Lesson Plan Version 10.0

Course:MCA-109–JavaProgramming		
MCA–1st Semester	**No. of Theory Hours per Week: 04**	**No. of Practical Hours per Week: 04 (02 Labs of 02Hourseach)**

Course Outcomes (CO):

COs for Theory (MCA-109):	
CO1	Illustrate the Object-Oriented paradigm, Java language constructs and JVM internal architecture. (BTL2)
CO2	Apply the concepts of exception handling, multithreading, and collection framework. (BTL3)
CO3	Analyze the use of event handling and JFC based toolkit in creating GUI-based computing solutions.(BTL4)
CO4	Design database enabled client-server applications using JDBC, RMI, I/O operations, network programming and relevant concepts. (BTL6)
CO5	Elaborate the functional programming concepts introduced in Java 8 and beyond.(BTL6)

Recommended Books:

Books	S. N.	Details of the Books
Text Books	1.	Herbert Schildt, "Java-The Complete Reference", Oracle Press, 9th Edition, 2014. **[HS].**
	2.	Kathy Sierra and Bert Bates, "Head First Java", O'Reilly Publications,2ndEdition,2005.**[KSB]**
Reference Books	1.	E. Balaguruswamy, "Programming with Java", Tata McGraw Hill, 4thEdition, 2009.
	2.	Cay Horstmann, "Computing Concepts with Java2 Essentials", John Wiley & Sons,2nd Edition,1999.**[CH]**
	3.	Decker and Hirshfield, "Programming Java: An Introduction to Programming using JAVA", Vikas Publication, 2ndEdition,2000.
	4.	N.P. Gopalan and J. Akilandeswari, "Web Technology-A Developers' Perspective", PHI ,2nd Edition,2014.
	5.	Eric Jendrock, Jennfer Ball and Debbei Carson, "The Java #EE5 Tutorial",Pearson,3rdEd.,2007
	6.	Daniel Liang, "Introduction to Java Programming", Pearson, 7thEd., 2010
	7.	Bill Vanners, "Inside Java Virtual Machine" ,Tata McGraw Hill, 2nd Edition ,2000.**[BV]**
	8.	Shelley Powers, "Dynamic Web Publishing",Techmedia,2nd Edition, 1997.

Lesson Plan for Theory:

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
	UNIT -I	
1.	Introduction of the Course, CO explanation	Syllabus with Course Outcomes (CO).pdf
2.	OOP Paradigm: Comparison of programming paradigms.	Chapter 1-**[HS]**
3.	Characteristics of Object-Oriented Programming Languages, Object-based programming languages	Chapter 1-**[HS]**
4.	Java Fundamentals: Brief History of Java, Structure of a Java program, Importance and features of Java	Chapter 2-**[HS]**
5.	Introduction to JVM and its architecture including set of instructions	Chapter 1-**[BV]**
6.	Overview of JVM Programming. Internal and detailed explanation of a valid .class file format.	Chapter 5-**[BV]**
7.	Instrumentation of a .class file, Bytecode engineering libraries, Overview of class loaders, Sandbox Model of Security	Chapter 6-**[BV]**
8.	Basic language construct of Java-including keywords, constants, variables, operators, looping and decision-making construct	Chapter 3-**[HS]**
9.	Objects, Classes and their implementation, Encapsulation, Data Abstraction, Inheritance	Chapter 3-**[CH]** Chapter 7-**[HS]** Chapter 8-**[HS]**
10.	**Buffer Reserved for Revision**	
11.	Polymorphism, Dynamic Binding, Message Passing, default parameter values, using reference variables with function	Chapter 9-**[HS]** Chapter 9-**[CH]**
12.	Creating an array, one and two-dimensional arrays.	Chapter 3-**[HS]** Chapter 11-**[CH]**
13.	String arrays and methods	Chapter 3-**[HS]** Chapter 17-**[HS]**
14.	String and String Buffer classes	Chapter 17-**[HS]**
15.	Wrapper classes: Basics types	Chapter 12-**[HS]**
16.	using super	Chapter 8-**[HS]**

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
17.	Multilevel hierarchy abstract and final classes	Chapter 8-**[HS]**
18.	Object class, packages	Chapter 7-**[HS]** Chapter 9-**[HS]**
19.	interfaces, access protection, extending interfaces	Chapter 9-**[HS]**
20.	**Buffer Reserved for Revision**	
UNIT II		
21.	Exception Handling: Fundamental exception types, exception hierarchy, caught and uncaught exceptions	Chapter10-**[HS]**
22.	throw, throw, finally, built-in exceptions, creating your own exceptions	Chapter10-**[HS]**
23.	Multithreaded Programming: Multithreading basics, Happens-before ordering	Chapter11-**[HS]**
24.	Java thread model: Thread priorities, synchronization, messaging, thread class	Chapter11-**[HS]**
25.	Runnable interface, inter-thread communication, suspending, resuming, and stopping threads.	Chapter11-**[HS]**
26.	The Collection Framework: The Collection Interface, Collection Architecture in Java	Chapter 19-**[HS]**
27.	Collection Classes, traversing Collections	Chapter 19-**[HS]**
28.	Working with Maps & Sets	Chapter 19-**[HS]**
	Buffer Reserved for Revision	
29.	Networking fundamentals: networking classes and interfaces, using java.net package,	Chapter 23-**[HS]**
30.	TCP/IP programming, Data-gram Programming	Chapter 23-**[HS]**
UNIT III		
31.	**Anonymous Classes and Inner classes in Java:** Core concept and its implementation	Chapter 24-**[HS]**
32.	Types of anonymous classes, nested and inner classes, and their implementation	Chapter 24-**[HS]**
33.	**Event Handling:** Different Mechanism, the Delegation Event Model	Chapter 24-**[HS]**
34.	**Event Classes, Event Listener Interfaces,** Adapter and Inner Classes, working with windows	Chapter 24-**[HS]** Chapter 25-**[HS]**
35.	Graphics and Text, using AWT controls	Chapter 25-**[HS]** Chapter 26-**[HS]**

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
36.	Layout managers and menus, handling Images, animation, sound and video.	Chapter 26-[HS] Chapter 27-[HS]
37.	**Swing:** Introduction to JFC (Java Foundation Classes), features of Swing	Chapter 31-[HS] Chapter 32-[HS]
38.	Comparison with AWT, Advanced Control	Chapter 33-[HS]
39.	**Buffer Reserved for Revision**	
40.	**JDBC:** Introduction to DBMS & RDBMS, DBC API, JDBC Application Architecture, JDBC Models: Two Tier and Three Tier Model	Chapter 23-[HS]
41.	Obtaining a Connection, Result Set, Prepared Statement, Callable Statement.	Chapter 23-[HS]
42.	**Input/output Programming:** Basics, Streams, Byte and Character Stream, predefined streams	Chapter 21-[HS]
43.	Reading and writing from console and files.	Chapter 21-[HS]
44.	**Java 8 Concepts:** Default and Functional Interfaces, Lambda Expression, Java stream API and Pipelines, Try with Resources, Java 8 Memory optimization	Chapter 14-[HS] Chapter 15-[HS]
45.	**RMI (Remote Method Invocation):** Introduction, Steps in creating a Remote Object,	Chapter 18-[KSB]
46.	Generating Stub & Skeleton, RMI Architecture, RMI packages	Chapter 18-[KSB]
47.	**Buffer Reserved for Revision**	

Course: MCA-167–Object-Oriented Programming and Java Lab		
MCA–1stSemester	:	**No. of Practical Hours per Week: 04(02 Labs of 02 Hours each)**

Course Outcomes (CO):

COs for Practical(MCA-167):	
CO1	Apply object oriented and Java language constructs for creating Java programs.(BTL3)
CO2	Make use of exception handling, multithreading and collection framework for constructing effective solutions.(BTL3)
CO3	Inspect the use of event handling and JFC based toolkit for GUI-based computing solutions.(BTL4)
CO4	Design database enabled client-server applications using JDBC, RMI, I/O operations, network programming and relevant concepts.(BTL6)
CO5	Elaborate the functional programming concepts introduced in Java8 and beyond.(BTL6)

Lesson Plan for Practical:

Week No.	Lab No.	Topics / Concepts to be Covered	Reference of Lab Manual
1.	1.	Implementing the basic Object Oriented Programmingconcepts in Java using Notepad++ and JDK toolkit.	Assignment A (Problem AP1 To AP4)
	2.	Implementing the concept of Wrapper Classes, TypeCasting and auto-boxing and un-boxing.	Assignment A (Problem AP5 To AP9) (Advanced:A A1-AA2)
2.	3.	Developing java applications on the concept of Arrays-single dimension, multi-dimension, ragged arrays.	Assignment B (Problem BP1To BP4)
	4.	Developing java applications working on complex array arithmetic using Comparable and Comparator interfaces.	Assignment B (Problem BP5To BP7)
3.	5.	Implementing the concept of inheritance in Java andvarious types of inheritance available.	Assignment B (Problem BP8 To BP10)
	6.	Buffer Reserved for Revision	Assignment A –B (Advanced:BA

			1-BA2)
4.	7.	Constructing java programs to see the working of auto-boxing and un-boxing in JSE and the working of Inner Classes in java.	Assignment C (Problem CP1To CP4)
	8.	Constructing java programs to see the working of Static Inner Classes in java and Exception Handling.	Assignment C (Problem CP5 To CP10)
5.	9.	Buffer Reserved for Revision	Assignment – C (Advanced:CA1 -CA3)
	10.	Implementing the concept of Multithreading in Java, practical aspects of concurrency control.	Assignment D (Problem DP1To DP3)
6.	11.	Creating threads using Thread Class, Runnable Interface and Anonymous Implementations.	Assignment D (Problem DP4To DP6)
	12.	Familiarizing the concept of block, method and volatilesynchronization in Threads and File Handling.	Assignment D (Problem DP7To DP8)
	13.	Connecting machines over the intranet using theconcept of TCP and UDP Sockets.	Assignment D (Problem DP9To DP10)
	14.	Buffer Reserved for Revision	Assignment – D (Advanced:DA1 -DA3)
	15.	Creating Java Applications for implementing File Handling for reading/writing data from persistent storage and vice-versa.	Assignment E (Problem EP1To EP3)
	16.	Exploring the Collections Framework and variouscollection types in Java.	Assignment E (Problem EP4To EP7)
	17.	Buffer Reserved for Revision	Assignment – E (Advanced:EA1 -EA3)

	18.	Implementing NetBeans IDE for GUI Development inJava by means of AWT and Swings Framework.	Assignment F (Problem FP1 To FP3)
	19.	Introducing event handling model in the same to make intuitive and responsive GUI with the help of NetBeans IDE.	Assignment F (Problem FP4 To FP8)
	20.	Buffer Reserved for Revision	Assignment – F (Problem FP1 to FP8) (Advanced:FA 1-FA2)
	21.	Connecting Java applications to underlying databases(Apache Derby DB and Oracle 11g) using JDBC API.	Assignment F (Problem FP9 To FP10)
	22.	Exploring Prepared Statement and Callable Statement Interfaces for the database connectivity.	Assignment F (Problem FP11 To FP12)
	23.	Buffer Reserved for Revision	Assignment – F (Advanced:FA3)
	24.	Constructing RMI client server applications to connecttwo remote machines for method access.	Assignment G (Problem GP4To GP6)
	25.	Buffer Reserved for Revision	Assignment – G (Advanced:GA1)

Testing Schedule:

Nature of Test	August	September	October	November
Surprise Test (ST)	-	-	ST in any of The Weeks	-
Mid Term Test(MT)	-	MT in 2nd/ 3rd Week	-	-
Class Test(CT)	CT1 in any of the Weeks	-	-	CT2 in any of the Weeks
Supplementary Test(Sp.T)	-	-	-	Sp.T in 1st week
Assignment Submission Schedule	**Assignment-1**is to be submitted One Week after completion of Unit-1 and Unit-2. **Assignment-2** is to be submitted One Week after completion of Unit-3. **Assignment-3** is to be submitted One Week after completion of Unit-4.			

Suggested Topics for Presentation:

S. No.	Suggested Topics for Presentation
1.	JVM Internals(.class file format, Magic number, JIT, Class Loaders)
2.	Garbage Collection in Java
3.	Sandbox Model of Security
4.	Custom Exception Handling
5.	Java memory model, Memory management
6.	Java Reflection API
7.	Remote Method Invocation
8.	Serialization and Persistence
9.	Java 8 Fundamentals
10.	JAR files
11.	JDBC API
12.	Collection Internals
13.	Transient and volatile modifiers
14.	Stubs and Skeleton in RMI
15.	Swings versus AWT

Suggested Topics for Group Discussion:

S.No.	Suggested Topics for Group Discussion
1.	Importance of Serialization
2.	Custom-Exception Handling
3.	Synchronization
4.	Maps and Sets
5.	Aspect Oriented Programming
6.	Advanced Swing Controls
7.	Design Patterns
8.	Aggregation and Composition
9.	JFC foundation
10.	TCP/IP versus Datagram