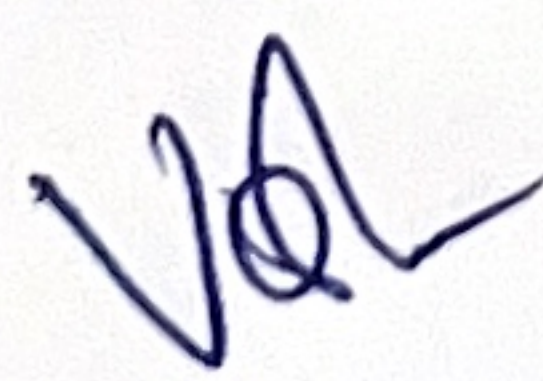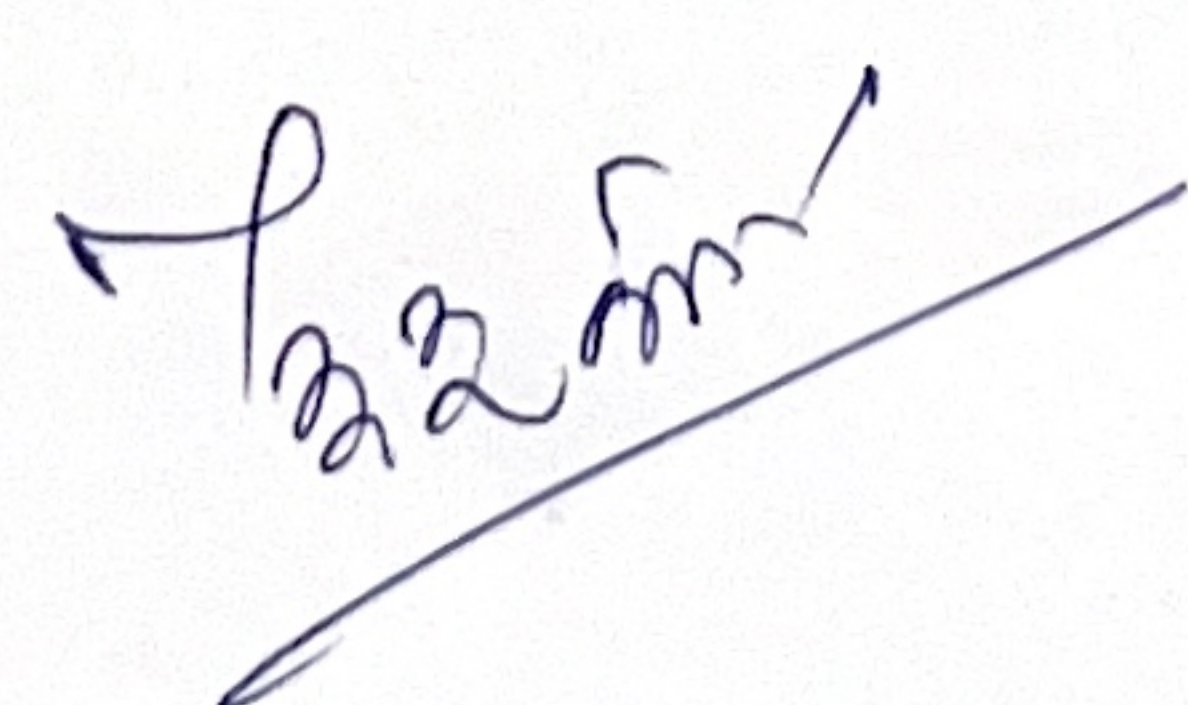# ASIAN EDUCATIONAL INSTITUTE, PATALA
SCHOOL OF COMPUTER SCIENCE
Syllabi Scheme of BCA – IInd Year Semester – IVth
Session 2025-2026 onwards

Sr. No.	Code	Course Type	Title of Paper	L+T	P	External Marks	Internal Marks	Max. Marks	Credits
1.	BCA401T	MAJ CC – 9	Operating System	4+0	0	70	30	100	4
2.	BCA402T	MAJ CC – 10	Computer Networks	4+0	0	70	30	100	4
3.	BCA403T	MAJ CC- 11	Mobile Application Development Using Kotlin	4+0	0	70	30	100	4
4.	BCA404P	MAJ LAB-V	Software Lab - V(Based on Paper BCA403T)	0	4	35	15	50	2

DISCIPLINE SPECIFIC , SKILL ENHANCEMENT AND VALUE ADDED COURSES

Sr. No.	Code	Course Type	Title of Paper	L+T	P	External Marks	Internal Marks	Max. Marks	Credits
1.	BDSE2T	DSE2	Artificial Intelligence	4	0	70	30	100	4
2.	BCA405T	SEC4	Data Analysis and Visualization	3	0	70	30	100	3
3.	BCA406P	SEC4 LAB	SEC4 Lab (Based on Paper BCA405T)	0	4	35	15	50	2
4.	BVAC4T	VAC4	Nutrition and Dietetics	2	0	35	15	50	2
			Total Marks			455	195	650	25

BOS: 29.07.2025

CONTINUOUS ASSESSMENT (THEORY PAPERS)

1. **Two tests will be conducted during the semester.** : **60%** of the total marks allotted for continuous assessment
   Both the tests will be counted for assessment.
2. **Assignment/Quizzes** : **20%** of the total marks allotted for continuous assessment.
3. **Attendance** : **10%** of the total marks allotted for continuous assessment.
4. **Class Participation and behavior** : **10%** of the total marks allotted for continuous assessment.

CONTINUOUS ASSESSMENT (PRACTICAL PAPERS)

1. **Two tests will be conducted during the semester.** : **60%** of the total marks allotted for continuous assessment
   Both the tests will be counted for assessment.
2. **Lab Assignments** : **20%** of the total marks allotted for continuous assessment.
3. **Attendance** : **10%** of the total marks allotted for continuous assessment.
4. **Practical File** : **10%** of the total marks allotted for continuous assessment.

NOTE: The Chairman of the Committee reserves the discretion to modify the syllabus, subject to changing circumstances or emerging needs.

BOS: 29. 07. 2025

BCA401T: MAJ - CC: OPERATING SYSTEM

Total Marks: 100

External Examination: 70

Internal Assessment: 30

Credits: 04

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Lectures to be delivered: 55-60Hrs

L:4   T:0   P:0

Instructions for Paper-Setter:

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

Instructions for Candidates:

Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.

Course Outcomes:

- To focus on understanding the fundamental concepts, structure, and functionality of operating systems.
- To gain knowledge about how the OS manages hardware and software resources.
- To provide an interface between the user and the computer, and ensures efficient and reliable system operation.

SECTION A

Operating System: Definition, Need, Services, Types of operating systems, simple batch system, multi programmed batch system, time sharing system, parallel system, distributed system, real time system, personal computer system.

Operating system components, operating system services, system calls.

Process Management process: definition, process state, process scheduling, operations on processes. Basic concepts of thread. Difference between process and thread.

CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms FCFS, SJF. Round Robin and Multilevel queue scheduling.

SECTION B

Deadlocks: Characteristics of deadlocks, methods for handling deadlocks, deadlock prevention, deadlock avoidance

Memory Management: Logical versus Physical address space, swapping, contiguous allocation, Paging, Concept of Virtual memory. Implementation by Demand Paging, Page replacement algorithms- FIFO, Optimal, LRU, Concept of thrashing.

File Management: Allocation methods: contiguous allocation, linked allocation and indexed allocation.

Device Management: Disk Scheduling: FCFS. SSTF, SCAN, C-SCAN, LOOK.

BOS: 29.07.2025

Text/Reference Books:

1. Abraham Silberschatz. Peter B. Galvin. Operating System Concepts. Addison Wesley Publishing Co. Engineering. Third Edition 2005
2. PankajJolote,Narosa Publications. 5th Edition.

BOS: 29. 07. 2025

BCA402T: MAJ - CC: COMPUTER NETWORKS

Total Marks: 100
External Examination: 70
Internal Assessment: 30
Credits: 04

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 55-60Hrs
L:4   T:0   P:0

Instructions for Paper-Setter:

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

Instructions for Candidates:

Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.

Course Outcomes:

- Become familiar with the basics of computer networks.
- Become familiar with network architectures.
- Become familiar with fundamental protocols.
- Become familiar with basic network computing techniques

SECTION-A

Introduction to Computer networks: Applications. Network hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less).

Network structure and architecture- point to point, multicast, broadcast. Classification of networks-LAN, MAN and WAN.

Reference models: OSI reference model, TCP/IP reference model. Comparison between OSI and TCP/IP models.

Data Link Layer: Design issues, Services to network layer, Framing. Error control. Flow control, Elementary data link protocols unrestricted simplex protocol, simplex stop and wait protocol, simplex protocol for a noisy channel.

SECTION-B

Network layer: Design issues. Services to the transport layer. Routing algorithms -Static non-adaptive and dynamic/adaptive algorithms. Congestion control algorithms -the leaky bucket algorithm, the token bucket algorithm.

Transport layer: design issues, connection management-addressing, establishing and releasing connection, transport layer protocols-TCP, UDP

Application layer: The DNS Name Space. Electronic Maid. The World Wide Web.

Network security: Introduction to cryptography, substitution cipers, transposition cipers, one-time pads, two fundamental cryptographic principles, public key algorithms (RSA, other Public-key algorithms), digital signatures (symmetric-key signatures, public key-signatures message digests.

Text/Reference Books:
1. B Forouzan. Introduction to data communication and networking
2. AS Tanenbaum, Computer Networks

BoS: 29.07.2025

BCA403T: MAJ - CC: MOBILE APPLICATION DEVELOPMENT USING KOTLIN

Total Marks: 100

External Examination: 70

Internal Assessment: 30

Credits: 04

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Lectures to be delivered: 55-60 Hrs

L:4   T:0   P:0

Instructions for Paper-Setter:
The question paper will consist of three sections A. B & C. Sections A& B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

Instructions for Candidates:
Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.

Course Outcomes
- To understand Kotlin syntax and features, mastering Android UI design, implementing app functionality with Kotlin, and publishing applications to the app store.
- To design user interfaces using XML layouts, including different types of views (buttons, text views, etc.) and layout managers.
- To utilize location services and device sensors for location-based features.
- To integrate external web services and APIs to retrieve and display data dynamically

SECTION A

Introduction to Android and Kotlin : Android OS architecture and components (Activities, Services, Broadcast Receivers, Content Providers), Setting up Android Studio, Kotlin syntax: variables, data types, functions, control flow, Null safety, classes, and object-oriented programming in Kotlin, Version control with Git/GitHub.

Mobile Computing & Android Architecture: History and evolution of mobile platforms, Application lifecycle and Android OS internals, MVVM and Clean Architecture overview

Android UI Development: XML Layouts, View Hierarchy, and Material Design, UI components (TextView, Button, ImageView, etc.), Layouts: Linear, Constraint, Relative

Introduction to Jetpack Compose and responsive design: Activities, Fragments & Navigation, Activity and Fragment lifecycles, Intents, navigation components, Safe Args, Dialogs, Menus, Bottom Sheets

State Management &ViewModel Architecture: ViewModel, LiveData, and Data Binding, StateFlow and handling configuration changes, User Interface Design, RecyclerView and Adapters, Navigation Graph and data transfer between screens

SECTION B

Data Persistence & Local Storage: Shared Preferences, internal & external storage, SQLite and Room Database, Jetpack Data Store and offline caching techniques

Networking & API Integration: REST APIs using Retrofit/Volley/Ok Http, JSON/XML handling, coroutines for async calls, Work Manager and Alarm Manager for background tasks

Dependency Injection & Modular Architecture: DI principles, Dagger Hilt, Modular app development and clean code practices, Firebase & Cloud Integration, Firebase Authentication, Firestore, Realtime Database, Push notifications, Firebase Analytics, Crashlytics

Security in Android Applications: Encrypted storage, network security config, ProGuard, R8, and runtime permissions, Testing, Debugging & Performance, Debugging tools (ADB, Logcat, Profiler),

Unit testing (JUnit), UI testing (Espresso),

CI tools: GitHub Actions, Firebase Test Lab

App Deployment, Monetization & Capstone: Preparing APKs and AABs, release signing, Play Store publishing, ASO, in-app purchases, ads

Text/Reference Books:
1. Android Programming with Kotlin for Beginners – John Horton
2. Kotlin Programming: The Big Nerd Ranch Guide – Josh Skeen & David Greenhalgh
3. Head First Android Development – Dawn Griffiths & David Griffiths
4. Kotlin in Action – Dmitry Jemerov& Svetlana Isakova
5. Professional Android – Reto Meier & Ian Lake

BOS: 29.07.2025

BCA404P: Software Lab V (Based On Paper BCA403T)

Total Marks: 50
University Examination: 35
Internal Assessment: 15
Credits :2

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs
L:0   T:0   P:4

This laboratory course will mainly comprise of exercise based on subject BCA403T (Mobile Application Development Using Kotlin).

The breakup of marks for the practical will be as under

i.	Internal Assessment	30% Marks
ii.	Viva Voce (External Evaluation)	30% Marks
iii.	Lab Record, Program Development and Execution(External Evaluation)	30% Marks
iv.	Lab Attendance	10% Marks

BOS: 29.07.2025

BDSE2T: DSE: ARTIFICIAL INTELLIGENCE

Total Marks: 100

External Examination: 70

Internal Assessment: 30

Credits: 04

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Lectures to be delivered: 55-60Hrs

L:4   T:0   P:0

Instructions for Paper-Setter:

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

Instructions for Candidates:

Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.

Course Outcomes:

- To learn the core concepts of AI, including machine learning, deep learning, and natural language processing.
- To apply AI techniques to solve real-world problems in areas like computer vision, robotics, and data analysis.
- To learn how to represent knowledge in AI systems using various methods like logic, rules.
- To understand the concept of AI agents and their role in interacting with the environment.
- To explore the ethical implications of AI and its impact on society.

Section – A

Introduction to Artificial Intelligence: Definitions of AI, Intelligent Agents, Problem solving. Knowledge, Reasoning and Planning: Logical Agents, Classical Planning, Knowledge Representation and Reasoning. Learning: Learning from examples, Knowledge in learning.
Communicating, Perceiving and Acting: Communication, Natural Language Processing, Perception, Computer Vision, Robotics.
Searching: Searching for solutions, uniformed search strategies: Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms.

Section – B

Expert Systems: Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors.Types of expert systems, knowledge engineering, scope of knowledge, difficulties ,in knowledge acquisition methods of knowledge acquisition, machine learning,intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case

based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

AI Applications (General): Speech Recognition, Image Recognition, Natural Language Processing, Autonomous Transportation. Natural Language understanding, Recognizing objects and describing images, Dimensionality reduction, feature selection and feature extraction.

AI Applications (Specific): Virtual Personal Assistants/ Chatbots, Gaming. Smart Cars, Drones, Fraud Detection, Software Testing and Development, Business, Health Care, Education, Finance.

Text /Reference Books:

1. S. Russel and P. Norvig, "Artificial Intelligence A Modern Approach", 2nd Edition, Pearson Education.
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", 4th Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

BCA405T: SEC:DATA ANALYSIS AND VISUALIZATION

Total Marks: 100

External Examination: 70

Internal Assessment: 30

Credits: 04

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Lectures to be delivered: 55-60Hrs

L:4   T:0   P:0

Instructions for Paper-Setter:

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

Instructions for Candidates:

Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.

Course Outcomes:

- To handle, analyse, visualize, manage and present data using various tools and techniques.
- To understand and apply descriptive statistics (mean, median, standard deviation, etc.) to summarize and understand data.
- To create various types of visualizations (charts, graphs, dashboards) to represent data effectively.
- To understand which visualization types are best suited for different types of data and analytical goals.

SECTION – A

Introduction to Spreadsheet: Overview of Spreadsheet,setting up the workspace and preferences, basic data entry and formatting.

Basic Functions and Formulas: Understanding formulas and functions. Basic arithmetic functions (SUM, AVERAGE, MIN, MAX), text functions (CONCATENATE, LEFT, RIGHT, MID), logical functions (IF, AND, OR, NOT).

Data Cleaning and Preparation: Importing data from various sources, data cleaning techniques: removing duplicates, handling missing values, data validation, text functions for data cleaning.

Data Manipulation and Transformation: Sorting and filtering data, using tables and structured references, using lookup functions (VLOOKUP, HLOOKUP, INDEX-MATCH), working with PivotTables for data summarization.

SECTION – B

Basic Data Analysis Techniques: Descriptive statistics in Excel: mean, median, mode, standard deviation, and variance, frequency distributions, using Excel's Data Analysis Tool pack.

Introduction to Data Visualization: Principles of data visualization, creating basic charts in Excel: bar charts, line charts, pie charts, customizing charts for better clarity.

BOS: 29.07.2025

Advanced Data Visualization Techniques: Creating advanced charts- scatter plots, histograms, box plots, introduction to Pivot Charts, using sparklines for data trends.

Advanced Excel Functions: SUMIFS, COUNTIFS, AVERAGEIFS, array formulas, performing scenario analysis and what-if analysis, using Solver for optimization problems.

Text/Reference Books:

1. For Open Source: Documentation Team, Libre Office. Getting Started with Libre Office 6.0. Australia,
Friends of Open Document, Incorporated, 2019.
2. For Proprietary: Working in Microsoft Office - Richard Mansfield -Tata McGraw Hill Education

BCA406P: SEC:SEC4 Lab (Based On Paper BCA405T)

Total Marks: 50
University Examination: 35
Internal Assessment:15
Credits :2

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs
L:0　　　T:0　　　P:4

This laboratory course will mainly comprise of exercise based on subject BCA405T (Data Analysis and Visualization).

The breakup of marks for the practical will be as under

i.	Internal Assessment	30% Marks
ii.	Viva Voce (External Evaluation)	30% Marks
iii.	Lab Record, Program Development and Execution(External Evaluation)	30% Marks
iv.	Lab Attendance	10% Marks