2021

COMPUTER SCIENCE

[HONOURS]

Paper : VI

Full Marks : 100   Time : 4 Hours

The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in
their own words as far as practicable note the
question number before answering.

Answer **question no. 1** and any **five** from the rest,
taking at least **one** from each Group.

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

    a) Differentiate between random scan and raster scan displays.

    b) What is context diagram? Give its utility.

    c) What are the functions of focusing anode and deflection plates in a cathode ray tube?

    d) What is distributed DBMS?

    e) Obtain the new coordinates of a point P(4, −8) after a rotation counter clockwise through an angle 90° about the origin.

    f) What is scan code?

    g) What is an SRS?

    h) What is resolution?

    i) State two metrics popularly used in estimating project size.

    j) What is the benefit of prototyping?

    k) Define cardinality and degree of a relation.

    l) What do you mean by loss less compression?

    m) What is referential integrity constraint?

    n) What is Relational Algebra?

    o) What are super key and candidate key?

GROUP–A

2. a) Explain the prototyping model of software development. What are the shortcomings of the classical waterfall model?

    b) "The primary characteristics of a neat module decomposition are high cohesion and low coupling." What do the terms cohesion and coupling mean? Describe the different types of coupling briefly.   (6+2)+(2+6)=16

3. a) What do you mean by SRS? Discuss the basic components of SRS.

   b) Draw the schematic diagram of a spiral model of software development and also discuss the activities carried out during each phase of the model.

   c) Mention the activities carried out in software configuration management.   6+6+4=16

GROUP–B

4. a) What is the advantage of Bresenham's line drawing algorithm over DDA algorithm? Determine the intermediate points of the line segment having end points (20, 10) and (30, 18) using Bresenham's line drawing algorithm.

   b) Consider a rectangular window whose lower left-hand corner is at (–3, 1) and upper right-hand corner is at (2, 6). Use the Cohen-Sutherland line clipping algorithm to clip the line segment whose end points are A (–l, 5) and B (3, 8).   (2+6)+8=16

5. a) What is the role of a video controller?

b) Prove that 2D rotation and scaling is commutative i.e. R.S = S.R if

   i) Sx = Sy

   ii) $\theta = n\pi$

c) A unit square is transformed by 2×2 transformation matrix. The resulting position vector are: $\begin{pmatrix} 0 & 2 & 8 & 6 \\ 0 & 3 & 4 & 1 \end{pmatrix}$. What is the transformation matrix?   2+6+8=16

GROUP–C

6. a) Describe the advantages of DBMS over file processing. What are the disadvantages of DBMS?

   b) Why Armstrong's axioms are said sound and complete?

   c) Explain the difference between database schema and database state with an example.   7+4+5=16

7. a) Describe specialization with suitable example.

   b) Explain the ACID properties of transactions.

   c) What is multiple relationship? State Armstrong's axioms.   4+6+6=16

GROUP–D

8. a) A database is being constructed to keep track of the teams and games of a sports league (football). A team has number of players, not all of the whom participate in each game. It is desired to keep track of players participating in each game for each team, the position they played in that game and result of the game. Design an ER diagram for this application, stating any assumption you make.

   b) What is subclass? When is subclass needed in data modeling?

   c) Explain the process of converting relationships of ER diagram into relations.   7+4+5=16

9. a) What is the difference between Physical Data Independence and Logical Data Independence?

   b) Explain different types of cardinality ratio in ER diagram.

   c) i) What is functional dependency? Give its utility.

      ii) Draw the E-R diagram of a hospital where a patient is treated by doctors and care taken by the nurse as instructed by the doctors. Patient may undergo some medical test as prescribed by the doctor.
        3+3+(3+7)=16

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