



# United International University

Name

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ID

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Invigilator's  
Signature with date

Course Code

CSE 4495

Course Title

Software testing and  
quality assurance

Section

B

Semester / Trimester : Spring / Summer / Fall, 2022

Name of Exam : Mid-term 1 / Mid-term 2 / Final

Date of Examination : 26.11.2022

Question	Marks
01	
02	
03	
04	
05	
06	
07	
08	
09	
10	
11	
12	
13	
14	
15	
<b>Total</b>	<b>26</b>

## Rules

- Any examinee found adopting unfair means will be expelled from the Trimester / Program as per UIU Disciplinary Rules.
- Unauthorized possession / use of a calculator, digital diary, mobile phone and other electronic data storage devices are strictly prohibited inside the examination hall.
- No examinee is allowed to go outside the examination hall before completing the examination. Invigilator can give permission in an exceptional / emergency case.
- Student must write down ID No. on the additional answer script(s), if any; and attach additional answer script(s) with the main script within the duration of examination. Make sure that the additional answer script(s) is/ are signed by the invigilator.
- An examinee must hand over the answer script and unused additional answer sheet (s) if any, to the invigilator before leaving the examination hall.
- An examinee should not leave the examination hall until all answer scripts are collected and the invigilator asks him/her to leave the examination hall.

Signature of the Examiner

(01)

@

verification:- our actual website's requirements should match with the implemented one. that means we have to implement right product based on the specification. Here for verification our developers are responsible.

validation:- it basically indicates that whether the product we developed can achieve people's demand or not. that means the main goal is here to gain user's satisfaction. In this case, students are users and we have to take feedback from them by doing beta testing. we have to remember that validation is much harder than verification.

P.T.O

(10)

Required level of v and r of my software:-

① Software purpose: the more critical application we will implement, the more reliable should our system otherwise user will not feel comfortable by using our website.

② User's purpose: we have to check and mark the bugs tolerance level for our students. We have to give priority to them and their demand.

③ Market environment: As it is a private website for our internal university so no worry about market condition. but if you want to release it for locally all over the world then we have to consider this.

(b)

Static verification: Here, we are not running the whole system to find faults. We basically doing code review manually to find error.

Dynamic verification: Here we run the system and apply testing, Fuzzing and taint analysis to observe our system's conditions.

Static verification can't find the all types of bugs easily, on the other hand dynamic verification finds quickly error, boundary values, <sup>problem</sup> fault tolerance, load and stress level in any system.

c

(iii) Scalability:- Ability to increase the concurrent request of any system. We have two types of scalability. one is horizontal, that means scaling down, here we are adding resources in the logical level. another is vertical scalability, that means scaling up, here we are adding resource to the physical levels.

Example:-

Now 100 request at a time.

Scale up  $\rightarrow 100 + 100 = 1100$  requests

Scale down  $\rightarrow 100 - 50 = 50$  requests.

remember that should be based on the system's situation.

iv) Security: Ability to protect information from unauthorized accessing but giving access to the authorized one at the same time. Here we have so many factors like confidentiality :- not giving access to random user. Availability :- system may damaged for so many fake requests and can be unavailable. Identification :- Identity of the user is authentic or fake. Besides we can do regression testing, that means if codes have been changed, we have to be able to run that again. And beside we have to be aware about hacker, so that they will not be able to find our loophole before us.

ii. Performance: Ability to response quickly against any attempt or request. the

Performance lightly depends of availability.

We can measure Performance by many attributes like latency :- how many time a system needs to response. throughput: how many attempt can a system occur in a certain period of time. Deadlines:- some tasks

should be finish within the deadlines. And we have missed event and so on to measure the performance of any system. suppose,

We have two device one can perform 10mb/sec and another 1mb/sec, So there the performance of second device is ~~more~~ slower than the first one.

(02)

@ i) MTBF = 5 min

$$\text{Requests} = 960 - 1200 \text{ / hours.}$$

$$\text{down} = 3 \text{ time / 7 day} = \frac{3}{7 \times 24 \text{ hours}}$$

$$(7 \times 24) \text{ hours} = 3 \text{ time} \times 6 \text{ min} = 18 \text{ min}$$

$$= 168 \text{ hours}$$

$$\text{downtime} = 18 \text{ min} = 0.3 \text{ hour}$$

$$\text{Uptime} = (168 - 0.3) \text{ hours} = 167.7 \text{ hours.}$$

$$\text{Availability} = \frac{167.7}{168} \times 100\% = 99.82\%$$

[Normally]

if, downtime half reduces,

$$\text{downtime} = 3 \times 3 = 9 \text{ min} = 0.15 \text{ hours.}$$

$$\text{Uptime} = (168 - 0.15) \text{ hours} = 167.85$$

$$\text{Availability} = \frac{167.85}{168} \times 100\%$$

$$= 99.91\%$$

[After reducing]

$$\text{ii) } \text{MTBF} = 5 \text{ min} \times 50\% = 5 \times \frac{50}{100} = 2.5 \text{ min}$$

X

$$5 + 2.5 \text{ min} = 7.5 \text{ min}$$

$$\text{MTTR} = \frac{\text{downtime}}{3} = \frac{0.3 \times 60}{3} = 6 \text{ min}$$

$$\text{MTTR} = 6 \text{ min.}$$

we know,

$$P.A = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}} \times 100\%$$

$$= \frac{7.5}{7.5 + 6} \times 100\%$$

$$= 55.55\% \quad X$$

that means first option is good to measure.

for user not being interrupted while using the systems.

③

a) Failure

~~Error~~: mistakes in functionality, like

(→) you want to go right side but it is going  
upside this <sup>because</sup> is fault and creates failure.

Faults

~~Error~~: it is basically happens in the  
coders. may be method overwrite or not  
properly organized.

For faults, we face failure. and for  
failure we are trying to find out where  
did we make faults inside the code  
base. both of the things are dependent  
on each other.

(b) To test this features we need to help from oracle. Here we are basically checking the functions and we are implementing another test case to check the functions are working properly or not. We are using assertequals options to check oracle have expected value oracle method.



# United International University

①

Name  
(Optional)

ID No.

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Section **B**

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Fall 26-11-22

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Name of Exam : Class Test / Mid-term 1 / Mid-term 2 / Final

Date: .....

① Unit test basically indicates the testing of individual jobs or it can be multiple jobs. There are three types of Acceptance test Alpha, beta, formal. Alpha:- small amount of people test, they are from the organization, beta:- large number of people gives feedback. Formal:- customer initially checks whether the product is ready for release or not. Unit tests are low level testing and if we are able to solve problems and

error at the bottom then there will be  
possibility to face bugs in system level test  
as UI test. that's why unit testing 70%  
and system 20%, UI 10%

② ⑥

$$\text{avail.} \geq 99.9\%$$

$$\text{POFOD} < 0.016$$

$$7 \text{ days} = 7 \times 24 = 168 \text{ hours}$$

3750 requests.

$$3750 \times 98.5\% = 3693.75$$

$$\text{Failed request} = 3750 - 3693.75 = 56.25$$

$$\text{System crash} = \frac{56.25}{3750} \times 57.1\% = 32.12$$

$$\text{downtime} = 32.12 \times 12.5 \text{ min} = 401.5 \text{ min} \\ = 6.69 \text{ hours}$$

$$\text{Uptime} = 168 - 6.69 = 161.31$$

$$\text{Availability} = \frac{161.31}{168} \times 100\% \\ \approx 96.02\%$$

$$P_{oFOD} = \frac{56.25}{3750} = 0.015$$

that means  $P_{oFOD}$  is good but availability less than required one. So system is not ready for release.

3	Safety	Lessons	Review
in	on	on	on

(05)

① K-way combination ~~and~~ <sup>ordinal</sup> interaction  
means, ~~combinations between~~ making test cases  
in a K ways <sup>by combining them each time.</sup> whether the value of the  
K can be anything. 3 way covering set  
means we have to combine each 3 column  
and their representative values. like if we  
have 9 choice and each have 2 represent  
ative values .then we have to combine  
them in 3 way ~~each time 3 choice together~~

should perform the rules -

~~Example:~~

Choice 1	choice 2	choice 3	choice 4
Yes	Yes	Yes	Yes
No	No	No	No

~~We have to combine them in this way~~  
to find the overall table .



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Furik  
26.11.2021

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(b)

Cookies	Add-ons	Attack sites	Forgeries
Allow	Yes	Yes	Yes
restrict	Yes	No	No
Block	Yes	Yes	No
Allow	No	No	No
restrict	No	Yes	Yes
Block	No	No	Yes

Up

(4)

a

Parameter: ProductA Parameter: ProductB

Choices: ProductCode

String

Four characters.

NULL [Error]

valid [Error]

Choices: vendor

String

NULL [Error]

Four characters

valid [Error]

Choices: sub category

NULL [Error]

String

Improper [Error]

Choices: category

NULL [Error]

String

Improper [Error]

Same as A.

Choices: ProductCode

String

Four characters

NULL [E]

valid [E]

Choices: vendor

String

NULL [E]

Four characters

Valid [E]

Choices: sub category

NULL [E]

String

Improper [E]

Choices: category

NULL [E]

String

Improper [E]

parameters: Database

choice: Number of Products

if = 0 ~~many~~ [single]  
true: 1

many [single]

Choice: Number of categories

0 ~~many~~ [if]  
1

many [single]

choice: Number of sub categories.

0 ~~many~~ [if]  
1

many [single]

Comparison code: choice

- 1 ~~Perfect~~ Perfect match
- 2 Similarity match
- 3 Partially match
- 4 No match,

(b) total number of specifications

Without applying constraints

$$4 \times 4 \times 3 \times 3 \times 4 \times 4 \times 3 \times 3 \times 3 \times 3 \times 4$$

$$= 3^7 \times 4^5 = 2239488$$



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Final  
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after applying constraints.

6 ~~2002~~ Error

3 single

if true =  $2 \times 2 \times 1 \times 1 \times 2 \times 2 \times 1 \times 1 \times 1 \times 1 \times 4$

$$= 64$$

False =  $2 \times 2 \times 1 \times 1 \times 2 \times 2 \times 1 \times 1 \times 1 \times 1 \times 4$

$$= 64$$

total Specification = 147