INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTOR

Course Title	SOFTWARE TESTING METHODOLOGY				
Course Code	AIT008				
Programme	B. Tech				
Semester	VII	CSE | IT			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	2
Chief Coordinator	Ms. M GeethaYadav, Assistant Professor,				
Course Faculty	Ms.B.Geeta Vani, Assistant Professor Ms.K Mayuri, Assistant Professor Ms.B.Anupama, Assistant Professor				

I. COURSEOVERVIEW:

The software testing is a process of executing a program or application with the intent of finding the bugs. This course will help students learn catch bugs and break software as you discover different testing methods that will help build better software. It will teach and make students think like a software tester and help in finding bugs in code earlier and write better code. The course demonstrates an in-depth understanding of the tools and technologies for software testing and do better programming and test the programsefficiently.

II. COURSEPRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	ACS008	V	Software Engineering	4

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Software Testing Methodology	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONALMETHODOLOGIES:

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

V. EVALUATIONMETHODOLOGY:

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 AREASSESSED:

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	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	3	Assignment
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	Assignment
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.	3	Seminar

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES AREASSESSED:

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.	2	Seminar
PSO 2	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to delivera quality product for business success..	2	Assignment
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	Assignment

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Understand the concept of software testing objectives, process criteria, strategies and methods.
II	Demonstrate various software testing issues and solutions in software like unit test, integration, regression and system testing.
III	Demonstrate the techniques and skills on how to use modern software testing tools to support software testing projects.
IV	Understand important concepts of complexity metrics and object oriented metrics.

IX. COURSE OUTCOMES:

COS	COURSE OUTCOMES	CLOS	COURSE LEARNING OUTCOMES
CO1	Understand the basic concepts of testing, path testing and sensitization	CLO 1	Explain the importance of testing and purpose of testing.
		CLO 2	Illustrate different and compare dichotomies of testing.
		CLO 3	Demonstrate the model for testing and different testing levels and role of models.
		CLO 4	Describe the consequences and taxonomy of bugs and different bugs in project environment.
		CLO 5	Illustrate the concepts of path testing and predicate loops and path sensitization.
		CLO 6	Explain Path instrumentation and their applications and link markers.
CO2	An Ability to learn about the transaction flow testing.	CLO 7	List Transaction flows techniques and transaction flow structures and their test databases.
		CLO 8	State Basics of data flow testing and Strategies in data flow testing, applications of dataflow testing.
CO3	Understand the concepts of domain based testing and logic based testing.	CLO 9	Describe Domains and paths and explain about domains and bugs and their tools effectiveness.
		CLO 10	Demonstrate Domains and Interfaces testing.
		CLO 11	Explain linearising transformation and coordinate transformation
		CLO 12	Describe Logic based testing and Decision tables and compare hardware and software testing.
		CLO 13	Illustrate Path expression and KV Charts and their specifications.
CO4	To describe about the path product and data flow anomaly detection.	CLO 14	State Path products and path expression, different laws used in path testing.
		CLO 15	Demonstrate Reduction procedure and applications.
		CLO 16	Explain about Regular expressions
		CLO17	Demonstrate about Flow anomaly detection
CO5	Understand the concepts of transitions testing.	CLO 18	Explain State Graphs and state testing
		CLO 19	Demonstrate about the Testability Tips.
		CLO 20	Explain finite state behavior in state graphs

X. COURSE LEARNING OUTCOMES:

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AIT008.01	CLO 1	**Explain** the importance of testing and purposeof testing.	PO 1	3
AIT008.02	CLO 2	**Illustrate** different and compare dichotomies oftesting.	PO 1,PO4	2
AIT008.03	CLO 3	**Demonstrate** the model for testing and differenttesting levels and role of models.	PO 1,PO 2	3
AIT008.04	CLO 4	**Describe** the consequences and taxonomy ofbugs and different bugs in project environment.	PO1,PO2	2
AIT008.05	CLO 5	**Illustrate** the concepts of path testing and predicate loops and path sensitization.	PO 2,PO3	2
AIT008.06	CLO 6	**Explain** Path instrumentation and their applications and link markers.	PO 1,PO 4	3
AIT008.07	CLO 7	**List** Transaction flows techniques and transaction flow structures and their test databases.	PO 2,PO 4	2

AIT008.08	CLO 8	**State** Basics of data flow testing and Strategies in data flow testing, applications of dataflow testing.	PO 2	2
AIT008.09	CLO 9	**Describe** Domains and paths and. explain about domains and bugs and their tools effectiveness	PO 1,PO 3	3
AIT008.10	CLO 10	**Demonstrate** Domains and Interfaces testing.	PO 1	3
AIT008.11	CLO 11	**Explain** about domains and testability	PO 3	2
AIT008.12	CLO 12	**Describe** Logic based testing and Decision tables and compare hardware and software Testing.	PO 1,PO 3	2
AIT008.13	CLO 13	**Illustrate** Path expression and KV Charts and their specifications.	PO 3,PO 4	2
AIT008.14	CLO 14	**State** Path products and path expression, different laws used in path testing.	PO3,PO 4	2
AIT008.15	CLO 15	**Demonstrate** Reduction procedure and Applications.	PO 3	2
AIT008.16	CLO 16	**Explain** about Regular expressions	PO 2,PO 3	2
AIT008.17	CLO 17	**Demonstrate** about Flow anomaly detection	PO 2,PO 3	2
AIT008.18	CLO 18	**Explain** State Graphs and state testing	PO1	2
AIT008.19	CLO 19	**Demonstrat**e about the Testability Tips.	PO2	2
AIT008.20	CLO 20	**Explain** finite state behavior in state graphs	PO1,PO4	2

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

Course Outcomes(COs)	Program Outcomes (POs)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PSO1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	1
CO2		2			2		
CO3	3		2	2	2		
CO4		2	2	2	2		
CO5	2	2		3			

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XII. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFICOUTCOMES:

(CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CLO 1	3												3		1
CLO 2	3			2									1	2	1

(CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CLO 3	3	3													
CLO 4	3	2											2		
CLO 5		2	3												1
CLO 6	3													2	
CLO 7		2											2		
CLO 8		2													
CLO 9	3		3										2		
CLO 10	3												2		
CLO 11			2												
CLO 12	3		2										2		
CLO 13			2	2										2	1
CLO 14			2	2									2		
CLO 15			2												
CLO 16		2	3												
CLO 17		2	3										2		
CLO 18	2														
CLO 19		2													
CLO 20	2			3											

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XIII. ASSESSMENT METHODOLOGIES –DIRECT

CIE Exams	PO 1,PO 2, PO3, PO 4, PSO1,PSO2, PSO3	SEE Exams	PO 1,PO 2, PO3, PO 4, PO5,PSO1,PSO2,PSO3	Assignments	PO2, PO3	Seminars	PO4
Laboratory Practices	PO 1	StudentViva	-	MiniProject	-	Certification	-
Term Paper	-						

XIV.ASSESSMENT METHODOLOGIES -INDIRECT

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

XV. SYLLABUS

UNIT-1	INTRODUCTION TO TESTING
Introduction: Purpose of testing, dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.	
UNIT-1I	**TRANSACTION FLOW TESTING**
Transaction flow testing: Transaction flows, transaction flow testing techniques, dataflow testing, basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.	
UNIT-III	**LEVELS OF TESTING**
Domain testing: Domains and paths, nice and ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability. Logic based testing: Overview, decision tables, path expressions, kv charts, and specifications.	
UNIT-IV	**PATH PRODUCTS**
Paths, path products and regular expressions: Path products and path expression, reduction procedure, applications, regular expressions and flow anomaly detection.	
UNIT-V	**TRANSITION TESTING**
State, state graphs and transition testing: State graphs, good and bad state graphs, state testing, testability tips.	
Text Books:	
1. Boris Beizer, ―Software Testing Techniques‖, Dreamtech Press, 2nd Edition, 2003.	
Reference Books:	
1. P. C. Jorgenson, ―Software Testing: A Craftmen‘s Approach, Auerbach Publications, 3rd Edition, 2013. 2. Perry, ―Effective Methods of Software Testing, John Wiley, 2nd Edition, 1999. 3. P. Nageswara Rao, ―Software Testing Concepts and Tools, DreamTech Press, 2 nd Edition, 2007.	

XVI. COURSEPLAN:

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	Introduction: Purpose oftesting	CLO 1	R1:1.1
3-4	Dichotomies, model for testing.	CLO 2	T1:1.2
5-6	Model for testing.	CLO 3	T1:1.3
7-9	Consequences of bugs, taxonomy of bugs.	CLO 4	R1:1.5
10-13	Path testing and predicate, loops and path Sensitization.	CLO 5	T1:3.2
14-15	Path instrumentation and their applications and link markers.	CLO 6	T1:3.5
16-19	Transaction flows techniques ,Transaction flows, transaction flow testing technique	CLO 7	T1:4.3
20-23	Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.	CLO 8	T1:5.2
24-27	Domains and paths, Nice and ugly domains, domain testing.	CLO 9	T1:6.2
28-31	Domains and interfaces testing,	CLO 10	T1:6.5
32-34	Domains and testability.	CLO 11	
35-37	Logic based testing and decision tables.	CLO 12	T1:10.2
38-42	Path expressions, k v charts, specifications.	CLO 13	T1:10.4
43-46	Path products and path expression.	CLO 14	R1:4.2.4
47-51	Reduction procedure, applications, regular expressions and flow anomaly detection.	CLO 15,CLO 16,CLO 17	T1:8.4

52-55	State graphs, good & bad state graphs	CLO 18,CLO 19,CLO 20	T1:11.3
56-60	State testing, Testability tips.	CLO 19,CLO 20	T1:11.3

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

S no	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Node reduction algorithm, building tools.	Seminars / Guest Lectures	PO 1, PO 2, PO 3	PSO 1
2	Motivational overview, matrixof graph, relations, power of amatrix.	Seminars	PO 2, PO 5	PSO 3

Prepared by:

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