Assignment #02

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Subject :
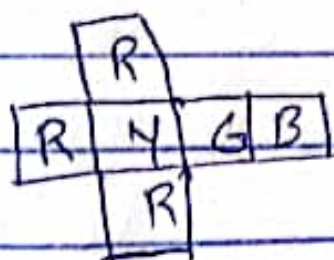
Graph Theory

Department :
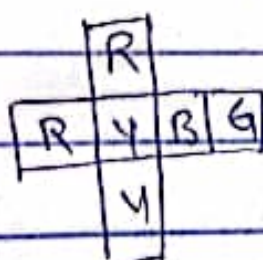
Mathematics

Ch#02

Case Studies:

We conclude this chapter with Two case studies - The four cubes problem and Social network

Four Cubes Problem:

An intriguing recreational puzzle, which has been marked under the game of instant insanity, concerns four cubes whose faces are coloured red, blue, green and yellow. These cubes are depicted in flattened-out form below.

```
    ┌─┐              ┌─┐              ┌─┐
    │R│              │R│              │G│
┌─┬─┼─┼─┬─┐      ┌─┬─┼─┼─┬─┐      ┌─┼─┼─┬─┐
│R│Y│G│B│        │R│Y│B│G│        │B│B│R│Y│
└─┼─┼─┴─┘        └─┼─┼─┴─┘        └─┼─┼─┴─┘
  │R│                │Y│              │G│
  └─┘                └─┘              └─┘
   ↓                  ↓                ↓
 cube-I             cube-2           cube-3
```

```
      ┌─┐
      │B│
  ┌─┬─┼─┼─┬─┐
  │G│Y│R│G│
  └─┼─┼─┴─┘
    │Y│
    └─┘
     ↓
   cube-4
```

Social Network:

Graphs have been used extensively in the social sciences to represent interpersonal relationships. The vertices correspond to individuals in a group or society, and the edges join pairs of individuals that are related in some way.

For example, x is joined to y if x likes, hates, agrees with, avoids, or communicates with y.

Such representations have been extended to relationships b/w groups of individuals, and have proved useful in a number of contexts raging from kinship relationships in certain primitive tribes to relationships b/w political parties.

Graphs have also used by political scientists to study international relations,
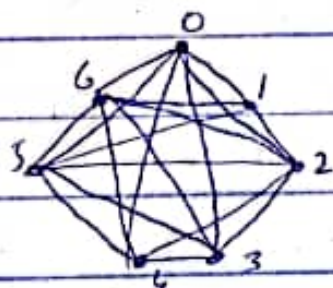
~~whole~~

example
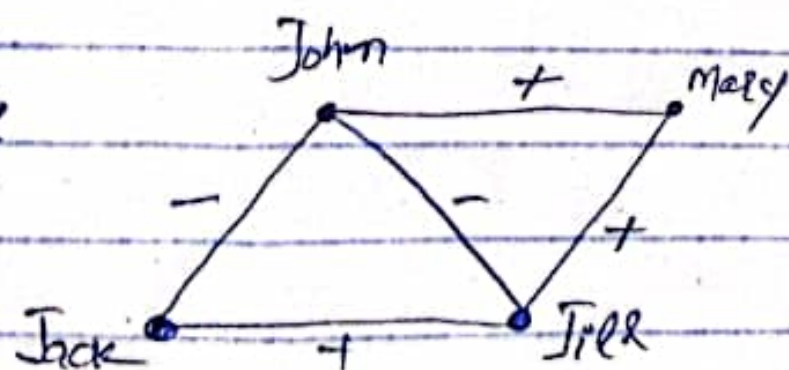
Case Studies:

We conclude this chapter with Four case studies. dominoes, diagram-tracing puzzles, the Knight's Tour problem and Gray Codes.

Dominoes:

An unsual application of Eulerian graphs is to the game of dominoes. We use the complete graph K_7 which is Eulerian since each vertex has deg 6.

Let us label the vertices $0, 1, 2, 3, 4, 5, 6$ consectively. Then an Eulerian trail is obtain by tracing the edges in the following order.
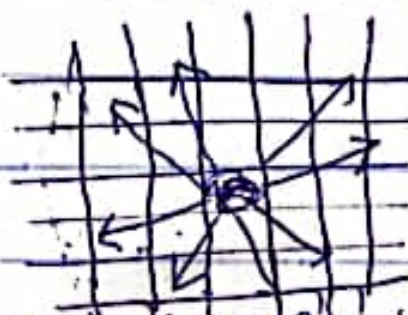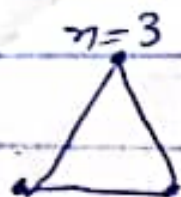
$01, 12, 23, 34, 45, 56, 60, 02, 24, 46,$
$61, 13, 35, 50, 03, 36, 62, 25, 51, 14, 40$

Diagram-Tracing Puzzles.

A common type of recreational puzzle is that drawing a given diagram with as few Continous

pen-stokes as possible, without covering any part of the diagram twice.

Konigsborg bridges problem, shown That diagrams $n = 3$

$n = 3$

v => Knight's Tour Problem

on a chess board a knight always moves Two squares in haizontal

Gray Codes:

Engineers sometimes wish to represent the angular position of a shaft that is rotating continously. An arrangment of brushes on a commutator is used to read certain tracks inscribed on the shaft and convert the angle through which shaft rotates into 3-digit binary word.

angle segment	A	B	C	D	E	F	G	H
binary word	000	001	011	010	110	111	101	100