



Department of Mathematics, SOPS, Doon University, Dehradun
Mid-Semester Examination March 2018
Integrated M.Sc. (Mathematics) IV (Fourth Semester)
Course Title & Course Code: Graph Theory, MAS-251

Time Allowed: 2 Hours

Maximum Marks: 30

Note: Attempt All Questions from Sections A & B. Attempt any four from Section C.

Section A

Q.1. Answer in brief (20-40 words):

(0.6 mark each)

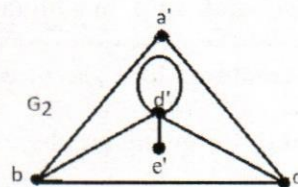
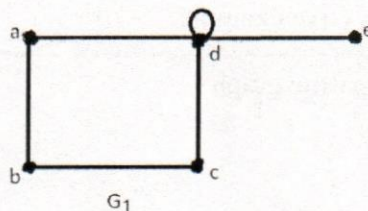
- (i) Define null graph.
- (ii) Each vertex is connected to how many of the other vertices in a complete graph?
- (iii) What is the maximum number of edges in a bipartite graph having 10 vertices? How?
- (iv) A graph with all vertices having equal degree is known as which graph? Give example.
- (v) Define 'cycle'. Give example.
- (vi) How many triangles can a bipartite graph may contain? Why.
- (vii) Define spanning subgraph.
- (viii) Define 'graph isomorphism'.
- (ix) What are self complementary graphs.
- (x) Define 'union' and 'intersection' of graphs.

Section B

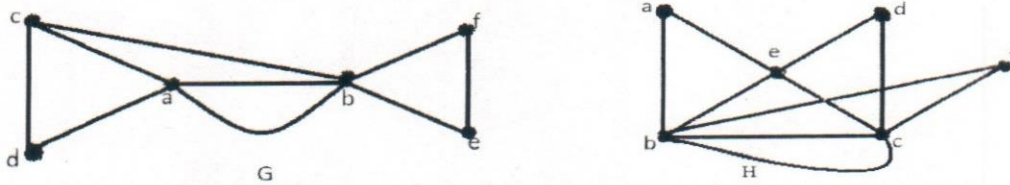
(2 marks each)

Q.1. There are 25 telephones in a region. Is it possible to connect them with wires so that each telephone is connected with exactly 7 others? How or why?

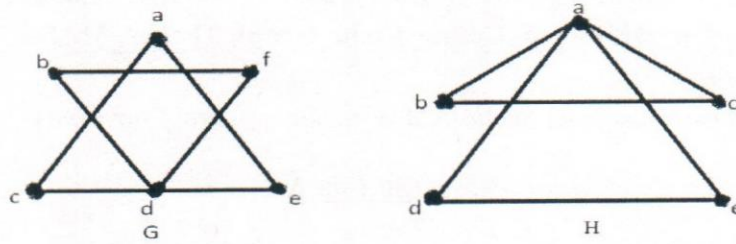
Q.2. Show that the following graphs are isomorphic:



- Q.3. (i) Find the edge deleted sub graph $G - \{(a, b)\}$ of the following graph G:
(ii) Find the vertex deleted sub graph $H - c$ of the following graph H:



Q.4. Find the spanning sub graph of the given graph G. Is H a spanning subgraph of G?

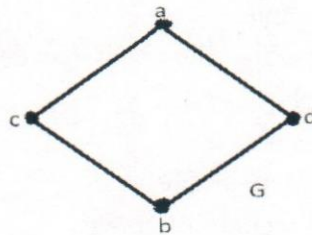


Q.5. Draw all graphs with five vertices and five edges.

Section C

(3.5 marks each)

Q.1. (i) Find the graph G' formed by of fusion of the vertices 'c' and 'd' of following graph G.



(ii) What is the condition for a graph to be self-complementary? Derive the general formula for the number of edges.

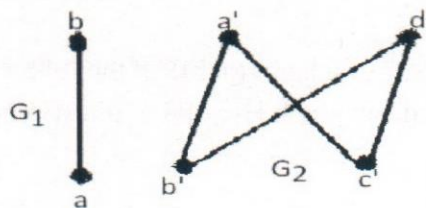
Q.2. (i) Define platonic graph. Give example of cube. Also, draw it as bipartite graph.

(ii) How many vertices does Q_n have. Give example of Q_3 .

Q.3. (i) Define 'source' and 'sink' in a digraph. Give example.

(ii) What is the condition for C_n to be a bipartite graph?

Q.4. Find the product of following graphs:



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Q.5. Find the ring sum of following graphs:

