

S'11: 7AN : CP407(1452)

SYSTEMS ANALYSIS AND DESIGN

Time : Three hours

Maximum Marks : 100

*Answer FIVE questions, taking ANY TWO from **Group A**,
ANY TWO from **Group B** and ALL from **Group C**.*

*All parts of a question (a,b,etc.) should
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answers may
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving
proper justification.*

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Draw the schematic diagram of spiral model and explain the various phases involved in it . For which types of development projects is spiral model suitable ? 10
- (b) Illustrate, with an example, the advantages of software prototyping. Why is it advisable to throw away the prototype in case of large scale software development ? 6 + 4
2. (a) Draw the context diagram and a set of data flow diagrams for developing a library management system with the following functionalities. List the assumptions made in your analysis. 12
- (i) Inquiring the availability of a book by giving the ISBN or title or author's name

- (ii) Renting a book that is available
 - (iii) Returning a book after use
 - (iv) Reserving a book when it is not available
 - (v) Collection of overdue charges
 - (vi) Maintaining book details
 - (vii) Maintaining supplier details who supply.
- (b) Briefly explain the Function Point Analysis method of software effort estimation. What is the advantage of using function point as compared to LOC (lines of code) for size estimation ? 8
3. (a) Show how the following relationships represented in E-R model with suitable examples : 12
- (i) One-to-one
 - (ii) One-to many
 - (iii) Many-to-many
- (b) Summarize the advantages of using CASE tools in systems analysis and design. 8
4. (a) Assume that you are incharge of designing software to be installed in bank ATM. Which kind of architecture would you choose ? Give reasons for your selection and draw the architecture diagram of the system. 10
- (b) Draw flow-chart representation of branching and looping constructs. 5
- (c) What do you mean by a layered architecture ? What are the advantages of a layered architecture ? 5

Group B

5. (a) What are the advantages of modular design ? Bring out the role of coupling and cohesion in effective modular design. 12
- (b) What is document configuration ? Why is it needed ? 8
6. (a) What are the characteristics of a good test case ? 6
- (b) Write a program to identify the maximum value from a given set of integer values. Identify suitable test cases to test all possible paths of the program. 6
- (c) Distinguish between white-box and black-box testing methods. 8
7. (a) Develop a set of guidelines to conduct a program walkthrough. 8
- (b) Summarize the factors to be considered in forms design. 8
- (c) List the steps involved in dialogue design. 4
8. (a) Design a set of files for supporting a common payroll system. Comment on the data security issues of the file system you have designed. 6 + 4
- (b) Explain how management information systems help senior managers in decision making with an illustrative example. 10

Group C

9. Answer the following in brief : 10 × 2
- (i) What are the limitations of the Waterfall model ?
 - (ii) Differentiate between technical feasibility and operational feasibility of a project.

- (iii) List *any two* common errors that are made while drawing data flow diagrams.
- (iv) What is a weak entity ? Give an example.
- (v) Why do we need to design software architecture ?
- (vi) Can a system be completely decoupled into independent modules ? Justify your answer.
- (vii) What is the purpose of system testing ?
- (viii) Who should be validating a system ? Why ?
- (ix) What are the major drawbacks of file system for storing large volumes of data pertaining to an application.
- (x) Give one example each for strategic, tactical and operational decisions.

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Group A

1. (a) What is system ? Explain characteristics and types of system. 10
(b) Explain system development life cycle (SDLC) in detail. How cost/benefit analysis plays an important role in SDLC ? 10
2. (a) What is the drawback of DFD ? Draw a DFD for the university admission system. 10
(b) Explain various types of feasibility studies that the analyst should consider. 10
3. (a) Write short notes on the following : 5 + 5
(i) System requirement specification
(ii) Data dictionaries.

(b) Draw 0-level, 1-level and 2-level DFDs depicting various processes, data flow and data repositories for a retail readymade garment stores. Follow the appropriate conventions/symbols. 10

4. (a) What do you understand by system testing? Explain different types of testing. 10

(b) Explain the cost-benefit analysis with an example. 10

Group B

5. (a) What are different methodologies of system design? What do you understand by module coupling and cohesion? 10

(b) What do you understand by quality assurance? Explain goals of quality assurance. Discuss various methods of software testing. 10

6. (a) Explain the information support and nature of management for the following systems : 5 + 5

(i) Office Automation Systems

(ii) Transaction Processing Systems

(b) List and explain at least seven considerations for the input design. 10

7. (a) Explain the indexed-file organization method. List advantages and disadvantages in comparison with the sequential and random methods. 10

(b) Explain the following categories of project documentation : 5 + 5

(i) Operations documentation

(ii) User documentation.

8. (a) Explain various steps of the project review process. 10

(b) Discuss the design methodologies used in system design. 10

Group C

9. Answer the following in brief : 10 × 2

(i) Differentiate between static and dynamic system models.

(ii) What is meant by analyst/user interface?

(iii) What is a decision tree?

(iv) What is behavioural feasibility?

(v) What is the significance of data dictionary?

(vi) List characteristics of a good interface.

(vii) What is post-implementation?

(viii) What is tailored software?

(ix) Define module coupling.

(x) What is an activity network?

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Group A

1. (a) Explain different types of CASE tools used in different phases of software life cycle. 7
- (b) Compare the relative advantages of a decision tree with a decision table for representing decision making. 6
- (c) Represent the different decision making that takes place when a user withdraws money from a bank ATM. 7
2. (a) Discuss the main activities carried out during feasibility analysis. 6
- (b) Explain the different ways in which an analyst gathers requirements from the customer. 6

- (c) Draw a labelled DFD of a Library Automation System. 8
3. (a) Explain the conceptual data modeling with entity relationship model. 6
- (b) Discuss the methods of designing interfaces and dialogues. 7
- (c) How will you design databases for an application? Explain with any one example. 7
4. (a) Draw ERD for a student information system for a college. Explain the concept of cardinality through it. 8
- (b) Explain the terms (i) Waterfall model, (ii) incremental model, and (iii) spiral process model. 3 × 4

Group B

5. (a) What is meant by cohesion and coupling in design solution? What is the relation between cohesion and coupling in modular design? Explain it with an example. 10
- (b) What is meant by system testing? Explain different types of system testing. 10
6. (a) What are the security issues in a computer system? How does an organization prevent its database from security concerns? Illustrate with an example. 10
- (b) Give steps in a form design. Explain at least five common GUI controls for inputs. 10
7. (a) What is MIS? What are different components of MIS? Explain different categories of information required to serve the needs of different levels of management in an organization. 10

- (b) What is DSS? Explain applications of DSS? What is the difference between MIS and DSS? 10
8. (a) Explain the following types of testing: (i) Alpha and Beta testing, (ii) recovery testing, (iii) security testing, (iv) stress testing, and (v) acceptance testing. 5 × 2
- (b) What are the important differences between code review and code walkthrough? Give examples of bugs identified by these two techniques. Briefly discuss how code review and code walkthrough are carried out. 10

Group C

9. Answer the following: 10 × 2
- (i) Why is code review considered a more efficient testing for bug reduction as compared to testing?
- (ii) Mention two main advantages of incremental process model.
- (iii) What is the main difference between analysis and design?
- (iv) What are basic elements of data modelling?
- (v) What is meant by the principle of “information hiding”? What is an advantage of using this principle?
- (vi) List the important activities in user interface design process.
- (vii) What is a program module? What is an advantage of a modular design?
- (viii) What are major drawbacks of file system?

- (ix) What is reverse engineering ? Why is it required ?
- (x) If a project is estimated to require 100 person-month of effort, does it mean that it can be completed by employing 100 software engineers for one month ? Explain briefly.

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Group A

1. (a) (i) Briefly describe the Waterfall model of software life-cycle with the help of a suitable schematic diagram. 6
- (ii) Discuss about its advantages and disadvantages. 4
- (iii) Give an example project for which Waterfall model is suited and an example project for which it is not suited. 2
- (b) What is prototyping ? Briefly explain the benefits of prototyping in software development. 8
2. (a) Distinguish between technical and economical feasibility studies. 6

(b) Assume that you are given the following details of a small mail order catalogue system that allows people to shop from home :

When a customer receives the catalogue and wants to buy something, he can telephone, fax or email his order to the company. The company gets the order and sends the goods and an invoice. When the customer receives the goods with a delivery note, he sends payment and receives a receipt for payment. Draw the context diagram and data flow diagrams up to level 2 to analyze the requirements of this system. Also, give the data dictionary. 14

3. (a) A university maintains data about the following entities with attributes :

- (i) **Course** Number, title, credits, syllabus and prerequisites
- (ii) **Course offered** Course number, year, semester, instructor, timings and classroom
- (iii) **Student** Student-id, name and degree program
- (iv) **Instructor** Identification number, name, department and title

The enrollment of students in courses and grades awarded to students in each course must be appropriately recorded. Construct an E-R diagram for the university using standard notation. 12

(b) List and illustrate the primary uses and elements of a decision table. 8

4. (a) Illustrate the concepts of logical and physical design with a suitable example. 10

(b) Develop architecture for a software system to be installed in the Automatic Teller Machine (ATM) of nationalized banks. Give justification for your selection. 10

Group B

5. (a) Explain different types of coupling and cohesion and discuss how these two factors influence functional independence. 12

(b) Differentiate system simulation from system implementation with respect to objectives and methodology. 8

6. (a) How is a structured walkthrough conducted ? Provide a set of at least four guidelines for conducting such an event. 8

(b) Illustrate the following testing strategies : 3 x 4

- (i) Unit testing
- (ii) Integration testing
- (iii) System testing

7. (a) What are the goals of input/output design ? 6

(b) What are the characteristics of data entry ? Briefly explain how data entry requirements influence forms design. 8

(c) List three heuristic rules for good dialogue design. 6

8. (a) Describe the sequential and indexed sequential organizations and comment on their applicability in file design. 10

(b) Write short notes on the following :

- (i) Threats to system security
- (ii) Flow of data in Management Information Systems.

5 + 5

Group C

9. Answer the following in brief : 10 × 2
- (i) Under what circumstances can an analyst terminate a project ?
 - (ii) Suggest any two methods to overcome the difficulties in gathering accurate requirements from users.
 - (iii) What is a weak entity ? Give an example.
 - (iv) What is the difference between a flow chart and a data flow diagram ?
 - (v) Are there any limitations in structured program coding ? Give reasons for your answer.
 - (vi) Differentiate verification from validation.
 - (vii) What are the major advantages of database ?
 - (viii) Why do we need forms control ?
 - (ix) What are the major types of decisions made using a Management Information Systems ?
 - (x) List the limitations of password as a security mechanism.

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