Oct 08

SYBSc (Computer Science)
Discrete Mathematics
& Computer graphics.

2nd-f-12-Dec-Nk-07 -200

**Con. 180-08.**

**SS-7556**

( 2 Hours) **[ Total Marks : 60**

**Section I**

**N.B.** (1) Attempt any **two** questions from **each** Question Nos. **1** to **4**.
(2) **Figures** to the **right** indicate marks.

1. (a) Determine the number of integers between 1 and 250 that are divisible by any integers 2, 3, 5 and 7 respectively. **5**
   (b) How many distinguishable permutations of the letters in the word BANANA are possible ? **4**
   (c) Construct the truth table for— **6**
   (i) $( p \leftrightarrow q) \leftrightarrow ( q \rightarrow p)$
   (ii) $( ( \sim p) \wedge q) \vee (p \wedge ( \sim q ))$
   (iii) $[ ( p \vee q) \wedge (\sim q) ] \wedge ( \sim q)$

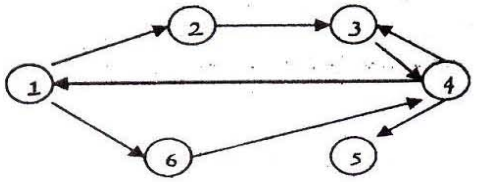
2. (a) Using set A = { a, b, c, d, e} , B = {a, b, e, g, h} C = { b, d, e, g, h, k, m, n } verify **6**

   $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

   and explain conclusion.
   (b) A computer company wants to hire 40 programmers to handle system programming jobs and 40 programmers for application programming. Of those hired, twenty will be expected to perform jobs of both the types. How many programmers must be hired ? **4**
   (c) If a and b are two positive integers then prove that— **5**

   G.C.D. (a, b) X L. C. M.(a, b) = (a × b)

3. (a) Let R be the relation whose diagraph is given below : **5**




   (i) List all the paths of length 1
   (ii) List all the path of length 3 starting from vertex 3
   (iii) List all paths of length 3.

   (b) State and prove extended pigeonhole principle and hence show that if 30 dictionaries in a library contain a total of 61,327 pages then one of the dictionaries must have at least 2045 pages. **6**
   (c) Construct Truth Table for statement $(P \Rightarrow Q) \Leftrightarrow ( \sim Q \Rightarrow \sim P)$ and show that it is a tautology. **4**

4. (a) Define Graph. **2**
   (b) Construct the truth table for **6**
   (i) $( p \leftrightarrow q) \leftrightarrow ( q \rightarrow p)$
   (ii) $( ( \sim q) \wedge p) \vee ( p \wedge ( \sim q) )$
   (iii) $[ (p \vee q) \wedge ( \sim q) ] \wedge ( \sim p )$
   (c) Prove by mathematical induction that if $A_1, A_2 \ldots\ldots A_n$ and B are n sets then **7**

   $( \cap A_i) \cup B = \cap ( A_i \cup B)$

**Section II**

**N.B.** (1) Attempt any **two** questions from **each** Question Nos. **5** to **7**.
(2) **Numbers** to the **right** indicate marks.

5. (a) Explain advantages of Bresenham line drawing algorithm over DDA line drawing algorithm. **5**
   (b) What are the different attributes of text ? **5**
   (c) Explain boundary filling algorithm. **5**

6. (a) Properties of Bezier Curves. **5**
   (b) Explain different approaches available for drawing circles. **5**
   (c) Specify 2D Transformation matrix for following operations (any **two**) :– **5**

   1. Translation 2. Reflection about X axis and Y axis 3. Scaling.

7. (a) Explain Window to View port transformation. **5**
   (b) What are the different applications of Computer Graphics. **5**
   (c) Explain Cohen-Sutherland line clipping algorithm. **5**

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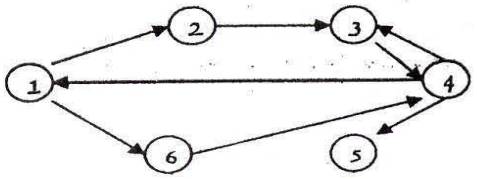


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(c) Explain boundary filling algorithm. **5**

8. Attempt any **two** :—
(a) How binary Tree data structure can be represented ? **5**
(b) Write functions in c/c++ for Inorder and Postorder Traversal of tree. **5**
**Note** : Use tree structure defined in Q. No. 2 (a) for code.
(c) Write short note on Hashing. **5**

9. (a) Define Graph. Explain various types of graph with diagram. **3**
**OR**
(a) Write short note on sparse matrix. **3**
(b) Write a programme in c/c++ to create single linked list, display elements in single linked list. Write separate functions to create, display elements in single linked list. **7**