WEST BENGAL STATE UNIVERSITY

B.Sc. Honours Part-III Examination, 2019

COMPUTER SCIENCE

PAPER-CMSA-VI

Time Allotted: 4 Hours   Full Marks: 100

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Answer Question. No. 1 and any 5 from rest taking at least *one* from each group

1.   Answer any *ten* questions from the following: 2×10 = 20

  (a) What is a reference variable in C++ ?

  (b) Give one example each of a multi-valued attribute and a derived attribute.

  (c) What is virtual base class?

  (d) What is a template class? Why is it used?

  (e) Differentiate between spiral model and waterfall model.

  (f) Define software quality.

  (g) Differentiate viewport and window.

  (h) Differentiate raster and vector graphics.

  (i) What is transformation and scaling?

  (j) Define cyclomatic complexity.

  (k) What is determinant of a functional dependency?

  (l) When is a relation said to be in 2NF?

  (m) What is acceptance testing?

  (n) What is copy constructor?

GROUP-A

2. (a) What is a pure virtual function? What are its merits and demerits in context to inheritance?   2+(2+2)+6+4

  (b) Describe the virtual base class problem with a block diagram.

  (c) Describe the role of virtual functions for the base class person and two derived classes student and teacher with proper code.

3. (a) Write down the operators that cannot be overloaded in C++. 2

   (b) For the class "Distance" write and explain the function signature of the overloaded operator "<<" such that cascading is possible. 2+2

   (c) Explain runtime and compile time polymorphism with proper example. 3+3

   (d) In case of copy constructor the argument should be a reference variable. Justify. 4

GROUP-B

4. (a) Describe and illustrate spiral model for developing a software. 6

   (b) Draw a DFD for result preparation system of the qualifying test examination of a college. Describe the working of the system. Mention all assumptions, made by you. What is the difference between logical DFD and physical DFD? 8+2

5. (a) Define Error, Fault and Failure. 3

   (b) What is control flow graph? Draw the control flow graph of the following code for gcd computation. 4

```
int gcd (int x, int y) {
    while (x! = y) {
        if (x > y) then
            x = x − y;
        else y = y − x;
    }
    return x;
}
```

   (c) Explain the roles of module drivers and stubs in integration testing. 4

   (d) What are Equivalence class partitioning and Boundary-value analysis? 4

   (e) What do you mean by Software Reverse Engineering? 1

GROUP-C
(GRAPHICS)

6. (a) Write and explain Mid Point Circle Drawing Algorithm. 4

   (b) Solve for points on the circle circumference using Mid Point Circle Drawing Algorithm where Radius = 10 cm and center of the circle is at coordinate (0, 0). 8

   (c) Write the DDA Line Drawing Algorithm. 4

7. (a) Perform a 45° rotation of triangle A(0, 0), B(1, 1), C(5, 2) 5
      (i) about the origin
      (ii) about a point P(−1, −1)
      Find the final coordinates.

   (b) What is the blackening effect of CRT? How it is resolved? 4+3

(c) What is pixel? What is Raster Scan display? 2+2

GROUP-D

8. (a) What is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type, and partial key with a suitable example. 2+6

   (b) Let the following relation schemas be given: 8

$$R = (A, B, C) \quad S = (D, E, F)$$

   Let relations $r(R)$ and $s(S)$ be given, give an expression in the tuple relational calculus that is equivalent to each of the following:

   (i) $\pi_A(r)$ (ii) $6_{E = 17}(r)$ (iii) $r \times s$ (iv) $\pi_{A, F}[6_{C = D}(r \times s)]$

9. (a) Explain the terms physical and logical data independence. 5

   (b) Differentiate between dense and sparse indexing. 2

   (c) Explain BCNF with example. 3

   (d) State the functions of a DBA. Compare the features of traditional file system with database system. 3+3

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