



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTOR

Course Title	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY				
Course Code	AITB06				
Programme	B.Tech				
Semester	IV	CSE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
				3	2
Chief Coordinator	Mr. N V Krishna Rao, Assistant Professor				
Course Faculty	Ms. S Swarajya Laxmi, Assistant Professor Ms. A Vijaya Laxmi, Assistant Professor				

I. COURSE OVERVIEW:

This course explains the fundamental ideas behind the object oriented approach to programming. Knowledge of java helps to create the latest innovations in programming. Like the successful computer languages that came before, java is the blend of the best elements of its rich heritage combined with the innovative concepts required by its unique environment. This Laboratory lab manual is intended to provide a basic knowledge of java programming for students. To develop software development skills in java programming and students will have the proficiency to develop projects in java programming. The course helps the students to solve the inter disciplinary applications through java programming.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	ACSB02	II	Program for Problem Solving	3
UG	ACSB05	III	Data Structures	3

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Object Oriented Programming through JAVA	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✗	Quiz	✗	Assignments	✗	MOOCs
✓	LCD / PPT	✗	Seminars	✗	Mini Project	✓	Videos
✓	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Presentation on real-world problems
PO 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	2	Seminar
PO 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.	2	Videos
PO 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.	1	Assignments
PO 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.	1	Assignments

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	3	Lectures, Assignments
PSO 2	Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.	2	App Development
PSO 3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	1	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Practice object-oriented programs and build java applications.
II	Implement java programs for establishing interfaces.
III	Implement sample programs for developing reusable software components.
IV	Create database connectivity in java and implement GUI applications..

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACS003.01	CLO 1	Use object oriented programming concepts to solve real world problems.	PO 1	3
ACS003.02	CLO 2	Explain the concept of class and objects with access control to represent real world entities.	PO 1	3
ACS003.03	CLO 3	Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.	PO 3	3
ACS003.04	CLO 4	Use overloading methodology on methods and constructors to develop application programs.	PO 3	1
ACS003.05	CLO 5	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.	PO 1	3
ACS003.06	CLO 6	Describe the concept of interface and abstract classes to define generic classes.	PO 1	2
ACS003.07	CLO 7	Use dynamic and static polymorphism to process objects depending on their class.	PO 1	2
ACS003.08	CLO 8	Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).	PO 4	2
ACS003.09	CLO 9	Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.	PO 2	2
ACS003.10	CLO 10	Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).	PO 1	2
ACS003.11	CLO 11	Use multithreading concepts to develop inter process communication.	PO 4	3
ACS003.12	CLO 12	Understand and implement concepts on file streams and operations in java programming for a given application programs.	PO 5	3
ACS003.13	CLO 13	Describe the backend connectivity process in java program by using JDBC drivers.	PO 5	1
ACS003.14	CLO 14	Develop java application to interact with database by using relevant software component (JDBC Driver).	PO 5	3
ACS003.15	CLO 15	Understand the process of graphical user interface design and implementation using AWT or swings.	PO 3	3
ACS003.16	CLO 16	Use different layouts (Flow Layout, BorderLayout, Grid Layout, Card Layout) to position the controls for developing graphical user interface.	PO 3	2
ACS003.17	CLO 17	Build the internet-based dynamic applications using the concept of applets.	PO 1, PO 3	2
ACS003.18	CLO 18	Develop applets that interact abundantly with client environment and deploy on the server.	PO 1, PO 2	2
ACS003.19	CLO 19	Knowledge on usage of graphical IDE for design and implementation of real time applications in java.	PO 1, PO 3	3
ACS003.20	CLO 20	Posses the knowledge and skills for employability and to succeed in national and international level competitive exams.	PO 12	1

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3	2											3	3	1
CLO 2	3	2	3										1	1	
CLO 3	2		3											1	
CLO 4			2										3		
CLO 5	3	2											2	3	
CLO 6	3	2	2										2	3	
CLO 7	3			1										1	
CLO 8	1	2		1									1		
CLO 9		2	1												
CLO 10	3													3	
CLO 11	3	2		3										1	
CLO 12	2	2			2								1	3	
CLO 13					2									3	
CLO 14			3		2									2	
CLO 15	1	2	3										1	3	
CLO 16	1	1	3											2	
CLO 17	1	2	1											3	
CLO 18		1	3											2	
CLO 19	2	2			1								3	3	
CLO 20												2			1

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2	SEE Exams	PO 1	Assignments	-	Seminars	PO2
Laboratory Practices	PO 1, PO 2 PO 3, PO 4	Student Viva	-	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	BASIC PROGRAMS
	<p>a. Try debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.</p> <p>b. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.</p> <p>c. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non recursive functions.</p>
Week-2	MATRICES, OVERLOADING, OVERRIDING
	<p>a. Write a java program to multiply two given matrices.</p> <p>b. Write a java program to implement method overloading and constructors overloading.</p> <p>c. Write a java program to implement method overriding.</p>
Week-3	PALINDROME, ABSTRACT CLASS
	<p>a. Write a java program to check whether a given string is palindrome.</p> <p>b. Write a java program for sorting a given list of names in ascending order.</p> <p>c. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape</p>
Week-4	INTERFACE
	<p>Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.</p>
Week-5	MULTITHREADING
	<p>a. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</p> <p>b. Write a java program that correct implements of producer consumer program</p>
Week-6	FILES
	<p>a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.</p> <p>b. Write a java program that displays the number of characters, lines and words in a text file.</p> <p>c. Write a java program that reads a file and displays the file on the screen with line number before each line.</p>

Week-7	FILES
<p>a. Suppose that table named table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using labels in grid layout.</p> <p>b. Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.</p>	
Week-8	JAVA PROGRAM WITH DATABASE
<p>a. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (/t). It takes a name or phone number as input and prints the corresponding other value from the hash table. Hint: Use hash tables.</p> <p>b. Implement the above program with database instead of a text file.</p>	
Week-9	FILES
<p>a. Write a java program that takes tab separated data (one record per line) from a text file and insert them into a database.</p> <p>b. Write a java program that prints the metadata of a given table.</p>	
Week-10	TRAFFIC LIGHT
<p>Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP “or “READY” or “GO” should appear above the buttons in selected color. Initially, there is no message shown.</p>	
Week-11	MOUSE EVENTS
<p>a. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.</p> <p>b. Write a java program to demonstrate the key event handlers.</p>	
Week-12	CALCULATOR
<p>Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.</p>	
Week-13	APPLET
<p>a. Develop an applet that displays a simple message.</p> <p>b. Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field, when the button named compute is clicked.</p>	
Week-14	ADDITIONAL PROGRAMS
<p>a. Design a class to represent a Student details include the Student ID, Name of the Student, Branch, year, location and college. Assign initial values using constructor. Calculate average of marks of 6 subjects and calculate attendance percentage.</p> <p>b. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism</p> <p>c. Write a program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.</p>	

Week-15	ADDITIONAL PROGRAMS
<p>a. Write an Applet that computes the payment of a loan on the amount of the loan, the interest rate and the number of months. It takes one parameter from the browser. Monthly; if true, the interest rate is per month, otherwise the interest rate is annual.</p> <p>b. Write a java programs to find factorial of a number. user is allowed to enter a number into the text field whose factorial is to be determined. On pressing the button the value of the text field is firstly converted into integer and then processed to find its factorial. The result will get displayed in another text field.(Hint: use swings).</p>	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	<p>a. Try debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.</p> <p>b. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.</p> <p>c. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non recursive functions.</p>	CLO 1, CLO 2, CLO 3, CLO 6	T1:1.4 R1:1.2
2	<p>a. Write a java program to multiply two given matrices.</p> <p>b. Write a java program to implement method overloading and constructors overloading.</p> <p>c. Write a java program to implement method overriding.</p>	CLO 1, CLO 2, CLO 3	T1:1.5 R1:2.4
3	<p>a. Write a java program to check whether a given string is palindrome.</p> <p>b. Write a java program for sorting a given list of names in ascending order.</p> <p>c. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape</p>	CLO 1, CLO 2, CLO 3, CLO 6	T1:2.5 R1:2.5
4	Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	CLO 6	T1:2.5 R1:2.6
5	a. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	CLO 11	T1:22.7

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
	b. Write a java program that correct implements of producer consumer program		
6	<p>a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.</p> <p>b. Write a java program that displays the number of characters, lines and words in a text file.</p> <p>c. Write a java program that reads a file and displays the file on the screen with line number before each line.</p>	CLO 12	T1:6.3 R1:5.3
7	<p>a. Suppose that table named table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using labels in grid layout.</p> <p>b. Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.</p>	CLO 12	T1:7.5 R1:6.3
8	<p>a. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (/t). It takes a name or phone number as input and prints the corresponding other value from the hash table. Hint: Use hash tables.</p> <p>b. Implement the above program with database instead of a text file.</p>	CLO 13, CLO 14	T1:8.5 R1:6.8
9	<p>a. Write a java program that takes tab separated data (one record per line) from a text file and insert them into a database.</p> <p>b. Write a java program that prints the metadata of a given table.</p>	CLO 13, CLO 14	T1:12.2 R1:13.1
10	Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP “or “READY” or “GO” should appear above the buttons in selected color. Initially, there is no message shown.	CLO 15,CLO 16	T1:12.3 R1:13.2
11	<p>a. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.</p> <p>b. Write a java program to demonstrate the key event handlers.</p>	CLO 15,CLO 16	T1:12.1 0 R1:13.7
12	Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.	CLO 15,CLO 16	T1:11.2 R1:10.2
13	<p>a. Develop an applet that displays a simple message.</p> <p>b. Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field, when the button named compute is clicked.</p>	CLO 17,CLO 18	T1:11.2 R1:10.2

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POs	RELEVANCE WITH PSOs
1	Producer consumer problem and inner classes.	Seminars / Guest Lectures / NPTEL	PO 1, PO 2, PO 3	PSO 1
2	Collection framework.	Seminars / Guest Lectures / NPTEL	PO 2, PO 5	PSO 2
3	Encourage students to develop web applications using IDE's.	Assignments / Laboratory Practices	PO 1, PO 3, PO 4	PSO 2

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