Subject Name: Design & Analysis of Algorithm **Subject Code:** TMI 401

Course Name: Master of Science in Information Technology
(M.Sc. IT)

1 Contact Hours: 45 **L** 3 **T** 0 **P** 0

2 Examination Duration(Hrs): **Theory** 0 3 **Practical** 0 2

3 Relative Weightage: **CWE:** 25 **MTE:** 25 **ETE:** 50

4 Credits: 0 3

5 Semester: ☐ **Autumn** ☑ **Spring** ☐ **Both**

6 Pre-Requisite: Elementary knowledge of Design and Analysis of Algorithm

7 Subject Area: Computer Applications

8 Objective: To teach how to measure the efficiency of algorithms and how to develop the efficient algorithms.

9 Learning Outcome: A student who successfully fulfills the course requirements will be able to

CO 1 Understand and apply basic data structures
CO 2 Understand and apply advance data structures.
CO 3 Implement programs that demonstrate geometrical transformations.
CO 4 Analyze and implement Dynamic Programming, Greedy Algorithm
CO 5 Understand and analyze NP-Hard and NP-Completeness Approximation Algorithms

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	Algorithms, Analysis of Algorithms, Design of Algorithms, and Space and time Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences relations, Divide and Conquer Relations. Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort Medians and order statistics	8
2	Binary Search Tree, Red Black Trees and its properties, Binomial Heap, B-Tree, Fibonacci Heap.	8
3	**Advanced Design and Analysis Techniques:** Dynamic programming approach and its application, Chain Matrix Multiplication Problem, Optimal Binary search tree , 0/1 knapsack problem, Greedy Algorithm, Backtracking approach, n-queens problem Hamiltonian cycles, Branch-and-Bound, and Amortized Analysis.	10

4	**Graph Algorithms**: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, Bellman Ford Algorithm, All pair Shortest Path, flow Network ,.Maximum flow -min cut theorem, Flow maximization Problem.	9
5	Randomized Algorithms, String Matching-Knuth-Morris-Pratt algorithm, Rabin-Karp algorithm, NP-Hard and NP-Completeness, Cooks theorem, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials & the Fast Fourier Transformation, Number Theoretic Algorithms, Computational Geometry	10
	TOTAL	**45**

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Horowitz Sahani, "Fundamentals of Computer Algorithms." Galgotia	2007
2	Coremen Leiserson etal, "Introduction to Algorithms", PHI	2009
3	Brassard Brately, :Fundamental of Algorithms" PHI	2007

Course Name: Mobile Application Development **Course Code:** TMI 402

Program Name: Master of Science in Information Technology (M.Sc. IT)

1 Contact Hours: 45 **L** 3 **T** 0 **P** 2

2 Examination Duration(Hrs): **Theory** 0 3 **Practical** 0 0

3 Relative Weightage: **CWE:** 25 **MTE:** 25 **ETE:** 50

4 Credits: 0 3

5 Semester: [ ] [*] [ ]
Autumn Spring Both

6 Pre-Requisite: Knowledge of 'Java' language

7 Subject Area: Computer Science

8 Objective: To familiarize students with the App designing and power of Android Programming.

9 Course Outcome:

CO 1 Apply the development tools in the Android development environment.

CO 2 Create UI-rich apps using all the major UI components and analyze the life cycles of Activities, Fragments and Intent.

CO 3 Design UI-rich apps using all the widgets and multimedia components that will show the power of Android Programming like Graphics, Sensors etc.

CO 4 Design applications to implement the concept of files and SQLite Database.

CO 5 Analyze the concept of web services, Telephony, and instant messaging and utilize the Google map to add location to their apps.

CO 6 Analyze and prepare their apps for distribution on the Google Play Store.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	**Introduction to Android:** Introduction of Android, OHA, Features of Android, History, versions, Android Architecture, Android core building blocks, Android Emulator, **Configuring Android Development Environment:** Downloading and installing JDK and Net beans, Downloading and installing Android Studio. **Creating First Android App:** Creating new Android Project, Creating AVD. **Android project files:** Android Manifest.xml, MainActivity.java,	**10**

	R.java, activity_main.xml etc. **Android Tools:** DVM, AVD Manager, Android SDK Manager, Android Emulator, DDMS, resource folder. **App Components**: Activity, Service, Broadcast Receiver, and Content Provider.	
2	**Fragment:** Introduction, needs of fragment and Lifecycle of Fragment. **Intent:** What is Intent, Why Intent? Types of Intent. **Layouts**: Linear, Relative, Tabular, Frame, and Absolute. **Views**: Button, Text View, Edit Text, Radio Button, Image View, Toast, Adapter, Spinner, List View, Grid View. **Adaptor:** Adaptor and Adaptor View. **Android Menu:** Option menu, context menu, and popup menu. **Events:** Event Handling, and Listeners.	**10**
3	**Multimedia:** Playing audio, video file and Camera. **Graphics:** Android Graphics and Animation **Sensors:** How sensors work, category of sensors, sensor framework, and classes and interfaces used to access sensor. **Bluetooth:** Bluetooth Adapter class, Paired devices, Enable/Disable devices. **Maps & Location:** What is Google map, Types of Google map, Methods of Google map.	**9**
4	**Content Provider:** How Content Provider works, steps to create content provider, URI, CRUD. **Files:** Internal and External storage**. Shared Preference**. **Storage**: Introduction to SQLite Database, SQLiteOpenHelper class, and Cursor.	**8**
5	**Android Web Services:** What is web service, Soap and Restful web service? **P2P Communication:** Introduction of Instant Messaging. **Introduction of Telephony.** **Versioning the app:** Setting the version publishing the app on Google play, Moniterizing the Android app.	**8**
	TOTAL	**45**

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	**Programming Android:** Expert Android application Development and professional Android by Reto Meier.	2014
2	Android Black Book, programming android by Zigurd Mednieks, Laird Dormin, G. Blake Meike & Masumi Nakamura.	2015
3	Android Application Development, Black Book by Pradeep Kothari	2014

Code	Title	Description
TMC 402(1)	Mobile Application Design and Development	**Unit I: Topic Added: App Components**: Activity, Service, Broadcast Receiver, and Content Provider. **Unit II: Topic Added: Adaptor:** Adaptor and Adaptor View. **Android Menu:** Option menu, context menu, and popup menu. **Events:** Event Handling, and Listeners. **Topic Removed: App Components**: Activity, Service, Broadcast Receiver, and Content Provider. **Unit III: Topic Added: Bluetooth:** Bluetooth Adapter class, Paired devices, Enable/Disable devices. **Maps & Location:** What is Google map, Types of Google map, Methods of Google map? **Topic Removed: Android Menu:** Option menu, context menu, and popup menu. **Events:** Event Handling, and Listeners. **Unit III: Topic Added: Android Web Services:** What is web service, Soap and Restful web service? **P2P Communication:** Introduction of Instant Messaging. **Introduction of Telephony.** **Topic Removed: Bluetooth:** Bluetooth Adapter class, Paired devices, Enable/Disable devices. **Thread:** Introduction, category and AsyncTask. **Maps & Location:** What is Google map, Types of Google map, Methods of Google map, Need of Callback methods, and Geocoder class?

Subject Name: Advance Java Programming **Subject Code:** TMI 403(1)

Course Name: Master of Science in Information Technology (M.Sc. IT)

1 Contact Hours: 45 **L** 3 **T** 0 **P** 0

2 Examination Duration(Hrs): **Theory** 0 3 **Practical** 0 0

3 Relative Weightage: **CWE:** 25 **MTE:** 25 **ETE:** 50

4 Credits: 0 3

5 Semester: [*] **Autumn** [ ] **Spring** [ ] **Both**

6 Pre-Requisite: Elementary knowledge of core Java

7 Subject Area: **Programming**

8 Objective: To familiarize students how to develop online/offline projects based on MVC patterns using latest frameworks like hibernate, Struts etc.

9 Learning Outcome: A student who successfully fulfills the course requirements will be able to:

CO1 Analyze the components of J2EE to design applications.

CO2 Apply the development tools like ANT in the advance java development environment.

CO3 Create applications using all the major Frameworks and analyze the life cycles of Servlets and JSP.

CO4 Design applications using several jdbc approaches and session handling techniques that will show the power of J2EE components..

CO5 Design applications to implement the concept of POJO classes using Hibernate to manipulate Database.

CO6 Analyze and implement the concept of Action Servlet using XML files in Struts.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	**Introduction to Advance Java:** Importance of client server applications ,Use of java in 3 tier applications ,Understanding MVC patterns, Configuring apache tomcat in eclipse IDE,Creating and applying jar files in IDEs **Servlets:** Advantages of Servlets over CGI, Installing Servlets, The Servlet's Life Cycle, Servlet API, Handling HTTP GET and POST Request, ServletConfig, ServletContext, Requests and Responses, GenericServlet, HttpSevlet, HttpServlet Request, HttpServletResponse, Deployment Descriptor,	9
2	**Use of JDBC :**Manipulating database using eclipse**,** Request dispatcher include	9

	and forward methods. Application development using database validation in servlet **XML:** Reading XML File in Java, Java **DOM** Parser, Java **SAX** Parser **Handling Session:** Use of Cookies, Session Tracking, Filter API, Multi-tier Applications Using Database. Connectivity.	
3	**Java Server Pages (JSP):** Problems with Servlets and Advantages of JSP, JSP Scripting Elements- (Directives, Declaratives, Scriplets, Expressions, Implicit Variables), Page Directives, JSTL, Standard Action, Custom Tags. **Java Beans:** Java Bean, Advantages, usebean and other tags, scope of beans.	9
4	**Hibernate Framework:** Object Relational Mapping, Advantages over JDBC, Mapping from Java classes to database tables (and from Java data types to SQL data types), Data query, retrieval and manipulation. **ANT Tool:** building Java applications with the full portability of pure Java *c*ode	9
5	**JUnit Framework** : How to use JUnit testing framework,Creating JUnit test, Integration with Other Libraries, JUnit test annotations. **Struts Framework :** Struts Architecture, Benefits of struts, MVC, control flow, Struts- Config.xml, web.xml, Action Forward, Action Form, Action Mapping, ActionServlets, Building a small Struts application.	9
	TOTAL	**45**

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Budi Kurniawan, " Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions", New Riders Publishing.	2007
2	Bert Bates, Kathy Sierra, Bryan Basham, “Head First Servlets and JSP”, O'Reilly	2009
3	Bert Bates, Kathy Sierra, Bryan Basham, “Head First EJB”, O'Reilly	2007
4	Uttam Roy”Advanced Java Programming Paperback”, Oxford University Press; UK ed. edition	21 April 2015

Course Name: .NET Programming using C# Language **Subject Code:** TMI 404

Program Name: Master of Science in Information Technology (M.Sc. IT)

1 Contact Hours: 45 **L** 3 **T** **P**

2 Examination Duration(Hrs): **Theory** 0 3 **Practical** 0 2

3 Relative Weightage: **CWE:** 25 **MTE:** 25 **ETE:** 50

4 Credits: 0 3

5 Semester: ☐ **Autumn** ☑ **Spring** ☐ **Both**

6 Pre-Requisite: Basics of Programming Language and Object-Oriented concepts

7 Subject Area: Computer Science

8 Objective: To provide the students with the knowledge and skills needed to develop web-based database driven Microsoft .NET products by using C# with introducing some advance concepts.

9 Course Outcome: After completion of the course students will be able to:

CO 1 Understand the .NET framework as a platform for running different languages.

CO 2 Solve programming problems using the C# programming language.

CO 3 Describe and apply concepts of object-oriented programming in application development.

CO 4 Walkthrough Microsoft Visual Studio Community and its various components and create projects in solution.

CO 5 Evaluate Custom queries in SQL Server to perform basic CRUD operations using ADO.NET.

CO 6 Apply .NET Framework to solve the problems in different domains.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	**Introduction to 4.6 .NET framework**: What is .NET Platform?, What is .NET Framework, .NET Framework, Languages, and Tools, .NET Framework Major Components, Common Language Runtime (CLR), Compilation and Execution in .NET, Understand the .NET Framework 4.6 stack, Introduction to .NET Core. **Using Microsoft Visual Studio Community:** Overview of Visual Studio, Tracing, Debugging, Build, Using break points, Using break conditions, Using watch and output window, Creating multiple projects within one solution, Setting project properties and adding references, Adding files, folders and code Compiling, debugging and testing programs.	9

2	**C# Language Syntax:** Basics of C#, Identifiers, Variables, Keywords, Data Types (Strings, Dates & Time, Integers etc. and their conversion), Type Casting (Boxing and Unboxing) and Nullable Type in C, Performing calculations with mathematical operators. **Controlling program execution:** IF statements, CASE (SWITCH) statements, FOR, FOREACH Loops, WHILE, DO-WHILE Loops. Storing multiple values with arrays, String, String Builder and Preprocessor Directive in C#, methods.	8
3	**C# .NET Object Oriented Programming:** Coding object oriented applications: Dividing code into classes, Adding fields, method properties, events and constructors to classes, Defining scope & visibility, Garbage collector, Inheritance & polymorphism, Overloading methods, Handling errors: Throwing exceptions, Try…..Catch…..Finally, Simplifying maintenance through inheritance: Implementing a base class, Defining virtual and abstract methods, Overriding methods in derived classes, Creating Interfaces, creating and accessing class component library(.dll). **Automating testing with Visual Studio:** Creating Visual Studio test projects, Writing Unit tests, Testing classes, properties, method and exceptions.	9
4	**Programming Web Applications with ASP.NET:** **Constructing ASP.NET Web Sites with Visual Studio:** Writing HTML pages and forms, Maintaining consistency with Master pages, Designing pages with ASP.NET controls, Styling sites with ASP.NET themes. **Processing ASP.NET Web Forms:** HTML server controls, Web server controls, Validation control, User controls, Activating Web Forms with events, ASP.NET AJAX, Working with XML, Introduction to ASP.NET MVC.	9
5	**ADO.NET Architecture**: .NET Data Providers, DB Connectivity , Architectures in .NET, Elements of .NET Data Providers, Introduction to SQL Server, Namespaces in ADO.NET, Using server explorer window, Connection class, Command class, Direct Command execution against database, Using Parameters in command, Performing CRUD operations , Connected Vs disconnected Architecture, Data reader class, The dataset and dataset Architecture, Comparison ADO & ADO.NET on Disconnected Data architecture, Implementing Disconnected Data Architecture, Performing CRUD operations in disconnected architecture. **Introduction to LINQ and Entity Framework.**	10
	TOTAL	45

11 Suggested Books:

Sl. NO.	NAME OF AUTHERS/BOOKS/PUBLISHERS	YEAR OF PUBLICATION
1	Pro C# 7: With .NET and .NET Core, Edition 8 - By Andrew Troelsen, Philip Japikse – "APRESS"	2017
2	C# 7.0 in a Nutshell: The Definitive Reference - Joseph Albahari, Ben Albahari,	2017

	- "O'Reilly Media, Inc."	
3	Professional C# 7 and .NET Core 2.0.: Edition 7, Christian Nagel, “John Wiley & Sons”	2018
4	Illustrated C# 7: The C# Language Presented Clearly, Concisely, and Visually, Edition 5, Daniel Solis, Cal Schrotenboer, “Apress”	2018
5	Head First C#, Andrew Stellman, Jennifer Greene, "O'Reilly Media, Inc."	2007