GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	:	**DIPLOMA IN CM/IT**
LEVEL NAME	:	**ELECTIVE COURSES**
COURSE CODE	:	**CM502E$**
COURSE TITLE	:	**SOFTWARE TESTING**
PREREQUISITE	:	**NIL**
TEACHING SCHEME	:	**TH: 03; TU: 00; PR: 02(CLOCK HRs.)**
TOTAL CREDITS	:	**04 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)**
TH.TEE	:	**03 HRs**
PR.TEE	:	**02 HRs (External)**
PT.	:	**01 HRs**

❖ RATIONALE:

Computer Engineering and Information Technology students should know basic strategies used to test software developed by them. This course describes the basic concept & principles to create tests that mimic the actions and assessments of a human tester which will describe the Software Quality Assurance. This course is helpful to adopt automated testing capabilities for functional, regression, GUI, and data-driven testing.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Apply strategies for generating system test cases.
2. Find defects in developed software.
3. Select tools for test management and bugs tracking.
4. Execute tests for different types of software.
5. Evaluate test results.
6. Perform automated regression testing.

❖ **COURSE DETAILS:**

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Software Testing Background	1. State the impact of software bugs on our lives. 2. Describe different types of bugs that they occur. 3. List major components that go into a software product. 4. Identify different people and skills contribute to a software product. 5. Define terms commonly used by software testers.	1.1 Infamous Software Error Case Studies, Terms for Software Failure, Bugs- A Formal Definition, causes of Bugs, The Cost of Bugs, goals of software tester, qualities of good software tester. 1.2 The Software Development Process, Product Components, Software Project Staff, Software Development Lifecycle Models, 1.3 Software Testing Terms and Definitions, Precision and Accuracy, Verification and Validation, Quality and Reliability, Testing and Quality Assurance.	06
2. Testing Fundamentals I	1. Differentiate different types of testing methods. 2. Apply high-level techniques used for reviewing a product specification. 3. Design and try to reduce the number of test cases by using different methods.	2.1 Examining the Specification- Black-Box and white-box Testing, Static and Dynamic Testing, Static Black Box Testing. 2.2 Performing a High Level Review of the Specification, Low Level Specification Test Techniques. 2.3 Testing the software with Blinders on Dynamic Black-Box Testing, Test-to-pass and Test-to-fail, Equivalences Partitioning, Boundary Value Analysis, Data Testing, State Testing, Other Black-Box Test Techniques.	08
3. Testing Fundamentals II	1. Enlist benefits of different static testing methods. 2. Apply coding guidelines and standards. 3. Review code for errors. 4. Describe dynamic testing method. 5. Differentiate between debugging and testing by using different methods.	3.1 Examining the Code: Static White Box Testing, Formal Review, Coding Standards and Guidelines. 3.2 Generic Code Review Checklist: Data Reference Errors, Data Declaration Errors, Computation Errors, Comparison Errors, Control Flow Errors, Subroutine	08

	6. Describe and apply different testing strategies.	Parameter Errors, Input/ Output Errors, and Other checks. 3.3 Testing the software with X-Ray Glasses: Dynamic White Box Testing, Dynamic white box testing versus debugging, testing the Pieces. 3.4 Data Coverage: Data Flow, Sub-Boundaries, Formula and Equations, Error Forcing. 3.5 Code Coverage: Program Statements and Line Coverage, Branch Coverage, Condition Coverage, basis path testing.	
4. Applying Your Testing Skills	1. State necessity of Configuration Testing. 2. Apply standard s and guidelines for software usability and compatibility testing. 3. Describe fundamental parts of a Web page that need to be tested. 4. Describe and apply basic white-box and black-box techniques to test Web page.	4.1 An Overview of Configuration Testing, Approaching the Task. 4.2 Compatibility Testing Overview, Platform and Application Versions, Standards and Guidelines, Data Sharing Compatibility. 4.3 User Interface Testing, Making a Good UI, Testing for the Disabled. 4.4 Web Site Testing: Web Page Fundamentals, Black-Box Testing, Gray-Box Testing, White-Box Testing, Configuration and Compatibility Testing, Usability Testing, Introducing Automation.	08
5. Automated Testing & Testing Tools	1. State necessity of test tools and automation. 2. Describe how to feed and care for "monkeys". 3. State the purpose of using different test tools. 4. Choose proper testing tools.	5.1 The Benefits of Automation and Tools, Test Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation. 5.2 Bug Bashes and Beta Testing:- Only as far as the eye can see, Test sharing, beta testing, outsourcing your testing. 5.3 Types of test Tools- Tools for test management and Control, Test Specification, Static Testing, Dynamic Testing, Non functional testing. 5.4 Selection and Introduction of Test Tools, Tool Selection and Introduction, Cost Effectiveness of Tool Introduction.	10

6. Test Management	1. Apply Test Strategies. 2. State benefits and drawbacks of independent testing. 3. State Roles and qualification of different profiles. 4. Apply guidelines for structuring the quality assurance plan. 5. State Metrics for monitoring the test process.	6.1. Test Organization, Test teams, tasks and Qualifications. 6.2. Test Planning, Quality Assurance Plan, Test Plan, Prioritization Plan, Test Exit Criteria. 6.3. Cost and economy Aspects 6.4. Test Strategies, Preventive versus Reactive Approach, Analytical versus. heuristic Approach, Testing and Risk 6.5. Test Activity Management, Incident Management, Configuration Management.	08
		Total Hrs.	**48**

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Write a program in C/C++ to find the roots of a quadratic equation and perform Boundary Value Analysis (BVA).	Testing Fundamentals I	2
2	Write a program in C/C++ to find the area of a circle, triangle, square and rectangle and perform Equivalence Class testing		2
3	Write Test Cases for any one given Application.	Testing Fundamentals II	2
4	Write a program in C/C++ to read 3 sides of a triangle & to determine whether they form scalene, isosceles or equilateral triangle and test the same using basis path testing and and find its V(G) by all the three methods.		4
5	Test a website using automation tool like QTP, Winrunner , Selenium etc)	Applying Your Testing Skills	4
6	Use any automated test tool.(e.g. Autoit V3 tool) and demonstrate the use of 1) If….else 2) For …Loop 3) Do…Until 4) Switch … Case	Automated Testing & Testing Tools	4
7	Create any GUI Application e.g. Calculator and Automate using Autoit V3 tool.		4
8	Automate Notepad Application using AutoIT.		2
9	Automate any installation procedure (e.g. WinZip, Winrar, Acrobet Reader etc.)		2
10	Choose any one Bug Tracking Tool (e.g. Bugzilla, Bugit, etc) and demonstrate it.		2
11	Choose any one test management tool (e.g. Test Director) and demonstrate it.	Test Management	2
		Skill Assessment	**2**
		Total HRs	**32**

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Software Testing Background	02(00)	08(04)	00(00)	10(04)
02	Testing Fundamentals I	00(00)	04(04)	06(00)	10(04)
03	Testing Fundamentals II	02(02)	04(04)	06(00)	12(06)
04	Applying Your Testing Skills	02(00)	04(04)	06(06)	12(10)
05	Automated Testing & Testing Tools	02(00)	08(04)	06(06)	16(10)
06	Test Management	02(02)	08(04)	00(00)	10(06)
	Total	**10(04)**	**36(24)**	**24 (12)**	**70 (40)**

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	3	R	2	4	R	2	5	R	2	6	R	2	3	R	2	5/7
	6	R	2																
02	1	U	4	2	U	4	3	U	4	1	U	4	2	U	4				3/5
03	1	U	4	4	U	4	5	U	4	3	U	4	4	U	4				3/5
04	5	U	4	6	U	4	6	U	4	5	U	4	6	U	4				3/5
05	2	A	6	3	A	6	4	A	6										2/3
06	4	A	6	5	A	6	5	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	**CA** (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Theory Answer Sheets	1, 2, 3
				Total	**100**	**40**		
Direct Assessment Practical	**CA** (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	**25**	**10**		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**50**	**20**	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION:

S.N.	Description	Max. Marks
1	Write Test Cases , Use any automated test tool, demonstration of any test management tool	20
2	Performance	10
3	Automate any installation procedure, selection of proper testing method	10
4	Viva voce	10
	TOTAL	**50**

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

1. Computer Engineering:-

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	-	3
2	-	3	-	-	-	-	-	-	-	3	-	3
3	-	3	-	-	-	-	-	-	-	3	-	3
4	-	3	2	2	-	-	-	2	2	3	2	3
5	-	3	2	2	-	-	-	2	2	3	2	3
6	-	3	2	2	-	-	-	2	2	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

2. Information Technology:-

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	-	3
2	-	3	-	-	-	-	-	-	-	3	-	3
3	-	3	-	-	-	-	-	-	-	3	-	3
4	-	3	2	2	-	-	-	2	2	3	-	3
5	-	3	2	2	-	-	-	2	2	3	-	3
6	-	3	2	2	-	-	-	2	2	3	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ REFERENCE & TEXT BOOKS:

S. N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Software Testing	Ron Patton, Sams; 2 Edition , August 5, 2005	10: 0672327988 13: 978-0672327988
2.	Software Testing Foundations	Andreas Spillner, Tilo Linz, Hans Schaefer, Spillner, Linz, Schaefer, 4th Edition, 2014	978-1-937538-42-2
3.	Foundations Of Software Testing	Aditya Mathur, Addison-Wesley Professional; 1 Edition (April 17, 2008	10: 8131716600 13: 978-8131716601
4.	The Art Of Software Testing	Glenford J. Myers Tom Badgett Corey Sandler, Johnwiley & Sons, Inc., Hoboken, New Jersey., Third Edition,October 2011.	978-1-118-03196-4 978-1-118-13313-2
5.	Software Testing Principles and Practices	Srinivasan Desikan, Gopalswamy Ramesh, Dorling Kindersley, Sixth Empression, 2008	978-81-7758-121-8

❖ E-REFERENCES:

- http://www.tutorialspoint.com/software_testing/software_testing_types.htm , **assessed on 30th August 2016**
- http://www.softwaretestingtimes.com/2010/04/software-testing-tutorials-for.html, **assessed on 30th August 2016**
- http://www.softwaretestinghelp.com/15-best-test-management-tools-for-software-testers/ , **assessed on 30th August 2016**
- http://www.etestinghub.com/testdirector.php , **assessed on 30th August 2016**

❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

1. Personal Computer with Operating system (XP, Windows etc)
2. Test management tool (e.g. Test Director) Wattmeter 0-3000 W
3. WinZip, Winrar, Acrobet Reader.
4. Bug Tracking Tool (e.g. Bugzilla, Bugit, etc).
5. Automation tool like QTP, Winrunner , Selenium etc).
6. Automation tool (eg. AutoIT).

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. P. Lambade	HOD, Computer Engineering	Government Polytechnic, Nagpur.
2	Dr.A.R.Mahajan	H.O.D, Information Technology	Government Polytechnic, Nagpur.
3.	Ms. S. N. Chaudhari	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
4.	Ms. D. M. Shirkey	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
5	Ms. G. B. Chavan	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
6	Prof. Manoj Jethawa	HOD Computer Science	Shri Datta Meghe Polytechnic, Nagpur
7	Prof. N.V.Chaudhari	Asst.Proffessor(CSE)	DBACEO, Wanadongari,Nagpur
8	Mr. Atul Upadhay	CEO	Vista Computers, Ram Nagar,Nagur

(Member Secretary PBOS) **(Chairman PBOS)**