TECHNO INDIA UNIVERSITY
W E S T B E N G A L

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

3-Year Bachelor of Computer Application (BCA) Curriculum and Syllabus

Fourth Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIU-UEN-T200	Career Advancement and Skill Development	2	1	0	3
TIU-UCA-T202	Object Oriented Programming with Java	3	1	0	4
TIU-UCA-T210	Operating Systems	3	1	0	4
TIU-UCA-T212	Fundamentals of Database Management Systems	3	1	0	4
TIU-UCA-T214	Introduction to Block Chain Technology ***	3	1	0	4
Practical					
TIU-UCA-L202	Java Programming Lab	0	0	3	3
TIU-UCA-L210	Operating Systems Lab	0	0	3	2
TIU-UCA-L212	Database Lab	0	0	3	2
Sessional					
TIU-UES-S298	Entrepreneurship Skill Development	0	0	4	2
Total Credits					28

*** to be introduced from July-19

Approved by:

External Expert-1 (Prof. Subhadip Basu, J.U.)

External Expert-2 (Prof. Amlan Chakraborty, C.U.)

HOD - (Prof. A.B. Chaudhuri)

DETAILED SYLLABUS

Career Advancement and Skill Development

TIU-PEN-T200

L-T-P: 2-1-0
Credit: 3

Course Code	Topics	Credit
Interview Skill Management	Types of Interview & Dress Code	1
	Aptitude Interview Grooming	
	Technical Interview Questions	
	Advanced English	1
Total		2

Object Oriented Programming with Java

TIU-UCA-T202

L-T-P: 3-1-0   **Credits: 4**

Unit I
Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes, Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Super class, Abstract Classes and Interfaces, Packages, Exception Handling, Thread, Multithreading.

Unit II
GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Binary I/O, Files & Streams, Recursion, Dynamic Binding, , Algorithm Efficiency, Searching & Sorting.

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Unit III

Generics & Generic Programming, Java Collections Framework, Networking, JDBC, and Internationalization, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Recommended Books:
Main Reading:
1. Y. Daniel Liang, "Introduction to Java Programming: Comprehensive Version", 7th Edition, 2009, Pearson Education Inc., New Delhi.
(Book Chapters: 1 to 24, 26, 29 to 37)
2. Cay S. Horstmann, "Big Java", 3rd Edition, Wiley India Pvt. Ltd., New Delhi**.**

Supplementary Reading:

1. Richard A. Johnson, "An Introduction to Java Programming and Object Oriented Application Development", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. E. Balagurusamy, "Programming with Java: A Primer"

Operating Systems

TIU-UCA-T210

L-T-P: 3-1-0   **Credits: 4**

Evolution of Operating Systems, Structural overview

Concept of process and Process synchronization, Process Management and Scheduling

Hardware requirements: protection, context switching, privileged mode

Threads and their Management; Tools and Constructs for Concurrency, Detection and Prevention of deadlocks, Dynamic Resource Allocation, Design of IO systems

Memory Management: paging, virtual memory management, Distributed and Multiprocessor Systems.

File management system

Recommended Books
Main Reading:

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1. Silberschatz Galvin, "Operating System Concepts", John Wiley & Sons; 7th edition (December 14, 2004).

2. Andrew S.Tanenbaum, Albert S. Woodhull, "Operating Systems: Design & Implementation", PHI.

Supplementary Reading:

1. D. M. Dhamdhere, "Operating Systems: A Concept Based Approach", TMH.

2. A. S. Godbole, "Operating Systems", TMH

Fundamentals of Database Management Systems

TIU-UCA-T212

L-T-P: 3-1-0   **Credits: 4**

Introductory Concepts: Databases and Information Systems, An example usage context, Database system concepts and architecture.

ANSI-SPARC architecture, Different database models, Relational model concepts, Relational integrity constraints, Languages and Systems: Relational algebra, Relational Calculus.

SQL: Data definition in SQL, Queries and update statements, Views, Integrity constraints.

Database design using the relational model: Functional dependencies, Keys in a relational model, Concept of functional dependencies, Normal forms based on primary keys, Boyce-Codd Normal Forms.

Semantic Database Design: High-level conceptual modeling, ER Modeling concepts, ER Diagrams, Cardinality constraints, Higher-order relationships, Enhanced ER Model (EER), Weak-entity types, Subclasses and inheritance, Specialization and Generalization, ER to relational mapping.

Transaction Processing and Concurrency Control: Transaction Fundamentals: OLTP environments, Concurrency issues, need for transactions, Necessary properties of transactions (ACID properties), serializability, Serial schedules, Conflict serializability, View serializability, Recoverable and non-recoverable schedules, Cascading rollbacks.

Concurrency control: Serialized and non-serialized schedules, Testing for serializability, Locking, Locking and serializability, Deadlocks and starvation, Two-phase locking (2PL) protocol, Conservative, strict and rigorous 2PL, 2PL with lock conversions, Timestamp-ordering based protocol, Deadlock, Deadlock prevention protocols, Wait-die and wound-wait schemes, Deadlock recovery.

Database recovery techniques: Recovery concepts, deferred updates technique, Immediate update technique, Shadow paging.

Recommended Books:
Main Reading:

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1. Leon and M. Leon, Database Management Systems, First Edition, 2002, Vikas Publishing House (P) Ltd.

2. Elmasri, S. Navathe, Fundamentals of Database Systems, Third Edition, 2000, Addison wesley.

Supplementary Reading:

1. Korth, A. Silberschatz, Database System Concepts, Third Edition, 1997, McGraw-Hill Internation.

2. Desai, An Introduction to Database Systems, Galgotia Publication.

3. K. Kroenke, Database Processing: Fundamentals, Design Implementation, Prentice Hall of India.

4. Bhattacharya and A. K. Majumder, Database Management Systems, First Edition, 1996, McGraw Hill.

Introduction to Block Chain Technology
TIU-UCA-T214

L-T-P: 3-1-0   **Credits: 4**

Introduction to Blockchain

Basic idea, Public Ledgers, Blockchain as public ledgers, Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions, Distributed Consensus, The Chain and the Longest Chain, Cryptocurrency to Blockchain 2.0, Permissioned Model of Blockchain.

Basic Crypto Primitives

Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

Bitcoin Basics

Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

Distributed Consensus

Importance, Distributed consensus in open environments, Consensus in a Bitcoin network, Consensus in Bitcoin- Bitcoin Consensus, Proof of Work (PoW), Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

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Programming With C#

TIU-UCA-T208

L-T-P: 3-1-0   **Credits: 4**

Syllabus of ASP.Net with C#

1. **An Introduction to C#:**
.NET framework. Components of .Net framework. Primitive types, Namespaces, Statements and expressions.
2. **C# - Generals**
Branching, Switching, Looping, Using foreach. Defining types, Arrays, Methods, Enumerated type data .
3. **Classes and Objects**
Object Oriented Programming, Class & constructors, Inheritance, Interfaces, Abstract Classes, Virtual Members, Operator overloading and Partial Classes.
4. **C# and GUI environment in ASP.Net**
Events, Properties. Basic controls, Panel, MenuStrip, ToolbarStrip and ContextMenuStrip, TreeView, Toolbar, dialog box, ListView control. Validation controls. Multiple Document Interface (MDI), Master page, Form Inheritance.
5. **ADO.NET**
Understanding ADO.net Objects. Sql server, ADO.net connection class, ADO.net command class. Connecting to Database, Performing insert, update and delete Operations, Fetching Data from database, Dataset, DataTable, Datarow, DataAdapter, Datareader.
6. **Page Navigation in ASP.Net**
Response.Redirect, Server.Transfer, Postback, Autopostback.
Recommended Books:
Main Reading:
1. Harsh bhasin, Programming in C# 1st Edition, OXFORD.
Supplementary Reading:

Java Programming Lab
TIU-UCA-L202

L-T-P: 0-0-3   **Credits: 3**

The laboratory component will emphasize on Programming using Java, study of various features of the language and application

Programming Lab With C# in ASP.Net environment
TIU-UCA-L208

L-T-P: 0-0-3   **Credits: 2**

Event Driven Programming using C# as directed by the faculty.

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Operating System Lab
TIU-UCA-L210

L-T-P: 0-0-3

Credits: 2

In this lab students are exposed to Linux Operating System. Initially they will be learning some of the frequently used commands. Then they will learn how to write and execute shell scripts. They will also learn how to create a process using fork system call, and also how to perform inter-process communication between related processes using unnamed pipe.
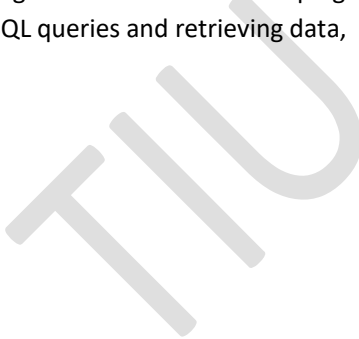
Database Lab
TIU-UCA-L212

L-T-P: 0-0-3   **Credits: 2**

Study of commercial DBMS package such as Oracle. Developing database application with Oracle Creation of a database, writing SQL queries and retrieving data,

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