EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India

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3-Year Master of Computer Application (MCA) Curriculum and Syllabus

Fifth Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIU-UTR-T301	Career Advancement and Skill Development- (SAP-ABAP For MCA & PHP-MySql For iMCA)	2	0	0	2
TIU-PCA-T311	Web Technologies -2 (J2EE)	3	0	0	3
TIU-PCA-T307	Application Development of Smart Devices	2	1	0	3
TIU-PCA-E305	Cryptography and Network Security (Elective I) ***	2	1	0	3
TIU-PCA-E303	Bio-informatics (Elective I)				
TIU-PCA-E311	Data Warehousing and Data Mining (Elective II)	3	1	0	4
TIU-PCA-E313	Digital image processing (Elective II)				
TIU-PCA-E315	Analysis & design of algorithms (Elective II)				
Practical					
TIU-PCA-L307	Android Development lab	0	0	3	2
TIU-PCA-L311	Web Technologies-2 Lab	0	0	3	2
Sessional					
TIU-PCA-P389	Minor Project & Seminar	0	0	3	8
TIU-PES-S399	Entrepreneurship Skill Development	0	0	2	2
Total Credits					31

NOTE: ***To be stated from July-19

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Detailed Syllabus

Career Advancement and Skill Development((SAP-ABAP For MCA & PHP-MySql For iMCA))

TIU-UTR-T301

L-T-P: 2-0-0   **Credit: 2**

Introduction to SAP-ABAP

Web Technologies-2 (J2EE)
TIU-PCA-T311

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

Servlet API 3.x

- Introduction to JEE, Overview of Dynamic web applications
- Introduction to Servlet, Servlet life cycle ,Annotations and their use in Servlet development
- Difference b/w web server & application server, Installing and configuring web & application server, Web Application formats.
- Deployment modes supported by servers, Creating and deploying a simple web application, Understanding the role of ServletRequest & ServletResponse, Differene b/w parameters and attributes, Using different content type for response
- Using RequestDispatcher for Include & Forward, Initialization Parameters and their use
- ServletConfig & ServletContext, Inter application collaboration
- State Management and use of HttpSession & Cookies, Hidden Form fields and URL Rewriting
- Using Http only Cookies, Listeners and web application events
- Applying Filters to servlets, Asynchronous request processing
- File Uploading & downloading, Security.

Java Server pages (JSP)

- -Advantages of JSP over Servlet, JSP Architecture, Integration of JSP & servlet API, JSP implicit objects, Use of JSP Tags, Actions and Directives
- Error Handling in JSP, Using Java Beans in JSP, Defining Custom Tags, JSTL & Expression Language.

Tools & IDE

- Introduction to Eclipse, Installing eclipse, Understanding Perspective & workspaces, Changing Compiler, JRE and other setting, Adding and removing plug-in,
- Project Management, Creating various type of projects, Closing & Importing projects, Building projects, Managing Libraries and Dependencies , Adding jar files from eclipse library, Adding third party jar , Removing jar files from a project ,Code Generation & Refactoring ,Generating getter & Setter methods, Generating constructors, Overriding and implementing methods, Renaming classes and members, Moving classes and packages, Extracting interfaces and abstract classes.
- Server Management, Configuring web/application server,

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- Starting and stopping servers, Deploying and un-deploying applications, Debugging, Debug perspective, Using line, method, exception and data member breakpoints, Setting up conditional breakpoints, Using step into, step over, step return and resume.
- Peeking into stack and heap contents, Unit Testing.
- Introduction to JUnit, Understanding assertions, Writing & executing Test Cases, Managing test cases with Test Suites
- Subversion (SVN) Code Repository & Client, Need of Code Repository, Architecture of SVN Code Repository, Configuring Project in a SVN Code Repository, Installing SVN Client
- Connecting client to SVN Repository, Checking out project form the repository, Updating SVN and local repository

Log4j

- Understanding the need of Logging
- Introduction to Apache Log4j
- Log4j Architecture: Appender, Logger & Layout
- Log4j Configuration for web application

Recommended Books:
Main Reading:
1. Kathy Sierra, Bert Bates, "Head First Servlets and JSP", O'Reilly Media, Inc.
2. Kogent Learning Solutions, "JAVA Server Programming JAVA EE6 (J2EE 1.6)", Black Book, Wiley

Supplementary Reading:
1. James L. Weaver ,Kevin Mukhar, James P. Crume, Ivor Horton , "Beginning J2EE 1.4: From Novice to Professional (Apress Beginner Series) Paperback – February
2. Jim Keogh, J2EE: The complete Reference Paperback – 26 Oct 2002, OSBORNE.
3. James McGovern, Rohm Adatia, Yakov Fain, Jason Gordon & 7 more, Java2 Enterprise Edition 1.4 (J2EE 1.4)
Bible Paperback – August 22, 2003

Application Development of Smart Devices
TIU-PCA-T307

L-T-P: 2-1-0   **Credit: 3**
1) Introduction To Mobile Apps
I. Why we Need Mobile Apps
II. Different Kinds of Mobile Apps
III. Briefly about Android
2) Introduction Android
I. History Behind Android Development
II. What is Android?
III. Pre-requisites to learn Android
IV. Brief Discussion on Java Programming
3) Android Architecture

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I. Overview of Android Stack

II. Android Features

III. Introduction to OS layers

4) Deep Overview in Android Stack

I. Linux Kernel

II. Libraries

III. Android Runtime

IV. Application Framework

V. Dalvik VM

5) Installing Android Machine

I. Configuring Android Stack

II. Setting up Android Studio

III. Working with Android Studio

IV. Using Older Android Tools

6) Creating First Android Application

I. Creating Android Project

II. Debugging Application through DDMS

III. setting up environment

IV. AVD Creation

V. Executing Project on Android Screen

7) Android Components

I. Activities

II. Services

III. Broadcast Receivers

IV. Content Providers

8) Hello World App

I. Creating your first project

II. The manifest file

III. Layout resource

IV. Running your app on Emulator

9) Building UI with Activities

I. Activities

II. Views, layouts and Common UI components

III. Creating UI through code and XML

IV. Activity lifecycle

V. Intents

VI. Communicating data among Activities

10) Advanced UI

I. Selection components (GridView, ListView, Spinner)

II. Adapters, Custom Adapters

III. Complex UI components

IV. Building UI for performance

V. Menus

VI. Creating custom and compound Views

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11) Notifications
I. Toast, Custom Toast
II. Dialogs
III. Status bar Notifications

12) Multithreading
I. Using Java Mutithreading classes
II. AsyncTask
III. Handler
IV. Post
V. Writing an animated game

13) Styles And Themes
I. Creating and Applying simple Style
II. Inheriting built-in Style and User defined style
III. Using Styles as themes

14) Resources and Assets
I. Android Resource
II. Using resources in XML and code
III. Localization
IV. Handling Runtime configuration changes

15) Intent, Intent Filters and Broadcast Receivers
I. Role of filters
II. Intent-matching rules
III. Filters in your manifest
IV. Filters in dynamic Broadcast Receivers
V. Creating Broadcast receiver
Receiving System Broadcast
VI. Understanding Broadcast action, category and data
VII. Registering Broadcast receiver through code and through XML
VIII. Sending Broadcast

16) Data Storage
I. Shared Preferences
II. Android File System
III. Internal storage
IV. External storage
V. SQLite
a. IntroducingSQLite
b. SQLiteOpenHelper and creating a database
c. Opening and closing adatabase
d. Working with cursors Inserts, updates, and deletes
VI. Network

17) Content Providers
I. Accessing built in content providers
II. Content provider MIME types
III. Searching for content

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IV. Adding, changing, and removing content

V. Creating content provider

VI. Working with content files

18)Services

I. Overview of services in Android

II. Implementing a Service

III. Service lifecycle

IV. Inter Process Communication (AIDL Services)

19) Multimedia in Android

I. Multimedia Supported audio formats

II. Simple media playback

III. Supported video formats

IV. Simple video playback

20) Location Based Services and Google Maps

I. Using Location Based Services

II. Finding current location and listening for changes in location

III. Proximity alerts

IV. Working with Google Maps

i. Showing google map in an Activity

ii. Map Overlays

iii. Itemized overlays

iv. Geocoder

v. Displaying route on map

21) Web Services and WebView

I. Consuming web services

II. Receiving HTTP Response (XML, JSON)

III. Parsing JSON and XML

IV. Using WebView

22) Sensors

I. How Sensors work

II. Using Orientation and Accelerometer sensors

III. Best practices for performance

23) WiFi

I. Monitoring and managing Internet connectivity

II. Managing active connections

III. Managing WiFi networks

24) Telephony Services

I. Making calls

II. Monitoring data connectivity and activity

III. Accessing phone properties and status

IV. Controlling the phone

V. Sending messages

25) Camera

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I. Taking pictures
II. Media Recorder
III. Rendering previews
26) Bluetooth
I. Controlling local Bluetooth device
II. Discovering and bonding with Bluetooth devices
III. Managing Bluetooth connections
IV. Communicating with Bluetooth
26) More
I. Fragments
II. Material Design
III. Gradle
IV. NEW TOPICS: Since each new version of Android has new features, we keep extra time for adding custom topics in every batch. You can request any Android Topic.
28) Android Application Deployment
I. Android Application Deployment on device with Linux and Windows
II. Android Application Deployment on Android Market

Cryptography and Network Security (Elective I)
TIU-PCA-E305

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

Unit I
Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model. Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES.
Unit II
Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.
Unit III
Conventional Encryption Algorithms: DES, AES, Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.
Unit IV
Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality, The Chinese Remainder Theorem.
Unit V
Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

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Unit VI

Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set).

Recommended Books:
Main Reading:

1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Cryptography and Network Security: Principles and Practice, William Stallings.

Supplementary Reading:

AtulKahate, "Cryptography and Network Security", TMH

Bio-informatics (Elective I)
TIU-PCA-E309

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

Biological Data Acquisition: The form of biological information. Retrieval methods for DNA sequence, protein sequence and protein structure information; Databases – Format and Annotation: Conventions for database indexing and specification of search terms, Common sequence file formats. Annotated sequence databases - primary sequence databases, protein sequence and structure databases; Organism specific databases; Data – Access, Retrieval and Submission: Standard search engines; Data retrieval tools – Entrez, DBGET and SRS; Submission of (new and revised) data; Sequence Similarity Searches: Local versus global. Distance metrics. Similarity and homology. Scoring matrices. Dynamic programming algorithms, Needleman-wunsch and Smith-waterman. Heuristic Methods of sequence alignment, FASTA, BLAST and PSI BLAST. Multiple Sequence Alignmentand software tools for pairwise and multiple sequence alignment; Genome Analysis: Whole genome analysis, existing software tools; Genome Annotation and Gene Prediction; ORF finding; Phylogenetic Analysis: Comparative genomics, orthologs, paralogs. Methods of phylogenetic analysis: UPGMA, WPGMA, neighbour joining method, Fitch/Margoliash method, Character Based Methods.

TEXTBOOKS

1. Bioinformatics: Databases and Systems, by Stanley I. Letovsky
2. Bioinformatics Databases: Design, Implementation, and Usage (Chapman & Hall/ CRC Mathematical Biology & Medicine), by SorinDraghici
3. Data base annotation in molecular biology, principles and practices, Arthur M.Lesk
4. Current topics in computational molecular biology, Tao, Jiang, Ying Xu, Michael Q.Zang

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Data Warehousing and Data Mining (Elective II)
TIU-PCA-E311

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

Unit I
Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse, architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables, Partitioning, partitioning strategy– horizontal partitioning, vertical partitioning.

Unit II

Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

Unit-III

Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. Data generation & Summarization based characterization, Analytical characterization, mining class comparisons, and mining descriptive statistical measures in large databases. Mining Association Rules in large databases: Association rule mining, single dimensional Boolean association rules from Transactional DBS. Multilevel association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

Unit IV
Classification and Prediction: Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Density based methods, Grid based methods, web mining, Temporal and spatial data mining.

Recommended Books:
Main Reading
1. W.H.Inmon : Building Data Ware House, John Wiley & Sons.
2. S. Anahory and D. Murray : Data Warehousing, Pearson Education, ASIA.
3. Jiawei Han & Micheline Kamber : Data Mining - Concepts & Techniques, Harcourt India Pvt. Ltd.

Supplementary Reading:
1. Michall Corey, M. Abbey, I Azramson& Ben Taub : Oracle 8i Building Data Ware Housing, TMH.
2. I.H. Whiffen : Data Mining, Practical Machine Cearing tools & techniques with Java (Morgan Kanffmen)
3. SimaYazdanri&Shirky& S. Wong : Data Ware Housing with oracle.

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Android lab
TIU-PCA-L305

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

As directed by faculty member.

Web Technologies-2 Lab
TIU-PCA-L311

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

Assignments will be given by the concerned faculty.

Minor Project and Seminar
TIU-PCA-P389

L-T-P: 0-0-3   **Credit: 8**

Unit I
Introduction: The World Wide Web: WWW Architecture, Web Search Engines, Web crawling, Web indexing, Web Searching, Search engines optimization and limitations; Introduction to the semantic web(RDF, OWL)

Unit II
Introduction to .NET framework: Evolution of .NET, Comparison of Java and .NET, Architecture of .NET framework, Common Language Runtime. Common Type System, Metadata, Assemblies, Application Domains, CFL, Features of .NET, Advantages and Application.

Unit III
C#: Basic principles of object oriented programming, Basic Data Types, Building Blocks- Control Structures, operators, expressions, variables, Reference Data Types- Strings , Data time objects, Arrays, Classes and object, Exception Handling, Generics, File Handling, Inheritance and
Polymorphism, Database programming.

Unit IV
Web Applications in ASP.NET: ASP.Net Coding Modules, ASP.NET Page Directives, Page events and Page Life Cycle, PostBack and Cross Page Posting,ASP.Net Application Compilation models, ASP.NET server Controls, HTML Controls, Validation Controls, Building Databases Introduction to JQuery :
What is jQuery? JavaScript vsj Query, How to use jQuery in ASP.NET?

Unit V

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Managing State: Preserving State in Web Applications, Page-Level State, Using Cookies to Preserve State , ASP.NET Session State , Storing Objects in Session State , Configuring Session State , Setting Up an Out-of-Process State Server , Storing Session State in SQL Server , Using Cookieless Session IDs , Application State

Unit VI
Introduction to web services: What is a Web Service? Software as a service, Web Service Architectures, SOA, Creating and consuming Web, XML Web Services, Designing XML Web Services, Creating an XML Web Service with Visual Studio, Creating Web Service Consumers, Discovering Web Services Using UDDI.

Unit VII
Advance .NET Concepts: Introducing WPF, WPF Class Hierarchy, Introducing WCF The WCF Architecture, WCF Endpoint, Introducing WF, Describing Components of WF , Exploring Activities , Describing Types of Workflows , Exploring Built-in Activities , Understanding Bookmark Activities ,
Handling Runtime Errors, Hosting Workflows, Creating a Simple WF Application Exploring Silverlight, Architecture of Silverlight, Silverlight Controls in Silverlight Applications, Creating a Simple Silverlight Application Integrating Silverlight with ASP.NET, Applications Introducing AJAX Controls The Script Manager Control , The ScriptManager Proxy Control, The Timer Control , The Update Panel Control ,
The Update Progress Control.

Recommended Books:
Main Reading:
 1. Beginning C# - Wrox Publication
2. Advance .NET Technology second edition by ChiragPatel- DreamTech Press
Supplementary Reading:
1. Learning jQuery Third Edition - Jonathan Chaffer and Karl Swedberg , SPD Publication
2. Professional C# 2012 and .NET 4.5- Wrox Publication
3. Internet and Web Technologies, RAJ KAMAL, Tata McGraw Hill
4. .NET programming Black Book
5. Murach's ASP. Net 4. 0 Web Programming with C# 2010
6. Pro C# 5.0 and the .NET 4.5 Framework – Andrew Trolsen, APress
7. C# with Visual Studio – Vijay Mukhi , BPB
8. Heard First C# Second Edition , O'Reilly
9. Murach's ADO. Net 4 Database Programming with C# 2010 4th Edition
10. Web Technologies Black book ,DreamTech Press
11. Developing Web Application- Second Editon - Ralph Moseley & M. T. Savaliya, Wiley

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