2020

COMPUTER SCIENCE — HONOURS

Sixth Paper

Full Marks : 100

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.* 1** and ***any four*** questions, taking at least ***one*** from ***each Group***.

1. Answer ***any five*** questions : 4×5

(a) State the importance of inline functions in C++.

(b) Explain class in C++ with an example.

(c) State the use of 'virtual' keyword in C++.

(d) Differentiate procedural and object oriented programming.

(e) What is meant by system testing?

(f) State the disadvantages of waterfall model.

(g) Distinguish between a data flow diagram (DFD) and a flow chart.

(h) Differentiate window and view port.

(i) State the importance of inverse transformation.

(j) Define bitmap and pixmap.

(k) Name only the design steps of animation sequence.

(l) What do you understand by data redundancy and inconsistency?

(m) Distinguish physical level and logical level data abstraction.

(n) What is weak entity set? Give an example.

(o) Distinguish procedural DML and non-procedural DML.

(p) Define instances and schema.

Group - A

2. (a) State the uses of friend function in C++. Mention some of its characteristics.

(b) How is polymorphism achieved in (i) compile time and (ii) run time? (5+5)+(5+5)

3. (a) What do you mean by data encapsulation?

(b) Explain different types of inheritance.

(c) Discuss with a suitable example about the template class in C++. 5+6+9

4. (a) Discuss different phases of iterative waterfall model.

(b) Compare the relative advantages of using the iterative waterfall model and the spiral model of software development. 12+8

5. (a) What are the main shortcomings of Data Flow Diagram (DFD) as a tool for performing structured analysis?

(b) Distinguish between software verification and software validation. When during the software life cycle, are verification and validation performed? Can one be used in place of the other? — Justify. 8+(6+6)

Group - B

6. (a) Consider an object ABC with coordinates A (1, 1), B (10, 1) and C (5, 5). Rotate the object by 90° in counter clockwise direction about the point A. Give coordinates of transformed object.

(b) Apply Bresenham's line drawing algorithm to draw a line from (4, 4) to (– 3, 0). 10+10

7. (a) Derive the Mid point Circle drawing algorithm.

(b) Apply the Cohen Sutherland line clipping algorithm to clip the line segment with coordinates P (30, 60) and Q (60, 25) against the window with diagonals (10, 10) and (50, 50). 10+10

8. (a) Discuss the following terms with suitable examples.

(i) Simple and composite attributes

(ii) Single-valued and multi-valued attributes

(iii) Null attributes and derived attributes.

(b) Define the concept of aggregration. Give an example where this concept is useful. (4+4+4)+8

9. (a) Explain Natural Join and Theta Join with suitable examples.

(b) Consider the following relational schema.

Employee (*empno*, name, office, age)

Books (*isbn*, title, authors, publisher)

Loan (*empno*, *isbn*, date).

Write the following queries in SQL.

(i) Find the names of employees who have borrowed a book published by McGraw-Hill.

(ii) Find the names of employees who have borrowed more than five different books published by McGraw-Hill.

(iii) List the names of employees who borrowed the books published by Pearson on 15/3/2020. (4+4)+(4+4+4)

10. (a) Illustrate with suitable example how insertion and deletion are done in hashed file organization.

(b) Define loss-less-join decomposition and dependency-preserving-decomposition. 10+(5+5)

11. (a) What are the basic concepts of functional dependencies?

(b) Compute the closure of the following set F of functional dependencies for relational schema R = (A, B, C, D, E)

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

List the candidate keys for R. 8+12