

5078

B.Tech. Examination, 2017

(Sixth Semester)

(I.T.)

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Paper - VI

GRAPH THEORY

Time Allowed : Three Hours

Maximum Marks : 50

Note : Attempt any five questions. All questions carry
equal marks.

Q.1. (a) Define Graph ? Is it possible to draw a

simple graph with 4 vertices and 7 edges ?

Justify.

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(2)

- (b) Prove the theorem that a simple graph with n vertices and k components cannot have more than**

$$\frac{(n-k)(n-k+1)}{2} \text{ edges}$$

5

- Q. 2. (a) Differentiate between walks, paths and**

circuits.

5

- (b) What is travelling salesman problem ?**

Explain.

5

- Q. 3. (a) A tree has 5 vertices of degree 2, three vertices of degree 3 and four vertices of degree**

(3)

4. How many vertices of degree 1 does it

5

have?

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5

(b) Describe Kruskal's Algorithm.

Q.4. (a) Show that if a planar graph G of order n and

size m has r regions and K components,

5

then

$$n - m + r = K + 1$$

(b) Prove that a graph G is 2-chromatic if and only if

G is bipartite.

5

(4)

Q. 5. (a) Every planar graph with fewer than 4-triangles

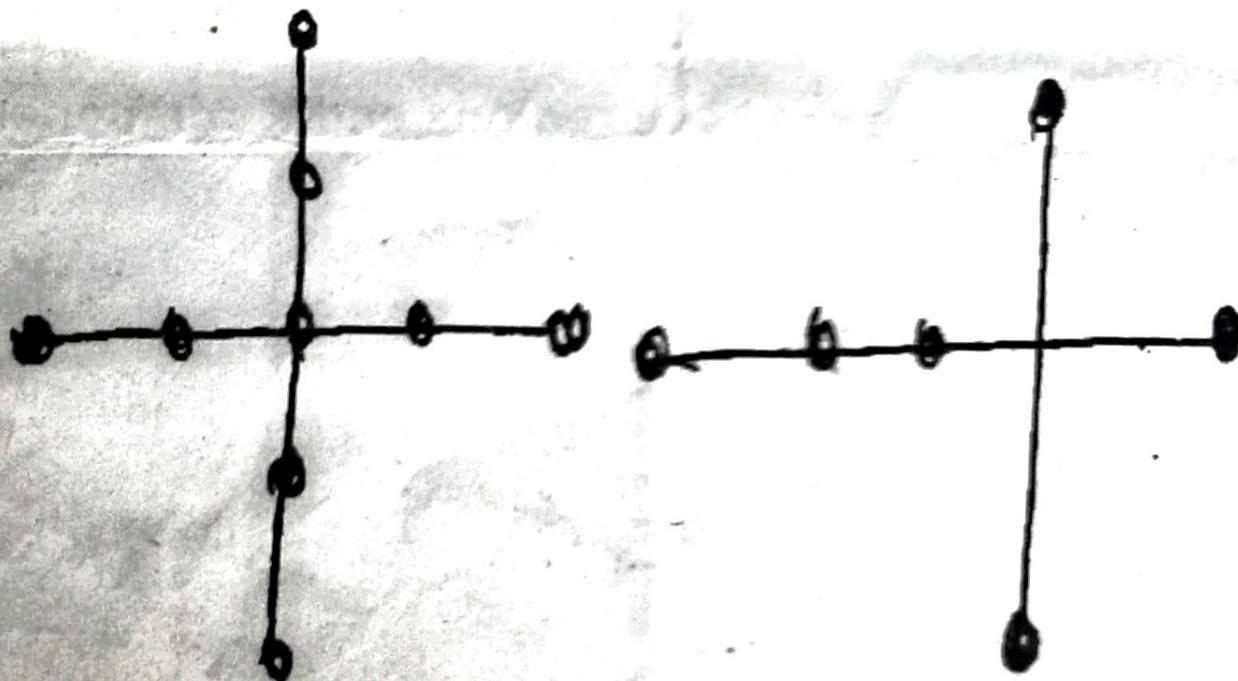
is 3-colourable. Prove.

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(b) Verify that the following two graphs are

homeomorphic but not isomorphic.

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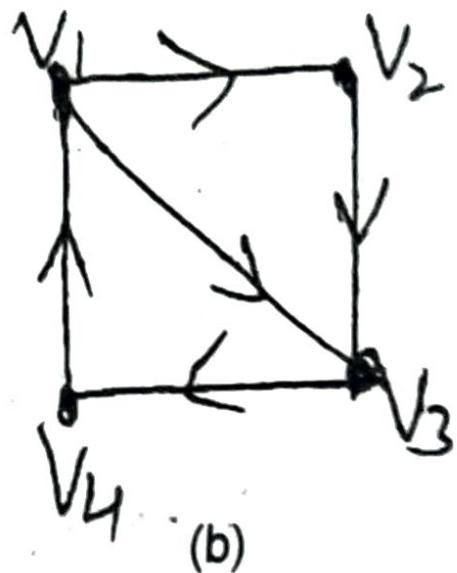
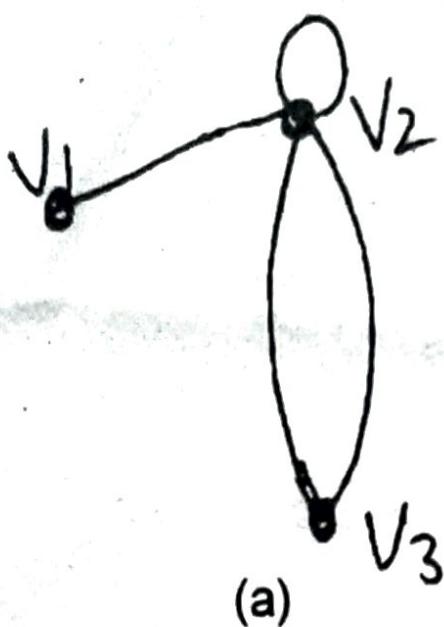


Q. 6. (a) Use adjacency matrix to represent the graphs

shown below :

5

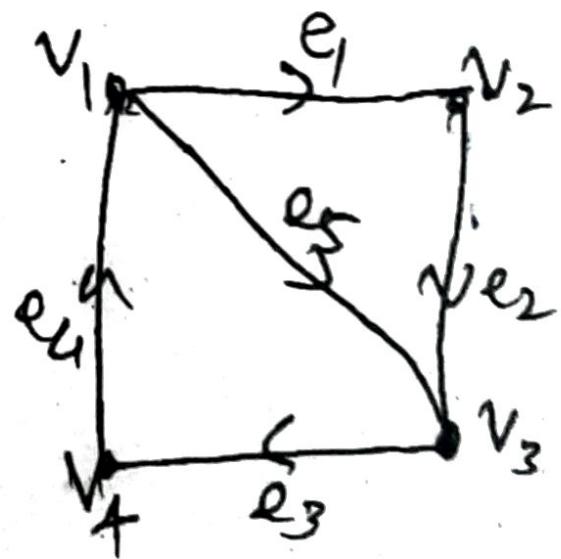
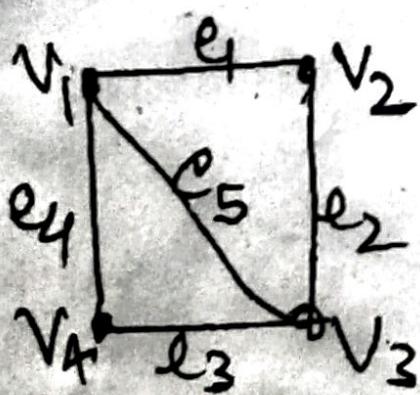
(5)



(b) Find the incidence matrix to represent the graph

shown in figures below :

5



(6)

(b) Explain chromatic number with suitable example. 5

Q. 8. Write shorts note on following any two : 10

(i) Konigsberg bridge problem

(ii) Rooted and binary tree

(iii) Four colour problem

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B.Tech. Examination, 2016
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Paper - VI

GRAPH THEORY

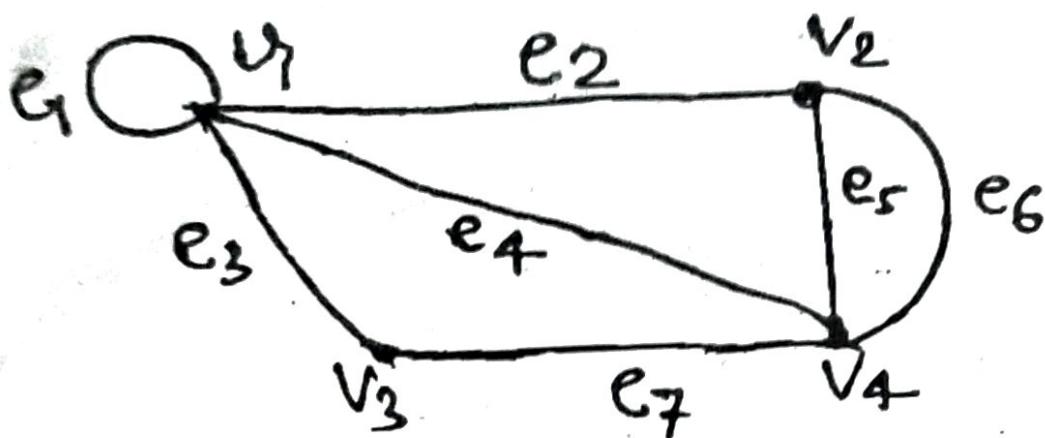
Time Allowed : Three Hours

Maximum Marks : 50

Note : Attempt any five questions of the following. All
questions carry equal marks.

- Q. 1.** (a) What is graph ? Discuss various application
of graph in brief. 3
- (b) Explain bipartite graph and complete bipartite
graph. 3
- (c) What is degree of vertex ? And verify for graph
shown in fig. 4

(2)



(i) $\sum_{i=1}^n d(v_i) = 2e$

(ii) $\sum_{\text{odd}} d(v_i)$ even and number of odd degree

vertices is even.

Q. 2. (a) Let G is graph with 12 edge if G has 6 vertices

each of degree 3 and the rest have degree

less than 3, find out minimum number of

vertices of G.

3

(b) Define sub graph and also explain properties

of subgraph.

4

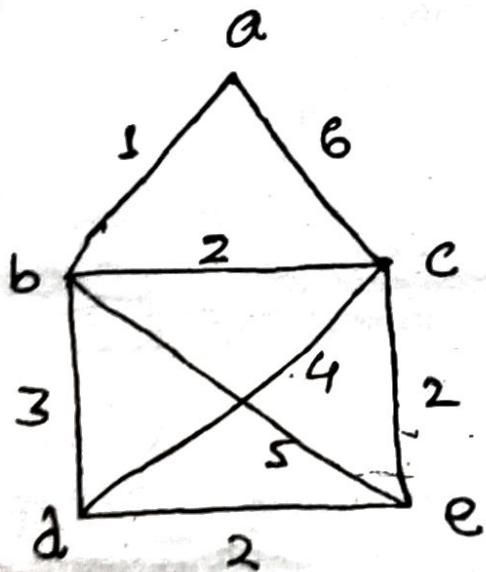
(3)

(c) Explain various operation on graph.

3

Q. 3. What is Dijkstra algorithm ? Find shortest path between a and c, a and d, a and e, in the following graph using Dijkstra algo.

10



Q. 4. (a) Explain the properties of walk, path and

6

circuit.

(b) Show that a simple graph with n vertices and

k component can have at most $(n - k)$

$(n - k + 1)/2$ edge.

4

(4)

Q. 5. (a) Define following term :

5

(i) Semi group

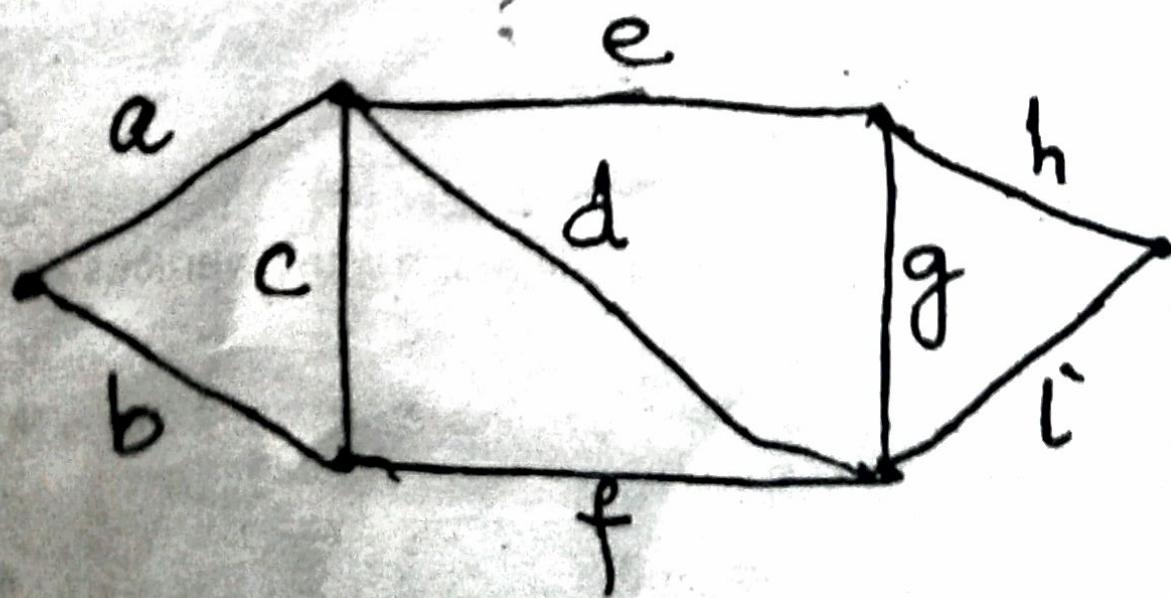
(ii) Monoid

(iii) Group

(iv) Abelian group

(b) Define spanning tree. Find all the spanning

tree of the following graph with procedure. 5

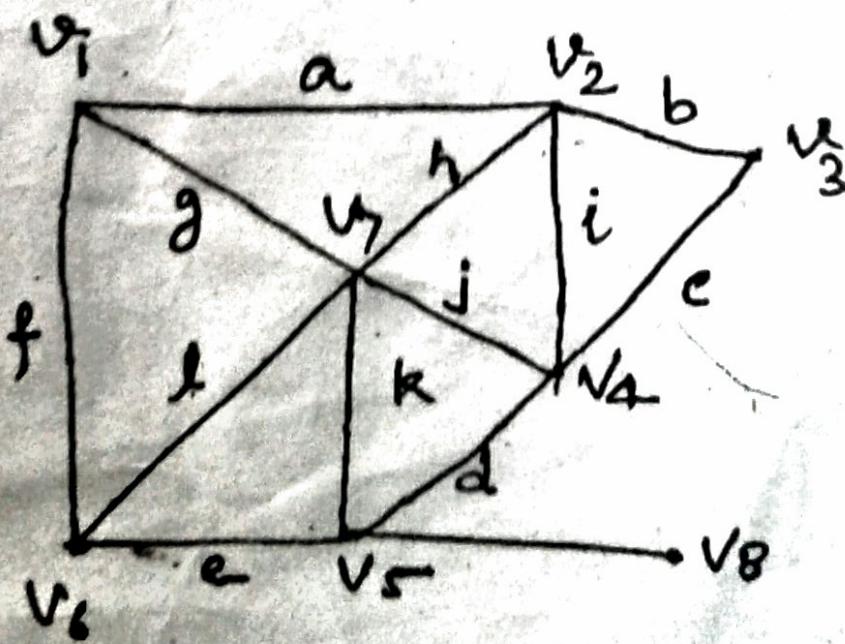


(5)

Q. 6. (a) Explain Euler graph and Hamiltonian graph
with suitable example. 5

(b) Define pendant vertex. Consider a tree T with
3 vertices of degree 2, 4 vertices of degree 3,
and 3 vertices of degree 4. Calculate the
number of pendant vertices in tree be m. 5

Q. 7. (a) Define the Adjacency matrix ? Find Adjacency
matrix for the given graph. 5



(6)

(b) Explain chromatic number with suitable example. 5

Q. 8. Write shorts note on following any two : 10

- (i) Konigsberg bridge problem**
- (ii) Rooted and binary tree**
- (iii) Four colour problem**

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B.Tech. Examination, 2015

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Paper - VI

GRAPH THEORY

Time Allowed : Three Hours

Maximum Marks : 50

Note : Attempt any five questions of the following. All
questions carry equal marks.

Q. 1. (a) Define a bipartite graph. Show that
complement of a bipartite graph need not to
be bipartite. 3

(b) Define Euler graph and how it differ to the
Hamiltonian graph. 3

(2)

(c) Define Isomorphic graph. Draw three

Isomorphic graph of following :

4

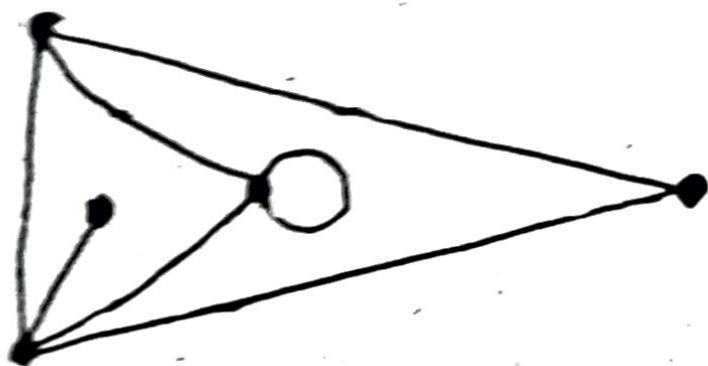


Fig. 1

Q.2. (a) Apply Prim's algorithm to find a minimal

spanning tree of the following graph :

5

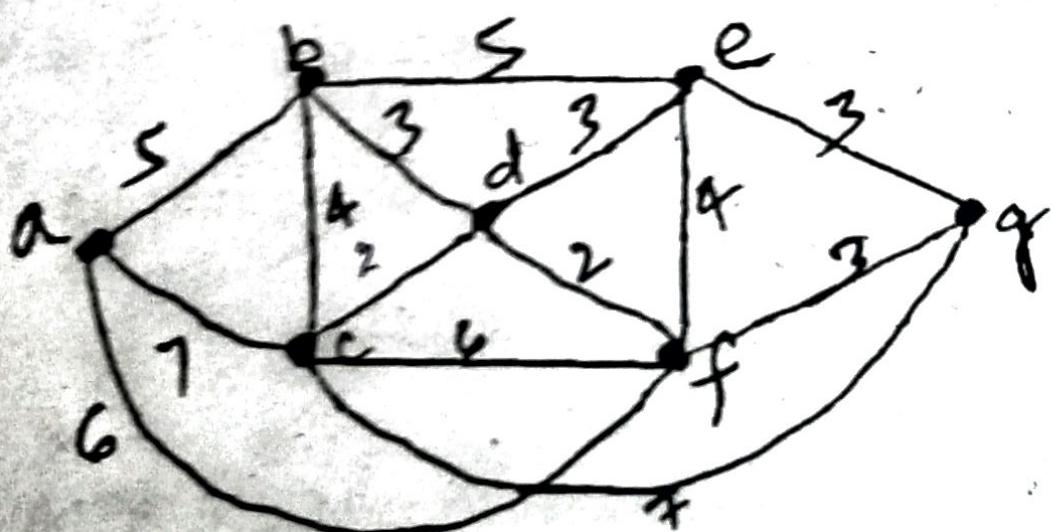


Fig. 2

(3)

(b) Find shortest path from x_1 to x_8 using Dijkstra

Algorithm in the following graph.

5

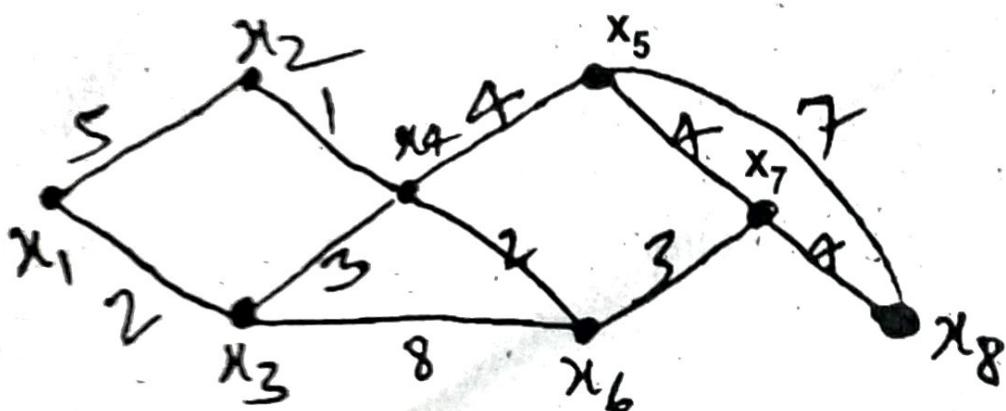


Fig. 3

Q. 3. (a) Define the edge connectivity and vertex

connectivity of a connected graph. Find them

for following graph :

6

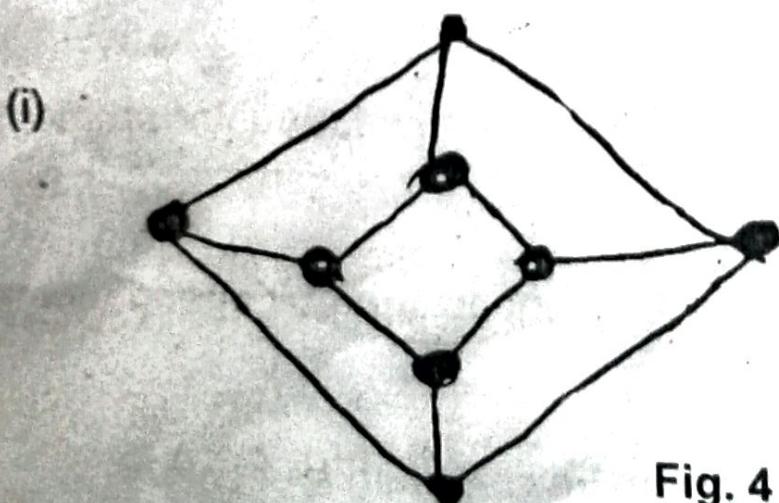


Fig. 4

(4)

(ii)

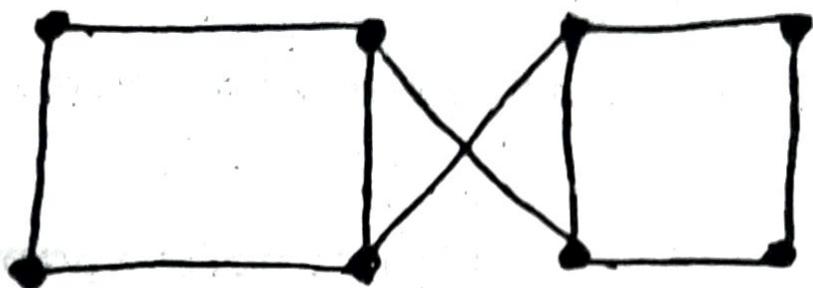


Fig. 5

(b) Show that a complete graph K_n is planar if

$$n \leq 4.$$

4

Q. 4. (a) Define basic vectors of a graph. Find the

number of distinct basis possible in a cut set

sub space.

5

(b) State that new four color problem is differ to

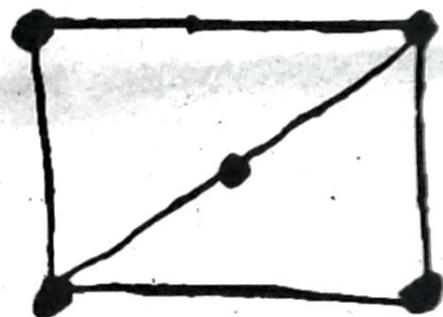
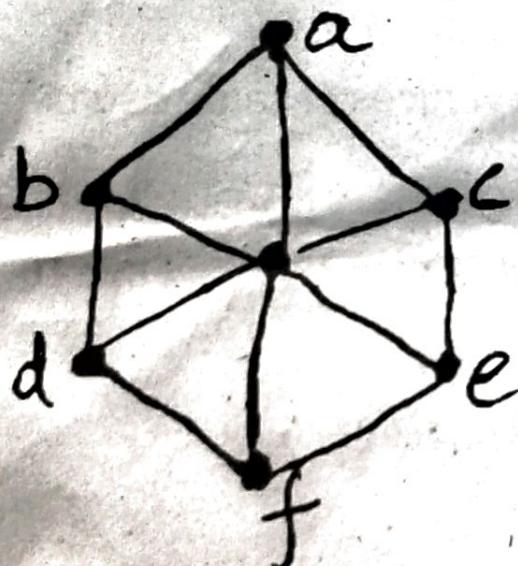
the eight color problem and their graphs that

can be color with four colors.

5

(5)

- Q. 5. (a) What do you mean by chromatic number and chromatic polynomial of a graph ? Define the chromatic number and chromatic polynomial of the following graph : 6



- (b) State and prove Cayley's theorem. 4

- Q. 6. (a) Define Euler diagram with example. Prove that every Euler digraph without isolated vertex is strongly connected. 5

(6)

(b) What is largest no. of vertices in a graph

with :

5

(i) 35 edge if all vertices are of degree at

least 3.

(ii) 24 edges and all vertices of same degree.

Q. 7. Write short notes on following any two : $5 \times 2 = 10$

(i) Infinite graph

(ii) Hamiltonian circuit

(iii) Isomorphic graph

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