Bihar Engineering University, Patna
B.Tech 5th Semester Examination, 2024

Course: B.Tech | | Time: 03 Hours
Code: 105504 | Subject: Software Engineering | Full Marks: 70

Instructions:-
(i) The marks are indicated in the right-hand margin.
(ii) There are **NINE** questions in this paper.
(iii) Attempt **FIVE** questions in all.
(iv) Question No. 1 is compulsory.

Q.1 *Choose the correct option / answer the following (Any seven question only):* [2 x 7 = 14]

(a) Which of the following activity spans all stages of a software development life cycle (SDLC)?
  (i) Coding
  (ii) Design
  (iii) Testing
  (iv) Project management

(b) Which one of the following life cycle models lacks the characteristics of iterative software development?
  (i) Spiral model
  (ii) Classical waterfall model
  (iii) Prototyping model
  (iv) Evolutionary model

(c) What is the correct order in which a software project manager estimates various project parameters while using COCOMO:
  (i) Cost, effort, duration, size
  (ii) Size, effort, duration, cost
  (iii) Cost, duration, effort, size
  (iv) Size, cost, effort, duration

(d) How is an application's "version" different from its "release"?
  (i) A release is a small change to an earlier release.
  (ii) A release is essentially the same as a version.
  (iii) A version is a small change made to an earlier release.
  (iv) A release is the one made available to customers whereas versions are for internal use.

(e) When the two bubbles are interconnected directly, it is referred as
  (i) Serial DFD
  (ii) Direct DFD
  (iii) Synchronous DFD
  (iv) Balanced DFD

(f) A software requirements specification (SRS) document should avoid discussing which one of the following?
  (i) Functional requirements
  (ii) Design specification
  (iii) Non-functional requirements
  (iv) Constraints on the implementation

(g) System Testing performed by a friendly set of customers is called
  (i) Alpha Testing
  (ii) Beta Testing
  (iii) Performance Testing
  (iv) Usability Testing

(h) The most desirable form of cohesion is
  (i) sequential cohesion
  (ii) procedural cohesion
  (iii) coincidental cohesion
  (iv) functional cohesion

(i) Functionality of software is tested by
  (i) white-box testing
  (ii) black-box testing
  (iii) glass-box testing
  (iv) grey-box testing

(j) To achieve a good design, modules should have
  (i) Weak cohesion Low coupling
  (ii) Weak cohesion High coupling
  (iii) Strong cohesion Low coupling
  (iv) Strong cohesion High coupling

Q.2 (a) Explain the software life cycle model that incorporates risk factor with its advantages and disadvantages. [7]

(b) Identify the criteria based on which a suitable life cycle model can be chosen for a given project development. Illustrate your answer using suitable examples. [7]

Q.3 (a) What is the difference between the functional and the non-functional requirements of a system? Explain with suitable examples. [7]

(b) List five desirable characteristics of a good software requirements specification (SRS) document. Also, make a checklist of errors that might exist in an SRS document. [7]

Q.4 (a) Briefly explain project size estimation using Delphi technique and expert judgement technique. Compare the advantages and disadvantages of them. [7]

(b) Suppose you are developing a software product of organic type. You have estimated the size of the product to be about 1,00,000 lines of code. Compute the nominal effort and the development time. [7]

Q.5 (a) Explain when you use the PERT charts and when to use Gnatt charts. Consider a software project with 5 tasks T1–T5. Duration of the 5 tasks in weeks are 3, 2, 3, 5, 2 respectively. T2 and T4 can start when T1 is complete. T3 can start when T2 is complete. T5 can start when both T3 and T4 are complete. Draw the PERT chart representation of the project. When is the latest start date of the task T3? What is the slack time of the task T4? Which tasks are on the critical path? [7]

(b) Enumerate different types of cohesion and coupling that a module in a design might exhibit. Give examples of each. [7]

Q.6 (a) Draw the context diagram and Level-1 DFD for the following Mail Order Processing System. [7]
"HMV Records is a mail-order company that distributes CDs and tapes at discounted prices to record-club members. When an order processing clerk receives an order form, he verifies that the sender is a club member by checking the member file. If the sender is not a member, the clerk returns the order along with a membership application form. If the customer is a member, the clerk verifies the order item data by checking the Item file. Then the clerk enters the order data and saves it to the Daily Order file. The clerk also prints an invoice and shipping list for each order, which are forwarded to order fulfilment section".

(b) Instead of having a onetime testing of a software at the end of its development, why are three different levels of testing—unit testing, integration testing, system testing and acceptance testing—are necessary? What is the main purpose of each of these different levels of testing? [7]

Q.7 (a) What do you understand by cyclomatic complexity of a program? How can it be measured? What are its applications in program development? Explain with suitable example. [7]

(b) Which one of the following is the strongest structural testing technique: statement coverage-based testing, branch coverage-based testing, or multiple condition coverage-based testing? Justify your answer. [7]

Q.8 (a) Define three metrics to measure software reliability. Do you consider these metrics entirely satisfactory to provide measure of the reliability of a system? Justify your answer. [7]

(b) What do you mean by the term software reverse engineering? Why is it required? Explain the different activities undertaken during reverse engineering. [7]

Q.9 Write short notes on *any two* of the following: [7 x 2 = 14]
(a) Agile Development Process
(b) UML Diagrams
(c) Equivalence Class Testing
(d) Putnam model