INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTOR

Course Title	OBJECT ORIENTED PROGRAMMING THROUGH JAVA				
Course Code	ACS003				
Programme	B.Tech				
Semester	III	CSE			
	IV	IT			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure		**Theory**		**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	2
Chief Coordinator	Mr. G Chandra Sekhar, Assistant Professor				
Course Faculty	Mr. E Sunil Reddy, 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 and GUI components. 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	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:

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.	2	Solving 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 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.	3	Lectures, Assignments
PSO 2	**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.	3	Seminars
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	Guest Lectures

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

	The course should enable the students to:
I	Understand the basic object oriented programming concepts and apply them in problem solving.
II	Illustrate inheritance concepts for reusing the program.
III	Demonstrate on the multi-tasking by using multiple threads.
IV	Develop data-centric applications using JDBC.
V	Understand the basics of java console and GUI based programming.

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
CACS003.01	CLO 1	Use object oriented programming concepts to solve real world problems.	PO 1, PO 2	3
CACS003.02	CLO 2	Explain the concept of class and objects with access control to represent real world entities.	PO1,PO2, PO3	3
CACS003.03	CLO 3	Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.	PO1,PO3	3
CACS003.04	CLO 4	Use overloading methodology on methods and constructors to develop application programs.	PO 3	1
CACS003.05	CLO 5	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.	PO 1, PO2	3
CACS003.06	CLO 6	Describe the concept of interface and abstract classes to define generic classes.	PO1, PO2, PO3	2
CACS003.07	CLO 7	Use dynamic and static polymorphism to process objects depending on their class.	PO 1, PO 4	2
CACS003.08	CLO 8	Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).	PO1, PO2, PO4	2
CACS003.09	CLO 9	Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.	PO 2, PO 3	2
CACS003.10	CLO 10	Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).	PO 1	2
CACS003.11	CLO 11	Use multithreading concepts to develop inter process communication.	PO 1, PO 2, PO4	3
CACS003.12	CLO 12	Understand and implement concepts on file streams and operations in java programming for a given application programs.	1,PO 2,PO 5	3
CACS003.13	CLO 13	Describe the backend connectivity process in java program by using JDBC drivers.	PO 5	1
CACS003.14	CLO 14	Develop java application to interact with database by using relevant software component (JDBC Driver).	PO3,PO 5	3
CACS003.15	CLO 15	Understand the process of graphical user interface design and implementation using AWT or swings.	PO1,PO2,PO3	3
CACS003.16	CLO 16	Use different layouts (Flow Layout, Boarder Layout, Grid Layout, Card Layout) to position the controls for developing graphical user interface.	PO1,PO2,PO3	2
CACS003.17	CLO 17	Build the internet-based dynamic	PO1,PO2,PO3	2

CACS003.18	CLO 18	applications using the concept of applets. Develop applets that interact abundantly with client environment and deploy on the server.	PO 2, PO 3	2
CACS003.19	CLO 19	Knowledge on usage of graphical IDE for design and implementation of real time applications in java.	PO1,PO2, PO 5	3
CACS003.20	CLO 20	Posses the knowledge and skills for employability and to succeed in national and international level competitive exams.	PO 12	1

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

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XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2	SEE Exams	PO 1	Assignments	-	Seminars	PO 2
Laboratory Practices	-	Student Viva	-	Mini Project	PO 5	Certification	PO 12
Term Paper	-						

XII. ASSESSMENT METHODOLOGIES - INDIRECT

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

XIII. SYLLABUS

UNIT-I	OOPS CONCEPTS AND JAVA PROGRAMMING	Classes:09

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, 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 statements, jump 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, exploring string class.

UNIT-II	MULTIPLE INHERITANCE ,INTERFACES AND PACKAGES	Classes:09

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;
Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT-III	EXCEPTION HANDLING AND MULTITHREADING	Classes:09

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, rethrowing 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.

UNIT-IV	FILES AND CONNECTING TO DATABASE	Classes:09

Files: streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class: Connecting to Database, querying a database and processing the results, updating data with JDBC.

UNIT-V	GUI PROGRAMMING AND APPLETS	Classes:09

GUI Programming with Java: The AWT class hierarchy, introduction to swing, swings Vs AWT, hierarchy for swing components.
Containers: JFrame, JApplet, JDialog, Jpanel, overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications.
Layout management: Layout manager types, border, grid and flow.

Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.		

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, 2011.2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, 2012.
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 .

XIV. 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
1-2	Understand and use OOP concepts.	CLO 1	T1: 1.5, 4.2 R2:1.2
3-4	Understand variables and program.	CLO 1	T1:1.4, 2.2 R2: 2.1
5-6	Understand operators and expressions and program.	CLO 1	T1:2.6-14, R2:3.5, 3.6
6-7	Understand the program on expressions, operators.	CLO 2	T1: 2.15
8-10	Use of arrays, formatted input and output.	CLO 4	T1:5.1- 5.4 R2:3.7
11-12	Understand the methods, parameter passing and constructors.	CLO 4	T1:22.8 R1:4.15
13	Explain the concept of static fields and methods.	CLO 4	T1: 6.2- 6.7 R2:4.1.5,
14	Use recursion and their applications.	CLO 5	T1:4.10,4.11, 5.7,
15	Relate the concept of class and to the sub class.	CLO 6	T1:7.1- 7.3
16	Explain the concept of final keyword with their usage	CLO 6	T1:7.4,7.5, 7.13, 7.14
17	List the methods of polymorphism	CLO 6	T1: 7.9- 7.12
18	Relate interfaces and abstract classes	CLO 6	T1:8.1- 8.5 R2: 4.4
19	Explain the concept of abstract classes	CLO 7	T1:8.6, 8.7 R2:4.4
20-21	Define basic concepts of packages	CLO 8	T1:9.1R2 :4.3
22	Illustrate the concept of exception handling	CLO 9	T1: 10.1,10.11 R2:5.5,5.6
23	Understand the concept of re-throwing exceptions	CLO 10	T1:10.1 R2:5.8
24-25	Define multithreading and able to explain the differences between multiple processes and states	CLO 11	T1:12.1 R2: 6.2
26-27	Analyze the problem of producer consumer pattern	CLO 11	T1:12.2 R2:6.3,6.4, 6.5, 6.8

28	Explain files and their types of reading and writing data to the files	CLO 12	T1:11.3 R2: 7.2, 7.3
29	Understand the concept of text and binary input/output.	CLO 12	T1: 1.12 R2:7.1
30-31	Identify various random access file operations.	CLO 12	T1:11.10 R2:7.6
32-33	Analyze the methods of file class	CLO 12	T1:11.12
34	Relate java program to JDBC	CLO 13	R2:9.2
35-36	Manage the connection to the data bases	CLO 13	R2:9.4
37-38	Understand the process of updating the data bases using JDBC	CLO 14	R2:9.4
39	Classify the AWT class hierarchy	CLO 15	T1:17.1 R2:10.2
40-41	List the swing components	CLO 15	T1:17.2
42-43	Explain the types of layout managers	CLO 16	T1:17.7,
44-45	Explain the differences between applets and applications, Understand the life cycle of applet, parameter passing to applets	CLO 17	T1:18.2

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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