2021

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 five*** from the rest taking at least ***one*** from each **Group**.

1. Answer ***any ten*** questions : 2×10

(a) What is an abstract base class?

(b) What is an exception?

(c) Differentiate between interlaced and non-interlaced raster scanning methods.

(d) What are the roles of animation in computer graphics?

(e) What are the properties of constant member functions in C++?

(f) What do you mean by V model in SDLC?

(g) Differentiate between cohesion and coupling.

(h) Illustrate full functional dependency with a suitable example.

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

(j) What is the difference between function oriented and object oriented design?

(k) When is the concept of friend class used in C++?

(l) What do you mean by balancing a DFD?

(m) When are two transformations said to be commutative?

(n) Differentiate between procedural and non-procedural query language.

(o) Give the syntax of defining a static member data in C++.

Group - A

2. (a) What is containership in C++ ? How is it different from inheritance?

(b) Write a program in C++ to create a class 'Shape' with a virtual function area(). Derive two classes 'Rectangle' and 'Circle' and implement function area() in it.

(c) What is the difference between private, public and protected access specifiers ? (3+2)+7+4

3. (a) What is an inline function?

(b) Give two uses of scope resolution operator.

(c) Write briefly about the different visibility modes used inheritance in C++.

(d) What ambiguity is faced in inheritance and how can it be resolved? Illustrate with an example. 2+2+6+6

Group-B

4. (a) Differentiate between structure chart and flow chart.

(b) What are the characteristics of a good software design ?

(c) Describe three different activities that can be performed during the maintenance phase of software lifecycle.

(d) What is a context diagram? 4+4+6+2

5. (a) What is the importance of data dictionary ?

(b) Write briefly about different types of cohesion that can be followed in software designing.

(c) Discuss about black box testing.

(d) Why do we need feasibility study in software engineering? 2+6+6+2

Group - C

6. (a) Apply Bresenham's algorithm to draw a line from (4, 4) to (–3, 0).

(b) Differentiate between parallel and perspective projection.

(c) When is 'flicker' visible? How can it be removed?

(d) Write a short note on 3D-shearing. 6+3+3+4

7. (a) Write a short note on Bezier curve.

(b) Explain the working principle of Midpoint circle algorithm.

(c) Consider the rectangle defined by (100, 10), (160, 10),(160, 40),(100, 40). Discuss clipping situation of straight line PQ using Cohen-Sutherland line clipping algorithm where P(50, 0) and Q(70, 80). 4+6+6

Group - D

8. (a) Discuss the three schema architecture for database systems.

(b) Explain the process of translating the ER model into Relational model for one to many and many to many relationships.

(c) What is a recursive relationship? Give a suitable example.

(d) What is meant by data independence? Write about the two ways in which data independence can be achieved. 4+4+3+5

9. (a) Explain full outer join and left outer join with suitable examples.

(b) Differentiate between sparse index and dense index.

(c) Discuss the 'insertion anomalies', and 'deletion anomalies' with respect to normal forms with suitable examples.

(d) What is lossless decomposition? 5+3+6+2

10. (a) For the following schema of the relational database:

employee(ename, street, city)

works(ename, company_name, salary)

company(company_name, city)

manages(ename, manager_name)

Give an expression in sql for each of the queries given below :

(i) Find all employees who live in the same city and on the same street as their managers.

(ii) Find all employees in the database who do not work for SBI.

(iii) Find all employees who earn more than every employee of PNB.

(b) A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose any sport. (3×3)+7

11. (a) Suppose schema R = (A, B, C, D, E) with F = (A $\rightarrow$ BC, CD $\rightarrow$ E, B $\rightarrow$ D, E $\rightarrow$ A) is decomposed into (A, B, C) and (A, D, E). Show that this decomposition is lossless-join decomposition.

(b) Compute the closure for relation r {I, m, n, o, p} with functional dependency set F as given below :

F = {|->mn; no -> p; m -> o; p ->|}

Identify the candidate key for the relation (r).

(c) State some advantages and disadvantages of Normalization. 5+6+5
