Advanced Java (Integrated)

Course Code	**21CS544**	**Course type**	**PEC Integrated Project based**	**Credits L-T-P**	2-0-1
Hours/week: L - T- P	2 - 0 – 2			**Total credits**	3
Total Contact Hours	L = 20Hrs; T = 0Hrs; P = 20 Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content	5 Hours			**SEE Marks**	100

Course learning objectives	
1.	Understand the different ways of handling I/O in Java, including file I/O.
2.	Demonstrate the multithreading concepts and develop multithreaded applications.
3.	Build Java applications using Java Data Base Connectivity (JDBC) to interact with databases
4.	Understand the different ways of handling I/O in Java, including file I/O.
5.	To understand the concept of RMI using Java.

Pre-requisites : Basics of Java **Programming**

Unit – I	**08 Hours**
Java I/O: Byte streams and Character streams, The Byte Stream classes, The Character Stream classes, Predefined streams, Using Byte Streams, Using Java's Type Wrappers to Convert Numeric Strings	
Unit – II	**08 Hours**
File I/O: Reading and Writing Files using Byte Streams, Automatically closing a file, Reading and Writing Binary data, Random-Access Files, Using Java's Character-based Streams, File I/O using Character Streams.	
Unit – III	**08 Hours**
Multithreaded Programming: Multithreading Fundamentals, The Thread class and Runnable interface, Creating a thread, Creating multiple threads, Determining when a thread ends, Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized statement, Thread communication using notify(), wait() and notifyall(), Suspending, Resuming and Stopping threads.	

Unit – IV	**08 Hours**
JDBC: The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing - commit(), rollback(), SavePoint.	
Unit – V	**08 Hours**
Networking:Networking basics, Java and the Net, Inet address, TCP/IP client sockets, URL connection, TCP/IP server sockets, Datagrams.RMI (Remote Method Invocation)Defining the	

remote interface, Implementing the remote interface, Define the client, Compile and execute the server and the client

Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	1	1	1	1	1

List of experiments	
1.	Write a menu driven Java program to work with files
2.	Write a Java Program to demonstrate the implementation of stream classes in Java
3.	Write a Java Program to demonstrate the implementation of reading and writing binary data in Java.
4.	Write a menu-driven Java Program to work with ArrayLists
5.	Write a multithreaded Java program to work with numbers.
6.	Write a Java program to demonstrate how the standard operations on a bank account can be synchronized.
7.	Write a multithreaded Java program to demonstrate the Producer-Consumer problem
8.	Write a Java program to search and display details of book(s) authored by a particular author from a "BOOKS" table. Assume an appropriate structure and attributes for the table.
9.	Program to demonstrate transaction processing. Assume an appropriate database/table.
10.	Write a program to demonstrate RMI.

PART B

Each student needs to formulate a problem definition in consultation with the guide for the Project component and work towards completion after approval. Project report has to be submitted by each student individually.

Books	
1.	Herbert Schildt and Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.
2.	Jim Keogh, J2EE: The Complete Reference, TMH Edition 2002 onwards
3.	Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000
4.	Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003
5	Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2007.
	E-Resources
1.	https://www.w3schools.com/java
2.	https://freecodecamp.org

3	https://www.tutorialspoint.com/java8
4	https://www.javatpoint.com
5.	https://swayam.gov.in/NPTEL

Course delivery methods		Assessment methods	
1.	Chalk & Talk	1.	IA test
2.	I A Test	2.	Journal writing
3.	Mini Project	3.	Lab project/ Open ended experiment
4.	Periodic Journal Evaluation	4.	Lab Test
5.	Practice session/Demonstrations in Labs	5.	Semester End Examination

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	Illustrate the different ways of handling I/O and file I/O and demonstrate in Java	Ap	1,3	1,3
2.	Develop Java programs to understand multithreading concepts and make use of different packages.	Ap	1,2,3,5, 9,10,12	1,2,3
3.	Apply Java Data Base Connectivity (JDBC) concepts to write applications that interact with databases	Ap	1,2,3,5, 9,10,12	1,2,3
4.	Make use of the type hierarchy in the Collections Framework and Lambda expressions.	Ap	1,3	1,3
5.	Experiment with the concept of packages and interfaces.	Ap	1,3,9,10,12	1,3

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (40 marks)		PROJECT (60 marks)			Total
IA test (Theory)	IA test (Lab)	Project Phase 1	Project Phase 2	Project report	
25 marks	15 marks	25 marks	25 marks	10 marks	100 marks

Theory IA test should be of one-hour duration.
Lab IA test should be of two/three-hour duration.
Project batch will ideally consist of 2 students (maximum of 3).
Project Phase 1 presentation will be conducted after 6 weeks and Project Phase 2 presentation will be conducted after 13 weeks from the start of the semester.
Submitting Project report is compulsory.

Eligibility for SEE:

1. 40% and above (16 marks and above) in theory component

2. 40% and above (24 marks and above) in project component 3. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Semester End Examination (SEE):

1.	It will be conducted for 100 marks having 3 hours duration.		
2.	**Lab Open ended program/problem/experiment** Write-up & execution (1 open ended expt)- (20 marks write-up + 20 marks algorithm/flowchart + 10 marks execution)	50 marks	100 marks
	Project evaluation a. Initial write up stating the objectives, methodology and the outcome b. Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project. c. Viva-voce	10 marks 30 marks 10 marks	
3.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 35%, however overall score of CIE + SEE should be $\geq$ 40%.		
4.	SEE will be conducted in project batches by **Internal & External examiners** together.		

CO-PO Mapping (planned)													**CO-PSO Mapping (planned)**		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
1	√		√						√	√		√	√		√
2	√	√	√		√				√	√		√	√	√	√
3	√	√	√		√				√	√		√	√	√	√
Tick mark the CO, PO and PSO mapping															