

1. **Name the activities involved in the path of engineering.**
  - Construction
  - Evaluation
2. **Name the activities involved in the path of science.**
  - Observation
  - Measurement
  - experimentation
3. **Write the set of actions needed to be performed for finding solutions to a problem.**
  - Postulate a solution
  - Build a model of the solution
  - Evaluate the model against the original requirement.
  - Elaborate the model to create solution.
4. **What is black box and white box model?**

Black-box model is one that describes the external functionality and behavior of a system as a whole, without any reference to how this is to be achieved.

White-box model is one in which the workings of the system are described.
5. **Write the steps in the model of the design process.**
  - Clarify nature of requirements
  - Build black-box model of problem.
  - Postulate a white box design solution
  - Validate solution
  - Implementation using suitable software
6. **Give examples for designer's learning process.**
  - Knowledge gained from scientific research.
  - Concept of reuse.
7. **What are the uses of design plan?**

Design plan describes

  - Static structure of the system
  - Any data objects used in the system
  - The algorithms to be used
  - The packaging of the system
  - Interaction between components
8. **Give some examples for design viewpoints.**
  - Entity-Relationship Diagram(ERD)
  - State-Transition Diagram(STD)
  - Data-Flow Diagram(DFD)
9. **Write any four characteristics of wicked problem.**
  - There is no formulation of a wicked problem.
  - Wicked problems have no stopping rule.
  - Wicked problems do not have an enumerable set of potential solutions.
  - Every wicked problem is essentially unique.
10. **What is a wicked problem?**

Wicked problem is a problem whose form is such that a solution for one of its aspects simply changes the problem.

**11. Write the process maturity levels.**

- Initial, Repeatable, Defined, Managed, optimizing

**12. Write the inputs that are to be provided to design activity to improve quality.**

- Domain knowledge
- Method knowledge
- Experience from similar projects.

**13. Write the ways of providing inputs to the design process.**

- Technical review
- Management review
- Prototyping

**14. Name the two types of review.**

Technical review, Management review

**15. Write the qualities of good design.**

Well-structured, simple, efficient, adequate, flexible, practical, implementable, standardized are the qualities of good design.

**16. Write the characteristics of maintainable design.**

- It allows efficient code to be generated.
- It might be a minimal design where the implementation is as compact as possible.
- It works correctly in all required situations.
- A maintainable design can be adapted to modify existing functions and add new functionality.

**17. Name the design development stages.**

- Analysis
- Architectural design
- Detailed design

**18. Write the four forms of design representation.**

- Constructional forms
- Behavioral forms
- Functional forms
- Data-modeling forms

**19. What are direct viewpoints?**

Viewpoints created directly by the designer are called direct viewpoints.

**20. What are derived viewpoints?**

Viewpoints that are created by applying some transformation to the design model are called derived viewpoints.

**21. Name the major components of software design method.**

- Representation part
- Process part
- Set of heuristics

**22. What is the difference between transformation and elaboration?**

A transformation step is one where the designer modifies the structuring for their model of the system in some way.

An elaboration step is usually to add more information to the model.

**23. Name the four types of design methods.**

- Decompositional methods
- Compositional methods
- Organizational methods
- Template-based methods

**24. What is top-down strategy?**

In top-down strategy, the main task of a program was subdivided into smaller tasks, with this subdivision being continued until the resultant subtasks were considered sufficiently elemental to be implemented as subprograms.

**25. What is bottom-up strategy?**

In bottom-up strategy, a model of the problem is constructed by developing a set of entities or objects that can be grouped in the problem itself, together with a description of the relationships that link these entities.

**26. Write the disadvantages of top-down strategy.**

- The solution is unstable.
- Important decisions have to be made at the beginning of the design process, so that the effects of any poor decisions will be propagated through the following steps.
- It has no stopping rule.
- Problem of duplication.

**27. Write the advantages of bottom-up strategy.**

- The solution is stable.
- Important decisions can be postponed until late in the design process.
- Better able to provide a good verification process between the design and the original specification.
- Avoids the problem of duplication.

**28. What is coupling?**

Coupling is a measure of intermodule connectivity, and is concerned with identifying the forms of connection that exist between modules and the 'strength' of these connections.

**29. What is cohesion?**

Cohesion provides a measure of the extent to which the components of a module can be considered to be 'functionally related'.

**30. Name the different forms of coupling?**

- Data coupling
- Stamp coupling
- Control coupling(Activating, Coordinating)
- Common-environment coupling

**31. Name the different forms of cohesion?**

- Functional
- Sequential
- Communicational
- Procedural
- Temporal

- Logical
- coincidental

**32. Write the concept of function-oriented design.**

A function-oriented design relies on decomposing a system into a set of interacting functions with a centralized system state shared by these functions.

**33. Give reasons why function-oriented design should not be replaced by object-oriented design.**

- Object-Oriented design does not offer significant advantages in terms of system maintainability or reliability
- Many organizations have developed standards and methods based on functional decomposition. Many design methods and associated CASE tools are function-oriented
- An enormous number of systems have been developed using function-oriented approach.

**34. Name the activities involved in function-oriented design process.**

- Data-Flow Design
- Structural Decomposition
- Detailed Design

**35. Give the advantages of designing DFD.**

- DFDs are a useful and intuitive way of describing a system.
- They are normally understandable without special training.
- They show end-to-end processing.

**36. Write the 'Rules of Thumb' that should be followed in converting DFD to structure chart.**

- Any system can be considered as three-stage systems  
Input, process, output
  - If data validation is required, functions to implement these should be subordinate to an input function. Output formatting, printing, and writing to disk should be subordinate to an output function.
  - The role of functions near the top of the hierarchy is to control and to coordinate a set of lower-level functions.
  - The objective of the design process is to have loosely coupled, highly cohesive components. Function should therefore do one thing only.
  - Each node in the structure chart should have between two and seven subordinates.

**37. Write the three process steps involved in the transformation process from DFD to structure chart.**

- Identify system processing transformations.
- Identify input transformations
- Identify output transformations

**38. Write the concept of object-oriented design.**

Object-Oriented Design views a system as a set of interacting objects, with their own private state, rather than as a set of functions that share a global state.

**39. Write the characteristics of Object-Oriented Design.**

- Objects are abstractions of real-world entities which are responsible for managing their own private state.
- Objects are independent entities that can be easily changed. Changing one object doesn't affect another object.
- System functionality is expressed in terms of operations and attributes.
- Objects may be distributed and may execute either sequentially or in parallel.

**40. Write the advantages of object-oriented design.**

- Object-oriented systems are easier to maintain as the objects are independent.
- They may be understood and modified as stand-alone entities.
- Improves the understandability and maintainability of the design.
- Designs can be developed using objects that have been created in previous designs. This reduces design, programming, and validation costs.

**41. Write the activities involved in the object-oriented development.**

- The identification of the objects in the system along with their operations and attributes.
- The organization of objects into an aggregation hierarchy which shows how objects are part-of other objects.
- The construction of dynamic object-use diagrams.
- The specification of object interfaces.

**42. What is an object?**

An object is a real-world entity that has a state and a defined set of operations which operate on that state.

**43. What is an object class?**

An object class is a template for objects.

**44. What is polymorphism?**

The ability of an object to take different forms is polymorphism.

**45. What is inheritance?**

The process of deriving traits of base class by a derived class is called inheritance.

**46. Name the different types of inheritance?**

- Single inheritance
- Multiple inheritance
- Multi level inheritance
- Hierarchical inheritance

**47. What is multiple inheritance?**

A class deriving properties of more than one base class is called multiple inheritance.

**48. What is design documentation?**

Design documentation is a process of creating a design document that includes all aspects of design.

**49. What are the uses of design documentation?**

- It addresses different aspect of design model.
- It helps to understand the design and its characteristics.

51. What is function oriented design?

Function oriented design is the process of decomposing a system into a set of interacting functions with a centralized system state shared by these functions.

52. Name the activities involved in function-oriented design.

- Data-Flow Design
- Structural decomposition
- Detailed design

53. Write the advantages of using data-flow diagrams.

- a. Data –Flow diagrams are useful ways of describing system.
- b. They are normally understandable without special training.
- c. They show end-to-end processing.
- d. They can be used in different design methods and also they support CASE tools.

54. What is structural decomposition or structured design?

It is the process of translating data-flow diagrams into structure chart.

55. State the 'rules of thumb' that are used in translating DFD to structure chart.

- Any system can be considered as three stage systems. They are input, process, and output.
- If data validation is required, functions to implement these should be subordinate to an input function. Output formatting, printing, and writing to disc should be subordinate to an output function.
- The role of the functions near the top of the hierarchy is to control and to coordinate a set of low level functions.
- The objective of the design process is to have loosely coupled, highly cohesive components.
- Each node in the structure chart should have between 2 and 7 subordinates.

56. Write the steps in the conversion of data-flow design to structure chart.

- Identify system processing transformations.
- Identify input transformations.
- Identify output transformations.

57. Write the uses of data dictionary.

- Data dictionary can be used to record information about design entities.
- Data dictionary reduces the chances of mistakenly reusing names.

58. What is object-oriented design?

Object-oriented design is the process of developing a system as a set of interacting objects with their own private state.

59. Write the characteristics of object-oriented design.

- Objects are real world entities which are responsible for managing their own private state and offering services to other objects.
- Objects are independent entities so that they can be easily changed without affecting other objects.

60. Define Software Design

Software design is a multi disciplinary activity that develops tools through effective communication of ideas and the use of engineering practices

61. What do you mean by Black Box model?  
Black box model is one that describes the external functionality and behavior of the system as a whole
62. Give examples for design viewpoints  
Data Flow Diagram  
Flow Chart  
Entity Relationship diagram  
State Transition Diagram
63. What is quality concept?  
Quality concepts are the abstract ideas that we have about what constitutes 'good' and 'bad' properties of the system and which will need to be accessed by the designer when making decisions about design choices.
64. What are the components for design strategy?  
Representation part  
Process part  
Set of problem analysis
65. Write notes on decompositional methods?  
Decompositional Methods generally take a top-down view of the design process, developing the design model through a process of sub division
66. What do you mean by transformation?  
Transformation step is one which the designer modifies the structuring for their model of the system in some way
67. What is the concept of design patterns?  
❖ The pattern describes a recurring problem  
❖ It also describes the core of a solution to that problem
68. Explain the terms Design and Product  
Design : Software design is a multi disciplinary activity that develops tools through effective communication of ideas and the use of engineering practices  
Product : It is a result of design
69. State five properties of wicked problem  
❖ No definitive formulation of a wicked problem  
❖ Wicked problems have no stopping rule  
❖ Solutions to wicked problems are not true or false but good or bad  
❖ There is no immediate and no ultimate test of a solution to a wicked problem  
❖ Every solution to a wicked problem is a 'one shot operation'  
❖ Every wicked problem can be considered to be a symptom of another problem
70. What do you mean by White box model?  
White box model is one that describes the internal functionality and workings of the system as a whole
71. What are the properties of good design?  
❖ Reliability  
❖ Efficiency  
❖ Maintainability

- ❖ Usability
72. Write notes on Behavioural forms
- ❖ Behavioural Forms a set of viewpoints that seek to describe the casual links between events and system responses during execution
  - ❖ Sequencing aspects can be described fairly well
  - ❖ Fixed interval descriptions are also fairly tractable
  - ❖ Constraint effects are very difficult to capture and describe using existing forms of descriptions
73. What is design Process?
- Process part of a method is closely entwined with the representation part , since it provides 'procedural' guidelines on how the models should be developed
74. What do you mean by elaboration?
- Elaboration step is one which does not usually involve any change of view point, but is more concerned with restructuring the design model within the current view point
75. Write short notes on Information hiding
- This concept is related to that of modularity, but it also incorporates additional notions about managing information in a system The basic concept encourages the designer to keep information about the detailed forms of such objects as data structures and device interfaces local to a module, or unit , and to ensure that such information should not be made 'visible' outside that unit.
76. Describe the levels of maturity
- ❖ Initial
  - ❖ Repeatable
  - ❖ Defined
  - ❖ Managed
  - ❖ Optimizing
77. Write notes on structure chart (call graph)
- It provides a visual 'index' the hierarchy of procedures within a program, using a tree like format. The structure chart provides means of recording the details of a program's structure in a form that is of great value to anyone who is trying to understand its operation.
78. Write the principal steps under process part of JSP
- a. Draw a structure diagram that describes each of the input and output data Streams
  - b. Merge these to form the program structure diagram
  - c. List the operations that need to be performed by the program, and allocate each operation to an element in the program structure design
  - d. Convert the program to text without specific conditions for any of the decision points
  - e. Add the conditions used for each iteration and selection operation
79. Write the rules for drawing structure diagrams
- ❖ Unmarked boxes represent sequence
  - ❖ Boxes marked with circles represent selection
  - ❖ An asterisked box represents iteration
  - ❖ Sequencing is from left to right

80. State the types of coupling

1. Content coupling
2. Common coupling
3. Stamp Coupling
4. Control Coupling
5. Data Coupling

81. State the types of Cohesion

1. Coincidental Cohesion
2. Logical Cohesion
3. Temporal Cohesion
4. Communication Cohesion
5. Sequential Cohesion
6. Functional Cohesion

82. Describe DFD

Data Flow Diagrams ( DFD) or bubble charts are directed graphs in which the nodes specify processing activities and the arcs specify data items transmitted between processing nodes.

83. Distinguish structure chart and flow chart

- ❖ A structure chart has no decision boxes but the flowchart has decision boxes.
- ❖ Sequential ordering of tasks inherit in a flowchart can be suppressed in a structure chart.

84. How transform centered system is characterized?

The transform centered system is characterized by similar processing steps for each data item processed by the Input , Process, and Output Subsystems.

85. State the rules for user interface design.

Place the user in control, reduce the user's memory load, make the interface consistent.

86. Name the interface design models.

Design model, User model, User's model, System image.

87. Name the categories of users.

- Novices
- Knoeledgeable, intermittent users, Knowledgeable frequent users.

88. State the activities involved in user interface design process.

- User, task, environment analysis
- Interface design
- Interface construction
- Interface validation

89. Name the design issues that arise in user interface design process.

- System response time
- User help facilities
- Error information handling
- Command labeling

90. What are the two characteristics of system response time?

- Length
- Variability

91. What is variability?

Variability refers to the deviation from average response time.

92. Name the different types of help facilities.

- Integrated help facility
- Add-on help facility

93. Name the basic constructs in structured programming.

- Sequence
- Condition
- Repetition

94. Write the steps that are applied to develop a decision table.

- List all actions
- List all conditions
- Associate specific sets of conditions with specific actions.
- Define rules.

95. Name the attributes of design notations.

Modularity, overall simplicity, ease of editing, machine readability, maintainability, logic verification.

96. Write the activities in the system design process.

- Partition the analysis model into subsystems.
- Identify concurrency
- Allocate subsystems to processors

97. Name the four layers of OO design pyramid.

- The subsystem layer
- The class and object layer
- The message layer
- The responsibilities layer

98. Define: Class

A class is an OO concept that encapsulates the data and procedural abstractions required to describe the content and behavior of some real world entity.

99. Define: Encapsulation.

Binding up of data and operations into a single unit is called encapsulation.

100. Define: Inheritance

The process of deriving traits of one class by another is called inheritance.