Pandit Deendayal Energy University
School of Technology
Department of Computer Science and Engineering
Odd Semester 2022-2023
Lab Course student handout file
INDEX

Name of the course: Object Oriented Programming with Java	**Course Code: 20CP204P**
Program: B. Tech. **Branch: CE**	**Semester: 3rd** **Academic Year: 2022-23**
Name of Course Coordinator: Dr. Debabrata Swain	
Subject Teachers (Division wise/Batch wise): G10, G11 **1. Dr. Shivangi Surati**	
1	**Departmental Vision & Mission**
2	**Program educational objectives (PEOs) of Department**
3	**Program Outcomes (POs)**
4	**Program Specific Outcomes (PSOs)**
5	**Academic Calendar**
6	**Class Time Table and Faculty Time Table with office hours**
7	**Course Outcomes (COs), Course Syllabus, Pre requisites for the course**
8	**Lesson Plan**
9	**Program Articulation Matrix and Course Articulation Matrix**
10	**Evaluation Scheme and Rubrics**
11	**Tutorials, Assignments, Case Studies, Quiz, Presentations etc.**
12	**Copy of Mid and End semester Examination Question Papers (Old and Current), solution of current examination with stage-wise marking scheme**
13	**Course covered beyond syllabus**
14	**Actual Engagement of Class**
15	**Attendance Record (Up to Mid Semester Examination and Up to End semester Examination)**
16	**Details for Remedial Classes (list and identification of slow learners, actions taken)**
17	**Justification for Course Outcome mapping with Exams and Assessments**
18	**Result of students (marks of mid, end and internal assessment components)**
19	**Direct Attainment of COs and POs and interpretation (Result analysis)**
20	**Indirect Attainment of POs through Course Exit Survey (Just before end sem. exam)**
21	**Final Attainment of COs and POs and interpretation (Result analysis), Actions to be taken if COs and POs are not achieved**
22	**Sample answer scripts of mid sem., end sem. exam and assignments** of**Good, Better and Best performing students (at least five copies of each assessment tool)**
23	**Class notes (Lecture PPT & Lab manual etc.) in Soft/ Hard copy**

Date:

Signature of Subject Teachers **Signature of Department Coordinator (IQAC)** **Signature of Head of the Department**

Departmental Vision & Mission

Vision

"To contribute to the society by imparting transformative education and producing globally competent professionals having multidisciplinary skills and core values to do futuristic research & innovations."

Mission

- To accord high quality education in the continually evolving domain of Computer Engineering by offering state-of-the-art undergraduate, postgraduate, doctoral programmes.
- To address the problems of societal importance by contributing through the talent we nurture and research we do:
- To collaborate with industry and academia around the world to strengthen the education and multidisciplinary research ecosystem.
- To develop human talent to its fullest extent so that intellectually competent and imaginatively exceptional leaders can emerge in a range of computer professions.

Program Educational Objectives (PEOs) of Department

The Program Educational Objectives of B. Tech. (Computer Engineering) program are:

1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
2. To prepare graduates who will make technical contribution to the design, development and production of computing systems
3. To prepare graduates who will get engage in lifelong learning with leadership qualities, professional ethics and soft skills to fulfill their goals
4. To prepare graduates who will adapt state of the art development in the field of computer engineering

Program Outcomes (POs)

Undergraduate engineering program are designed to prepare graduates to attain the following program outcomes:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

The graduates of CSE department will be able to:

1. Develop computer engineering solutions for specific needs in different domains applying the knowledge in the areas of programming, algorithms, hardware-interface, system software, computer graphics, web design, networking and advanced computing.
2. Analyze and test computer software designed for diverse needs.
3. Pursue higher education, entrepreneurial ventures and research.

Academic Calendar

		11	12	13	14	15	16	17	FACULTY DEVELOPMENT PROGRAMME WEEK
		18	19	20	21	22	23	24	FACULTY DEVELOPMENT PROGRAMME WEEK
1	JULY 2022	25	26	27	28	29	30	31	COMMENCEMENT OF ODD SEMESTER: July 25
2	AUGUST	1	2	3	4	5	6	7	
3		8	9	10	11	12	13	14	RAKSHA BANDHAN
4		15	16	17	18	19	20	21	INDEPENDENCE DAY, JANMASHTAMI
5		22	23	24	25	26	27	28	
6	SEP	29	30	31	1	2	3	4	SAMVATSSARI
7		5	6	7	8	9	10	11	
8		12	13	14	15	16	17	18	**MID-SEM EXAMINATIONS**
9		19	20	21	22	23	24	25	
10	OCT	26	27	28	29	30	1	2	COURSE FEEDBACK WEEK
11		3	4	5	6	7	8	9	DUSSHERA
12		10	11	12	13	14	15	16	
13		17	18	19	20	21	22	23	
14		24	25	26	27	28	29	30	DIWALI WEEK
15	NOV	31	1	2	3	4	5	6	
16		7	8	9	10	11	12	13	GURU NANAK JAYANTI
17		14	15	16	17	18	19	20	COMPLETION OF ODD SEMESTER: Nov. 18
		21	22	23	24	25	26	27	**FOET Practical Exams : Nov.21 Onwards** **FOLS Sem. End Examination : Nov. 21 Onwards**
	DEC	28	29	30	1	2	3	4	**FOET Sem. End Examination : Nov.28 Onwards**
		5	6	7	8	9	10	11	
		12	13	14	15	16	17	18	Rural Internship for FOLS Students: Dec. 17, 2022 to Jan. 10, 2023
		19	20	21	22	23	24	25	
		26	27	28	29	30	31	1	**WINTER BREAK**

Total Weeks: 17

Class Time Table and Faculty Time Table with office hours

Class Time Table:

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (5)

Autumn Semester 2022 — w.e.f : 1st July 2022

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday			G9 (20CP204P) F-203, NIRA-P				G9G10 (20CP204T) D005, PCH-L	G9G10 (20CP203T) D005, TABH-L	G9G10 (20MA206T) D005, ARA-L	G9G10 (20CP202T) D005, HVA-L	
Tuesday		G9G10 (20MA206T) E104, ARA-L	G9G10 (20CP203T) E104, TABH-L				G9 (20CP202P) E213, KADH-P		G9G10 (20CP201T) D005, ADSH-L		
							G10 (20CP201P) F-202, KIKO-P				
Wednesday	G10 (20CP203P) E115, HITH-P		G9G10 (20MA206T) Y5, ARA-T	G9G10 (20CP201T) Y5, ADSH-L							
	G9 (20CP204P) E213, NIRA-P										
Thursday	G10 (20CP204P) F-104, SVS-P		G9G10 (20CP204T) Y6, PCH-L	G9G10 (20MA206T) Y6, ARA-L			G9G10 (20CP203T) Y6, TABH-L	G9G10 (20CP201T) Y6, ADSH-L	G9G10 (20CP202T) Y6, HVA-L		
	G9 (20CP203P) F-103, HITH-P										
Friday	G10 (20CP204P) F-203, SVS-P						G10 (20CP202P) F-104, SMP-P				
							G9 (20CP201P) F-203, KIKO-P				
Saturday											

Faculty Abbr.	Faculty Name	Subject Abbr.	Subject Name
ADSH	Aditya shastri	20CP201P	Data Structures Lab
ARA	Ankush Raje	20CP201T	Data Structures
HITH	Hiren Thakkar	20CP202P	Microprocessor Programming &Interfacing Lab
HVA	Hitesh Vandra	20CP202T	Microprocessor Programming &Interfacing
KADH	Mr. Kandhar Dharmeshbhai N (VF)	20CP203P	Digital Electronics &Computer Organization Lab
KIKO	Kinnari Kotak (VF)	20CP203T	Digital Electronics &Computer Organization
NIRA	Nisha Rathod (VF)	20CP204P	Object Oriented Programming With JAVA Lab
PCH	Payal Chaudhary	20CP204T	Object Oriented Programming With JAVA
SMP	Samir Patel	20MA206T	Discrete Mathematical Structures
SVS	Shivangi Surati		
TABH	Tanmay Bhowmik		

Timetable Coordinator
Santosh Bharti

HoD
Dr. Samir Patel

Director

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (6)

Autumn Semester 2022 w.e.f : 1st July 2022

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday	G11 (20CP204P) FC- 202, SVS-P		G11 (20CP202P) F-103, KADH-P				G11G12 (20CP203T) Y5, TABH-L	G11G12 (20MA206T) Y5, ARA-L	G12 (20CP202P) E216, SMP-P		
	G12 (20CP203P) E214, TABH-P										
Tuesday		G11G12 (20CP202T) Y6, HVA-L	G11G12 (20MA206T) Y6, ARA-L				G11 (20CP203P) E115, TABH-P				
							G12 (20CP204P) E215, NTD-P				
Wednesday	G11 (20CP201P) F-103, ADSH-P		G11G12 (20CP201T) Y6, ADSH-L	G11G12 (20CP203T) Y6, TABH-L			G11G12 (20MA206T) Y6, ARA-L	G11G12 (20CP203T) Y6, TABH-L	G11G12 (20CP204T) Y6, SVS-L		
	G12 (20CP204P) F-202, NTD-P										
Thursday		G11G12 (20CP202T) Y6, HVA-L	G12 (20CP201P) F-202, ADSH-P				G11G12 (20CP201T) E103, ADSH-L	G11G12 (20MA206T) E103, ARA-L	G11G12 (20CP204T) E103, SVS-L		
			G11 (20CP204P) E115, SVS-P								
Friday			G11G12 (20CP201T) Y6, ADSH-L								
Saturday											

Faculty Abbr.	Faculty Name	Subject Abbr.	Subject Name
ADSH	Aditya shastri	20CP201P	Data Structures Lab
ARA	Ankush Raje	20CP201T	Data Structures
HVA	Hitesh Vandra	20CP202P	Microprocessor Programming &Interfacing Lab
KADH	Mr. Kandhar Dharmeshbhai N (VF)	20CP202T	Microprocessor Programming &Interfacing
NTD	Nishant Doshi	20CP203P	Digital Electronics &Computer Organization Lab
SMP	Samir Patel	20CP203T	Digital Electronics &Computer Organization
SVS	Shivangi Surati	20CP204P	Object Oriented Programming With JAVA Lab
TABH	Tanmay Bhowmik	20CP204T	Object Oriented Programming With JAVA
		20MA206T	Discrete Mathematical Structures

Timetable Coordinator
Santosh Bharti

HoD
Dr. Samir Patel

Director

Faculty Time table:

Shivangi Surati

Academic Year: 2022-23 (Odd semester) W.E.F.: 1st July, 2022

Day	08:00-09:00	09:00-10:00	10:00 to 11:00	11:00 to 12:00	12:00 to 13:00	13:00 to 14:00	14:00 to 15:00	15:00 to 16:00	16:00-17:00	17:00-18:00
MON	G11 (20CP204P) E-215, CP(3) - P						G5 (20CP302P) F-103, CP(5) - P			
TUE				Office Hour			G6 (20CP302P) F-103, CP(5) - P		G8 (20CP302P) F-202, CP(5) - P	
WED									G11, G12 (20CP204T) F-404, CP(3)-L	
THURS	G10 (20CP204P) F-104, CP(3) - P		G11 (20CP204P) E-115, CP(3) - P						G11, G12 (20CP204T) E-103, CP(3)-L	
FRI	G10 (20CP204P) F-203, CP(3) - P									
SAT										

Syllabus

20CP204T					Object Oriented Programming with Java					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25			100

COURSE OBJECTIVES

- To build an understanding of basic concepts of object-oriented programming techniques
- To develop programming skills in Java programming language
- To implement object-oriented techniques using Java language features.
- To develop software using object-oriented programming paradigms

UNIT 1 BASICS OF JAVA **7 Hrs.**

Features of Object Oriented Programming and Java, Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in Java.

UNIT 2 INHERITANCE **7 Hrs.**

Basics of objects and classes in java, Constructors, Visibility modifiers, Inbuilt classes in Java, this reference; Inheritance in java, Overriding, Object class, Polymorphism, Dynamic binding, Abstract class, Interface in java, Package in java.

UNIT 3 I/O PROGRAMMING, EXCEPTION AND MULTITHREADING **6 Hrs.**

Introduction to Java IO streams, Character and Binary streams, reading data from and writing data to files, Difference between error and exception, Exception handling in Java, Multithreading in Java, Thread life cycle and methods, Runnable interface, Thread synchronization

UNIT 4 EVENT HANDLING AND GUI PROGRAMMING **6 Hrs.**

Event handling in Java, GUI Components and Layouts, Applet and its life cycle.

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- **Describe** the basic features of Object-oriented programming and map them with the Java.
CO2- **Distinguish** Objects and Classes using Java.
CO3- **Demonstrate** Inheritance and Runtime Polymorphism
CO4- **Apply** I/O handling, exception handling for interactive problem.
CO5- **Use** the concepts of Event Handling in GUI Programming.
CO6- **Construct** object-oriented solutions for small systems involving multiple objects.

TEXT/REFERENCE BOOKS

1. Brett D. McLaughlin, Head First Object-Oriented Analysis and Design, O Reilly, 2006
2. Matt Weisfeld, The Object-Oriented Thought Process, Addison-Wesley Professional, 2019
3. Herbert Schildt, The Complete Reference, Java 2, McGraw Hill, 2020
4. Balagurusamy, Programming with Java – A Primer, McGraw Hill, 2019

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

Practical List

Sr. No.	Practical Definition	
1.	**First module**	
	1.	Install JDK, setup Java environment and write a program to print -"CODING IS FUN, ENJOY IT!".
	2.	Write a program in Java to generate first *n* prime numbers.
	3.	Write a program to enter two numbers and perform all arithmetic, comparison, logical and bitwise operations on them.
	4.	Write a program that scans marks and credits of 2 subjects of the student and calculate the following: Grade of each subject (using else if ladder), Gradepoint of each subject from grade (using switch case), SPI using gradepoints and credits of 2 subjects.
	5.	Write a program in Java to find maximum of three numbers using nested if-else and conditional operator.
	6.	Write a program to accept a line and check how many consonants and vowels are there in line.
	7.	Write a program to count the number of words that start with capital letters.
	8.	Create a class which ask the user to enter a sentence, and it should display count of each vowel type in the sentence. The program should continue till user enters a word "quit". Display the total count of each vowel for all sentences.
	9.	Write an interactive program to print a string entered in a pyramid form. For instance, the string "stream" has to be displayed as follows: S St Str Stre Strea Stream
	10.	Write an interactive program to print a diamond shape. For example, if user enters the number 3, the diamond will be as follows: * * * * * * * * *
	11.	Develop minimum 4 program based on variation in methods i.e., passing by value, passing by reference, returning values and returning objects from methods.
	12.	Write a Java Program to find area of Geometric figures using method Overloading.
	13.	Write a program in Java to create a simple scientific calculator using Math Class.
	14.	Write a program in Java to sort the elements of list so that they are in ascending order (Take dynamic array).
	15.	Write a program in Java to multiply two matrixes (Take dynamic arrays).
2.	**Second module**	
	1.	Write a program to create a "distance" class with methods where distance is computed in terms of feet and inches, how to create objects of a class.
	2.	Modify the "distance" class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.

	3.	Write a program in Java in which a subclass constructor invokes the constructor of the super class and instantiate the values.
	4.	Write a program in Java to develop overloaded constructor. Also develop the copy constructor to create a new object with the state of the existing object.
	5.	Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
	6.	Write a program to show the use of static functions and to pass variable length arguments in a function.
	7.	Write programs in Java to use Wrapper class of each primitive data types.
	8.	Write a program that implements two constructors in the class. We call the other constructor using 'this' pointer, from the default constructor of the class.
	9.	Write a program in Java to demonstrate single inheritance, multilevel inheritance and hierarchical inheritance.
	10.	Java Program to demonstrate the real scenario (e.g., bank) of Java Method Overriding where three classes are overriding the method of a parent class. Creating a parent class.
	11.	Write a program that implements simple example of Runtime Polymorphism with multilevel inheritance. (e.g., Animal or Shape)
	12.	Write a program to compute if one string is a rotation of another. For example, pit is rotation of tip as pit has same character as tip.
	13.	Describe abstract class called Shape which has three subclasses say Triangle, Rectangle, Circle. Define one method area() in the abstract class and override this area() in these three subclasses to calculate for specific object i.e. area() of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle.
	14.	Write a program in Java to demonstrate multiple inheritance.
	15.	a) Write an application that illustrates method overriding in the same package and different packages. b) Also demonstrate accessibility rules in inside and outside packages.
3.	**Third module**	
	1.	Read a content from file: calculate number of sentences, words and characters from the file.
	2.	Read from a file convert it to uppercase and save it into another file.
	3.	Remove duplicate lines from a File.
	4.	Create a class called Student. Write a student manager program to manipulate the student information from files by using FileInputStream and FileOutputStream
	5.	Refine the student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter
	6.	Write a program to manipulate the information from files by using the Reader and Writer class. Assume suitable data.
	7.	Write a program "DivideByZero" that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
	8.	Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
	9.	Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
	10.	Write a small application in Java to develop Banking Application in which user deposits the amount Rs 1000.00 and then start withdrawing of Rs 400.00, Rs 300.00 and it throws exception "Not Sufficient Fund" when user withdraws Rs. 500 thereafter.
	11.	Write a program to handle ArrayIndexOutOfBounds exception for binary search.
	12.	Write a Java Program that demonstrates thread class and few methods.
	13.	Write a program to demonstrate thread example by implementing runnable interface.
	14.	Write a program to demonstrate priorities among multiple threads.

	15.	Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
4.	**Fourth module**	
	1.	Write a program to demonstrate different Window handling events.
	2.	Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
	3.	Write a program to demonstrate different keyboard handling events.
	4.	Write a program to generate a window without an applet window using main() function.
	5.	Write a program to demonstrate the use of push buttons.
	6.	WAP to create a Menu using the frame.
	7.	WAP to create a Frame that display the student information.
	8.	WAP to create a Dialogbox.
	9.	WAP to implement the FlowLayout and BorderLayout.
	10.	WAP to implement the GridLayout and CardLayout.
	11.	WAP to implement the GroupLayout and BoxLayout.
	12.	Write a program that demonstrates the life cycle of an applet.
	13.	WAP to demonstrate System clock.
	14.	WAP to demonstrate Painting in applet.
	15.	WAP to demonstrate Graphics in applet.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO 1	1	1	3	1	3	1	1	1	1	-	3	1	1	2	-
CO 2	1	1	3	1	2	1	1	1	1	-	3	1	1	1	-
CO 3	1	1	3	1	2	1	1	1	3	-	3	1	1	1	-
CO 4	1	1	3	1	2	1	1	1	3	-	3	1	1	1	-
CO 5	1	2	3	1	2	1	1	1	1	-	3	1	2	1	-
CO 6	1	2	3	1	2	2	1	1	1	-	3	1	2	1	-

Program Articulation Matrix

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
1	1.3	3	1	2.1	1.1	1	1	1.6	-	3	1	1.3	1.1	-

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Evaluation Scheme and Rubrics

Course code: 20CP204T **Course name:** Object Oriented Programming with Java

Course Outcomes (CO's): On completion of the course, students will be able to

CO1- Describe the basic features of Obejct-oriented programming and map them with the Java.
CO2- Distinguish Objects and Classes using Java.
CO3- Demonstrate Inheritance and Runtime Polymorphism
CO4- Apply I/O handling, exception handling for interactive problem.
CO5- Use the concepts of Event Handling in GUI Programming.
CO6- Construct object-oriented solutions for small systems involving multiple objects.

CO Assessment Tools (Direct Assessment):

Various assessment tools used to evaluate CO's (Rubrics) and the frequency with which the assessment processes are carried out are listed below.

Assessment Method	**Assessment Tool**	**Description**	**Marks**	**Mapping with CO**	**Contribution to CO's**
Continuous Assessment	Problem solving/ design/Project	Analytical/design based questions on syllabus covered	50	CO1,CO2, CO3,CO4, CO5, CO6	It contributes to 50% weightage of Direct Assessment to CO attainment.
	Total 50 marks				
Direct	End-Sem Examination	**Topics to be covered:** Unit I, II, III, IV	50	CO1,CO2, CO3,CO4, CO5, CO6	It contributes to 50% weightage of Direct Assessment to CO attainment.
	Total 50 marks				

Tutorials, Assignments, Case Studies, Quiz, Presentations etc.

Available online on Teams Platform, PPT sent to students through Email and Teams.

Lecture

- Topic wise PPTs/recordings for All units 1 to 4 will be shared with students with following file names
    - Unit 1 – **Introduction to Java**
    - Unit 2 – I**nheritance, Interfaces and Packages**
    - Unit 3 – **IO Handling, Exception and Multithreading**
    - Unit 4 – **GUI and Event handling in Java**

LAB

- Unit wise practical list is covered and will be distributed to students with synchronization to class teaching.

Course covered beyond syllabus

An introduction to Java related technologies trending in current industry will be given to students through some expert lectures conducted by Industry persons.

Materials from national and international level like NPTEL, Web resources, etc. is shared related to subject domain

- Database Connectivity using JDBC
- Socket Programming

Students will be motivated and guided to get the knowledge of latest updates in Java language thru following websites:

- www.javapoint.com
- www.tutorialspoint.com/java
- https://www.w3schools.com/java/
- https://docs.oracle.com/javase/tutorial/