Assignment

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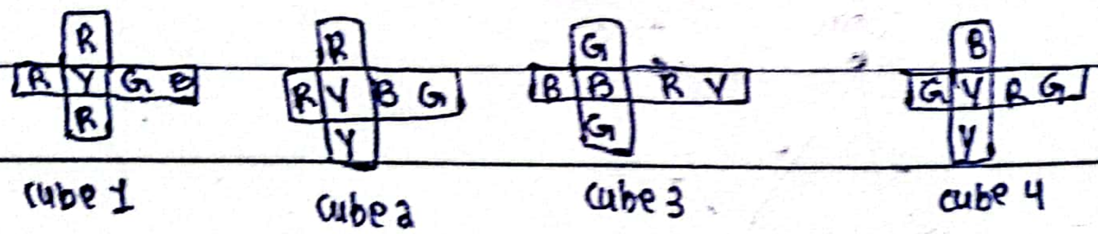
Case 2.5.

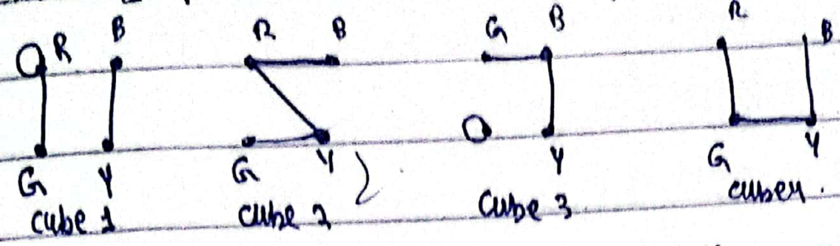
we conclude this chapter with case-studies the four cubes Problems & Social network.

Four cubes Problems.

An intringuing recreational puzzle, which has been marketed under the name of Instant Insauity. four cubes whoes face are coloured red, blue, green & Yellow.



if one face of the cube appears on one side of the stack, then the opposite Site face of the cube must appear on opposite side of the stack. In the corresponding graph the graph for the above set of cubes are.



a) each subgraph contains exactly one edge from the graph of each cube.

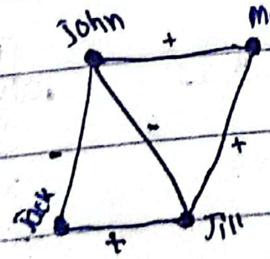
b) The subgraph have no edges in common.

c) each vertex is incident with two edges.

Social Networks.

Graph have been used extensively in the social series to represent Interper- social relationships. we can analyse the possible tension in such situations by using the concept of a signed graph.

Therefore not joined by an edge.



The definition resembles that of a bipartite graph. Indicated by the following diagram

Balanced signed Graph

bipartite Graph.

In a bipartite graph, every cycle has an even number of edges.

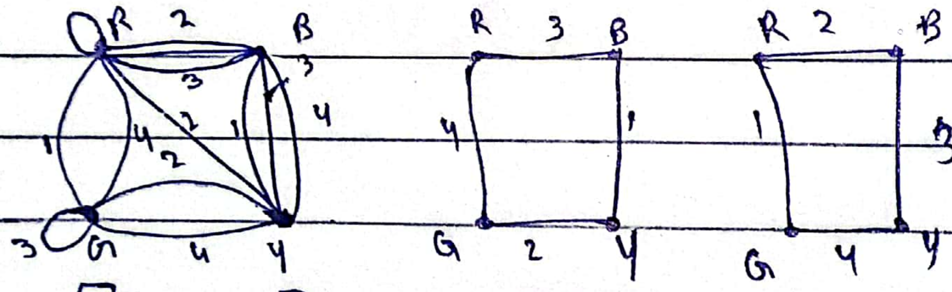
For balanced signed graph the corresponding result is

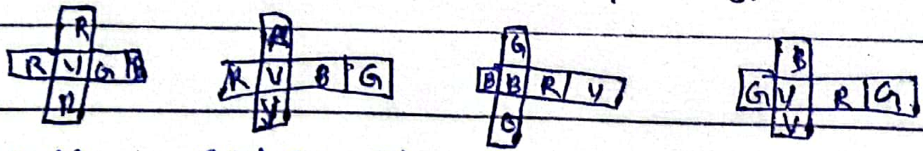
In a balance signed graph, every cycle has an even number of negative edges.

Case-Studies.

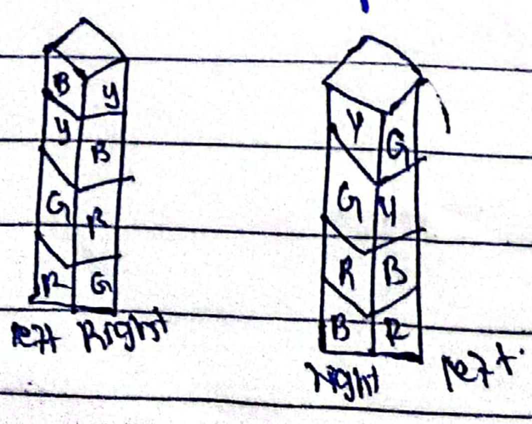
Cubes problems.

Show the subgraph H_1 & H_2 and find the solution to the four-cubes problems for the following set of cubes.





Solution. subgraph.

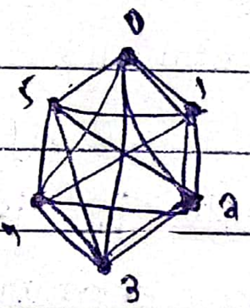


Case-studies 3.4.

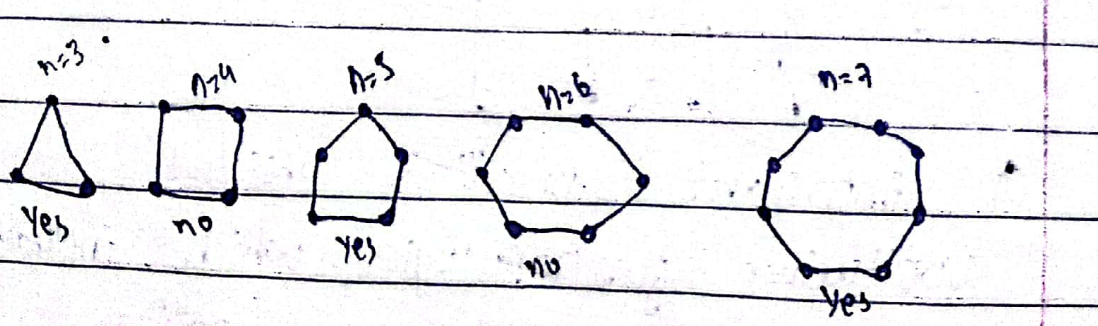
we conclude this chapter with four case studies: dominoes, diagram-tracing puzzles, the knight's tour problems and Gray codes.

Dominoes.

An unusual application of Eulerian graph is to the game of dominoes. Complete graph K_7 which is Eulerian since each vertex has degree 6.



Such problems are equivalent to determine the minimum number open trails with no edges in common that makeup corresponding graph.



Knight's Tour problem:

A knight always moves two squares in horizontal or vertical direction and one square in a perpendicular direction

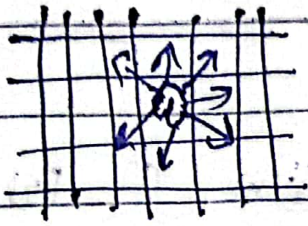
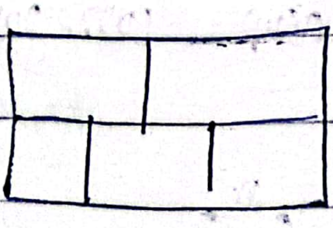


Diagram-Tracing Puzzles.

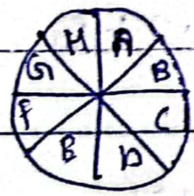
A common type of recreational puzzle is that of drawing a given diagram with as few continuous pen-strokes as possible, without covering any part of few. For example it is easy to draw the following diagram with four continuous strokes, but can it be done with three



an important treatise entitled Vorstudien zur Topulogie, which included a discussion of diagram-tracing puzzles.

Gray Codes.

Engineers sometimes wish to represent the angular position of a shaft that is rotating continuously. The shaft rotates into a 3-digit binary word as follows:



As the shaft rotates "the binary word changes by only one digit at a time as we progress from each word to the next in the sequence."

A sequence of binary words with this property is called Gray code.

Advantage:

A code is that it minimizes ambiguities that might be caused by misalignments of the brushes that read that tracks.

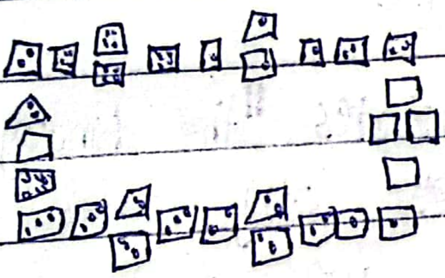
000 → 001 → 011 → 010 → 110 → 111 → 101 → 100

Case studies.

Dominoes-

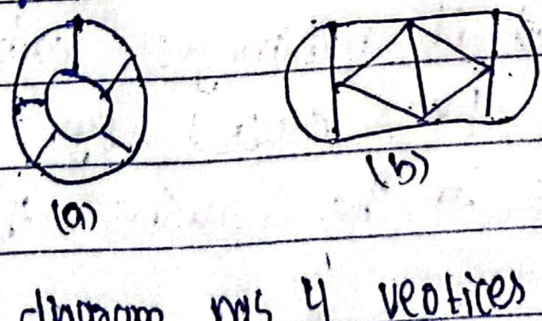
38. Finding domines in a Ring.

There are many possibilities.
if we take trail 0123402 4130
and add the double in a suit
able way we obtain following
ring.



39. Diagram - Tracing puzzle.

How many continuous pen-stokes are need to draw the following diagram.



(a) The diagram has 4 veotices of odd degree so at least two continuous pen-stock are required in fact two are sufficient

16) The diagram has 6 vertices has odd degree at least 3 Continuous pen-stocke are required.

3.10 Knight's Tour Problem:

Show that there is no ~~3x6~~ Knight's tour on a ~~3x6~~ 3x6.

3x6

The graph with many chessboard is bipartite, since a knight's move always takes a knight to a squar of different colour. We can take A to set of black and B to be set of white square. The results now follows immediately from the fact that a bipartite graph with an odd number of vertices.

3.11 Gray code:

write dow a Gray code with 5-digits binary words.

We ~~d~~ find another Hamiltonian

cycle in the 5-cube.

One possibility is

00000 → 01000 → 11000 → 11111 → 00111 →
→ 00001 → 11001 → 01010 → 01111 → 01100
→ 00100 → 10101 → 10000 (→ 00000)