INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTOR

Course Title	**JAVA PROGRAMMING**
Course Code	ACS552
Programme	B.Tech
Semester	VI ECE
Course Type	Elective
Regulation	IARE - R16

	Theory			Practical	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
Course Structure	3	-	3	-	-

Chief Coordinator	**Mr. G Chandra Sekhar, Assistant Professor**
Course Faculty	**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, packages, Exception handling, multithreading, files, JDBC. This course is presented to students by power point projections, course handouts, lecture notes, assignments, objective and subjective tests.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	ACS001	I	Computer Programming	3
UG	ACS002	II	Data Structures	4

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Java Programming	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:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with "either" or "choice" will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

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

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Quiz/ Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
Type of Assessment	CIE Exam	Quiz / AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):
Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

Quiz / Alternative Assessment Tool (AAT):
Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

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.	3	Assignments
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	Seminars
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	Assignments / Quiz
PO 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.	2	5 minutes Video / Guest Lectures

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:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	3	Seminars
PSO 2	**Problem-Solving Skills:** An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	-	--
PSO 3	**Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental- wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real- world applications using optimal resources as an Entrepreneur.	2	Seminar/Guest Lecture

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Understand fundamentals of object-oriented terminology and programming concepts in java.
II	Acquire basics of how to translate solution problem into object oriented form.
III	Develop programs in java for solving simple applications.
IV	Design and implement simple program that use exceptions and multithreads.

IX. COURSE OUTCOMES (COs):

COs	Course Outcome	CLOs	Course Learning Outcome
CO 1	Able to learn the concept of object oriented programming that helps to organize complex	CLO 1	Use object oriented programming concepts to solve real world problems.
		CLO 2	Explain the concept of class and objects with access control to represent real world entities.

COs	Course Outcome	CLOs	Course Learning Outcome
	programs	CLO 3	Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors.
		CLO 4	Describe the concept of operators and variables, arrays, parameter passing.
CO 2	Understand the appropriate roles of subtyping and inheritance, and use them effectively.	CLO 5	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
		CLO 6	Use dynamic and static polymorphism to process objects depending on their class.
		CLO 7	Analyze and understand the concept of abstract classes to define generic classes.
CO 3	Demonstrate an ability to design high speed, fault tolerant applications using multi-threading and exception handling concepts.	CLO 8	Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.
		CLO 9	Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
		CLO 10	Use multithreading concepts to develop inter process communication.
		CLO 11	Understand the use of interrupting threads in the real world.
CO 4	Design and develop the java applications by using concepts of interfaces and packages.	CLO 12	Understand the importance of interfaces to develop real world java applications.
		CLO 13	Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
		CLO 14	Demonstrate the import statement usage and built-in packages.
CO5	Experiment with the usage of files and database connectivity, to familiarize the advanced java programming skills and develop java based web applications.	CLO 15	Understand and implement the concepts on file streams and operations in java programming for a given application programs.
		CLO 16	Understand text, byte, and character input/output streams.
		CLO 17	Describe the backend connectivity process in java program by using JDBC drivers.
		CLO 18	Develop java application to interact with database by using relevant software component (JDBC Driver).

X. 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
ACS552.01	CLO 1	Use object oriented programming concepts to solve real world problems.	PO 1	3
ACS552.02	CLO 2	Explain the concept of class and objects with access control to represent real world entities.	PO 1	3
ACS552.03	CLO 3	Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors.	PO 2, PO 3	2
ACS552.04	CLO 4	Describe the concept of operators and variables, arrays, parameter passing.	PO 1	3
ACS552.05	CLO 5	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.	PO 2, PO 3	1
ACS552.06	CLO 6	Use dynamic and static polymorphism to process objects depending on their class.	PO 2, PO 3	1
ACS552.07	CLO 7	Analyze and understand the concept of abstract classes to define generic classes.	PO 1	3

ACS552.08	CLO 8	Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.	PO 3	2
ACS552.09	CLO 9	Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).	PO 1	3
ACS552.10	CLO 10	Use multithreading concepts to develop inter process communication.	PO 2, PO 3	2
ACS552.11	CLO 11	Understand the use of interrupting threads in the real world.	PO 2, PO 12	2
ACS552.12	CLO12	Understand the importance of interfaces to develop real world java applications.	PO 2, PO 3	2
ACS552.13	CLO13	Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).	PO 2, PO 3	2
ACS552.14	CLO 14	Demonstrate the import statement usage and built-in packages.	PO 1	3
ACS552.15	CLO 15	Understand and implement the concepts on file streams and operations in java programming for a given application programs.	PO 2, PO 3	2
ACS552.16	CLO 16	Understand text, byte, and character input/output streams.	PO 1	3
ACS552.17	CLO 17	Describe the backend connectivity process in java program by using JDBC drivers.	PO 1	3
ACS552.18	CLO 18	Develop java application to interact with database by using relevant software component (JDBC Driver).	PO 2, PO 3	2

3   = High; 2 = Medium; 1 = Low

XI. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 12	PSO1	PSO2	PSO3
CO 1	3	3	2		2		
CO 2	3	3	2		2		
CO 3	3	3	2		1		
CO 4	2	3			2		
CO 5	3	3		3	1		2

XII. 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												3		
CLO 2	3												2		2
CLO 3		3	2												
CLO 4	3												3	2	

CLO															
CLO 5		3	2												
CLO 6		2	3												
CLO 7	3														
CLO 8		2	1												
CLO 9		3	2												
CLO 10			2											2	
CLO 11	3														
CLO 12		2	2										3		
CLO 13		3	3										3	2	
CLO 14	3														
CLO 15		3	3									1		2	
CLO 16	3												3		
CLO 17	3														2
CLO 18		2	3										2		2

3 = High; 2 = Medium; 1 = Low

XIII. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2, PO 3, PO 12, PSO1, PSO3	SEE Exams	PO 1, PO 2, PO 3, PO 12, PSO1, PSO3	Assignments	PO 1, PO 3	Seminars	PO 2
Laboratory Practices	-	Student Viva	-	Mini Project	-	Certification	-
Term Paper	-						

XIV. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XV. SYLLABUS

UNIT-I	OOPS CONCEPTS AND JAVA PROGRAMMING

	OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, constructors, methods, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, arrays, parameter passing.
UNIT-II	**INHERITANCE**
	Inheritance: Inheritance hierarchies, super and subclasses, member access rules, Polymorphism: Dynamic binding, method overriding, abstract classes and methods
UNIT-III	**EXCEPTION HANDLING AND MULTITHREADING**
	Exception Handling: Benefits of exception handling, the classification of exceptions, usage of try, catch, throw, throws and finally. Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads.
UNIT-IV	**INTERFACES AND PACKAGES**
	Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, Packages: Defining, creating and accessing a package, importing packages.
UNIT-V	**FILES AND CONNECTING TO DATABASE**
	Files: streams – byte streams, character stream, text input/output, binary input/output, file management; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.
Text Books:	
	1. Herbert Schildt and Dale Skrien, "Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013. 2. Herbert Schildt, "Java the Complete Reference", McGraw Hill, Osborne, 7th Edition, 2011. 3. T.Budd, "Understanding Object- Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.
Reference Books:	
	1. P.J.Dietel and H.M.Dietel , "Java How to program", Prentice Hall, 6th Edition, 2005. 2. P.Radha Krishna , "Object Oriented Programming through Java", CRC Press, 1st Edition, 2007. 3. S.Malhotra and S. Choudhary, " Programming in Java", Oxford University Press, 2nd Edition, 2014.

XVI. COURSE PLAN:

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

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1-3	OOP concepts: Classes and objects, Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, constructors, methods	CLO 1	T1: 1.5, 4.1, 4.2 R2:1.2, 1.3, 1.5, 2.3
4-6	Data types, variables, constants, scope and life time of variables, Operators, operator hierarchy, expressions type conversion and casting	CLO 2	T1:1.4, 2.2, 2.5
7-8	Enumerated types, control flow statements, arrays, parameter passing.	CLO 3, CLO 4	T1:2.6-2.14, 3.1-3.16 R2:3.5, 3.6
9-10	Inheritance, Inheritance hierarchies, super and subclasses member access rules.	CLO 5	T1:7.1
11-13	Polymorphism: Dynamic binding, method overriding	CLO 6	T1:7.4, 7.5, 7.13, 7.14
14-16	Abstract classes and methods with examples	CLO 7	T1:7.4, 7.5, 7.13, 7.14
17	Revision of first two and half units	---	---
18-20	Exception Handling , benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally.	CLO 8, CLO 09	T1: 7.9-7.12 R2:4.2

21-22	Multithreading, Differences between multiple processes and multiple threads, thread states.	CLO 10	T1:8.1-8.5 R2: 4.4
23-24	Creating threads, interrupting threads	CLO 11	T1:8.6, 8.7 R2:4.4
25-27	Interface, Interfaces VS Abstract classes, defining an interface, implements interfaces.	CLO 12	T1:9.1-9.3 R2:4.3
28-29	Packages, Defining creating packages.	CLO 13	T1:10.12, 10.14 R2:5.8
30-31	Accessing a package, importing packages	CLO 14	T1:12.1 R2: 6.2
32-34	Files, streams, byte streams, character stream.	CLO 15, CLO 16	T1:11.3-11.4 R2: 7.2, 7.3
35-37	Text input/output, binary input/output.	CLO 16	T1: 11.12 R2:7.1, 7.2.3
38	Random access files operations, file management.	CLO 15	T1:11.10 R2:7.6
39-40	Connecting to Database, JDBC Type 1 to 4 drivers.	CLO 17	R2:9.2
41-42	Connecting to a database, querying a database.	CLO 17	R2:9.4
43-44	Processing the results, updating data with JDBC.	CLO 18	R2:9.4
45	Revision of remaining two and half units	---	---

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

S. No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	GUI programming	Seminars / Assignments / NPTEL	PO 1	PSO 1
2	About Swing and its components,	Seminars / Guest Lectures / NPTEL	PO1	PSO 2
3	Development of Applet applications	Assignments / Laboratory Practices	PO 2	PSO 2

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