INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

DUNDIGAL, HYDERABAD -500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTION FORM

Course Title	JAVA PROGRAMMING			
Course Code	A40503			
Regulation	R13 – JNTUH			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	1	-	4
Course Coordinator	Mr G Chandra Sekhar, 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 course involves OOP concepts, java basics, inheritance, polymorphism, interfaces, inner classes, packages, Exception handling, multithreading, collection framework, files, JDBC and GUI components. This course is presented to students by power point projections, course handouts, lecture notes, course handouts, assignments, objective and subjective tests.

II. PREREQUISITES:

Level	Credits	Periods / Week	Prerequisites
UG	4	5	C,C++

III. COURSE ASSESSMENT METHODS:

a) Marks Distribution:

Sessional Marks	University End Exam marks	Total marks
Mid Semester Test There shall be two midterm examinations. Each midterm examination consists of subjective type and objective type tests. The subjective test is for 10 marks of 60 minutes duration. Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks. The objective type test is for 10 marks of 20 minutes duration. It consists of 10 Multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark.	75	100

Sessional Marks	University End Exam marks	Total marks
First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.		
Assignment		
Five marks are earmarked for assignments.		
There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.		

IV. EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80 minutes	20
2	I Assignment	-	05
3	II Mid Examination	80 minutes	20
4	II Assignment	-	05
5	External Examination	3 hours	75

V. COURSE OBJECTIVES:

i. **Understand** object oriented programming concepts and apply them in problem solving.
ii. **Understand** the basics of java Console and GUI based programming.
iii. **Describe** the basics of inheritance for reusing the program.
iv. **Demonstrate** how the multi tasking is performed by using threads.
v. **Enumerate** the types of exception handling.
vi. **Describe** the byte streams and character streams for file management.
vii. **Relate** java applications to database for connectivity.

VI. COURSE OUTCOMES:

1. **List** and use Object Oriented Programming concepts for problem solving.
2. **Apply** java programming on different operating systems to understand portability.
3. **Use** of object oriented programming is easy to communicate between developers and users.
4. **Solve** the inter-disciplinary applications using the concept of inheritance.
5. **Produce** design stability for various applications- by applying exception handling and inheritance.
6. **Use** multithreading to reduce the wastage of CPU time.
7. **Develop** programs using Java collection API as well as the java standard class library.
8. **Construct** JDBC to provide a program level interface for communicating with database using java programming.
9. **Create** java programs using console and GUI based programming.
10. **Simulate** dynamic and interactive programs using applets.

VII. HOW PROGRAM OUTCOMES ARE ASSESSED:

	Program Outcomes	Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	S	Design exercises
PO2	**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.	S	Solving practical examples
PO3	**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.	H	Tutorials, Mini projects
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.	S	modularizing complex problems
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.	H	Design Exercises
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.	N	--
PO7	**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.	N	---
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	S	Exams
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	H	Workshop, Mini Projects, Prototypes
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.	N	---
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 multidisciplinary environments.	H	Assigning Exercises, Development of Prototypes, Mini Projects
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.	S	Exams, Discussions

N = None   S = Supportive   H = Highly Related

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	**Professional Skills:** The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Assignments
PSO2	**Software Engineering practices:** The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	S	Mini Projects
PSO3	**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.	H	Guest Lectures

N - None   **S - Supportive**   **H - Highly Related**

IX   SYLLABUS:

UNIT I

OOP concepts- Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, procedural and object oriented programming paradigm.
Java programming – History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow – block scope, conditional statements ,loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class.

UNIT II

Inheritance – Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods
Polymorphism – dynamic binding, method overriding, abstract classes and methods
Interface – Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface.
Inner classes – Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.
Packages – Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT III

Exception Handling – Dealing with errors, benefits of exception handling, the classification of exceptions , exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.
Multithreading – Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter – thread communication, producer consumer pattern

UNIT IV

Collection Framework in java – Introduction to java collections, overview of java collection frame work, generics, commonly used collection classes- Array List, vector ,hash table, stack, enumeration, iterator, string tokenizer ,random ,scanner ,calendar and properties
Files – streams – byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class.
Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT V

GUI Programming with Java – The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components, containers- JFrame, JApplet, JDialog, Jpanel, overview of some swing components – JButton, JLabel, JTextField, JTextArea, java lab course description simple applications, Layout management – Layout manager types – border, grid and flow
Event Handling: Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Example: handling a button click, handling mouse events, Adapter classes.
Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

Text books:
1. Java Fundamentals – A comprehensive Introduction- Herbert Schildt and Dale Skrien,TMH.

References
1. Java for programmers-P.J.Dietel and H.M.Dietel Pearson education(or)Java: How to program P.J.Dietel and H.M.Dietel-PHI
2. Object Oriented programming through Java -P.Radha Krishna -Universities Press
3. Thinking in Java- Bruce Eckel-Pearson Education
4. Programming in Java- S.Malhotra and S. Choudhary- Oxford University Press.

X   COURSE PLAN:

At the end of the course, the students are able to achieve the following course learning outcomes.(The course plan is meant as a guideline. There may probably be changes.)

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
1	**Understand** and use OOP concepts.	Paradigms of programming language ,Need of OOP	T1
2	**Analyzing** the class and object	Need of Classes and objects	T1, R2
3		Data abstraction, encapsulation, inheritance, polymorphism dynamic binding	T1,R2
4	**Memorize** the benefits of OOP	Benefits of OOP, procedural and object oriented programming paradigm.	T1, R2
5	**Understand** the history of java and features	History of java, comments, java features	T1
6	**Explain** the data types	JDK,JRE,data types	
7	**Explain** the functionality of variables	Variables, constants	T1
8	**Understand** variable, operators and expressions and program.	scope and life time of variables, Operators, operator hierarchy ,expressions type conversion and casting,	T1, R2

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
9	**Solve** a program using control statements	Enumerated types, control flow control flow block scope conditional statements, loops, break and continue statements	T1
10	**Solve** a program using control statements	simple java stand alone programs	T1
11	**Solve** a program using I/O operations	Arrays, console input and output, formatting output	T1, R2
12-13	**Analyze** the way of modularizing a program	Constructors, methods, parameter passing overloading methods and constructors	T1,R2
14	**Examine** the common values and tasks.	static fields and methods, access control, this reference	T1, R2
15	**Demonstrate** the creation of string object	Recursion, garbage collection- building strings, exploring string class.	T1, R2
16-17	**Analyze** the extension of one class into another class	Inheritance, Inheritance hierarchies, super and subclasses, member access rules,	T1, R2
18-19	**Relate** the classes	super keyword, preventing inheritance: final classes and methods, the object class and its methods	T1
20	**Use** of polymorphism is to create many forms	Polymorphism, dynamic binding method overriding, abstract classes and methods	T1
21-22	**Define** the interface and its implementations	Interface, Interfaces VS Abstract classes, defining an interface implements interfaces, accessing implementations through interface references, extending interface.	T1,R2
23-24	**Explain** inner classes which also provide security	Inner classes Uses of inner classes, local inner classes, anonymous inner classes, static inner classes- examples.	T1, R2
25	**Demonstrate** the package- which groups the classes.	Packages, Defining creating and accessing a package, classpath, importing packages.	T1
26-27	**Explain** the exception handling	Exception Handling , Dealing with errors, benefits of exception handling the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions usage of try, catch, throw, throws and finally	T1, R2
28-29	**Describe** the creation of user defined exceptions	Re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.	T1, R2
30-31	**Illustrate** the concept of creating multitasking by using multiple threads	Multithreading , Differences between multiple processes and multiple threads, thread states	T1
32-33	**Define** threads along with their priorities	Creating threads, interrupting threads, thread priorities	T1, R2
34	**Relate** the threads to producer consumer problem	synchronizing threads, inter , thread communication, producer consumer pattern	T1
35-36	**Apply** the collection framework	Collection Framework in java , Introduction to java collections, overview of java collection frame work	T1
37	**Use** of collection classes and array list	Generics, commonly used collection classes, Array List	T1, R2
38	**Explain** the vector and hash table	Vector, hash table	T1, R2
39-40	**Describe** the collections	Stack, enumeration, iterator	T1
41-42	**Analyze** the String Tokenizer	String tokenizer , random, scanner,calendar and properties	T1, R2

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
43-44	**Demonstrate** the byte streams and character steams	Files , streams , byte streams, character stream	T1
45	**Explain** the text input/output and binary input/output	text input/output, binary input/output	T1, R2
46	**Discuss** the file operations	Random access file operations	T1
47	**Illustrate** the file management	File management using file class.	T2, R2
48	**Describe** the JDBC connectivity	Connecting to Database , JDBC Type 1 to 4 drivers	T1, R2
49	**Demonstrating** JDBC	Connecting to a database, querying a database	R2
50	**Manage** the connectivity using JDBC	Processing the results, updating data with JDBC.	T1
51-52	**Use** the AWT class for creating the graphical user interface components	The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components	T1
53-54	**Explain** the container class and also the swing components	Containers, JFrame, JApplet, JDialog, Jpanel, overview of some swing components , JButton, JLabel , JTextField, JTextArea	T1
55-56	**Construct** the simple applications and also understand the management of components.	Simple applications, Layout management , Layout manager types , border, grid and flow	T1,R2
57-58	**Classify** the event and actions Design the events	Event Handling : Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners	T1
59-61	**Distinguish** the button click and mouse events	Delegation event model, Example: handling a button click, handling mouse events, Adapter classes.	T1
62	**Compare** applets and applications	Inheritance ,hierarchy for applets, differences between applets and applications	T1
63	**Explain** the parameter passing method to applets	Life cycle of an applet	T1
64	**Differentiate** the methods to mprove Stability	Passing parameters to applets	T1
65	**Describe** security issues	Applet security issues	T1

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	S	S			H				S		S	S	S	S	
II			H		S								H	S	
III	S				S								S		
IV				S					H					S	H
V					S						H		S		
VI		S		H										S	
VII					H					S					H

N= None   S = Supportive   H = Highly Related

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	S	S	H									S	S		
2	S	S												S	
3	S		S												H
4					H							S	S		
5					S									S	
6	S		S										S		
7					S					S					H
8	S	S			H										H
9					S					S			S		
10	S			S						S				S	

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Prepared by: Mr. G CHANDRA SEKHAR, ASSISTANT PROFESSOR

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