LONDON METROPOLITAN UNIVERSITY

Examination question paper: 2021/22
Model Answers

Module code:	CS6003ES
Module Name	Advanced Software Engineering
Module leader:	

Date:	**TBA**
Start time:	**TBA**
Duration:	**TBA**

Exam type:	**Unseen**
Materials supplied:	
Materials permitted:	**Scientific Calculator**
Warning:	**Candidates are warned that possession of unauthorised materials in an examination is a serious assessment offence.**

Instructions to candidates:	**This exam contains 2 parts (Part A and B). Candidates MUST answer all MCQ question given in Part A and any three (3) questions from Part B.** **Do not turn page over until instructed**

Part A

Mark Answers for all the questions

Q. 1: Which of the following stage is least relevant stage in a software development process?
A. Requirement Elicitation
B. Software Maintenance
C. Deployment
D. Feasibility analysis

Q. 2: V Life cycle model can be divided in to two main phases, those are …
A. Inception and Development
B. Decomposition and Integration
C. Development and Testing
D. Development and Maintenance

Q. 3: Which of the following process model requires user involvement throughout the project?
A. Waterfall process
B. V Life cycle model
C. Agile
D. RAD

Q. 4: Which of the following two attributes represents software quality as whole?
A. Clear Requirements and Executable Code
B. Complete Requirements and Acceptable Design
C. Current Usefulness and Potential Usefulness
D. Complete Design and Useability Testing

Q. 5: System testing should investigate
A. Non-functional requirements only not Functional requirements
B. Functional requirements only not non-functional requirements
C. Non-functional requirements and Functional requirements
D. Non-functional requirements or Functional requirements

Q.6: What is meant by software "Phase out"?
A. Completion of one phase of a software process
B. Completely removing a software from its use.
C. Software development deviate from its planned process
D. Use of outdated software

Q.7: Which of the following is <u>not</u> a feature of an Incremental Development?
A. Cost in change of software increases
B. Continuous customer feedback available
C. More rapid development and deployment
D. Iterates through Specification, Development and Validation

Q.8: When Comparing Spiral model with the other software development process models, what is the significant difference?
A. More weight given for the requirement elicitation
B. More emphasis on risk factors in each phase
C. More concentration on Budgetary requirements
D. More weight given for the development and maintenance

Q.9: When an ambiguous requirement may be interpreted in different ways by developers, this situation referred as …

A. Requirement imprecision
B. System Requirement
C. Invalid Requirement
D. Bug

Q.10: What is the main objective of software testing?

A. Finding Errors
B. Show that software is operative
C. Fix the bugs
D. Show the software adhere to the requirements

Q.11: Normally which of the following role perform debugging?

A. Business analyst
B. Tester
C. Developer
D. Trainer

Q. 12: Which of the following is not a testing principle?
A. Absence of Error Fallacy
B. Defect clustering
C. Pesticide paradox
D. Testing is context independent

Q. 13: What is meant by shared memory interface in software testing?
A. Same input feed into two or more software interfaces
B. Block of memory variable shared by two or more software functions
C. Output of one function passes as input for another function
D. One function request service of another function

Q. 14: The name of the testing which is done to make sure the existing features are not affected by new changes.

A. Recursive testing
B. White box testing
C. Unit testing
D. Regression testing

Q. 15: An alarm is to ring once the temperature falls above 40 and then it is turned off when the temperature is less than 20. Identify the most suitable Equivalence Partition which belong to the same class.

A. 0,1,2,59
B. 1, 6, 9, 5

C. 20, 29, 35, 40
D. 40, 57, 67, 99

Q. 16: Which of the following role responsible for the acceptance testing?

A. Client
B. Developer
C. Tester
D. Software Designer

Q. 17: Cyclomatic Complexity is a measure for determining …

A. Number of test cases
B. Number of test paths
C. Number of code lines to test
D. Percentage of test coverage

Q. 18: Which of the following is not a normal stage of software risk management?
A. Risk identification
B. Risk planning
C. Risk mitigation
D. Risk monitoring

Q. 19: Which of the following step is not available in a Sprint Cycle of an agile process?
A. User story selection
B. Development of functionality
C. Review the operation
D. Outline the integration plan

Q. 20: Calculate the Cyclomatic Complexity of the following code fragment.
INT X = INPUT;
IF X > 5
THEN Statement 1;
ELSE Statement 2;
END

A. 1
B. 2
C. 3
D. 4

Part B

Answer for 3 questions out of 5 questions.

Question 1

Case Study: Face2Face Cosmetics

Consider the following business case to answer the questions. Assume that you are assigned to develop a software system for the following business requirements.

Face2Face Cosmetics (Pvt) Ltd., wishes to integrate a software system with the customer care operations. Customer care service intended to deliver in two modes where direct contact of a customer care officer or online form-based queries.

The described system requirements are as follows:

- Software interface needed for entering the customer profiles and their queries, which is in assistance of call center operator.
- Form based web interface needed to take the customer queries based on product items.
- In web-based form, it should be able to identify real customers based on purchased item codes.
- Customer inquiries are to be categorized as complaints or request for help.
- Further, customer feedbacks can be collected through both operational modes of the system
- The customer feedbacks within a given period can be categorized as positive, neutral and negative feedbacks based on the product item.
- Customer queries are forwarded to back office specialists by the call center operators.
- If any query is not attended within 24 hours, those are to be marked as red and sent to the customer care manager.

Based on the above given requirements, you have to analyze the hidden requirements of the intended system.

a) Identify the roles available in the intended system.

Customer

Call center operator

Back office specialists

Customer care manager

System

[5 marks]

b) List the functional and non-functional requirements of the given system.

FN:
Customer detail entry
Item verification
Query entry
Categorization of queries
specialist reply
Query forwarding
NF:
Separate item codes to be available each item

Real-time item code verification

[7 marks]

c) Draw a use case diagrams for the software system.

Use cases: customer
Customer detail entry
Query entry
Call center operator:
Customer detail entry
Query entry

Query forwarding
Expert:
Reply
System:
Item verification
Categorization of queries

Above are to be drawn

[8 marks]

Question 2

a) What is referred as dynamic testing in software testing?

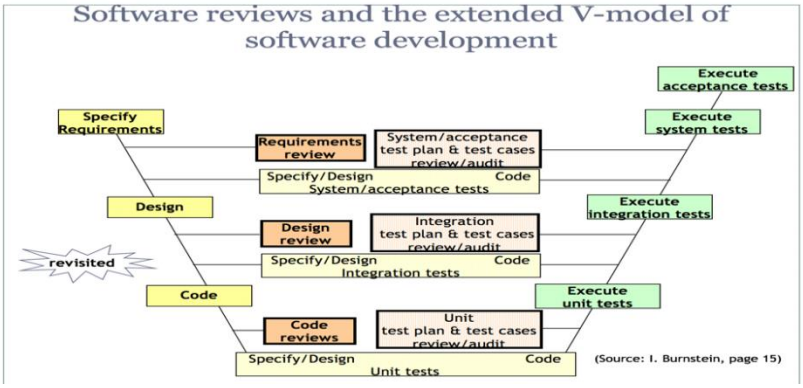
- Dynamic testing is: 'Testing that involves the execution of the software of a component or system'
- Dynamic testing does involve the execution of the software.
- Test cases are used to check the conformity of outputs generated by the system

Dynamic Testing:

- Functional Testing
- Unit Testing
- Integrated Testing
- Deployment Testing
- User acceptance testing
- Beta Testing

[8 marks]

b) Describe the testing strategy used in V model with its' Stages.



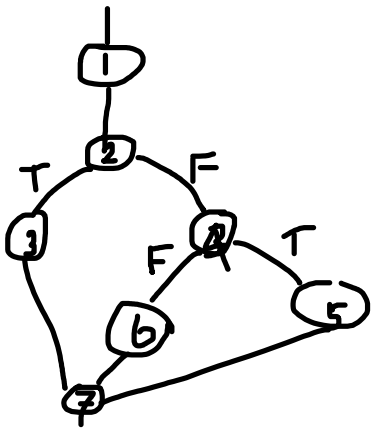
[8 marks]

c) Consider the following Pseudo code fragment to answer the two questions below.

```
  int x = a;
  int y = b;
 if (y == 0)
    print (“div by zero”);
elseif (y < x)
    print( x / y);
else
   print(1);
```

(i) Draw Control Flow Graph (CFG) for the above code and calculate the Cyclomatic Complexity.

[4 marks]



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Question 3

a) Give the benefits of verification and validation in software development and describe the techniques of verification and validation in the process of software development.

Verification: "Are we building the product right”.

The software should conform to its specification.

Validation: "Are we building the right product”.

The software should do what the user really requires.

Aim of V & V is to establish confidence that the system is 'fit for purpose'.
Depends on system's purpose, user expectations and the context
Software purpose: The level of confidence depends on how critical the software is to an organisation.
User expectations: Users may have low expectations of certain kinds of software.
Marketing environment: Getting a product to market early may be more important than finding defects in the program.
Techniques:
Software inspections Concerned with analysis of the static system representation to discover problems (static verification) May be supplement by tool-based document and code analysis.

[6 marks]

b) Use COCOMO application composition model to calculate effort needed to complete an application with the following features.
Number of application points: 100
Application point productivity: Nominal (rate 12)
Percentage identified as reusable: 40%

PM = (NAP . (1 - %reuse/100)) / PROD
Personal Months = 100 * (1-0.40) /12 = 5 personal months

[6 marks]

c) Write short note on the followings.
   i. Black box testing

Black box testing is defined as a testing technique in which functionality of the Application Under Test (AUT) is tested without looking at the internal code structure, implementation details and knowledge of internal paths of the software. This type of testing is based entirely on software requirements and specifications.

   ii. Stress Testing

Stress Testing is defined as a type of Software Testing that verified the stability & reliability of the system. This test mainly determines the system on its robustness and error handling under extremely heavy load conditions.

It even tests beyond the normal operating point and evaluates how the system works under those extreme conditions. Stress Testing is done to make sure that the system would not crash under crunch situations.

[2 x 4 marks]

Question 4

a) Describe the following terms in the context of software project management.

(i) Critical Path

The critical path is the set of tasks that determines the shortest possible completion time. The completion time will be longer if there are insufficient resources to do all parallel activities.

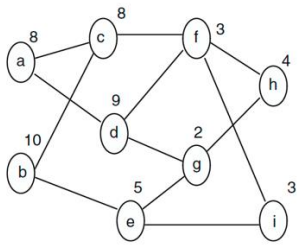
(ii) Slack Time

Any subtasks that are not on the critical path have some flexibility on when they are started. This flexibility is called the slack time.

[2 x 4 marks]

(iii) Illustrate a network diagram for the following activities using a standard diagrammatic technique. (12 marks)

Activity	Duration (weeks)	Dependencies
a	8	none
b	10	none
c	8	a, b
d	9	a
e	5	b
f	3	c, d
g	2	d
h	4	f, g
i	3	e, f



Question 5

a) In agile eXtreame Programming (XP) method, Test First Development (TFD) is a testing approach commonly followed, describe the TFD.

Writing tests before code clarifies the requirements to be implemented.

Tests are written as programs rather than data so that they can be executed automatically. The test includes a check that it has executed correctly.

Usually relies on a testing framework such as Junit.

All previous and new tests are run automatically when new functionality is added, thus checking that the new functionality has not introduced errors.

[7 marks]

b) Briefly describe the Pair Programming approach used in agile software development.

In XP, programmers work in pairs, sitting together to develop code.

This helps develop common ownership of code and spreads knowledge across the team.

It serves as an informal review process as each line of code is looked at by more than 1 person.

It encourages refactoring as the whole team can benefit from this.

Measurements suggest that development productivity with pair programming is similar to that of two people working independently.

In pair programming, programmers sit together at the same workstation to develop the software.

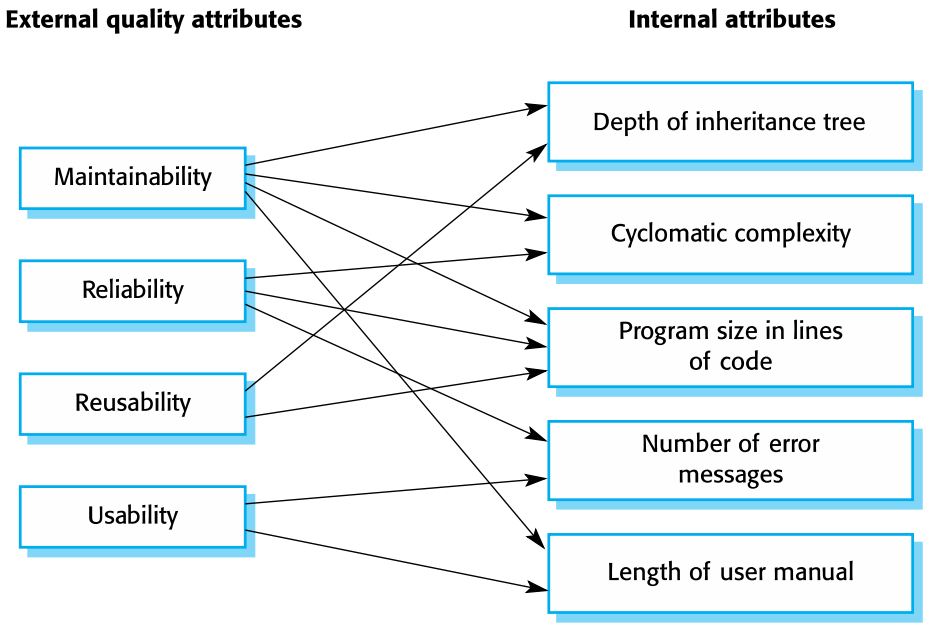
Pairs are created dynamically so that all team members work with each other during the development process.

The sharing of knowledge that happens during pair programming is very important as it reduces the overall risks to a project when team members leave.

Pair programming is not necessarily inefficient and there is evidence that a pair working together is more efficient than 2 programmers working separately.

[5 marks]

c) External Quality attributes of a software normally depends on internal attributes. List down the external and internal quality attributes of a software and there inter dependencies.


External quality attributes
Internal attributes
Maintainability
Reliability
Reusability
Usability
Depth of inheritance tree
Cyclomatic complexity
Program size in lines of code
Number of error messages
Length of user manual

[10 marks]