

B.E. COMPUTER SCIENCE AND ENGG. 4th YR 1st SEM. Exam.-2019
SOFTWARE ENGINEERING

Time: Three Hours**Full Marks:100****GROUP-A**

Answer all questions

 $40 \times 2 = 80$

Choose the unique correct answer.

1. The GUI part of a software system is almost always developed using the
 - (a) RAD model
 - (b) Spiral model
 - (c) Prototyping model
 - (d) Waterfall model

2. A sequence of evolutionary system integrations or prototypes, each restricted to a well-defined period of time, called a time-box, is employed in
 - (a) RAD model
 - (b) Spiral model
 - (c) Prototyping model
 - (d) Waterfall model

3. For long projects that may make managers or customers nervous, it is advisable to use the
 - (a) RAD model
 - (b) Spiral model
 - (c) Prototyping model
 - (d) Waterfall model

4. The Waterfall model may be used when
 - (a) porting an existing product to a new platform
 - (b) it is necessary to provide interim deliverables to the customer and users need to get used to the system gradually
 - (c) the deliverables of a phase can change
 - (d) there can be dynamic changes in requirements over the life cycle

5. Which of the following is a weakness of the RAD model ?
 - (a) considerable risk assessment expertise is required
 - (b) it can fail if reusable components are not available
 - (c) the customer may want to have the prototype delivered rather than waiting for the full, well-engineered version
 - (d) it is document-driven, and the amount of documentation can be excessive

[Turn over

6. Which of the following is a weakness of the Spiral Model ?
(a) it requires a system that can be properly modularized
(b) use of the model may be expensive and even unaffordable-time spent planning, resetting objectives, doing risk analysis, and prototyping may be excessive
(c) it is ineffective for risks identified later during the development cycle
(d) it may not yield systems having optimal performance and reliability
7. The following is an advantage of function-point analysis
(a) it requires subjective evaluations, with much judgment involved
(b) it does not evaluate environmental factors
(c) users can relate more easily to this measure of size. They can more readily understand the impact of a change in functional requirements
(d) it takes advantage of the expertise of several people
8. External inquiries are
(a) things received by the software from outside of the system
(b) specific commands or requests that the software performs, generated from the outside
(c) machine-generated files used by the program
(d) the same as queries
9. External interface files are
(a) machine readable interfaces to other systems
(b) inputs from the user that provide distinct application-oriented data
(c) logical file within the program
(d) error messages
10. Internal logical files are
(a) direct access to a database that retrieve specific data
(b) units of business information input by the user to the software for storage
(c) primary logical group of user data permanently stored entirely within the software system boundary
(d) data stored outside the boundary of the software system being evaluated
11. An air-traffic-control system that must continuously provide accurate, timely positions of aircraft from radar data will have a high value for the following environmental factor
(a) reusability
(b) multiple sites
(c) stringent performance objectives
(d) online data entry
12. The size of an organic type software product is approximately 32,000 LOC. The effort required to develop the software product is
(a) 230 person-months
(b) 145 person-months
(c) 91 person-months
(d) 9 person-months

13. The effort for a project is estimated to be 1000 person-months and the estimated duration is 15 months. The project cost is Rs 200,000,000/- If the product has to be developed in 12 months, what should be the new cost ?
- (a) Rs 250,000,00/-
 - (b) Rs 488,281,250/-
 - (c) Rs 390,625,000/-
 - (d) Rs 312,500,000/-

14. Identifying, estimating, and evaluating risks are activities associated with
- (a) Risk planning
 - (b) Risk control
 - (c) Risk monitoring
 - (d) Risk analysis

15. Guiding the risk management effort, integrating it into the overall software life-cycle, and determining when to conduct additional risk analysis are associated with
- (a) Risk staffing
 - (b) Risk directing
 - (c) Risk identification
 - (d) Risk control

16. The activity of averting identified risks with greatest importance is associated with
- (a) Risk control
 - (b) Risk planning
 - (c) Risk monitoring
 - (d) Risk evaluation

17. Which of the following is NOT a risk analysis technique ?
- (a) Sensitivity Analysis
 - (b) Probability Analysis
 - (c) Program Evaluation and Review Technique
 - (d) Utility Theory

18. In CMMI-DEV (Capability Maturity Model Integration for Development), requirements development is a process area included in
- (a) Level 2
 - (b) Level 3
 - (c) Level 4
 - (d) none of the above

19. The following is a Key Process Area of Level 2 (Repeatable) of the Capability Maturity Model:
- (a) Peer Reviews
 - (b) Software Quality Management
 - (c) Software Quality Assurance
 - (d) Defect Prevention

[Turn over

20. The following requirement is classified as 'Process Control' in the ISO 9001 Requirements:
- (a) a quality system must be maintained and documented
 - (b) purchase material, including bought-in software, must be checked for conforming to requirements
 - (c) the product must be identifiable at all stages of the process
 - (d) quality requirement must be identified in a quality plan
21. In PSP, the focus is on
- (a) a precise framework for evolving the skills of a software engineer
 - (b) frameworks for developing software
 - (c) maturity level of an engineering organization
 - (d) risk minimization
22. Which of the following is NOT a characteristic of Inspection ?
- (a) cost reduction in test and maintenance
 - (b) early removal of defects
 - (c) a review of the capabilities of the producer
 - (d) improved quality delivered to the user.
- For Q23-Q28.** With reference to the terminology of an SRS, answer the following:
-
23. Software Interfaces are classified under
- (a) External Interface Requirements
 - (b) Performance Requirements
 - (c) Design Constraints
 - (d) Quality Characteristics
24. Portability is classified under
- (a) Functional Requirements
 - (b) Performance Requirements
 - (c) Quality Characteristics
 - (d) Other Requirements
25. Standards Compliance is classified under
- (a) Functional Requirements
 - (b) Other Requirements
 - (c) Quality Characteristics
 - (d) Design Constraints
26. The sizes of tables and files are described under
- (a) Design Constraints
 - (b) Performance Requirements
 - (c) Quality Characteristics
 - (d) Other Requirements

27. If an SRS does not specify all the tasks that the user wants to perform, it is
- (a) ambiguous
 - (b) incomplete
 - (c) inconsistent
 - (d) incorrect
28. If the requirements are not written in a language and with a vocabulary the user understands, the SRS is not
- (a) verifiable
 - (b) modifiable
 - (c) traceable
 - (d) unambiguous
-
29. If the interactions between two modules occur through some shared data, the modules are
- (a) tightly coupled
 - (b) loosely coupled
30. If the different functions of a module execute in a sequence, and the output from one function is input to the next in the sequence, then the module possesses
- (a) functional cohesion
 - (b) sequential cohesion
 - (c) procedural cohesion
 - (d) temporal cohesion
31. If all the functions of a module refer to or update the same data structure, the module possesses
- (a) temporal cohesion
 - (b) sequential cohesion
 - (c) functional cohesion
 - (d) communicational cohesion
32. The ability of software to run on as many platforms as possible is in accordance with the principle of
- (a) Design for portability
 - (b) Design for flexibility
 - (c) Reuse existing design
 - (d) Design for testability
33. Design by contract is in accordance with the principle of
- (a) Design for testability
 - (b) Divide and Conquer
 - (c) Design defensively
 - (d) Increase cohesion

[Turn over

34. A subsystem can be divided up into one or more

- (a) clients and servers
- (b) methods
- (c) packages
- (d) classes

35. Equivalence class partitioning is a

- (a) white box testing technique
- (b) compatibility testing technique
- (c) black box testing technique
- (d) none of the above

36. Boundary value testing for robust software is

- (a) same as equivalence partition testing
- (b) test boundary condition: on, below, and above the edges of input and output equivalence classes
- (c) testing combination of input circumstances
- (d) used in white-box testing

37. Errors at the lower modules are detected early in

- (a) bottom-up integration
- (b) top-down integration
- (c) sandwich integration
- (d) path-based integration

38. Testing how well a system recovers from crashes, hardware failures or other catastrophic problems is

- (a) Security testing
- (b) Regression testing
- (c) Recovery testing
- (d) none of the above

39. Informal software testing that is not based on formal test plans or test cases and testers may be learning the software as they test is referred to as

- (a) Exploratory testing
- (b) System testing
- (c) Ad-hoc testing
- (d) none of the above

40. Usability testing is

- (a) testing the functionality
- (b) testing the speed
- (c) testing the ease of use
- (d) testing the user documentation

GROUP-B

41. Halstead worked on software metrics. He considered any program to be a collection of tokens, which he classified as either operators or operands. **Operands** were tokens that had a value (e.g. variables and constants). Everything else was considered an **operator** (e.g. commas, parentheses, arithmetic operator, brackets, and so forth).

All tokens that always appear as a pair, triple, and so on will be counted together as one token. For example, a left parenthesis and a right parenthesis will be considered as one occurrence of the token parenthesis. The if-then construction will be considered to have an if-then token.

The count of unique operators in a program is η_1 and the count of unique operands in a program is η_2 .

The basic measure of the size of a program is the total count of unique tokens, i.e. $\eta = \eta_1 + \eta_2$. The total count of operators is N_1 and the total count of operands is N_2 . The length of the program in tokens is $N = N_1 + N_2$.

The estimate of the actual size of a program in terms of tokens is

$$N' = \eta_1 * \log_2 \eta_1 + \eta_2 * \log_2 \eta_2$$

Now consider the following program:

```

Z = 0;
while X > 0
    Z = Z + Y;
    X = X - 1;
end-while;
print(Z);

```

- | | |
|------------------------------------|---|
| (a) Find η_1 and η_2 . | 8 |
| (b) Find N_1 , N_2 , and N . | 6 |
| (c) Compute N' . | 6 |

-----END-----

Ref. No.:EX/CSE/T/411A/2018

**B.E. COMPUTER SCIENCE AND ENGG. 4th YR 1st SEM. Exam.-2018
SOFTWARE ENGINEERING****Time: Three Hours****Full Marks:100****GROUP-A**

Answer all questions

 $40 \times 2 = 80$

Choose the unique correct answer.

1. In order to overcome human cognitive limitation, Software Engineering adopts the principles of
 - (a) abstraction
 - (b) decomposition
 - (c) both abstraction and decomposition
 - (d) none of the above

2. Software Engineering employs
 - (a) past experience
 - (b) provable principles only
 - (c) unique solutions as opposed to several alternate solutions
 - (d) subjective judgment

3. When the development team has very little knowledge of the technical issued involved, the appropriate life-cycle model is
 - (a) RAD
 - (b) Prototyping
 - (c) Waterfall
 - (d) Spiral

4. The life-cycle model suitable for customized software (developed for one or two customers by adapting an existing software) is
 - (a) RAD
 - (b) Prototyping
 - (c) Waterfall
 - (d) Spiral

5. In each phase of the spiral model, the second quadrant involves
 - (a) development of next-level product
 - (b) determination of objectives, alternatives, and constraints
 - (c) evaluation of alternatives and risk management
 - (d) planning of next phase

For Q6..Q8: Function-Point Estimation in a particular software development project generated the following parameters:

- No. of external outputs = { 12 (optimum), 15 (likely), 22 (pessimistic) }
- Raw function point count ("count total") = 320
- Sum of the Value Adjustment Factors = 52
- The external outputs are classified as having an "average" weighting factor (as opposed to simple or complex)

6. The estimated count (rounded) for the number of external outputs is

- (a) 14
- (b) 15
- (c) 16
- (d) 17

7. The contribution of the no. of external outputs to the raw function point count is

- (a) 64
- (b) 78
- (c) 112
- (d) 150

8. The complexity adjustment factor is

- (a) 0.1
- (b) 0.52
- (c) 0.65
- (d) 1.17

9. Project scheduling is indispensable because

- (a) tasks are not predefined
- (b) many software engineering tasks proceed in parallel
- (c) some tasks may face unknown difficulties
- (d) resource requirements are unpredictable

10. One of the primary objectives of the critical path method is

- (a) to plan the project in such a way that it is completed as quickly as possible
- (b) to convert a sequential schedule to a parallel schedule
- (c) to estimate the development effort in person-months
- (d) none of the above

11. Earliest start dates are computed

- (a) by determining the critical path
- (b) during the backward pass
- (c) during the forward pass
- (d) by computing floats

12. When an activity A has more than one immediately preceding activity, the earliest start date for A is

- (a) earliest of the earliest finish dates of those activities
- (b) latest of the latest finish dates of those activities
- (c) earliest of the latest finish dates of those activities
- (d) latest of the earliest finish dates of those activities

13. When an activity B has more than one activity that can commence immediately after B is complete, the latest finish date for B is

- (a) latest of the earliest start dates of those activities
- (b) earliest of the latest start dates of those activities
- (c) latest of the latest start dates of those activities
- (d) earliest of the earliest start dates of those activities

14. The float of an activity is

- (a) latest start date – earliest start date
- (b) latest finish date – earliest start date
- (c) earliest finish date – latest start date
- (d) none of the above

15. The completion date of a project will be delayed if

- (a) any activity is delayed
- (b) each and every activity is delayed
- (c) a critical activity is delayed
- (d) none of the above

16. An activity in a PERT network has a duration of 8 weeks (optimistic), 10 weeks (most likely), or 15 weeks (pessimistic). Its expected duration is

- (a) 11 weeks
- (b) 10.5 weeks
- (c) 19.72 weeks
- (d) none of the above

17. In the embedded mode of the basic COCOMO model, the project cost LM is given by

- (a) $2.4 \times (\text{KSLOC})^{2.5}$
- (b) $2.5 \times (\text{KSLOC})^{0.38}$
- (c) $2.5 \times (\text{KSLOC})^{0.32}$
- (d) $3.6 \times (\text{KSLOC})^{1.20}$

18. Consider the following code fragment:

If a and b then

The two tests

- a = True, b = False; and
- a = True, b = True

ensure

- (a) Statement coverage
- (b) Branch coverage
- (c) Condition coverage
- (d) Path coverage

19. Refer to the code in Q18. The two tests

- a = True, b = False; and
- a = False, b = True

ensure

- (e) Statement coverage
- (f) Branch coverage
- (g) Condition coverage
- (h) Path coverage

20. Two basis paths (independent paths)

- (a) must not have any common edge
- (b) must involve an edge that belong to one and only one of them
- (c) must have all nodes common
- (d) none of the above

21. The cyclomatic complexity $V(G)$ of a control flow graph G

- (a) gives a lower bound on the number of independent paths
- (b) gives an upper bound on the number of independenyt paths
- (c) is exactly equal to the number of independent paths
- (d) none of the above

22. Errors at module interfaces are tested in

- (a) White-box testing
- (b) Stress testing
- (c) Integration testing
- (d) Unit testing

23. A major weakness of big-bang testing is that

- (a) it is very difficult to localise a detected error
- (b) it requires stubs and drivers
- (c) it requires a huge amount of disk space
- (d) none of the above

24. The disadvantage of top-down testing is that
- (a) user interface components are tested late
 - (b) test drivers are needed
 - (c) test stubs are needed
 - (d) none of the above
25. A criterion used in determining equivalence classes for equivalence testing is that every possible input belongs to one of the equivalence classes. This is termed
- (a) Soundness
 - (b) Disjointedness
 - (c) Representation
 - (d) Coverage
26. The test which checks if the system can respond to many simultaneous requests is
- (a) Security testing
 - (b) Stress testing
 - (c) Timing testing
 - (d) Volume testing
27. The subsection of an SRS which relates the product to other products or projects is
- (a) Overview
 - (b) General Constraints
 - (c) Product Function
 - (d) Product Perspective
28. The subsection of SRS that describes required screen formats is
- (a) User Interfaces
 - (b) Software Interfaces
 - (c) Communication Interfaces
 - (d) none of the above
29. Use of other required software products (e.g. a data management system, an operating system, or a mathematical package) are described in the following subsection of an SRS:
- (a) User Interfaces
 - (b) Hardware Interfaces
 - (c) Software Interfaces
 - (d) Communication Interfaces
30. The subsection of an SRS which discusses the number of files and records to be handled is
- (a) Quality Characteristics
 - (b) Design Constraints
 - (c) External Interface Requirements
 - (d) Performance Requirements

31. A module that updates a database

- (a) is functionally cohesive
- (b) is NOT functionally cohesive

32. In order to achieve layer cohesion

- (a) lower layers must not access higher layers
- (b) higher layers can access lower layers
- (c) both (a) and (b)
- (d) layers must NOT form a hierarchy

33. A type of cohesion is achieved when modules that access or manipulate certain data are kept together (e.g. in the same class) and everything else is kept out. This is

- (a) Utility cohesion
- (b) Sequential cohesion
- (c) Procedural cohesion
- (d) Communicational cohesion

34. A type of cohesion is achieved when a series of procedures, in which one procedure provides input to the next, are kept together- and everything else is kept out. This is

- (a) Communicational cohesion
- (b) Functional cohesion
- (c) Sequential cohesion
- (d) Procedural cohesion

35. It is hard to understand or change a system if it is

- (a) tightly coupled
- (b) loosely coupled

36. Flexibility can be built into a design by

- (a) reducing coupling
- (b) increasing cohesion
- (c) creating abstractions
- (d) all of the above

For Q37-Q38: Consider McCall's Quality Factors.

37. The extent to which a program can be expected to perform its intended function with required precision is called

- (a) Correctness
- (b) Integrity
- (c) Reliability
- (d) Usability

38. The extent to which a program can be used in other applications is called

- (a) Reusability
 - (b) Interoperability
 - (c) Portability
 - (d) Flexibilty
-

39. An important design principle is to ensure that all the functionality of the code can be executed without going through the graphical user interface. This principle is termed

- (a) Design for flexibility
- (b) Design for portability
- (c) Design defensively
- (d) Design for testability

40. Reusability can be increased by

- (a) simplifying the design as much as possible
- (b) reducing coupling
- (c) increasing abstraction
- (d) all of the above

GROUP-B

41. Consider the following job log:

| Task | Estimated effort (programmer-days) | Actual effort so far (programmer-days) | Estimated completion date | Actual date of completion |
|------|---------------------------------------|---|---------------------------|---------------------------|
| 1 | 50 | 70 | 15.01.11 | 01.02.11 |
| 2 | 35 | 20 | 15.02.11 | 15.02.11 |
| 3 | 20 | 40 | 25.02.11 | 01.03.11 |
| 4 | 40 | 40 | 15.04.11 | 01.04.11 |
| 5 | 60 | 10 | 01.06.11 | ----- |
| 6 | 80 | 20 | 01.07.11 | ----- |

Assume that the current date is 01.05.11.

(a) Calculate BCWS, BCWP, ACWP, earned value, schedule variance, and cost variance.

16

(b) Is the project on schedule ?

4

END-----

BCSE Examination 2014 (2nd year, 2nd Semester)

Software Engineering

Time: Three Hours

Full Marks: 100

Group-A

Match the correct pairs.

$16*3=48$

SET-I

- ✓ 1. Baseline budget
- ✓ 2. COCOMO
- ✓ 3. Communicational Cohesion
- ✓ 4. Component
- ✓ 5. Constituents of a package
- ✓ 6. Cutoff line language level
- ✓ 7. Earned Value
- ✓ 8. FTR
- ✓ 9. Interdependences
- ✓ 10. Large-scale systems
- ✓ 11. Layer cohesion
- ✓ 12. Module
- ✓ 13. Requirements are fuzzy
- ✓ 14. Systematic, sequential approach
- ✓ 15. Uncertainty and loss
- ✓ 16. Zero-float

SET-II

- (i) API
- (ii) BCWP
- (iii) BCWS
- (iv) Boehm
- (v) classes
- (vi) component defined at the programming-
- (vii) critical activity
- (viii) object-oriented paradigm
- (ix) Project scheduling
- (x) Prototyping model
- (xi) quality control
- (xii) replaceable
- (xiii) risk
- (xiv) risk table
- (xv) Spiral model
- (xvi) Waterfall model

Group-B

$10*3=30$

Answer any ten.

Choose the unique correct answer.

- ✓ 17. If requirements change often in the cycle, we can use the
 - (a) Incremental model
 - (b) Prototype model
 - (c) RAD model
 - (d) Waterfall model
- 18. If the project manager does not closely track the team's progress, we can use the
 - (a) Incremental model
 - (b) RAD model
 - (c) Spiral model
 - (d) Waterfall model
- 19. Inquiries
 - (a) use many keys
 - (b) include operations or calculations on data
 - (c) use simple keys
 - (d) none of the above
- ✓ 20. The project cost (estimated labour months) is given by $LM = 3.0 * (KSLOC)^{1.12}$ in the
 - (a) Organic mode
 - (b) Semidetached mode
 - (c) Embedded mode
 - (d) all of the above

21. If a =optimistic duration, b = pessimistic duration, and m =most-likely duration, the expected duration t_e is

- (a) $(a+4b+m)/6$
- (b) $(b+4a+m)/6$
- (c) $(a+4m+b)/6$
- (d) none of the above

22. In McCall's methodology, usability is a

- (a) product operation quality factor
- (b) product revision quality factor
- (c) product transition quality factor
- (d) all of the above

23. In McCall's methodology, flexibility is a

- (a) product operation quality factor
- (b) product revision quality factor
- (c) product transition quality factor
- (d) all of the above

24. The software quality criteria of consistency, simplicity, conciseness, modularity, and self-descriptiveness are associated with

- (a) Reliability
- (b) Integrity
- (c) Portability
- (d) Maintainability

25. A requirement

- (a) need not be reviewed by all stakeholders
- (b) describes the domain
- (c) must describe how the system will be implemented
- (d) says something about the tasks the system is supposed to accomplish

26. If facilities for operating on the same data are kept together, we achieve

- (a) functional cohesion
- (b) communicational cohesion
- (c) procedural cohesion
- (d) utility cohesion

27. An example of a functionally cohesive module is one which

- (a) has side-effects
- (b) updates a database
- (c) solves a set of equations
- (d) creates a new file

28. Reusability can be increased by

- (a) increasing cohesion
- (b) increasing coupling
- (c) decreasing abstraction
- (d) avoiding hooks

29. Flexibility can be built into a design by

- (a) avoiding interfaces or superclasses with polymorphic operations
- (b) avoiding reusable code
- (c) increasing coupling
- (d) increasing cohesion

Answer all questions

Group-C

30. A project began on 01 January. Its progress is detailed below.

| Milestone | Completion Date | | Cost | |
|-----------|-----------------|----------|---------|--------|
| | Planned | Actual | Planned | Actual |
| A | 01 Feb | 20 Jan | 15,000 | 10,000 |
| B | 01 March | 28 Feb | 20,000 | 15,000 |
| C | 01 April | 05 April | 25,000 | 25,000 |
| D | 01 May | | 20,000 | 10,000 |
| E | 01 June | | 15,000 | |
| F | 01 July | | 5,000 | |
| Totals | | | 100,000 | 60,000 |

Consider the status of the project on 01 May.

- (a) Calculate BCWS, BCWP, and ACWP on 01 May.
(b) Calculate Cost Variance and Schedule Variance.
(c) Comment on the condition of the project.

6
4
1

31. Consider the following pseudocode:

```
if a
then b
else begin
    if d then c else e;
    f
end
g.
```

1

- (a) Draw a flowchart for this program.
(b) Draw a directed graph G corresponding to this flowchart. A node of G represents either a decision-box or a block of sequential statements. Determine the in-degree and out-degree of each node.
(c) Find the equivalence classes in G. An equivalence class consists of nodes having the same in-degree and out-degree.

1

2

(d) Let n be the total number of nodes in G. For each equivalence class k, compute the entropy

$$H_k = -(1/n)\log_2 (C_k/n)$$

where C_k is the number of nodes in equivalence class k.

Then compute the total entropy

$$H_G = \sum_{k=1}^c H_k$$

2

where c is the number of equivalence classes.

4

- (e) Compute the total entropy H_J for the following pseudocode:

```
if a
then b else c;
if d then e else f;
g.
```

- (f) Compare H_G and H_J . Which pseudocode has higher diversity of structure and how is it related to its entropy?

1

-END-

BCSE EXAMINATION, 2013

(2nd Year, 2nd Semester)

SOFTWARE ENGINEERING

Full Marks : 100

Time : Three Hours

The figures in the margin indicate full marks.

Group - A

Match the correct pairs :

$2 \times 15 = 30$

Set-I

1. Backward Pass
2. Big Bang testing
3. Defensive design
4. Environmental factor
having an average effect
5. Environmental factor
having a moderate effect
6. Estimation
7. Forward Pass
8. Inquiry
9. Proactive strategy

Set-II

- | | | |
|---|--------------------------|------|
| X | (i) 2 | 4 X |
| X | (ii) 3 | 5 X |
| X | (iii) 60 days | 12 X |
| X | (iv) avoiding risk | |
| | (v) earliest start date | 7 X |
| | (vi) historical data | |
| | (vii) integration | 2 |
| | (viii) latest start date | 1 |
| X | (ix) many keys | |

[Turn over]

[2]

- | | |
|----------------------------|-----------------------------|
| 10. Project manager | (x) preconditions |
| 11. Query | (xi) schedule <u>14</u> |
| 12. RAD | (xii) sequential <u>15</u> |
| 13. Software scope | (xiii) simple keys |
| 14. Task interdependencies | (xiv) stakeholder <u>10</u> |
| 15. Waterfall | (xv) use-cases |

Group - B

Answer any fifteen questions.

$2 \times 15 = 30$

Fill in the blanks.

16. Software Engineering is the application of a systematic, disciplined, _____ approach to the development, operation, and _____ of software.

17. The waterfall model has difficulty accommodating the natural _____ that exists at the _____ of many projects.

18. Software project planning encompasses estimation, scheduling, risk analysis, _____ management planning, and _____ management planning.

19. Software feasibility has four dimensions : _____, finance, time, and _____.

20. The major _____ of software co-

21. When fire-
takes over a

22. Risk invo-

23. To find wh-
the software

24. Risk expos-
of risk and

25. In an activi-
joining all r-

26. PERT prov-
meeting or

27. In PERT, t-
measure of
duration est-

28. McCall's "so-
software
conciseness

20. The major categories of resources are people, _____ software components, and _____ environment.
21. When fire-fighting mode fails, _____ takes over and the project is in real jeopardy.
22. Risk involves two characteristics : _____ and _____.
23. To find whether a project is "at risk" one might ask : "Does the software engineering team have the right _____ of _____ ?"
24. Risk exposure is the product of _____ of occurrence of risk and _____ to the project if the risk occurs.
25. In an activity-on-arrow network, the critical path is the path joining all nodes with a zero slack.
26. PERT provides a method for estimating the _____ of meeting or missing _____ dates.
27. In PERT, the standard deviation of an activity time is a measure of the _____ of _____ of an activity duration estimate.
28. McCall's "Maintainability" quality factor translates to the software quality criteria of _____, simplicity, conciseness, modularity, and _____.

[Turn over]

~~29.~~ A use case model captures services offered by a system and users of the system in terms of _____, use cases, and the _____ relationship.

~~30.~~ Flexibility can be built into a design by creating abstractions. In particular, we should try to create interfaces or superclasses with _____.

31. The criteria used in determining equivalence classes are _____, disjointedness, and _____.

32. A disadvantage of equivalence class and boundary testing is that these techniques do not explore _____ of test _____ data.

~~33.~~ The advantage of bottom-up testing is that _____ can be more easily found.

~~34.~~ In top-down testing, test _____ are used to simulate the components of subsequent layers that have not yet been integrated.

~~35.~~ In acceptance testing, _____, functional, and performance tests are performed by the customer in the _____ environment against acceptance criteria.

Choose the

36. In Rap
involve

(a) req

(b) dev

(c) fina

(d) all o

37. If resou
appropri

(a) Water

(b) Incre

(c) Prot

(d) RAD

[5]

Group C

Answer any *ten* questions. :

$$2 \times 10 = 20$$

Choose the unique correct answer.

36. In Rapid Application Development (RAD), the user is involved in

- (a) requirements definition
- (b) development and test
- (c) final delivery
- (d) all of the above.

37. If resources (time, money, tools, people) are scarce, the appropriate process model is

- (a) Waterfall
- (b) Incremental
- (c) Prototype
- (d) RAD

[Turn over]

[6]

38. If high reliability is desired, the appropriate process model
is
- (a) Spiral
(b) Waterfall
(c) Prototype
(d) RAD
39. Data structures shared between systems are counted as
- (a) external inputs
(b) interfaces
(c) data structures
(d) both interfaces and data structures
40. In the Software Equation $L = P \times E^{\frac{1}{3}} \times t^{\frac{4}{3}}$, E is
- (a) earned value
(b) effort in person-months

(c) expenditure in dollars

(d) energy in kilowatts

41. In the critical path method, if activities are represented as nodes, the links between nodes represent

(a) precedence requirements

(b) path of information flow

(c) concurrent development

(d) wired link between the offices of the company

42. A critical activity has

(a) positive float

(b) zero float

(c) negative float

(d) undefined float

[Turn over]

[8]

43. In McCall's methodology, Integrity is a

(c) tool or repre

- (a) product operation quality factor
- (b) product revision quality factor
- (c) product transition quality factor
- (d) none of the above

(d) all of the ab

44. In McCall's methodology, Portability is a

(c) methods

- (a) product operation quality factor
- (b) product revision quality factor
- (c) product transition quality factor
- (d) none of the above

(d) none of the

45. UML is a

(a) decomposab

- (a) visual programming language
- (b) visual modelling language

(b) controllabilit

(c) operability

(d) understanda

[9]

(c) tool or repository specification

(d) all of the above

~~46.~~ A subsystem can be divided into one or more

(a) packages

(b) classes

(c) methods

(d) none of the above

~~47.~~ The maxim "The more information we have, the smarter we will test" is related to

(a) decomposability

(b) controllability

(c) operability

(d) understandability

[Turn over]

[10]

48. The test which checks if the system can respond to many simultaneous requests is

- (a) Security testing
- (b) Stress testing
- (c) Volume testing
- (d) none of the above

Group D

Answer all questions :

$10 \times 2 = 20$

49. A flowchart is represented by a directed graph with the following set of arcs :

$$\{(1, 2), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (5, 6), (6, 7), (6, 8)\},$$

where (a, b) represents an arc directed from vertex "a" to vertex "b". A vertex with out-degree = 2 represents a decision-box.

- (a) Identify, for every vertex "k", all the paths from vertex "1" to vertex "k".

8

- (b) Find the cyclomatic complexity of the flowchart.

2

Class lln {

 box * co

 lln * ptr

 Public :

 lln (box

 {cell

 lln * ge

 box * g

 void set

 {pt

}

 Let I_j be the

 (a) Find P

and Q

[11]

many
50. Consider the following nested class in a C++ program :

Class lln {

 box * cell;

 lln * ptr;

Public :

 lln (box* newbox)

 {cell = newbox; ptr = 0;}

 lln * getptr () {return ptr;}

 box * getbox () {return cell;}

 void setptr (lln * newptr)

 {ptr = newptr;}

}

Let I_j be the set of instance variables used by method m_j .

(a) Find $P = \{(I_i, I_j) / I_i \cap I_j = \emptyset\}$

and $Q = \{(I_i, I_j) / I_i \cap I_j \neq \emptyset\}$

8

[Turn over]

[12]

(b) Compute LCOM (Lack of Cohesion in Methods)

$$= \begin{cases} \text{Card}(P) - \text{Card}(Q), & \text{if } \text{card}(P) > \text{card}(Q) \\ 0, & \text{otherwise} \end{cases} \quad 2$$

50. The following pseudocode accepts three numbers, a, b and c, interprets those numbers as the lengths of the sides of a triangle and outputs the type of the triangle.

```
read a, b, c;
type = "scalene" ;
if (a == b || b == c || a == c)
    type = "isosceles" ;
if (a == b & & b == c)
    type = "equilateral" ;
if (a >= b + c || b >= a + c || c >= a+b)
    type = "not a triangle" ;
if (a <= 0 || b <= 0 || c <= 0)
    type = "bad inputs" ;
print type ;
```

- a) Draw a control-flow graph for the above code. The first three times of the cose may be merged into a single node. 2

- b) Choose sets of inputs in such a manner that every arc of the graph is tested at least once. The number of sets should be as small as possible. Prepare a table showing the arcs tested for each set. 8

**BACHELOR OF ENGINEERING IN COMPUTER SCIENCE &
ENGINEERING EXAMINATION, 2012**

(2nd Year, 2nd Semester)

SOFTWARE ENGINEERING

Time : Three Hours

Full Marks - 100

Group - A

Match the correct pairs :

| | Set - I | Set - II |
|----|------------------------------|---|
| 1. | Basis path | i) is - a |
| 2. | Big-endian / little-endian | ii) large amount of data |
| 3. | Concurrent development model | iii) many simultaneous requests |
| 4. | Deprecating | iv) modularity, generality, expandability, self-descriptiveness |
| 5. | Flexibility | v) non-functional requirement |
| 6. | Generalization | vi) optional functionality |
| 7. | Hooks | vii) obsolescence |
| 8. | Interoperability | viii) portability |
| 9. | Operability | ix) product transition quality factor |

[Turn over

| Set - I | Set - II |
|-----------------------|--|
| 10. Simplicity | x) series of events |
| 11. Stability | xi) the better it works the more efficiently it can be tested |
| 12. Stress testing | xii) the fewer the changes the fewer the disruptions to testing |
| 13. Throughput | xiii) the less there is to test, the more quickly we can test it |
| 14. Usability testing | xiv) white-box |
| 15. Volume testing | xv) user's expectation |

15x2=30

Group - B

Answer any 15 :

Fill in the blanks :

16. A component is any piece of software or hardware that has a clear role and can be _____, allowing us to replace it with a different component with equivalent _____.
17. A _____ is a detailed description of the steps involved in performing a use case and describes sequences of observable behaviour.

Group - D

Answer all questions

49. Consider the following job log :

| Task | Estimated effort (Programmer - days) | Actual effort so far (Programmer - days) | Estimated completion date | Actual date of completion |
|------|---|---|---------------------------|---------------------------|
| 1 | 50 | 70 | 15.01.11 | 01.02.11 |
| 2 | 35 | 20 | 15.02.11 | 15.02.11 |
| 3 | 20 | 40 | 25.02.11 | 01.03.11 |
| 4 | 40 | 40 | 15.04.11 | 01.04.11 |
| 5 | 60 | 10 | 01.06.11 | — |
| 6 | 80 | 20 | 01.07.11 | — |

Assume that the current date is 01.05.11.

- a) Calculate BCWS, BCWP, ACWP, earned value, schedule variance, and cost variance. 8
- b) Is the project on schedule? 2

46. The software quality factor related to access control and access audit is
- a) reliability
 - b) integrity
 - c) testability
 - d) none of the above
47. To build flexibility into a design, we should
- a) increase coupling
 - b) reduce cohesion
 - c) hard-code constants
 - d) none of the above
48. UML is a
- a) visual programming language
 - b) tool specification
 - c) process
 - d) language

10x2=20

18. An activity diagram consists of _____ and _____.
19. A _____ simulates the part of the system that calls the component under test.
20. A subsystem is a system that is part of a _____ system and which has a definite _____.
21. In order to create abstractions, we should try to create _____ or superclasses with _____ operations.
22. In order to ensure that the system can be adopted in the future, we should describe _____ that are _____ for subsequent releases.
23. In the spiral model, each of the _____ activities represents one _____ of the spiral path.
24. _____ is achieved when operations that are performed during the same phase of the execution of the program are kept together, and everything else is kept out.
25. _____ is the heart of quality control.
26. One of the strong points of the object-oriented paradigm is that it helps ensure _____ cohesion.

27. _____ requirements are constraints that must be adhered to during development. They limit what _____ can be used.
28. Test planning can begin as soon as the _____ _____ is complete.
29. The focus of the FTR is on a _____ _____.
30. The main deliverable of the Domain Analysis phase is the _____ model, which consists of class programming abstractions related by _____.
31. The most important way to design defensively is to check that all of the _____ to a component are valid, i.e. to check the _____ of each component.
32. The Rapid Application Development (RAD) is an _____ software process model that emphasizes a development cycle.
33. Traceability establishes traces among the _____ of activities of the _____ phase and validates them against user requirements.
34. UML applies to _____ and _____.
35. Unlike other process models that end when software is delivered, the _____ model can be adapted to apply throughout the _____ of the computer software.

15x2=30

- b) Communicational cohesion
c) Layer cohesion
d) Temporal cohesion
43. The following system testing activity involves tests of common functionality among a selected group of end users in the target environment :
a) Pilot testing
b) Installation testing
c) Acceptance testing
d) Performance testing
44. The following risk threatens the viability of the software to be built:
a) Business risk
b) Project risk
c) Technical risk
d) none of the above
45. The missing parts of a framework are called
a) modules
b) plugs
c) slots
d) jacks

39. If the requirements can be defined early in the cycle, we can use the

- a) Prototype model
- b) Spiral model
- c) Incremental model
- d) none of the above

40. Integrity is a

- a) Product Transition Quality factor
- b) Product Revision Quality factor
- c) Product Operation Quality factor
- d) none of the above

41 In a CPM activity-on-node network, a particular node W has three immediately preceding activities X, Y, and Z. The earliest start date of W is the

- a) earliest of the latest finishing dates of X, Y, Z.
- b) latest of the earliest finishing dates of X, Y, Z.
- c) earliest of the earliest finishing dates of X, Y, Z.
- d) latest of the latest finishing dates of X, Y, Z.

42. Procedural cohesion is more important than

- a) Sequential cohesion

Group - C

Answer any 10 :

Choose the unique correct answer.

36. Activity Diagrams are deliverables of

- a) Subsystem Analysis
- b) Domain Analysis
- c) Requirements Analysis
- d) None of the above

37. A use case model is a

- a) specification model
- b) design model
- c) object model
- d) subsystem model

38. If L is the member of source statements, P is a productivity parameter, t is the project duration in calendar months, and E is the development effort in person-months, then

- a) $E = L^4 / (P^4 t^3)$
- b) $E = L^3 / (P^3 t^4)$
- c) $E = L^3 / (P^3 t^3)$
- d) none of the above

50. A control flow graph has nodes a, b, c i, and j. Its edges are (a,b), (a,c), (a,d), (b,d), (b,e), (c,d), (c,f), (c,g), (d,h), (e,g), (e,h), (f,g), (f,j), (g,i), (h,i), (i,j).

- a) What is the number of regions ? 2
b) Calculate the cyclomatic number? 3

**BACHELOR OF COMPUTER SCIENCE ENGINEERING
EXAMINATION, 2011
(2nd Year, 2nd Semester)
SOFTWARE ENGINEERING**

Time : Three Hours Full Marks - 100

Group - A

Match the correct pairs : 15x2=30

| Set - I | Set - II |
|--|---|
| 1. Availability | i) Risk table |
| 2. Backward pass | ii) Average amount of time between failures |
| 3. Basic Unix commands such as grep, cat | iii) Baseline budget |
| 4. BCWP | iv) Boehm |
| 5. BCWS | v) Bottom up parsing |
| 6. COCOMO | vi) Conformance to requirements |
| 7. Cutoff Line | vii) Defensive |
| 8. Design by contract | viii) Earliest date |
| 9. Forward Pass | ix) Earned value |
| 10. Interdependency | x) Hard to understand |
| 11. No test drivers | xi) Latest date |
| 12. No test stubs | xii) Project scheduling |

| Set - I | Set - II |
|---------------------|---|
| 13. Quality | xiii) Reusable components |
| 14. Reliability | xiv) Amount of time that a server is running |
| 15. Tightly coupled | xv) Top-down parsing |

Group - B

Answer any 15

Fill in the blanks :

$$15 \times 2 = 30$$

16. All tests should be traceable to ____ ____.
17. Testing is a process of ____ a program with the intent of finding an ____.
18. ____ ____ is a testing technique that minimizes the number of test cases.
19. ____ ____ detects faults that have not been detected during unit testing by focusing on small groups of components.
20. Big bang testing is inconvenient because in this method it is impossible to distinguish failures in the ____ from failures within a ____.
21. Functional testing finds differences between the ____ ____ model and the observed system behaviour.

| Z | Probability of meeting due date |
|------|---------------------------------|
| 1.4 | — |
| 1.2 | — |
| 1.0 | — |
| 0.8 | — |
| 0.6 | — |
| 0.4 | — |
| 0.2 | — |
| 0.0 | — |
| -0.2 | — |
| -0.4 | — |
| -0.6 | — |
| -0.8 | — |
| -1.0 | — |
| -1.2 | — |
| -1.4 | — |

- a) Draw an activity - on - arrow network. 4
- b) Find the expected duration and variance for each activity. 5
- c) What is the probability that the project will be completed at least 3 weeks earlier than expected? 3
- d) If the project due date is 18 weeks what is the probability of not meeting the due date? 3

[Turn over

32. Frameworks also usually have ____ : these are like , except that they represent functionality that is optional for the developers to provide when they exploit the framework.
33. Modules that update a database or create a new file are not ____ ____ since they have side-effect in the database or file system respectively.
34. Anticipation of ____ is a special case of design for ____.
35. A utility is a procedure or class that has wide applicability to many different ____ and is designed to be ____.

$$15 \times 2 = 30$$

Group - C

Answer any 10

Choose the unique correct answer :

36. Testing
- a) shows the absence of errors
 - b) shows that errors are present
 - c) is useless because software invariably contains bugs
 - d) all of the above.
37. The maximum "the less there is to test, the more quickly we can test it" is related to

- a) interoperability
 - b) maintainability
 - c) portability
 - d) flexibility
45. If the requirements can be defined early in the cycle then an appropriate process model is
- a) prototype
 - b) RAD
 - c) spiral
 - d) none of the above.
46. If the majority of team members are new to the problem domain for the project then an appropriate process model is
- a) prototype
 - b) waterfall
 - c) RAD
 - d) incremental
47. If an environmental factor has a moderate effect, the corresponding value adjustment factor is
- a) 0
 - b) 1
 - c) 2
 - d) 3

- c) Layer, Procedural, Communicational.
d) Layer, Communicational, Procedural.
41. Increasing abstraction
a) decreases reusability.
b) increases reusability.
c) does not change reusability.
d) none of the above.
42. According to Mc Call's terminology, "Usability is a
a) product revision quality
b) product transition quality
c) product operation quality
d) all of the above.
43. According to McCall's terminology, " reusability " is a
a) product revision quality
b) product transition quality
c) product operation quality
d) all of the above.
44. The software quality criteria of modularity self descriptiveness, machine independence and software system independence are associated with
- a) stability
b) observability
c) understandability
d) simplicity
38. During performance testing, we test whether the system can respond to many simultaneous requests. This is called
a) Stress testing
b) Volumn testing
c) Recovery testing
d) none of the above.
39. A design principle dictates that facilities for operating on the same data should be kept together. This is called
a) Communicational cohesion.
b) Utility cohesion.
c) Procedural cohesion.
d) Layer cohesion.
40. The following sequence of cohesion types is arranged in descending order of precedence:
a) Procedural, Communicational, Layer.
b) Communicational, Procedural, Layer.

48. Cost variance is the difference between
a) ACWP and BCWP
b) ACWP and BCWS
c) BCWS and BCWP
d) None of the above
- 10x2=20

Group - D

Answer **ALL** questions :

49. A project consists of the following activities :

| Activity | | Estimated duration (weeks) | | |
|----------------|-------------|----------------------------|-------------|-------------|
| Beginning node | Ending node | Optimistic | Most likely | Pessimistic |
| 1 | 2 | 1 | 1 | 7 |
| 1 | 3 | 1 | 4 | 7 |
| 1 | 4 | 2 | 2 | 8 |
| 2 | 5 | 1 | 1 | 1 |
| 3 | 5 | 2 | 5 | 14 |
| 4 | 6 | 2 | 5 | 8 |
| 5 | 6 | 3 | 6 | 15 |

a portion of the standard normal table is given below :

22. For number crunching programs that may take hours or for servers that continually respond to client requests, it is a good idea to specify _____, in terms of computations or _____ per minutes.
23. A system is a logical entity, having a set of definable _____ or _____, and consisting of hardware, software or both.
24. A subsystem is a system that is part of a _____ system and which has a definite _____.
25. The incremental model applies _____ sequences in a _____ fashion as calendar time progresses.
26. A use case model captures services offered by a system and users of the system in terms of _____, use cases, and the _____ relationship.
27. _____ _____ is the first phase in design activity based on UML.
28. In UML -modelling, interactions among subsystems can be determined from _____ _____.
29. In a proactive strategy for risk management, potential risks are identified, their _____ and _____ are assessed and they are ranked by importance.
30. The critical path is the path joining all nodes with a _____ _____.
31. The keything that distinguishes a framework from other kinds of software subsystem is that a framework is _____ _____.

BACHELOR OF COMPUTER SC. ENGG. EXAMINATION, 2010

(2nd Year, 2nd Semester)

SOFTWARE ENGINEERING

Time : Three hours

Full Marks :100

GROUP – A

Match the correct pairs.

Set – I

1. Communicational Cohesion
 2. Flexibility
 3. Functional Cohesion
 4. Incremental Model
 5. Integrity
 6. Layer Cohesion
 7. Operability
 8. Prototyping Model
 9. Rapid Application Development (RAD) Model
- | |
|---|
| i) access control, access audit |
| ii) anchor point milestones |
| iii) assists in understanding what is to be built when requirements are fuzzy |
| iv) between Communicational Cohesion and Procedural Cohesion. |
| v) between Functional Cohesion and Communicational Cohesion |
| vi) between Procedural Cohesion and Utility Cohesion. |
| vii) facilities for operating on the same data. |
| viii) facilities that perform only one computation with no side-effects. |
| ix) incremental model that emphasizes a short development cycle. |

[TURN OVER]

(2)

Set – I

10. Sequential Cohesion
11. Simplicity
12. Spiral Model
13. Stability
14. Temporal Cohesion
15. Throughput

Set – II

- x) linear sequences in staggered fashion.
- xi) modularity generality, expandability, self-descriptiveness.
- xii) non-functional requirement
- xiii) the better it works the more efficiently it can be tested.
- xiv) the fewer the changes the fewer the disruptions to testing.
- xv) the less there is to test, the more quickly we can test it.

$$15 \times 2 = 30$$

GROUP – B

Answer any 15

Fill in the Blanks.

16. According to IEEE Standard 610.12-1990, software Engineering is the application of a systematic, _____, _____ approach to the development, operation, and maintenance of software.
17. If software Engineering is viewed as a layered technology, Software Engineering tools provide automated or semiautomated support for the _____ and the _____.
18. Software feasibility has four dimensions: _____, _____, time, and resources.

(3)

19. In a proactive strategy, potential risks are identified, their _____ and _____ are assessed, and they are ranked by importance.
20. The following question can be used to discover whether a project is “at risk”.
Do end-users have _____ ?
21. The Putnam – Norden – Rayleigh (PNR) curve can be modelled by the equation _____.
22. The SQA group serves as the customer’s _____.
23. The focus of the FTR is on a _____ .
24. A formal technical review is a software _____ activity performed by software engineers (and others).
25. A requirement says something about the _____ a system is supposed to accomplish. It does not describe the _____, nor how the system will be implemented.
26. In order to ensure that the system can be adopted in the future, we should describe _____ that are _____ for subsequent releases.
27. It is quite important to make it clear what hardware and operating system the software must be able to work on. Normally such requirements specify the _____ platforms.
28. A component is any piece of software or hardware that has a clear _____ and can be _____, allowing us to replace it with a different component with equivalent functionality.
29. A _____ is reusable software that implements a _____ solution to a generalized problem.

(4)

30. A subsystem is a system that is part of a _____ system and which has a definite _____.
31. Methods in two different classes may provide inputs to each other and be called in sequence; but they would each be kept in their own class, since _____ cohesion is more important than _____ cohesion.
32. In order to create abstractions, we should try to create _____ or superclasses with _____ operations.
33. The most important way to design defensively is to check that all of the _____ to a component are valid, i.e., to check the _____ of each component.
34. All tests should be traceable to _____.
35. A _____ simulates the part of the system that calls the component under test. $15 \times 2 = 30$

GROUP – C

Answer any 10

Choose the unique correct answer.

36. In the Waterfall Model, a working version of the program becomes available
 - a) early
 - b) in the middle
 - c) late
 - d) whenever the customer wants it.
37. The following model defines a series of events that will trigger transitions from state to state for each of the Software

[TURN OVER]

(5)

- Engineering activities, actions, or tasks :
- a) Spiral Model
 - b) RAD Model
 - c) Incremental Model Development Model
 - d) Concurrent Development Model.
38. The following risk threatens the viability of the software to the built :
 - a) Business risk
 - b) Project risk
 - c) Technical risk.
 - d) none of the above.
 39. In a CP/M activity-on-node network, a particular node W has three immediately preceding activities X,Y, and Z. The earliest start date of W is the
 - a) earliest of the latest finishing dates of X,Y,Z
 - b) latest of the earliest finishing dates of X,Y, Z
 - c) earliest of the earliest finishing dates of X, Y,Z
 - d) latest of the latest finishing dates of X,Y,Z
 40. In a CP/M activity – on-node network, a particular node S has three immediate successors P,Q and R. The latest finishing date of S is the
 - a) earliest of the latest start dates of P,Q,R
 - b) latest of the earliest start dates of P,Q,R
 - c) earliest of the earliest start dates of P,Q,R

[TURN OVER]

(6)

- d) latest of the latest start dates of P,Q,R
41. Integrity is a
- a) Product transition Quality factor.
 - b) Product Revision Quality factor.
 - c) Product Operation Quality factor.
 - d) None of the above.
42. Interoperability is a
- a) Product Operation Quality factor.
 - b) Product Revision Quality factor.
 - c) Product Transition Quality factor.
 - d) none of the above.
43. Reducing coupling
- a) decreases reusability
 - b) increases reusability
 - c) has no effect on reusability
 - d) contradicts the principle of reusability.
44. A way to build flexibility in to a design is to
- a) increase coupling and increase cohesion
 - b) reduce coupling and reduce cohesion
 - c) increase coupling and reduce cohesion
 - d) reduce coupling and increase cohesion.
45. Boundary testing is a special case of

(7)

- a) Sandwich testing
 - b) Integration testing
 - c) Equivalence testing
 - d) none of the above.
46. One approach to implementing an Integration testing strategy is to test all components individually and then test them together as a single system.
This approach is called
- a) big -bang testing
 - b) bottom-up testing
 - c) top-down testing
 - d) sandwich testing.
47. The following performance test checks if the system can respond to many simultaneous requests :
- a) Recovery testing
 - b) Timing testing
 - c) Volume testing
 - d) Stress testing
48. The following system testing activity involves tests of common functionality among a selected group of end users in the target environment :
- a) Pilot testing
 - b) Installation testing
 - c) Acceptance testing

[TURN OVER]

(8)

- d) Performance testing.

$$10 \times 2 = 20$$

GROUP – D

Answer all Questions.

49. A piece of software has the following characteristics :

| | Simple | Average | Complex |
|---------------------------|---------------|----------------|----------------|
| Number of Outputs | 12 | 11 | 5 |
| Number of Inputs | 8 | 9 | 6 |
| Number of Inquiry Outputs | 5 | 7 | 3 |
| Number of Inquiry Inputs | 5 | 8 | 4 |
| Number of files | 12 | 3 | 2 |
| Number of Interfaces | 9 | 6 | 4 |

- a) for each row, compute the function Points.
 b) Compute the total FP.
 c) If the total environmental influence factor is 51, find the Complexity Adjustment factor (CAF).
 d) Find the Adjusted function Points
 e) Find LOC for an implementation in the 'C' language. 12

50. Consider the following codes

```
cin >> a >> b >> c;
```

```
if (a > 10)
```

```
{
```

```
Cout << "hello";
```

```
if (b < a)
```

(9)

```
{
  Cout << "part 1 ";
  if (c > a)
  {
    cout << "part 2";
  }
  else
  {
    cout << " parts 3 ";
  }
}
cout << "exiting";
a) Draw the Control flow graph and show which lines are represented by which nodes.
b) Calculate the cyclomatic number using three methods. 8
```

_____x_____

| <u>Z</u> | <u>Probability of meeting due date</u> |
|----------|--|
| - 1.2 | 0.115 |
| - 1.4 | 0.081 |
| - 1.6 | 0.055 |
| - 1.8 | 0.036 |
| - 2.0 | 0.023 |
| <hr/> | |
| - 2.2 | 0.014 |
| - 2.4 | 0.008 |
| - 2.6 | 0.005 |
| - 2.8 | 0.003 |
| - 3.0 | 0.001 |
| <hr/> | |

50. Prepare a UML class diagram for a graphical document editor that supports grouping. Assume that a document consists of several sheets. Each sheet contains drawing objects, including text, geometrical objects, and groups. A group is simply a set of drawing objects, possibly including other groups. A group must contain at least two drawing objects. A drawing object can be a direct member of at most one group. Geometrical objects include circles, ellipses, rectangles, lines and squares.

8

-----x-----

BACHELOR OF COMPUTER SC. ENGG. EXAMINATION 2009

(2nd Year, 2nd Semester)

SOFTWARE ENGINEERING

Time : Three hours

Full Marks : 100

GROUP-A

Match the correct pairs.

15×2=30

Set -ISet II

- | | | |
|-----------------------------|--------|-----------------------------------|
| 1. Abstraction | (i) | BCWP |
| 2. Big-endian/little-endian | (ii) | defensive |
| 3. Communicational cohesion | (iii) | hierarchy |
| 4. Critical path | (iv) | User's' expectation |
| 5. Deprecating | (v) | large amount of data |
| 6. Design by contract | (vi) | many simultaneous requests |
| 7. Earned Value | (vii) | risk management |
| 8. Functional testing | (viii) | obsolescence |
| 9. Interoperability | (ix) | portability |
| 10. ISO9126 | (x) | product transition quality factor |
| 11. Layer cohesion | (xi) | observed system |

[Turn Over]

(2)

(9)

| | behaviour | <u>Z</u> | <u>Probability of meeting due date</u> |
|-----------------------|-------------------------|----------|--|
| 12. Reactive strategy | (xii) side-effects | 3.0 | 0.999 |
| 13. Stress testing | (xiii) software quality | 2.8 | 0.997 |
| 14. Usability testing | (xiv) zero slack | 2.6 | 0.995 |
| 15. Volume testing | (xv) information hiding | 2.4 | 0.992 |
| GROUP-B | | 2.2 | 0.986 |
| Answer any 15. | | 2.0 | 0.977 |

Fill in the blanks $15 \times 2 = 30$

16. The disadvantage of top-down testing is that the development of _____ is time-consuming and prove to error.
17. The assumption behind boundary testing is that developers often overlook _____ at the boundary of the equivalence classes.
18. Coupling occurs when there are between one _____ and another.
19. A utility is a procedure or class that has wide _____ to many different _____ and is designed to be reusable.
20. A system is a _____ entity, having a set of _____ responsibilities or objectives and consisting of hardware, software or both.
21. The main deliverable of the Domain Analysis phase is the _____ model, which consists of class programming

[Turn Over]

(4)

32. Traceability establishes traces among the _____ of activities of the _____ phase and validates them against user requirements.
33. Failure costs are those that would _____ if no defects appeared _____ shipping a product to customers.
34. A software system contains a fanet if for some _____ data the behaviour of the system is _____, that is, different from the one included in software specification.
35. Risk involves two characteristics : _____ and _____.

GROUP-C

Answer any 10.

Choose the unique correct answer $15 \times 2 = 30$

36. The behaviour of the end user is observed and recorded in
 - a) alpha test
 - b) beta test
 - c) usability test
 - d) all of the above
37. Test drivers are not needed during
 - a) bottom-up testing
 - b) top-down testing
 - c) sandwich testing
 - d) none of the above
38. Test stubs are not necessary during
 - a) bottom-up testing
 - b) top-down testing
 - c) sandwich testing
 - d) none of the above
38. Communicational cohesion is more important than
 - a) functional cohesion
 - b) layer cohesion
 - c) sequential cohesion
 - d) all of the above
40. The cyclomatic complexity $V(G)$, for a flow graph G is defined as
 - a) $E - N + 2$
 - b) $N - E + 2$
 - c) $E + N + 2$
 - d) $E - N - 2$
41. Procedural cohesion is more important than
 - a) Sequential cohesion
 - b) Communicational cohesion
 - c) Layer cohesion
 - d) Temporal cohesion

(5)

(6)

42. The software quality factor related to access control and access audit is
- reliability
 - integrity
 - testability
 - none of the above
43. Compartmentalization is a basic principle of
- risk management
 - project scheduling
 - testing
 - requirements analysis
44. Activity Diagrams are deliverables of
- Subsystem Analysis
 - Domain Analysis
 - Requirements Analysis
 - None of the above
45. A use case model is a
- specification model
 - design model
 - object model
 - subsystem model

(3)

- abstractions related by _____ .
22. UML applies to _____ and _____ .
23. An extend relationship is a _____ relationship where one use case extends another by adding _____ to it.
24. A _____ _____ is a detailed description of the steps involved in performing a use case and describes sequences of observable behaviour.
25. In a proactive strategy for risk management, potential risks are identified, their _____ and _____ are assessed, and they are ranked by importance.
26. COCOMO II is actually a _____ of _____ models.
27. In the organic mode of the basic COCOMO model, the estimated labour months is _____ .
28. The _____ _____ model defines a series of events that will trigger transitions from state to state for each of the software engineering activities, actions or tasks.
29. The Rapid Application Development (RAD) is an _____ software process model that emphasizes a _____ development cycle.
30. Unlike other process models that end when software is delivered, the _____ model can be adapted to apply throughout the _____ of the computer software.
31. The incremental model applies _____ sequences in a _____ fashion as calendar time progresses.

[Turn Over]

(8)

GROUP-D

Answer all questions

49. The following table lists the jobs of a network along with their time estimates.

12

| <u>Job</u> | <u>Duration (days)</u> | | |
|------------|------------------------|-------------|-------------|
| i j | Optimistic | Most likely | Pessimistic |
| 1 2 | 3 | 6 | 15 |
| 1 6 | 2 | 5 | 14 |
| 2 3 | 6 | 12 | 30 |
| 2 4 | 2 | 5 | 8 |
| 3 5 | 5 | 11 | 17 |
| 4 5 | 3 | 6 | 15 |
| 6 7 | 3 | 9 | 27 |
| 5 8 | 1 | 4 | 7 |
| 7 8 | 4 | 19 | 28 |

- a) Draw the PERT network.
- b) Calculate the length and variance of the critical path.
- c) What is the approximate probability that jobs on the critical path will be completed by the due date of 41 days ? [Use the standard normal table given below]

(7)

46. The architecture of a system describes
- a) objects
 - b) use cases
 - c) activity diagrams
 - d) subsystems, their communication, and interfaces
47. The software equation states that
- a) $L = P^{\frac{1}{3}} \times E^{\frac{4}{3}} \times t$
 - b) $L = P^{\frac{4}{3}} \times E^{\frac{1}{3}} \times t$
 - c) $L = P \times E^{\frac{4}{3}} \times t^{\frac{1}{3}}$
 - d) $L = P \times E^{\frac{1}{3}} \times t^{\frac{4}{3}}$
48. In the Critical Path Method, the forward pass is used to calculate
- a) latest start date
 - b) earliest finish date
 - c) latest finish date
 - d) earliest start date

[Turn Over]