16. A 5 digit positive integer is entered through the keyboard, write a function to calculate sum of the digits of the 5 digit number : (i) without using recursion (ii) using recursion.

17. Describe different storage classes in 'C'.

18. Write a program to compute the product of two 3 × 3 matrices.

19. 25 numbers are entered from the keyboard into an array. Write a program to find out how many of them are positive, how many are negative, how many are even and how many odd.

20. Write a program to obtain the determinant value of a 5×5 matrix.

2016

Time : 4 hours

Full Marks : 100

The questions are of equal value.

*Answer any **five** questions from each Group.*

Group – A

(Graph Theory)

(Full Marks – 50)

1. Define the following :
   (a) Open path and Closed path
   (b) Connected Graph
   (c) Euler Path

2. Define Isomorphism of Graphs. Give properties of isomorphism. How do you determine when graphs are not isomorphic ?

3. Prove that a tree with n-vertices has exactly n-1 edges.

4. Define Hamiltonian Graphs. Discuss some basic rules for constructing Hamiltonian paths and cycles.

5. In a connected plane graph (simple) G, with $|E| > 1$, prove that :
   (a) $|E| \leq 3|V| - 6$.
   (b) There is a vertex v in G such that degree $(v) \leq 5$.

6. Show that the wheel graph W_n on n vertices is isomorphic to its dual.

7. Prove that every simple planar graph is 5-colorable.

8. Show that a simple connected planar graph with 17 edges and 10 vertices cannot be colored with 2 colors.

9. Let S and D be the source and sink, respectively, of a network (G, K). Let F be a flow in G. The n prove that the flowout of S = F(S, V(G)) = F (V(G), D) = the flow into D.

10. If K(e) = 1 for each edge e in (G, K), give another description of the value of a flow and of a maximal flow.

Group – B

(Programming in C)

Full Mark – 50

11. (a) Convert the equation $X = \frac{-b + (b * b) + 2 - 4ac}{2a}$ into corresponding C statement.
    (b) Write a program to calculate the sum of the first and last digit of a four digit number.

12. Discuss how the decision control instructions are implemented in C.

13. Explain, with examples, the use of "go to" statements.

14. (a) Write a program to generate all combinations of 1, 2 and 3 using for loop.
    (b) Write a program to find the value of one number raised to the power of another.

15. Write a C-function to determine whether a year entered through the keyboard is a leap year or not.