

[Time:2.30 Hrs]

[Marks:75]

Please check whether you have got the right question paper.

N.B:

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1 Attempt any four of the following:

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- A In how many ways a committee consisting of 4 men and 2 women, can be chosen from 7 men and 8 women?
- B Find the number of positive divisors of 360.
- C Find the number of integers between 1 and 50(both Inclusive) which are divisible by 2.
- D In how many ways can the letters of the word "DELHI" be arranged so that all the vowels come together?
- E Find the greatest common divisor of 13 and 48.
- F Show that $1 + 3 + 5 + \dots + (2n-1) = n^2$.

Q.2 Attempt any four of the following:

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- A Define the following terms: Graph, Vertices, Edges and Edge-sets. Give an example.
- B Define complete graph. Draw a complete graph with at most 5 vertices.
- C Give an example of isomorphic graphs.
- D Draw a connected graph of 4 vertices and also write its vertices, edges, and edge-sets.
- E Prove that A graph G is eulerian if and only if it is connected and every vertex has even degree.
- F Explain a bipartite graph with a suitable example.

Q.3 Attempt any four of the following:

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- A Define the following terms: Network, Source, Sink, Capacity.
- B Explain What Happens When the Sink is labelled?
- C Explain integer solution of a linear programming problem.
- D Give a concrete example with a suitable graph.
- E Explain Polya's enumeration theorem.
- F Explain Chain Partitioning with a suitable example.

Q.4

Attempt any three of the following:

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- A Give simple examples of typical combinatorial optimization problems.
- B There are 2 vegetarian options and 5 meat options on a dinner menu. What is the total number of options available for dinner?
- C Prove that: $R(1, n) = 1$
- D Find the number of different permutations for the letters in the word "Mississippi".
- E Explain matching in bipartite graph with a suitable example.
- F Explain Ford-Fulkerson Labelling Algorithm.