

### payment status Course outline **About NPTEL** How does an **NPTEL** online course work? Week 0 Week 1 O Lecture 1 -Motivation Lecture 2 -Terminologies O Lecture 3 -Testing based on Models and Criteria O Lecture 4 -Automation -JUnit as an example Week 1 Feedback Form :Software Testing!! Practice: Week 1 : Assignment 1 (Non Graded) Quiz: Week 1 : **Assignment 1** Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8

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Accepted Answers:

Yes, the answer is correct.

Accepted Answers:

True. False.

Score: 1

True.

 $C_1$  subsumes  $C_2$  iff every test case that satisfies  $C_1$  also satisfies  $C_2$ .

10) What does the JUnit assertion assertFalse(val1 > val2) return whenval1 is less than val2? 1 point

Week 1 : Assignment 1 The due date for submitting this assignment has passed.

Due on 2025-08-06, 23:59 IST.

Assignmen	it Submitted	10112025-06-0	4, 10.2013
4)		1	T 11 1 7 1

Assignment submitted on 2025-08-04, 16:28 IST	
1) Choose the right option to fill in the blank: Suppose a method $M_1$ calls a method $M_2$ , $1_{1}$ which in turn, calls another method $M_3$ . The level of testing that tests for the interface of calls from $M_1$ to $M_2$ and then to $M_3$ is called as	<b>ooint</b> 1
O Functional testing.	
O Unit testing.	
<ul><li>Integration testing.</li><li>System testing.</li></ul>	
Yes, the answer is correct.	
Score: 1 Accepted Answers:	
Integration testing.	
2) State true of false: A coverage criterion $C_1$ said to subsume another coverage criterion $C_2$ if there is at least one test case that satisfies $C_1$ which also satisfies $C_2$ .	ooint
○ True.	
False.	
Yes, the answer is correct. Score: 1	
Accepted Answers: False.	
3) State true or false: Testing can be used to find <b>all</b> the errors in code.	ooint
	Milit
<ul><li>○ True.</li><li>● False.</li></ul>	
Yes, the answer is correct.	
Score: 1 Accepted Answers:	
False.	
4) Which of the following are practised in level 3 thinking during testing?	ooint
Testing is a mental discipline, everyone in an organization strives to test thoroughly.	
Testing is done mainly by developers, to debug their code.	
Testing is done to identify failures and reduce risks.	
Testing is done to show absence of errors.	
Yes, the answer is correct. Score: 1	
Accepted Answers: Testing is done to identify failures and reduce risks.	
5) Which of the following best defines usability testing?	ooint
Testing done to ensure that the software looks nice.	
<ul><li>Testing done to ensure that the software is usable by all the users.</li><li>Testing done to understand how users can use a software.</li></ul>	
Testing done to ensure that the user interface of the software is as specified in the	
requirements.	
Yes, the answer is correct. Score: 1	
Accepted Answers:	
Testing done to ensure that the user interface of the software is as specified in the requirements	i.
6) Which of the following is a list of white-box testing techniques?	ooint
Unit testing, performance testing.	
<ul><li>Integration testing, stress testing.</li><li>Unit testing, integration testing.</li></ul>	
Usability testing, performance testing.	
Yes, the answer is correct.	
Score: 1 Accepted Answers:	
Unit testing, integration testing.	
7) As per the lectures, which of the following sentences best defines a test case?	ooint
A test case contains only inputs to the software artifact.	
A test case contains inputs to the software artifact along with the expected outputs.	
A test case contains inputs to the software artifact and a decision on pass or fail.	
A test case contains inputs to the software artifact, which is run and the actual output is also recorded as a part of the test case.	)
Yes, the answer is correct.	
Score: 1 Accepted Answers:	
A test case contains inputs to the software artifact along with the expected outputs.	
8) When do we say that a set of test cases $T$ satisfies the test requirements $TR$ for a coverage criterion $C$ ?	ooint
$\bigcirc$ For every test requirement $\ tr \in TR$ , there is exactly one test case $t \in T$ such that $t$ satisfies	fies
$\bigcirc$ For some test requirement $\ tr \in TR$ , there is some test case $t$ such that $t \in T$ such that $t$ satisfies $tr$ .	
$\bigcirc$ For some test requirement $\ tr \in TR$ , all the test cases $t \in T$ are such that $t$ satisfies $tr$ .	
	<i>c</i> :
For every test requirement $\ tr \in TR$ , there is at least one test case $t \in T$ such that $t$ satisfy:	siles
Yes, the answer is correct. Score: 1	
Accepted Answers: For every test requirement $\ tr \in TR$ , there is at least one test case $t \in T$ such that $t$ satisfi	es
tr.	
9) When do we say that a coverage criterion $C_1$ subsumes a coverage criterion $C_2$ ?	ooint
$C_1$ subsumes $C_2$ iff some test case that satisfies $C_1$ also satisfies $C_2$ .	
$C_1$ subsumes $C_2$ iff every test case that satisfies $C_1$ also satisfies $C_2$ .	
Yes, the answer is correct. Score: 1	



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**Assignment 2** 

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# Week 2 : Assignment 2

The due date for submitting this assignment has passed.

Due on 2025-08-06, 23:59 IST.

## Assignment submitted on 2025-08-04, 16:43 IST

1) Which of the following best defines an infeasible test path?

An infeasible test path is one that can be executed by a failed test case.

An infeasible test path is one that does not exist in the graph.

An infeasible test path is one that cannot be executed by any test case.

On infeasible test path is one that does not start at an initial vertex or end at a final vertex.

Yes, the answer is correct. Score: 1

**Accepted Answers:** 

An infeasible test path is one that cannot be executed by any test case.

- 2) How are test requirements defined and met in graphs-based structural coverage criteria? 1 point
- Test requirements are basically the same as test paths, they are given as test paths.
- Test requirements are defined as properties of test paths and they are met by using test paths that satisfy each test requirement.

Yes, the answer is correct.

Score: 1

**Accepted Answers:** 

Test requirements are defined as properties of test paths and they are met by using test paths that satisfy each test requirement.

3) In control flow graphs, which of the terms below represents a basic block?

1 point

1 point

A basic block is a sequence of statements such that there is no branching in the sequence. A basic block is any sequence of statements that occurs as a path in the control flow graph.

Yes, the answer is correct.

Score: 1 Accepted Answers:

A basic block is a sequence of statements such that there is no branching in the sequence.

4) Consider a control flow graph G corresponding to a method and a strongly connected 1 point component S in C. Which of the following does S represent in the code that G corresponds to?

 ${\cal S}$  represents the entire method in case the method does not have loops.

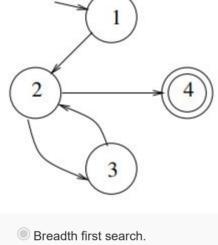
S represents a loop in the method.

Yes, the answer is correct. Score: 1

Accepted Answers:

S represents a loop in the method.

5) Which of the algorithms will return the shortest paths between two nodes in a control flow 1 point graph?



Depth first search.

Yes, the answer is correct.

Score: 1 **Accepted Answers:** 

Breadth first search.

6) State true or false: There are test paths that achieve node coverage but not edge coverage.

1 point

False.

True.

No, the answer is incorrect. Score: 0

**Accepted Answers:** 

True.

7) Which of the following test paths achieve edge coverage? Test path [1, 2, 3, 2, 4].

1 point

Test paths [1, 2, 4] and [1, 2, 3, 2].

Both the paths above achieve edge coverage.

None of the above two paths achieve edge coverage. Yes, the answer is correct.

Score: 1 **Accepted Answers:** Test path [1, 2, 3, 2, 4].

8) State yes or no: In the graph above, the test path [1, 2, 3, 2, 4] tours the pair of edges [3, 1 point

2, 3]. Yes.

No.

Yes, the answer is correct. Score: 1

Accepted Answers: No.

9) The test paths {[1, 2, 4], [1, 2, 3, 2, 3, 2, 4]} achieve which of the following coverage criteria?

1 point

Node coverage only.

Edge coverage only. Node and edge coverage only.

Edge pair coverage

Yes, the answer is correct. Score: 1

**Accepted Answers:** Edge pair coverage

10) State true or false: The test path [1, 2, 3, 2, 4] achieves edge coverage.

1 point

True. O False.

Yes, the answer is correct.

Score: 1

Accepted Answers: True.



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# Week 3: Assignment 3

Assignment	Submitted	011 2025-	·UO-12,	11.25 13

Due on 2025-08-13, 23:59 IST
Assignment submitted on 2025-08-12, 11:25 IST
1) Which of the following represents a basic block in a control flow graph? 1 point
<ul> <li>A basic block of statements is a set of all statements that are a part of a function that the control flow graph represents.</li> <li>A basic block of statements is a sequence of statements such that if the first statement the sequence is executed then all the statements in the sequence will also be executed.</li> <li>Yes, the answer is correct.</li> <li>Score: 1</li> </ul>
Accepted Answers:  A basic block of statements is a sequence of statements such that if the first statement the sequence is executed then all the statements in the sequence will also be executed.
2) Consider a variable count of type int. Suppose there is a method that has a statement of <i>1 poin</i>
the type count++;. Which of the following statements are correct regarding the data flow definition o count?
$\bigcirc$ The statement is a definition of $\operatorname{count}$ .
The statement is a use of count.
The statement is both a definition and use of $\operatorname{count}$ .
$\bigcirc$ The statement is neither a definition nor a use of ${ m count.}$
Yes, the answer is correct. Score: 1
Accepted Answers: The statement is both a definition and use of count.
3) Consider a variable $x$ of type double and suppose a particular method in Java has a statement <b>if(Math.log(x))</b> >= <b>4.2</b> , will it be considered a definition of $x$ or a use of $x$ ?
The statement is a definition of x
The statement is a use of x.
Yes, the answer is correct. Score: 1 Accepted Answers: The statement is a use of x.
4) State true or false: Consider a variable $x$ in a program. Not every definition of $x$ will always reach a use.
<ul><li>True.</li><li>False.</li></ul>
Yes, the answer is correct. Score: 1
Accepted Answers:  True.
5) Which of the following best defines a du-path for a variable $x$ ? 1 points
A du-path is a simple path from a definition of $x$ to a use of $x$ without any further definitions of $x$ in-between.
A du-path is a path from a definition of $x$ to a use of $x$ without any further definitions of $x$ inbetween.
A du-path is a simple path from a definition of $x$ to a use of $x$ without any further uses of $x$ inbetween.
A du-path is a path from a definition of $x$ to a use of $x$ without any further uses of $x$ in-between.
Yes, the answer is correct. Score: 1
Accepted Answers: A du-path is a simple path from a definition of $x$ to a use of $x$ without any further definitions of $x$ inbetween.
6) State yes or no: We group du-paths with respect to a variable by their definitions. 1 points
<ul><li>Yes.</li><li>No.</li></ul>
Yes, the answer is correct.
Score: 1 Accepted Answers: Yes.
7) Is it true that the all-du-paths data flow coverage criterion subsumes prime path coverage?
○ Yes.
No.

Yes, the answer is correct. Score: 1 **Accepted Answers:** 8) Which of the following statements are true when it comes to comparing traditional source 1 point code coverage criteria with graph based coverage criteria? Node and statement coverage are the same, edge and branch coverage are the same. Edge and decision coverage are the same. Yes, the answer is correct. Score: 1

Accepted Answers: Node and statement coverage are the same, edge and branch coverage are the same.

graph?

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9) Which of the following defines a linearly independent path of execution in a control flow

A path in which there are no branches. A path which does not contain other paths within it.

1 point

A path that represents structural complexity of a program.

A path within a connected component.

No, the answer is incorrect. Score: 0

Accepted Answers:

A path which does not contain other paths within it.

10) State true or false: Node and edge coverage, as test requirements for structural coverage 1 point over graphs, are given with the input graph itself.

False.

True.

No, the answer is incorrect. Score: 0

Accepted Answers: True.



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O Lecture 15 -

Data Flow Graph Coverage Criteria: Applied to Test Code Lecture 16 -

Software Design and Integration Testing Lecture 17 -

Design Integration Testing and Graph Coverage Lecture 18 -

Specification Testing and Graph Coverage O Lecture 19 -

Graph

Coverage and Finite state Machines Week 4 Feedback Form:

Software Testing (IIITB) Practice: Week 4: Assignment

4 (Non Graded) Quiz: Week 4 : **Assignment 4** 

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## Week 4: Assignment 4 The due date for submitting this assignment has passed.

Due on 2025-08-20, 23:59 IST.

1 point

1 point

#### Assignment submitted on 2025-08-12, 11:52 IST 1) Which of the following best describes a test driver?

It is a special purpose implementation of a software module, used to develop or test a

component that calls it. It is a software component that replaces another component that takes care of the control

and/or the calling of a software component. Yes, the answer is correct.

Score: 1

**Accepted Answers:** 

It is a software component that replaces another component that takes care of the control and/or the

calling of a software component.

2) If method A uses a variable v shared with method B, where A writes to v and B reads from 1 point

v, then, it is an example of which kind of coupling interface listed below?

 Parameter coupling. Interface coupling.

External coupling.

Shared data coupling. Yes, the answer is correct.

Score: 1 Accepted Answers:

Shared data coupling.

3) To test sequencing constraints that occur as requirements specification, which of the 1 point following tests are used?

Tests are inputs to sequencing constraints that satisfy the constraints.

Tests are inputs to sequencing constraints that violate the constraints.

Tests are sequences of method calls, as they occur in the specification.

Tests are sequences of method calls, as they occur in the specification.

Tests are randomly generated sequencing constraints.

No, the answer is incorrect. Score: 0

Accepted Answers:

4) A simple path from the last definition to the first use of a coupling variable is called as . . . 1 point

A coupling du-path.

A du-path.

Yes, the answer is correct. Score: 1

**Accepted Answers:** 

5) State Yes or No: Are control flow graphs representing code the same as finite state machines that represent the same code?

No

O Yes

Yes, the answer is correct.

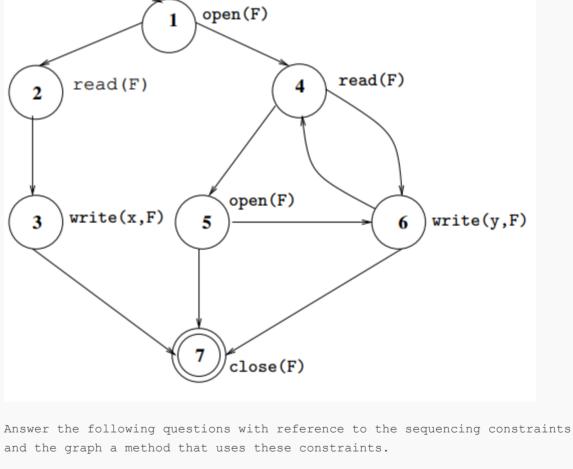
Score: 1 **Accepted Answers:** 

No

Consider the graph below that depicts the calls to file handler methods

methods has to satisfy the following sequencing constraints: (1) An open(f) must be executed before every write(t), (2) An open(f) must be executed before every close(), (3) A write(f) may not be executed after a close() unless there is an open(f) in between, (4) A write(t) should be executed before every close().

open(), close(), read() and write(). Any procedure/method that uses these



6) Which of the following is true with reference to the graph satisfying the sequencing 1 point constraints?

All the sequencing constraints are satisfied.

Constraints (1) and (2) are satisfied but (3) and (4) are not. Constraints (1), (2) and (3) are satisfied but (4) is not.

Score: 1 **Accepted Answers:** Constraints (1), (2) and (3) are satisfied but (4) is not.

Yes, the answer is correct.

All constraints are violated.

7) State true or false: The path (1,4,5,7) satisfies constraint (4).

True. False.

Score: 1 Accepted Answers:

False. 8) State true or false: The path (1,2,3,7) satisfies all the constraints.

Yes, the answer is correct.

O False. Yes, the answer is correct.

**Accepted Answers:** 

Score: 1

True.

True.

9) State yes or no: Does the path (1,4,6,7) violate any of the constraints?

Yes. No.

1 point

1 point

1 point

Yes, the answer is correct. Score: 1

**Accepted Answers:** No.

10) State true or false: The path (1,4,6,4,6,7) satisfies all the constraints.

1 point

Yes. O No.

Yes, the answer is correct. Score: 1 Accepted Answers:

Yes.

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Assignment 4: Graph Coverage Criteria

O Logic: Basics Needed for Software Testing

Logic: Coverage Criteria

Criteria, Contd. Logic Coverage

Coverage

Criteria Week 5 Feedback Form:

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## Week 5 : Assignment 5 The due date for submitting this assignment has passed.

Due on 2025-08-27, 23:59 IST.

## Assignment submitted on 2025-08-26, 09:29 IST

1) State true or false: GACC subsumes predicate coverage.

True.

1 point

False.

Yes, the answer is correct. Score: 1

Accepted Answers: False.

2) When we test to check if a particular clause does not determine a predicate, which kind of 1 point coverage criteria are we considering?

Active coverage criteria.

Inactive coverage criteria

Yes, the answer is correct.

Score: 1

**Accepted Answers:** Inactive coverage criteria

3) Which of the following represents a correct order of subsumption amongst logic coverage 1 point criteria? In the options below, read  $\rightarrow$  as 'subsumes'.

○ Correlated active clause coverage → Predicate coverage → Clause coverage. ○ Combinatorial coverage → Predicate coverage → Clause coverage.

Combinatorial coverage → Correlated active clause coverage → Predicate coverage.

General active clause coverage → Correlated active clause coverage → Clause coverage.

Yes, the answer is correct.

Score: 1

Accepted Answers:

 $Combinatorial\ coverage \rightarrow Correlated\ active\ clause\ coverage \rightarrow Predicate\ coverage.$ 

Consider the logical predicate  $p=a\lor(b\land c)$ . Truth table for the predicate is given below with rows numbered from 1 to 8. T represents the Boolean value true and F represents the Boolean value false.

ll		a	U		P
1		T	T	T	Т
2	2	T	$\mathbf{T}$	F	T
3	3	T	F	T	Т
4	1	T	F	F	Т
5	5	F	T	T	T
6	;	F	T	F	F
7	7	F	F	T	F
8	3	F	F	F	F

a h c n

given truth table. 4) Which of the following represents  $p_a$ , the conditions under which clause a determines p? **1 point** 

Answer the following questions with reference to logical coverage criteria for this predicate and the

 $b \vee c$ .  $\neg b \lor \neg c$ .  $\neg b \wedge \neg c$ .

 $\neg b \lor \neg c$ .

 $a \wedge c$ .

 $\neg a \wedge c$ .

 $b \wedge c$ .

Yes, the answer is correct. Score: 1 Accepted Answers:

5) Which of the following represents pb, the conditions under which clause b determines p? **1** point

 $a \lor c$ .  $\neg a \wedge c$ .  $\neg a \lor \neg c$ Yes, the answer is correct. Score: 1 **Accepted Answers:** 

6) Which of the following represents  $p_c$ , the conditions under which clause c determines p? **1 point** 

 $\neg a \lor b$ . Yes, the answer is correct. Score: 1 **Accepted Answers:** 

 $\neg a \wedge b$ .

 $\neg a \wedge b$ .

represent row numbers from the truth table.

7) Which of the following represents GACC pairs for clause a? Note: Numbers below

1 point

 $\{1,3,4\} \times \{5,6,7\}.$ Yes, the answer is correct. Score: 1

Accepted Answers:  $\{2,3,4\} \times \{6,7,8\}.$ 

 $\{2,3,4\} \times \{6,7,8\}.$ 

True. False

8) State true or false: GACC pairs for clauses b and c are the same.

1 point

Yes, the answer is correct. Score: 1

Accepted Answers: False

9) The set  $\{(2,6),(3,7),(4,8)\}$  is the set of RACC pairs for which clause?

Clause a. OClause b.

1 point

Yes, the answer is correct. Score: 1

**Accepted Answers:** Clause a.

10) State true or false: CACC pairs for clauses a, b and c are different from GACC pairs for

True.

False Yes, the answer is correct.

these clauses.

Score: 1 Accepted Answers:

False

Due on 2025-09-03, 23:59 IST.



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No, some times we have to add extra clauses to the predicate Yes, the answer is correct. Score: 1 Accepted Answers: No, some times we have to add extra clauses to the predicate 1 point 2) How do logical predicates occur in finite state machines? The logical predicates occur as a part of the states of the finite state machines. The logical predicates occur as guards in the transitions of the finite state machines. Yes, the answer is correct. Score: 1 Accepted Answers: The logical predicates occur as guards in the transitions of the finite state machines. 3) In a requirements specification document, where do logical predicates occur? 1 point They occur directly as a part of the requirements. They occur as pre-conditions, invariants and post-conditions in the requirements. All the conditions in requirements can be translated into predicates. Logical predicates cannot be found in requirements. Yes, the answer is correct. Score: 1 Accepted Answers: They occur as pre-conditions, invariants and post-conditions in the requirements. Answer the following questions for the method twoPred() below. The method is called with two input parameters  $\mathbf{x}$  and  $\mathbf{y}$ . public String twoPred (int x, int y) boolean z; if (x < y)z = true;else z = false; if (z && x+y == 10)return z; else return z-1; 4) State true or false: The internal variable z in the second predicate needs to be re-written 1 point in terms of the input parameters x and y. True False Yes, the answer is correct. Score: 1 Accepted Answers: 5) Is it true that predicate coverage for the first predicate will also subsume predicate 1 point Week 10 coverage for the second predicate? Week 11 True False Week 12 Yes, the answer is correct. Score: 1 Learning **Materials** Accepted Answers: **DOWNLOAD** 6) How many test cases will be needed for clause coverage for the second predicate if we **VIDEOS** explicitly count the true and false values for each clause? Text Two test cases. **Transcripts** Four test cases Yes, the answer is correct. Score: 1 Accepted Answers: Four test cases 7) State true or false: The set of test case inputs 1 point  $\{(x=5,y=3),(x=4,y=6),(x=5,y=6)\}$  will satisfy clause coverage for the second predicate. True False Yes, the answer is correct. Score: 1 Accepted Answers: True 8) State yes or no: The set of test case inputs  $\{(x=5,y=3),(x=4,y=6),(x=5,y=6)\}$  will also satisfy predicate coverage for the first and second predicates. Yes O No

Yes, the answer is correct.

Only one test case Two test cases Three test cases Five test cases

Yes, the answer is correct.

Yes, the answer is correct.

Accepted Answers:

10) State true or false: The set of test case inputs

Accepted Answers: Three test cases

9) How many test cases are needed for satisfying RACC for all the clauses for the second 1 point

 $\{(x=4,y=6),(x=6,y=4),(x=4,y=5)\}$  satisfy RACC for the second predicate.

1 point

Accepted Answers:

Score: 1

Score: 1

True False

Score: 1

True

Week 6: Assignment 6

Assignment submitted on 2025-08-26, 10:21 IST

Yes, the predicates can be considered exactly as they occur in code.

1) While applying logic-based testing to test source code, is it true that the predicates can be 1 point

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taken exactly as they occur in code always?



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## Week 7: Assignment 7 The due date for submitting this assignment has passed.

Due on 2025-09-10, 23:59 IST.

## Assignment submitted on 2025-09-07, 00:07 IST

For the first five questions, consider the following set of requirements for a college job placement process. If the CGPA is ≥ 8 (out of 10), then the students are eligible for companies that offer salaries ≥ INR 20,00,000/= per annum. If the CGPA is between 6 and 8 then they are eligible for companies that of IN CC CC ра

offer salaries less than INR 20,00,000/= per annum. If there aren't any companies with salary of INR 20,00,000/= per annum in a particular period, then those with CGPA $\geq$ 8 will also appear in companies in the lower salary categories. Those with less than 6 CGPA will not be assisted by	n the the
college placement office for their placements. Answer the following questions related to equiva partitioning based testing of these requirements.	lence
1) How many partitions will be there for the input CGPA if we consider only valid inputs?	1 point
Three partitions.	
Five partitions.  Yes, the answer is correct.	
Score: 1 Accepted Answers:	
Three partitions.	
<ul><li>2) Do the test inputs {CGPA = 8, CGPA = 9, CGPA = 9.5} belong to the same partition?</li><li>Yes, they belong to the same partition.</li></ul>	1 point
No, they belong to different partitions.	
Yes, the answer is correct. Score: 1	
Accepted Answers: Yes, they belong to the same partition.	
3) What is the expected output for the test case containing CGPA = 8 as input?	1 point
Eligibility for offers above INR 20,00,000/= per annum and if no such offers exist, eligib offers.	le for all
Only eligible for offers above INR 20,00,000/= per annum.	
Yes, the answer is correct. Score: 1	
Accepted Answers:  Eligibility for offers above INR 20,00,000/= per annum and if no such offers exist, eligible for offers.	r all
4) State true or false: A student has a CGPA of 6 and will be eligible to appear for placements for companies with a salary offer of INR 20,00,000/=.	1 point
○ True.  ■ False.	
Yes, the answer is correct.	
Score: 1 Accepted Answers: False.	
	4
5) Which of the following is a correct partitioning of inputs?	1 point
Salary range: 1. INR $x$ to INR 20,00,000, 2. INR 20,00,001 to INR $y$ where $x$ is the minim salary offered and $y$ is the maximum salary offered.  Salary range: 1. INR 0 to INR 20,00,000, 2. $\geq$ INR 20,00,000.	um
Both the options above can be valid partitions.	
None of the options above are valid partitions.	
Yes, the answer is correct. Score: 1 Accepted Answers:	
Both the options above can be valid partitions.	
6) Amongst the various coverage criteria for input space partitioning, which is the most expressive and which is the least expressive?	1 point
All combinations coverage is the least expressive and multiple base choice coverage is most expressive.	the :
All combinations coverage is the most expressive and multiple base choice coverage is	s the
least expressive.  Each choice coverage is the most expressive and all combinations coverage is the least	st
expressive.  Each choice coverage is the least expressive and all combinations coverage is the mose expressive.	st
Yes, the answer is correct. Score: 1	
Accepted Answers:  Each choice coverage is the least expressive and all combinations coverage is the most exp	pressive.
7) State true or false: Multiple base choice coverage subsumes pair-wise coverage.	1 point
True.	i poiite
○ False.	
No, the answer is incorrect. Score: 0	
Accepted Answers: False.	
8) Which criterion below will have a maximum number of test cases?	1 point
Each choice criterion.  All combinations criterion.	
All combinations criterion.      Base choice coverage criterion.	
Multiple base choice coverage criterion.	

Yes, the answer is correct. Score: 1

Accepted Answers:

All combinations criterion.

9) When does T-wise coverage criterion become the same as all combinations coverage

When the value for T is the maximum value in a partition.

When the value for T is equal to the number of partitions.

Yes, the answer is correct. Score: 1

Accepted Answers:

criterion?

When the value for T is equal to the number of partitions.

and invalid inputs need to be considered. Yes.

1 point

10) State yes or no: While partitioning the inputs using equivalence partitioning, both valid

O No.

Yes, the answer is correct. Score: 1

Accepted Answers: Yes.

Due on 2025-09-17, 23:59 IST.



If already registered, click to check your payment status

Course outline	Assignment submitted on 2025-09-07, 00:40 IST
About NPTEL	1) Consider the regular expression $(a+b)\cdot (a+b)*$ over the alphabet $\Sigma=\{a,b\}$ . 1) Which of the following options represents a list of words generated by this regular expression?
	$\stackrel{\bigcirc}{ab,a,aab}.$
How does an NPTEL online	
course work?	abab, babab.
Week 0	aaa,bbb. $lacktriangledown$ All of the above.
	Yes, the answer is correct.
Week 1	Score: 1 Accepted Answers:
Week 2	All of the above.
Week 3	2) For the same regular expression $(a+b)\cdot(a+b)*$ , which of the following options
Week 4	represents the language corresponding to the regular expression?
Week 5	The language is the set of all words over $a$ and $b$ that have at least one $a$ and at least one $b$ in them.
Week 6	
Week 7	The language is the set of all words over $a$ and $b$ that have at least one $a$ or at least one $b$ in them.
vveek /	Yes, the answer is correct.
Week 8	Score: 1 Accepted Answers:
<ul><li>Syntax-Based</li><li>Testing</li></ul>	The language is the set of all words over $a$ and $b$ that have at least one $a$ or at least one $b$ in th
Mutatioon     Testing	3) While parsing a program to extract syntactic information, which of the following defines 1 phow characters form tokens?
Mutation Testing	Regular expressions.
for Programs	Ocontext-free grammars.
Mutation  To atting out.	Context-sensitive grammars.
Testing: Mutation	The normal form of the grammar.
Operators for Source Code	Yes, the answer is correct. Score: 1
	Accepted Answers:  Regular expressions.
<ul><li>Mutation Testing</li><li>Vs. Graphs and</li></ul>	Negulai expressions.
Logic Based Testing	4) Consider the context-free grammar given by $G=(N,T,P,S)$ where
<ul><li>Practice: Week</li></ul>	$N=\{S,X\}, T=\{a,b\}, P=\{S\rightarrow aXb, X\rightarrow ab\}$ . Which of the following is the language generated by this grammar?
8 : Assignment	generated by the grammar.
8 (Non Graded)	The language generated by $G$ is $\{w w=aabb\}.$
Quiz: Week 8 : Assignment 8	The language generated by $G$ is $\{w w$ is of the form $a^nb^n, n\geq 1\}$
O Week 8	Yes, the answer is correct. Score: 1
Feedback Form :Software	Accepted Answers:
Testing!!	The language generated by $G$ is $\{w w=aabb\}.$
Week 9	5) State yes or no: Is the ground string in mutation testing the same as the program under test?
Week 10	Ves.
Week 11	No.
Week 12	Yes, the answer is correct. Score: 1
I a a maior m	Accepted Answers:
Learning Materials	Yes.
DOWNLOAD	6) Which of the following is a mutant that can be killed by any test case?
VIDEOS	<ul><li>○ Dead mutant.</li><li>○ Equivalent mutant.</li></ul>
Text	Trivial mutant.  Trivial mutant.
Transcripts	Idempotent mutant.
	Voe the answer is correct

Yes, it will find many errors early.

Yes, the answer is correct.

No, the answer is incorrect.

Accepted Answers:

Accepted Answers:

Score: 1

O True. False.

Score: 0

True.

No, mutation operators work best when applied one at a time.

10) State true or false: Mutation testing can be used to show that a program behaves

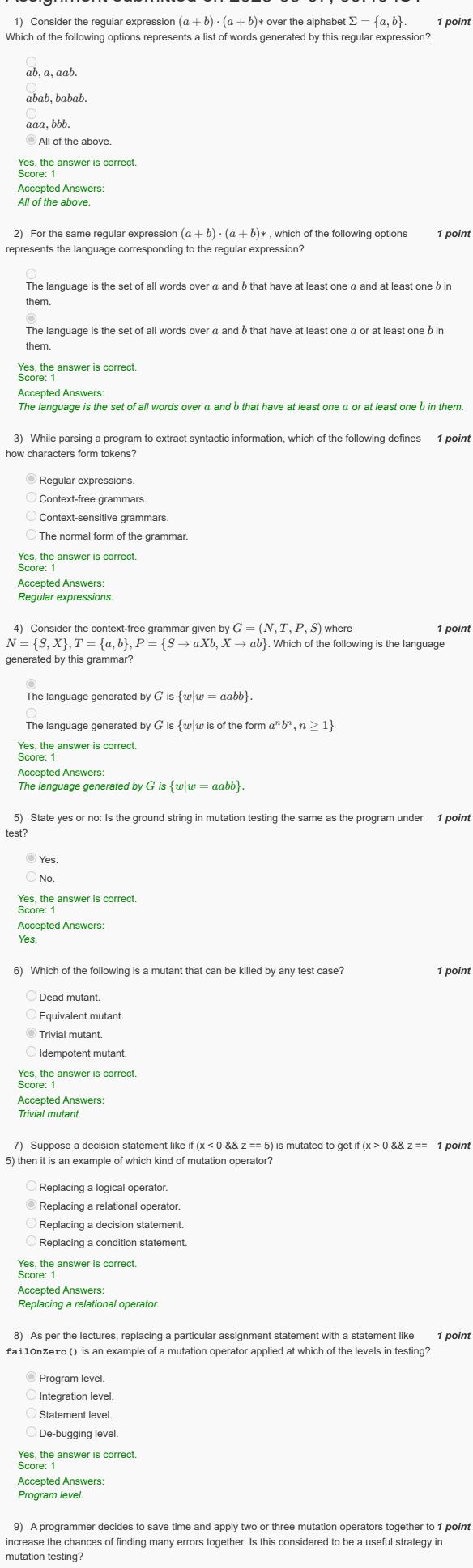
1 point

No, mutation operators work best when applied one at a time.

identically when a particular operation is replaced or removed.

Week 8 : Assignment 8

The due date for submitting this assignment has passed.





Course outline
About NPTEL
How does an NPTEL online course work?
Week 0
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
<ul><li>Mutation testing</li></ul>
<ul><li>Mutation Testing</li><li>Mutation for integration</li></ul>
<ul><li>Mutation testing</li><li>: Grammars and inputs</li></ul>
Software Testing Course: Summary after Week 9
<ul><li>Week 9</li><li>Feedback Form:</li><li>Software</li><li>Testing (IIITB)</li></ul>
<ul><li>Practice: Week</li><li>9 : Assignment</li><li>9 (Non Graded)</li></ul>
Quiz: Week 9 : Assignment 9
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Learning Materials

**DOWNLOAD VIDEOS** 

**Transcripts** 

Text

## Week 9 : Assignment 9 The due date for submitting this assignment has passed.

Due on 2025-09-24, 23:59 IST.

Assignment	submitted	on 2025-09	-22, 18:56 IS

Assignment submitted on 2025-09-22, 18:56 IST
1) How is overloading different from overriding in object oriented programming? 1 point
<ul> <li>Overloading occurs between two methods in the same class and overriding occurs between methods in a class and one of its descendants.</li> <li>Overloading occurs between a method in a class and one of its descendants and overriding occurs between two methods in the same class.</li> </ul>
Yes, the answer is correct. Score: 1
Accepted Answers:  Overloading occurs between two methods in the same class and overriding occurs between methods in a class and one of its descendants.
2) Which of the following represents use of <b>super()</b> keyword? 1 point
<ul> <li>Sub-classes can explicitly use their parents variables and methods using the keyword super().</li> <li>Sub-classes can use their own variables and methods and not the inherited ones using the keyword super().</li> </ul>
Yes, the answer is correct. Score: 1
Accepted Answers:  Sub-classes can explicitly use their parents variables and methods using the keyword super().
3) While applying the mutation operator that deletes a method call, how is the value to be 1 point returned by the deleted method passed back to the caller method?
The method itself is deleted, so the call should also be deleted in the caller method.
<ul><li>The value returned by the deleted method is replaced with a suitable statement in the caller.</li><li>A message is sent to the caller indicating that there is no value to be returned as the method is</li></ul>
deleted.  The value returned by the deleted method is replaced with a fixed, constant value.
Yes, the answer is correct. Score: 1
Accepted Answers:  The value returned by the deleted method is replaced with a fixed, constant value.
4) When mutation testing is applied as a black-box testing technique to mutate the inputs, <b>1 point</b> which of the following statements hold true?
Both the inputs and the program which is accepting the inputs have to be mutated with one mutation operator.
<ul> <li>Only the inputs are mutated, the program which is accepting the inputs remains the same.</li> <li>The inputs are not mutated, the program is mutated at a random statement.</li> <li>The inputs are not mutated, the program is mutated at one of the statements that process the inputs.</li> </ul>
Yes, the answer is correct. Score: 1
Accepted Answers:  Only the inputs are mutated, the program which is accepting the inputs remains the same.
5) When we change a method call <b>is-divisible(a,b)</b> to <b>is-divisible(b,a)</b> is an example of which of the mutation operators listed below?
<ul> <li>Integration parameter variable replacement.</li> <li>Integration parameter variable exchange.</li> </ul>
Yes, the answer is correct. Score: 1
Accepted Answers: Integration parameter variable exchange.
6) State yes or no: The programming language Java does not support multiple class <i>1 point</i> inheritance and hence each class only has a single parent.
<ul><li>♥ Yes.</li><li>♦ No.</li></ul>
Yes, the answer is correct. Score: 1
Accepted Answers: Yes.
7) Which of the following integration mutation operator represents changing the order of arguments in method invocations to be the same as that of another overloading method, if one exists?
Overloading method change.
Argument number change.      Argument order change.
Reference type change.
Yes, the answer is correct. Score: 1
Accepted Answers: Argument order change.
8) State true or false: While testing inputs using mutation testing, the inputs always have to 1 point adhere to their underlying syntax.
● True.

False.

No, the answer is incorrect. Score: 0

Accepted Answers: False.

9) Towards ensuring that mutation testing subsumes edge coverage, which of the following 1 point

mutation operators are used? Relational operator replacement.

Statement replacement. O Logical operator replacement.

Ocondition statement replacement. Yes, the answer is correct.

Score: 1 Accepted Answers:

Relational operator replacement.

10) Which of the statements below are true with reference to mutation testing subsuming all- 1 point

defs coverage? We need to consider strong mutation to be applied to the statements that contain variable

definitions. Both weak and strong mutation on the statements that contain variable definitions will work.

Yes, the answer is correct. Score: 1

Accepted Answers:

We need to consider strong mutation to be applied to the statements that contain variable



**Transcripts** 

Iteration and selection.

Yes, the answer is correct.

Accepted Answers:

Score: 1

Score: 1

Sequencing, iteration and selection.

Sequencing, iteration, selection and aggregation.

8) Which of the following defines the nodes of a yo-yo graph?

9) Which of the following best defines the edges of a yo-yo graph?

Nodes of a yo-yo graph are the classes of the inheritance hierarchy.

Nodes of a yo-yo graph are the methods of different classes, one node for each of the new,

Nodes of a yo-yo graph are the methods of different classes, one node for each of the new,

Edges of a yo-yo graph are the method calls among methods of different classes.

Edges of a yo-yo graph are either the actual method calls or the calls that cannot be made due

Edges of a yo-yo graph are either the actual method calls or the calls that cannot be made due to

10) State true or false: All the faults in object-oriented programs can be determined statically. 1 point

Edges of a yo-yo graph are among classes at different levels of inheritance.

Edges of a yo-yo graph are from a caller method to a callee method.

1 point

1 point

Sequencing, iteration, selection and aggregation.

inherited and overridden methods.

inherited and overridden methods.

Yes, the answer is correct.

Accepted Answers:

to overriding.

**Accepted Answers:** 

Score: 0

True. False.

Score: 1

False.

No, the answer is incorrect.

Yes, the answer is correct.

**Accepted Answers:** 

#### Week 10 : Assignment 10 payment status The due date for submitting this assignment has passed. Due on 2025-10-01, 23:59 IST. Assignment submitted on 2025-09-22, 19:26 IST Course outline 1) Which of the following features of static websites are tested using graphs? 1 point **About NPTEL** We check if all the connections are valid and if there are any dead links. We check if all the information given is correct in each of the linked web pages. How does an Yes, the answer is correct. **NPTEL** online Score: 1 course work? Accepted Answers: We check if all the connections are valid and if there are any dead links. Week 0 2) While testing web applications, which of the following is true regarding client-side vs. 1 point Week 1 server-side testing? Week 2 Client and server are separated and testers typically don't have access to the server code. Testers have equal accesss to the client code and server code eventhough they are separated. Week 3 Yes, the answer is correct. Score: 1 Week 4 Accepted Answers: Client and server are separated and testers typically don't have access to the server code. Week 5 3) State yes or no: It is possible to generate all the input screens that are passed to a web Week 6 application. Week 7 Yes. No. Week 8 Yes, the answer is correct. Score: 1 Week 9 Accepted Answers: No. Week 10 4) Which of the following is a list of techniques that can be used to provide test values to a Testing of web web application? Applications and Web Services Generate values automatically using an appropriate algorithm. Testing of web Request user to supply inputs. Applications and Random choice, user session data, construct based on the domain of application. Web Services Generate inputs randomly and then choose based on the application. Testing of web Yes, the answer is correct. Applications and Score: 1 Web Services Accepted Answers: Testing of Random choice, user session data, construct based on the domain of application. Object-Oriented Applications 5) Which of the following features can be checked using HTML without the need to write 1 point extra scripting constraints? Testing of Object-Oriented Change of transfer mode, checking for length of input and checking against a list of pre-defined Applications values O Week 10 Change of transfer mode and change of data type of input. Feedback Form: Checking of inter-dependency of input values. Software Testing (IIITB) Checking for length of input and also the data type. Practice: Week Yes, the answer is correct. Score: 1 10: Assignment 10 (Non Accepted Answers: Graded) Change of transfer mode, checking for length of input and checking against a list of pre-defined values. Quiz: Week 10 : Assignment 6) Is a control graph model useful for testing system level properties of web applications? 1 point Yes. Week 11 O No. Week 12 No, the answer is incorrect. Score: 0 Learning Accepted Answers: **Materials DOWNLOAD** 7) Which of the following is a complete list of operators that are used in component 1 point **VIDEOS** expressions? Sequencing and selection. **Text**



#### Week 11: Assignment 11 payment status The due date for submitting this assignment has passed. Due on 2025-10-08, 23:59 IST. Assignment submitted on 2025-10-08, 01:22 IST Course outline 1) State yes or no: Is concolic testing a white-box testing technique? 1 point **About NPTEL** Yes. O No. How does an Yes, the answer is correct. **NPTEL** online Score: 1 course work? Accepted Answers: Yes. Week 0 2) Which of the following is true about concolic testing? 1 point Week 1 Oconcolic testing is used instead of symbolic testing when the latter fails. Week 2 Concolic testing keeps concrete state and symbolic state. Yes, the answer is correct. Week 3 Score: 1 **Accepted Answers:** Week 4 Concolic testing keeps concrete state and symbolic state. Week 5 3) What is the use of a SAT/SMT solver in symbolic testing? 1 point Week 6 SAT/SMT solvers are used to collect path constraints in symbolic testing. SAT/SMT solvers are used to solve path constraints and get values that can be used as test Week 7 inputs. Oconstraint solvers are not useful in symbolic testing as not all path constraints can be collected Week 8 and solved. Oconstraint solvers on predicates always return true or false values which helps to decide the Week 9 execution paths. Week 10 Yes, the answer is correct. Score: 1 Accepted Answers: Week 11 SAT/SMT solvers are used to solve path constraints and get values that can be used as test inputs. Symbolic Testing 4) State true or false: Symbolic execution can be used to detect non-termination in 1 point programs. Symbolic Testing 2 True. DART: Directed False. Automated No, the answer is incorrect. Random Testing Score: 0 O DART: Directed Accepted Answers: False. Automated Random Testing 5) Which of the following is a list of techniques used in the algorithm deployed by DART? 1 point O DART: Directed Ramdom testing, symbolic testing and constraint solvers. Automated Symbolic testing and automated testing Random Testing Directed search, random testing and constraint solvers. Concrete testing and symbolic testing. Practice: Week 11: Assignment No, the answer is incorrect. 11 (Non Score: 0 Graded) Accepted Answers: Directed search, random testing and constraint solvers. Quiz: Week 11 : **Assignment 11** 6) Which of the following strategy is used for input search in concolic testing? 1 point WWeek 11 Feedback Form Random search. :Software Systematic, random search interleaved with path-sensitive search. Testing!! Yes, the answer is correct. Week 12 Score: 1 Accepted Answers: Systematic, random search interleaved with path-sensitive search. Learning **Materials DOWNLOAD** Common data for Q7-Q10: **VIDEOS** Consider the code fragment given below. Answer the following questions related to symbolic execution **Text** of the given code fragment. **Transcripts** 0: int x, y;

```
1: if (x > y) {
2:
      x = x + y;
      y = x - y;
4:
      x = x - y;
      if (x - y > 0)
5:
6:
         --- error ---;
 7) What does the code fragment do?
```



It swaps the values of x and y.

It swaps the values of x and y twice.

Yes, the answer is correct. Score: 1

It swaps the values of x and y.

Accepted Answers:

8) How many decision points and execution paths are there in the code fragment?

Two decision points and three execution paths.

10) State yes or no: Is the error statement reachable in the given program fragment?

Three decision points and four execution paths.

Yes, the answer is correct. Score: 1

Accepted Answers: Two decision points and three execution paths.

9) What will be the path constraint at line 1 of the code fragment such that program exits

1 point without further execution?  $\bigcirc$  x > y.

1 point

x <= y.</p>

Yes, the answer is correct.

Score: 1 Accepted Answers:

 $x \le y$ .

O Yes.

No. Yes, the answer is correct. Score: 1

Accepted Answers:

No.



#### Assignment submitted on 2025-10-08, 01:34 IST Course outline С **About NPTEL** How does an **NPTEL** online Yes, the answer is correct. course work? Score: 1 Accepted Answers: Week 0 False. Week 1 2) Let P be a program and let P' be a modified version of P. Whendo we say that a particular test case t is obsolete for P'? Week 2 Week 3 Test case t is obsolete for P' if it does not produce an output on execution. Week 4 Yes, the answer is correct. Score: 1 Week 5 Accepted Answers: Test case t is obsolete for P' if it has an input that is not valid for P'. Week 6 3) State true or false: Testing for non-functional or quality requirements can be done at all Week 7 the phases of software development. Week 8 True. False. Week 9 No, the answer is incorrect. Score: 0 Week 10 Accepted Answers: False. Week 11 Week 12 Testing of Object-Oriented The application X is forward compatible. **Applications** The application X is backward compatible. Testing of Mobile Yes, the answer is correct. **Applications** Score: 1 **Accepted Answers:** Non-Functional The application X is forward compatible. System Testing Regression **Testing** the users, then, it is an example of which kind of quality requirement? Software It is an example of a confidentiality requirement. Testing: Summary at the It is an example of a reliability requirement. End of the It is an example of a security authorization requirement. Course It is an example of a security authentication requirement. O Week 12 Yes, the answer is correct. Feedback Form Score: 1 :Software Accepted Answers: Testing!! It is an example of a security authorization requirement. Practice: Week 12: Assignment 6) Installation instructions are made available as a part of the software package. What are 12 (Non these instructions a part of? Graded) They are a part of the software documentation. Quiz: Week 12 They are a part of the software operations procedure. : Assignment They are a part of the regulatory requirements for the software. They are a part of the availability requirements of the software. Learning

# Week 12 : Assignment 12

The due date for submitting this assignment has passed.

Due on 2025-10-15, 23:59 IST.

1) State true or false: Regression testing is a white-box testing technique as it tests for the changes done to the code.	1 point
○ True.  ■ False.	

1 point

Test case t is obsolete for P' if it has an input that is not valid for P'.

1 point

4) If a software application version X released in the year 2007 can be used on version Y 1 point of the same application released in the year 2010, what does it indicate regarding its compatibility?

5) If a particular file available in a particular web link is set to have "Readonly" access to all 1 point

Yes, the answer is correct. Score: 1

Accepted Answers:

**Materials** 

**VIDEOS** 

**Text** 

**DOWNLOAD** 

**Transcripts** 

They are a part of the software documentation.

7) Which of the following terms represents the testing that is done to find the upper limit 1 point capacity of the inputs that a particular system can handle?

Performance testing.

Load testing.

Spike testing.

Stress testing.

Yes, the answer is correct. Score: 1

Accepted Answers: Stress testing.

8) Which of the following is a list of key challenges in testing of mobile applications? Device fragmentation, different mobile networks, compatibility across platforms.

Key challenge is related to mobile applications being different from that of desktop applications. Mobile applications have to be tested within a mobile phone only, this is the key challenge.

1 point

1 point

Testing across platforms is the only key challenge.

Yes, the answer is correct.

Score: 1 Accepted Answers:

Device fragmentation, different mobile networks, compatibility across platforms.

9) When performance testing is considered for mobile applications, which of the following

aspects are tested for? Screen size, operating systems and browsers.

Network coverage, memory and battery. Speed with uniform user experience.

Load and stress in terms of the number of users.

Yes, the answer is correct.

Score: 1 Accepted Answers:

Network coverage, memory and battery.

10) Which of the following is a list of interrupts that mobile applications are tested for? 1 point Network coverage, memory and battery.

Network outage, incoming/outgoing calls and messages.

Score: 1 Accepted Answers:

Yes, the answer is correct.

Network outage, incoming/outgoing calls and messages.