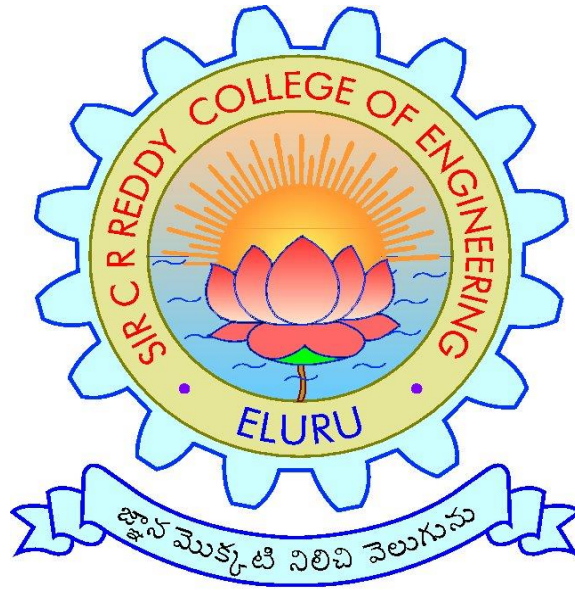


SIR C R REDDY COLLEGE OF ENGINEERING, ELURU
DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA COURSE HANDOUT



SUBJECT: JAVA PROGRAMMING

CLASS: II/IV B.Tech (A & B sections)Semester-II, A.Y.2022-23

INSTRUCTOR: Dr K Satyanarayana

Course Handout Index

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College Vision & Mission

Vision: To emerge as a premier institution in the field of technical education and research in the state and as a home for holistic development of the students and contribute to the advancement of society and the region.

Mission: To provide high quality technical education through a creative balance of academic and industry oriented learning; to create an inspiring environment of scholarship and research; to instill high levels of academic and professional discipline; and to establish standards that inculcate ethical and moral values that contribute to growth in career and development of society in general.

Department Vision & Mission

Vision: To be a premier department in the region in the field of Information Technology through academic excellence and research that enable graduates to meet the challenges of industry and society.

Mission: To Provide dynamic teaching-learning environment to make the students industry ready and advancement in career; to inculcate professional and leadership quality for better employability and entrepreneurship; to make high quality professional with moral and ethical values suitable for industry and society.

Program Educational Objectives (PEOs)

PEO1: Solve real world problems through effective professional skills in Information Technology industry and academic research.

PEO2: Analyze and develop applications in Information Technology domain and adapt to changing technology trends with continuous learning.

PEO3: Practice the profession in society with ethical and moral values.

Program Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society, and environmental considerations.

PO4: 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.

PO5: 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.

PO6: 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.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in society and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: 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.

PO11: 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 multi-disciplinary environments.

PO12: 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)

PSO1: Design Skill: Design and develop softwares in the area of relevance under realistic constraints.

PSO2: New Technology: Adapt new and fast emerging technologies in the field of Information Technology.

JNTUK Academic Calendar

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Directorate of Academic Planning
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. DAP/RAC/II Year /B. Tech/2022

Date 02.11.2022

Dr. KVSG Murali Krishna,
M.E, Ph.D.,
Director, Academics & Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

**Revised Academic Calendar for II Year - B. Tech for the AY 2022-23
(2021-22 Admitted Batch)**

I SEMESTER			
Description	From	To	Weeks
Community Service Project	22.08.2022	03.09.2022	2W
I Unit of Instruction	05.09.2022	29.10.2022	8W
I Mid Examinations	24.10.2022	29.10.2022	
II Unit of Instructions	31.10.2022	24.12.2022	8W
II Mid Examinations	19.12.2022	24.12.2022	
Community Service Project for Lateral Entry Students, Preparation & Practicals	26.12.2022	14.01.2022	3W
End Examinations	18.01.2023	28.01.2023	2W
Commencement of II Semester Class Work	28.01.2023		
II SEMESTER			
I Unit of Instructions	30.01.2023	25.03.2023	8W
I Mid Examinations	20.03.2023	25.03.2023	
II Unit of Instructions	27.03.2023	20.05.2023	8W
II Mid Examinations	15.05.2023	20.05.2023	
Preparation & Practicals	22.05.2023	27.05.2023	1W
End Examinations	29.05.2023	10.06.2023	2W

* As per the APSCH Guidelines Out of the Total 180 hours of Community Service Project leading to 4 Credits, two weeks will be offline and remaining project work can be done during the II-I semester weekends and holidays.

KVSG
2/11/22

Director,
Academics & Planning, JNTUK
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, JNTUK
Copy to Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

Course Description

This course will introduce the Java language. After completing this course, student will be able to identify Java's benefits, program in basic Java syntax using Java data types, and incorporate branches, loops, Exception Handling , Multithreading and JDBC.

This course introduces computer programming using the JAVA programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects.

Course Objectives

The learning objectives of this course are:

- To identify Java language components and how they work together in applications
- To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- To understand how to design applications with threads in Java
- To understand how to use Java APIs for program development

Course Outcomes

After the completion of the course, student will be able to

CO	CO Description	Level
CO1	Discuss the java programming constructs, control Structures, classes, objects, methods, arrays, inheritance, interfaces, packages, exception handling, string handling, multi threaded programing and data base connectivity.	L2
CO2	Use the java programming constructs, control structures, classes, objects, methods, arrays, inheritance, interfaces, packages, exception handling, string handling, multi threaded programing and data base connectivity for a given scenario.	L3

CO3	Breakdown the java programming constructs, control structures, arrays, inheritance, interfaces, exception handling, string handling and multi threaded programming and java data base connectivity.	L4
CO4	Recommend the best suitable java construct/concept for a given application/problem.	L5

Syllabus

UNIT I

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators. Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?;, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this. Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Threedimensional Arrays, Arrays as Vectors. Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object

Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class. Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, try-with-resources, Catching Subclass Exception, Custom Exceptions, Nested try and catch Blocks, Rethrowing Exception, Throws Clause.

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder. Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface, Creating JDBC Application, JDBC Batch Processing, JDBC Transaction Management

Text Books:

- 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
- 2) 2) The complete Reference Java, 8th edition, Herbert Schildt, TMH.

References Books:

- 1) Introduction to java programming, 7th edition by Y Daniel Liang, Pearson
- 2) Murach's Java Programming, Joel Murach

e-Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105191/>
- 2) https://www.w3schools.com/java/java_data_types.asp

Lesson Plan

Unit	Topics	Teaching Aids	CO
I	Introduction- JAVA	BB/PPT	
	Course Outcomes	BB/PPT	
	Program Structure in Java	BB/PPT	2
	Command Line Arguments, User Input to Programs	BB/PPT	2
	Data Types, Variables, and Operators	BB/PPT	1
	Static Variables and Methods, Attribute Final,	BB/PPT	1
	Introduction to Operators	BB/PPT	1
	Control Statements	BB/PPT	1
II	Class Declaration and Modifiers, Class Members	BB/PPT	2
	Declaration of Class Objects, Assigning One Object to Another	BB/PPT	2
	Access Control for Class Members, Accessing Private Members of Class	BB/PPT	2
	Constructor Methods for Class, Overloaded Constructor Methods	BB/PPT	2
	Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this	BB/PPT	2
	Defining Methods, Overloaded Methods	BB/PPT	2
	Class Objects as Parameters in Methods, Access Control	BB/PPT	2
Recursive Methods, Nesting of Methods, Overriding Methods	BB/PPT	2	

	Attributes Final and Static	BB/PPT	2
III	Declaration and Initialization of Arrays, Storage of Array in Computer Memory	BB/PPT	3
	Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array	BB/PPT	3
	Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays	BB/PPT	3
	Two-dimensional Arrays, Arrays of Varying Lengths, Threedimensional Arrays, Arrays as Vectors	BB/PPT	3
	Inheritance	BB/PPT	3
	Application of Keyword Super, Constructor Method and Inheritance, Dynamic Method Dispatch	BB/PPT	3
	Abstract Classes, Interfaces and Inheritance.	BB/PPT	3
	Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces	BB/PPT	3
		Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface	BB/PPT
IV	Packages and Java Library	BB/PPT	3
	Predefined Packages lang,util	BB/PPT	3
	Temporal Adjusters Class, Temporal Adjusters Class	BB/PPT	3
	Exception Handling: Introductiona and why?	BB/PPT	3
	Try, catch and finally with examples	BB/PPT	3
	Unchecked Exceptions, Checked Exceptions,	BB/PPT	3
	Catching Subclass Exception, Custom Exceptions	BB/PPT	3
	Nested try and catch Blocks, Rethrowing Exception, Throws Clause	BB/PPT	3

V	String Handling in Java: Introduction, methods of String class	BB/PPT	3
	Class String Buffer, Class String Builder.	BB/PPT	3
	Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor	BB/PPT	3
	Creation of New Threads, Thread States, Thread Priority-Synchronization	BB/PPT	3
	Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads	BB/PPT	3
	JDBC Architecture, Installing MySQL and MySQL Connector/J	BB/PPT	3
	JDBC Environment Setup, Establishing JDBC Database Connections	BB/PPT	3
	ResultSet Interface, Creating JDBC Application	BB/PPT	3
	JDBC Batch Processing, JDBC Transaction Management	BB/PPT	3

Evaluation Pattern

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	-	50	50
5	Project Work	60	140	200

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 50)	Level	Letter Grade	Grade Point
≥ 90	≥ 45	Outstanding	A+	10
≥80 to <89	≥40 to <44	Excellent	A	9
≥70 to <79	≥35 to <39	Very Good	B	8
≥60 to <69	≥30 to <34	Good	C	7
≥50 to <59	≥25 to <29	Fair	D	6
≥40 to <49	≥20 to <24	Satisfactory	E	5
<40	<20	Fail	F	0
-		Absent	AB	0

Timetable

Day/Time	09.00- 09.50	09.50- 10.40	11.00- 11.50	11.50- 12.40	01.40- 02.30	02.30- 03.20	03.20- 04.10	04.10- 05.00
Mon		Java Lab -B Section						
Tue	A		B				B	
Wed	B						A	
Thu				A	Java Lab -A Section			
Fri		B		A				A &B(M)
Sat	B		A		*****			

Unit wise Questions and Programs

Note:

1. Each question must be answered and explained with the help of JAVA program.
- 2.Refer programing exercises given at end of each chapter in the textbook.

UNIT-I

(Program structure, datatypes, operators and control statements)

THEORY QUESTIONS:

- 1.Explain elements or tokens in java programs.
- 2.Describe the command line arguments with an example.

3. Illustrate datatypes in java.
4. Explain typecasting with example.
5. How do you perform formatted output with printf() method.
6. Illustrate operators along with precedence and associativity.
7. Explain selection statements with examples
8. Explain iteration statements with examples
9. Describe the jump statements with examples.

PRACTICE PROGRAMS:

1. write a java program to find out area and circumference of a circle.
2. calculation of periphery and area of a regular polygon.
3. write a java program to print word "JAVA" as *(star).
4. calculation of compound and simple interest.
5. finding factorial of a number entered by a user.
6. Illustrate projectile problem in java.
7. Generation of double and integer random numbers.
8. Illustrate the dice play by random numbers in java
9. Roots of a quadratic equation.

UNIT-2

(classes, objects and methods)

THEORY QUESTIONS:

1. Explain class declaration, class members and modifiers.
2. How do you declare the class objects and how do you assign one object to another.
3. How do you access the private variables and private methods.
4. Illustrate the nested classes.
5. Explain final class, abstract class and this keyword.
6. Discuss the passing arguments by value and by reference.
7. Describe garbage collection in java and mention the purpose of Finalize() method.

8. Illustrate the defining of methods.
9. Explain the method overloading and constructor overloading.
10. Explain the recursion in java.

PRACTICE PROGRAMS:

1. Illustrate the difference between instance and static variable.
2. Write a java program for factorial and fibonacci numbers.

UNIT-3

(Arrays, inheritance and interface)

THEORY QUESTIONS:

1. Explain the declaration, initialization and accessing of arrays.
2. Illustrate the predefined class Arrays and its methods.
3. Explain 2 dimensional arrays and its operations.
4. Explain 3 dimensional arrays and its operations.
5. Illustrate the Vector class and its methods.
6. Explain types of inheritances.
7. Describe the process of inheritance. Mention advantages and disadvantages of inheritance.
8. Explain universal super class-Object.
9. Illustrate access control in inheritance and describe inheritance with default access control and private members with program.
10. Explain usage of keywords final , super and abstract. Describe the constructor method in inheritance.
11. Illustrate method overriding along with program.
12. Illustrate static binding and dynamic binding. Describe the concept of dynamic method dispatch (or) run time polymorphism.
13. Discuss similarities and dissimilarities between interface and class.
14. Illustrate implementation of interfaces.
15. a) Illustrate the multiple interfaces.

- b) Explain inheritance of interfaces.
16. illustrate nested interfaces with example programs.
 17. Explain default and static methods in interfaces.
 18. Illustrate the functional interfaces and lambda method.
 19. Describe the concept of annotations

PRACTICE PROGRAMS:

1. Illustration of arithmetic operations on array.
2. Illustration of array as parameter method.
3. Illustration of assigning one array to another array.
4. bubble sort, insertion sort and selection sort programs in java
5. linear search and binary search implementation in java
6. computation of mean and standard deviation of a sample.
7. implement matrix addition, subtraction, and multiplication in java
8. java program for solution of linear algebraic equation.
9. Illustration of abstract classes.
10. Illustration of interface to find areas of a square and circle.
11. Write a program to compute the cost of stitching a dress using interfaces.

UNIT-4

(Packages, exception handling)

THEORY QUESTIONS:

1. Explain user defined packages and classes.
2. Describe path and class path.
3. Discuss the access control in packages.
4. Illustrate java.lang package.
5. Illustrate java.util package.
6. Illustrate java.time package.

7. Discuss enumeration .
8. Describe wrapper classes.
9. Explain autoboxing and auto unboxing.
10. Explain Hierarchy of standard exception classes.
11. Illustrate try, catch, finally blocks.
12. Explain throws and throw clauses. what happens when we rethrow an exception.
13. Describe multiple catch blocks and nested try-catch blocks.
14. Illustrate Throwable class.
15. Explain checked exceptions and unchecked exceptions.
16. Explain try-with-resources.
17. Discuss the catching subclass exceptions.
18. How do you create your own exceptions. (or) custom exceptions.

PRACTICE PROGRAMS:

1. Illustration of conversion of numbers in different number systems
2. illustration of conversion from string to number.
3. illustration of generation of random numbers.
4. illustration of use of enum type in preparing result.
5. illustration of cellular mobile system design.
6. illustration of design of spindle speeds of machine tools.

UNIT-5

(String handling, multithreaded programming and java database connectivity)

THEORY QUESTIONS:

1. Explain the storage and immutability of strings?
2. Describe the constructors of class String.. and explain the methods in CharSequence interface.
3. how do you extract the characters from string.

4. Discuss the methods available for comparison of strings.
5. How do you modify a string and how do you search the strings.
6. Explain the class string buffer.
7. Describe the class string builder.
8. Illustrate the Thread class
9. Describe the creation of new threads.
10. a) Explain the thread states.
b) Explain the thread priority.
11. Explain synchronization in threads.
12. a) Discuss the deadlock and race situations
b) Explain inter thread communication
13. Explain JDBC architecture
14. Describe JDBC environment setup. (or) JDBC connectivity model and API (JDBC driver types)
15. Illustrate the establishing the JDBC database connections.
16. Discuss the resultset interface.
17. Explain concept of transaction management and batch processing.

PRACTICE PROGRAMS:

1. Write a Java program to illustrate the number of vowels, number of characters and digits in the string entered by user.
2. Write a Java program to illustrate the online quiz testing.
3. Write a Java program to illustrate the producer and consumer problem.
4. Creation of threads programs
5. Access the database records through JDBC
6. Create the table
7. Insert the values into table
8. Delete a row
9. Update a tuple.