling with Data – Cole Nussbaumer Knaflic
2. Fundamentals of Data Visualization – Claus Wilke
3. Python for Data Analysis – Wes McKinney

<p><b>Subject: Viva Voce</b>  <b>Full Marks: 50</b>  <b>Credits: 1.5</b></p>
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# PART II

**Subject: Web-Based Software Development**

**Full Marks: 100**

**Credits: 03**

**Session: 36**

Session	Topics
1-2	<b>Introduction to Web Technologies</b> <b>HTML Fundamentals</b> <ul style="list-style-type: none"><li>• Overview of web technologies</li><li>• Client–Server Architecture</li><li>• Front-end vs Back-end Roles</li><li>• HTTP/HTTPS Protocols</li><li>• Domain &amp; Hosting</li><li>• Modern Web Ecosystem</li><li>• How web applications work behind the scenes</li><li>• HTML Syntax &amp; Document Structure</li><li>• Semantic Elements, Headings, Paragraphs, Links, Lists</li><li>• Forms and Input Types</li></ul>
3-4	<b>Bootstrap Framework &amp; Introduction to CS</b> <ul style="list-style-type: none"><li>• Bootstrap Installation &amp; Folder Structure</li><li>• Grid System &amp; Breakpoints</li><li>• Layout Utilities &amp; Responsive Containers</li><li>• Common Components (Navbar, Forms, Buttons, Cards, Modals)</li><li>• Utility Classes</li><li>• Basic Customization of Bootstrap</li><li>• CSS Basics (Colors, Fonts, Backgrounds, Borders, Spacing)</li></ul>
5-6	
7-8	<b>PHP Fundamentals &amp; Environment Setup</b> <ul style="list-style-type: none"><li>• PHP Installation Tools</li><li>• Local Server Setup</li><li>• PHP Syntax</li><li>• Variables</li><li>• Echo &amp; Print Statements</li><li>• Comments</li></ul>
9-10	<b>PHP Control Structures</b> <ul style="list-style-type: none"><li>• Data types</li><li>• Operators (Arithmetic Operators, Assignment Operators, Comparison Operators, Logical Operators, Increment/Decrement/Operators)</li><li>• Conditional statements (if, else, switch) Loops (for, while, do-while)</li></ul>

Session	Topics
11-12	<b>Working with Forms and User Input</b> <ul style="list-style-type: none"> <li>• HTML Form Integration with PHP</li> <li>• Superglobals (GET, POST, REQUEST)</li> <li>• Form Validation &amp; Sanitization</li> </ul>
13-14	<b>Session &amp; Cookie Management, MySQL Introduction</b> <ul style="list-style-type: none"> <li>• PHP Sessions &amp; Cookies</li> <li>• Introduction to MySQL</li> <li>• Advantages of MySQL</li> <li>• Database &amp; Table Concepts</li> <li>• MySQL Installation</li> </ul>
15-16	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>
<b>Mid-Term</b>	
17-18	<b>Database Concepts &amp; Design</b> <ul style="list-style-type: none"> <li>• Database Concepts (Tables, Rows, Columns)</li> </ul>
19-20	<ul style="list-style-type: none"> <li>• SQL Commands (SELECT, INSERT, UPDATE, DELETE)</li> <li>• Relational Concepts</li> <li>• Primary &amp; Foreign Keys</li> </ul>
21-22	<b>Filtering, Sorting &amp; Aggregation in SQL</b> <ul style="list-style-type: none"> <li>• Sorting Entries.</li> </ul>
23-24	<ul style="list-style-type: none"> <li>• ORDER BY clause</li> <li>• Where clause</li> </ul>
25-26	<ul style="list-style-type: none"> <li>• AND, OR Operators</li> <li>• MySQL MIN () and MAX () Functions</li> <li>• MySQL COUNT (), AVG () and SUM () Functions</li> </ul>
27-28	<b>PHP and MySQL Integration</b> <ul style="list-style-type: none"> <li>• Connecting PHP with MySQL using PDO</li> <li>• CRUD Operations</li> </ul>
29-30	<b>Laravel Fundamentals</b> <ul style="list-style-type: none"> <li>• Introduction to Laravel</li> <li>• MVC Architecture</li> <li>• Laravel Installation (Composer &amp; Artisan)</li> <li>• Project Structure</li> <li>• Routing, Controllers &amp; Blade</li> <li>• Routing (web.php)</li> <li>• Controller Basics</li> <li>• Resource Controllers</li> <li>• Blade Syntax</li> <li>• Layouts &amp; Sections</li> <li>• Loops &amp; Conditionals in Blade</li> <li>• Asset Management</li> </ul>

Session	Topics
31-32	<b>Database, Eloquent ORM &amp; Form Handling</b> <ul style="list-style-type: none"> <li>• Database Configuration</li> <li>• Models</li> <li>• Migrations</li> <li>• Seeding</li> <li>• Form Validation</li> <li>• Custom Error Messages</li> <li>• Old Input Handling</li> </ul>
33-34	<b>Authentication, Authorization &amp; Practice Projects</b> <ul style="list-style-type: none"> <li>• Laravel Authentication (Breeze / UI)</li> <li>• Login &amp; Registration Flow</li> <li>• Practice Projects: To-Do List, Personal Blog, Student Management System</li> </ul>
35-36	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

Reference:

1. <https://www.php.net/manual/en/>
2. <https://www.w3schools.com/php/>
3. <https://dev.mysql.com/doc/>
4. <https://laravel.com/docs>  
<https://platform.openai.com/docs/guides/prompt-engineering>

**Subject: Fundamentals of AI****Full Marks: 100****Credits: 03****Session: 36**

Session	Topics
01-02	<b>Module- 1: Introduction to AI:</b> <ul style="list-style-type: none"><li>• What is AI? History &amp; evolution.</li><li>• Types of AI: Narrow vs General, Weak vs Strong.</li><li>• AI in everyday life (voice assistants, recommendation systems, etc.)</li><li>• Ethics and social implications.</li><li>• AI myths and realities.</li></ul>
03-04	<b>Module- 2: Data and Knowledge Representation:</b> <ul style="list-style-type: none"><li>• Data types and sources.</li><li>• Introduction to datasets (structured/unstructured)</li></ul>
05-06	<ul style="list-style-type: none"><li>• Basics of search and problem-solving</li><li>• Introduction to ontologies and expert systems</li></ul>
07-08	<b>Module-3: Machine Learning Fundamentals:</b> <ul style="list-style-type: none"><li>• What is Machine Learning? Types: Supervised, Unsupervised, Reinforcement</li><li>• Common algorithms (conceptually): Linear regression, Logistic Regression, KNN, SVM, Bagging and Boosting Methods, clustering (K-Means, DBSCAN)</li></ul>
09-10	<ul style="list-style-type: none"><li>• Common algorithms (conceptually): Linear regression, Logistic Regression, KNN, SVM, Bagging and Boosting Methods, clustering (K-Means, DBSCAN)</li><li>• Training vs testing, overfitting, Model Tuning, bias-variance.</li></ul>
11-12	<ul style="list-style-type: none"><li>• Tools &amp; platforms (demo with scikit-learn, Teachable Machine, etc.)</li><li>• Evaluation metrics (R Squared, accuracy, precision, recall)</li></ul>
13-14	<ul style="list-style-type: none"><li>• Evaluation metrics (R Squared, accuracy, precision, recall)</li></ul>
	<b>Assignment:</b> <ul style="list-style-type: none"><li>• Comparative Analysis of Classification Algorithms on a Given Problem (Anaconda/Google Co-lab)</li></ul>
15-16	<b>Class test/presentation/Quiz-1/Industry Visit</b>
<b>Mid-Term</b>	
17-18	<b>Module-4: Natural Language Processing (NLP) and Speech:</b> <ul style="list-style-type: none"><li>• Basics of NLP. Structure of language.</li><li>• Text Pre-processing concepts: Tokenization, Stemming, Lemmatization, and Embedding.</li></ul>

Session	Topics
19-20	<ul style="list-style-type: none"> <li>NLP Models Evolution: (Bag of Words, Word2Vec, Glove, BERT)</li> <li>Chatbots and sentiment analysis.</li> <li>Speech recognition basics. Text-to-speech and vice versa.</li> </ul>
21-22	<b>Assignment:</b> <ul style="list-style-type: none"> <li>Analyze sentiment of news headlines using a simple tool (Google Colab/online NLP demo)</li> </ul>
	<b>Module-5: Generative AI:</b> <ul style="list-style-type: none"> <li>Introduction to Generative AI.</li> <li>Understanding Large Language Models (LLMs)</li> </ul>
23-24	<ul style="list-style-type: none"> <li>Core ideas behind Transformers and Attention mechanism.</li> </ul>
	<ul style="list-style-type: none"> <li>Concept of fine-tuning vs. prompt engineering.</li> </ul>
25-26	<ul style="list-style-type: none"> <li>Generative AI for Sentiment Analysis and Topic Modeling.</li> </ul>
	<b>Assignment:</b> <ul style="list-style-type: none"> <li>Perform sentiment analysis on a Product Review dataset and generate actionable insights (Using GPT/ LLaMA)</li> </ul>
27-28	<b>Module-6: Computer Vision and Robotics:</b> <ul style="list-style-type: none"> <li>Image processing and facial recognition.</li> </ul>
	<ul style="list-style-type: none"> <li>Object detection basics.</li> </ul>
29-30	<ul style="list-style-type: none"> <li>Introduction to robotics and AI agents.</li> </ul>
	<ul style="list-style-type: none"> <li>Real-life use cases: Health, agriculture, security.</li> </ul>
31-32	<b>Module-7: Future of AI and Capstone:</b> <ul style="list-style-type: none"> <li>AI in public services, education, and healthcare.</li> </ul>
	<ul style="list-style-type: none"> <li>Global and local AI policies and strategies</li> </ul>
33-34	<ul style="list-style-type: none"> <li>Responsible AI: Bias, fairness, and transparency.</li> <li>Review and integration.</li> </ul>
35-36	<b>Class Test/ Presentation/ Assignment/ Quiz- 2/Industry Visit</b>

**Reference books:**

1. Artificial Intelligence: A Guide for thinking Humans – Melanie Mitchell
1. Artificial Intelligence: Foundations of Computational Agents – David L. Poole & Alan Mackworth
2. Machine Learning for Absolute Beginners – Oliver Theobald
3. Pattern Recognition and Machine Learning - Christopher Bishop
4. Transformers for Natural Language Processing - Denis Rothman

**Subject: Mobile Applications Development (Java Platform)****Full Marks: 100****Credits: 03****Session: 36**

<b>Session</b>	<b>Topics</b>
<b>1-2</b>	Introduction to Dart & Flutter – Overview, setup, and environment configuration Dart Basics: Variables, Data Types, Operators
<b>3-4</b>	Control Flow: Conditional Statements, Loops Functions and Scope in Dart
<b>5-6</b>	Collections: Lists, Sets, and Maps Object-Oriented Programming in Dart: Classes & Objects
<b>7-8</b>	Inheritance, Polymorphism, Abstract Classes Asynchronous Programming: Future, async & await
<b>9-10</b>	Exception Handling in Dart Introduction to Flutter Framework
<b>11-12</b>	Flutter Project Structure & Widgets Overview Stateless vs Stateful Widgets
<b>13-14</b>	Layouts in Flutter: Row, Column, Container, Stack Input & Form Handling
<b>15-16</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 1/Industry Visit</b>
<b>Mid Term</b>	
<b>17-18</b>	Navigation & Routing Working with Images and Assets
<b>19-20</b>	Using External Packages & Pubspec.yaml State Management Basics
<b>21-22</b>	State <i>Management</i> with Provider Networking & API Integration
<b>23-24</b>	JSON Parsing and Displaying Data List View & Grid View Widgets
<b>25-26</b>	Database Integration: SQLite & Hive Overview Firebase Setup and Authentication
<b>27-28</b>	Cloud Firestore Integration Firebase Storage for Files and Images
<b>29-30</b>	Animations and Transitions Responsive Design and Media Query, Theme and Dark Mode Implementation
<b>31-32</b>	Using Shared Preferences, Push Notifications App Testing & Debugging, App Deployment – Android
<b>33-34</b>	App Deployment – iOS, Capstone Mini Project (Part 1) Capstone Mini Project (Part 2) & Presentation
<b>35-36</b>	<b>Class Test/ Presentation/ Assignment/ Quiz- 2</b>

**Subject: Cyber Security & Emerging Technologies****Full Marks: 100****Credits: 03****Session: 36**

<b>Session</b>	<b>Topics</b>
<b>01–02</b>	<b>Introduction to Cyber Security:</b> Concept of cybersecurity, information security vs cybersecurity, importance of cybersecurity in the digital era, cyberspace and digital assets.
<b>03–04</b>	<b>Cyber Risk, Threat, and Vulnerability Concepts:</b> Threat, vulnerability, and risk, cyber risk from individual and organizational perspectives, basic risk understanding.
<b>05–06</b>	<b>Cyber Threat Landscape:</b> Types of cyber threat actors, cybercrime ecosystem, motivations behind cyber attacks, overview of global cyber threats.
<b>07–08</b>	<b>Malware and Ransomware:</b> Types of malware, ransomware concept, impact of ransomware on organizations, recent ransomware trends.
<b>09–10</b>	<b>Phishing and Social Engineering Attacks:</b> Phishing, vishing, smishing, social engineering techniques, human psychology in cyber attacks.
<b>11–12</b>	<b>Human Factor and Insider Threat:</b> Human behavior as a cybersecurity weakness, insider threats (intentional and unintentional), cyber awareness culture.
<b>13–14</b>	<b>Internet and Network Security Basics:</b> Basic concept of internet and networks, attack surface, common network-based cyber threats (conceptual overview).
<b>15–16</b>	<b>Class Test / Assignment / Presentation / Quiz – 1</b>
<b>Mid-Term</b>	
<b>17–18</b>	<b>Data Protection, Privacy and Identity Security:</b> Types of data, data breaches, privacy concepts, password risks, multi-factor authentication, identity-based attacks.
<b>19–20</b>	<b>Cyber Defense and Security Controls:</b> Preventive, detective and corrective controls, defense-in-depth concept, basic organizational security measures.
<b>21–22</b>	<b>Security Operations Center (SOC) and Monitoring:</b> SOC concept, security monitoring, alerting, overview of incident detection.
<b>23–24</b>	<b>Incident Response Management:</b> Incident response lifecycle, detection, containment, eradication and recovery, importance of preparedness.

Session	Topics
25–26	<b>Introduction to Digital Forensics:</b> Purpose of digital forensics, types of digital evidence, investigation overview, reporting concept.
27–28	<b>Cyber Security in Organizations:</b> Cybersecurity challenges in government, banking and enterprises, business impact of cyber incidents.
29–30	<b>Emerging Technologies and Cyber Risk:</b> Artificial intelligence and cybersecurity, automation and SOAR concepts, risks of emerging technologies.
31–32	<b>IoT, OT and Critical Infrastructure Security:</b> IoT and smart device risks, operational technology security, cyber threats to critical infrastructure.
33–34	<b>Cyber Law, Ethics and Governance:</b> Legal awareness in cyberspace, ethical responsibilities, organizational and national cybersecurity governance. <b>Future cyber threat trends, emerging challenges, course revision and wrap-up</b>
35–36	<b>Class Test / Assignment / Presentation / Quiz – 2</b>

**Subject: Software Engineering**

**Full Marks: 100**

**Credits: 03**

**Session: 36**

<b>Session</b>	<b>Topics</b>
<b>1-2</b>	<b>Introduction to Software Engineering</b> <ul style="list-style-type: none"><li>● Software and Software Engineering</li><li>● Software Crisis</li><li>● Characteristics of Software</li></ul>
<b>3-4</b>	<ul style="list-style-type: none"><li>● Software Engineering Ethics</li><li>● Software Process Framework</li><li>● Role of Software Engineer</li></ul>
<b>5-6</b>	<b>Software Process Models</b> <ul style="list-style-type: none"><li>● Waterfall Model</li><li>● Incremental Model</li><li>● Spiral Model</li></ul>
<b>7-8</b>	<ul style="list-style-type: none"><li>● Prototyping Model</li><li>● Agile Models (Scrum, XP)</li></ul>
<b>9-10</b>	<ul style="list-style-type: none"><li>● Comparison of Process Models</li><li>● DevOps Overview</li></ul>
<b>11-12</b>	<b>Software Requirements Engineering</b> <ul style="list-style-type: none"><li>● Requirement Engineering Process</li><li>● Types of Requirements (Functional &amp; Non-functional)</li></ul>
<b>13-14</b>	<ul style="list-style-type: none"><li>● Requirement Elicitation Techniques</li><li>● Software Requirement Specification (SRS)</li><li>● Requirement Validation and Management</li><li>● Use Case Modeling</li><li>● Design Concepts and Principles</li></ul>
<b>15-16</b>	<b>Class Test / Assignment / Presentation / Quiz – 1</b>
<b>Mid-Term</b>	
<b>17-18</b>	<b>Software Design</b> <ul style="list-style-type: none"><li>● Architectural Design</li></ul>
<b>19-20</b>	<ul style="list-style-type: none"><li>● Design Patterns (Introductory)</li></ul>
<b>21-22</b>	UML Diagrams: <ul style="list-style-type: none"><li>● Class Diagram</li><li>● Sequence Diagram</li><li>● Use Case Diagram</li></ul> User Interface Design Principles

Session	Topics
23-24	<b>Software Testing &amp; Quality Assurance</b> <ul style="list-style-type: none"> <li>● Software Quality Concepts</li> <li>● Verification and Validation</li> </ul>
25-26	<ul style="list-style-type: none"> <li>● Testing Levels: <ul style="list-style-type: none"> <li>● Unit Testing</li> <li>● Integration Testing</li> </ul> </li> </ul>
27-28	<ul style="list-style-type: none"> <li>● System Testing</li> <li>● Acceptance Testing</li> </ul>
29-30	<ul style="list-style-type: none"> <li>● Black Box &amp; White Box Testing</li> <li>● Test Case Design</li> <li>● Introduction to Automated Testing</li> </ul>
31-32	<b>Software Project Management &amp; Maintenance</b> <ul style="list-style-type: none"> <li>● Project Planning and Scheduling</li> <li>● Cost Estimation Models (COCOMO – Intro)</li> </ul>
33-34	<ul style="list-style-type: none"> <li>● Risk Management</li> <li>● Configuration Management</li> <li>● Software Maintenance Types</li> <li>● Re-engineering and Reverse Engineering</li> </ul>
35-36	<b>Class Test / Assignment / Presentation / Quiz – 2</b>

**Subject: Term Paper**  
**Full Marks: 100**  
**Credits: 03**

	<b>Approved Marks</b>
<b>Term Paper Proposal</b>	<b>25</b>
<b>Term Paper Presentation</b>	<b>25</b>
<b>Term Paper Evaluation</b>	<b>50</b>

**Subject: Viva Voce**  
**Full Marks: 50**  
**Credits: 1.5**