Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination-2080

Level: B.Ed. / III Semester

Sub: Graph Theory (MATH 435/336)

Roll	No.		
ICOH	110.		•

Group 'A'

 $10 \times 1 = 10$

Tick (\checkmark) the best answers.

- 1. The total number of edges in the complete graph K_n is ...
 - a. C(n, 1)

b. C(n,2)

c. C(n, 3)

d. C(n,4)

- 2. Every planar map M is ...
 - a. three-colourable.

b. four-colourable.

c. five-colourable.

- d. six-colourable.
- 3. A spanning path of a digraph D is the directed walk containing
 - a. no vertices of D.

b. single vertices of D.

c. some vertices of D.

- d. all vertices of D.
- 4. Which one of the following statements is not correct?
 - a. The graph has loops.
 - b. The multigraph has loops.
 - c. The graph without any edges and vertices is empty graph.
 - d. The graph with one vertex and no edge is trivial graph.
- 5. If G is a connected planar graph with |V| = v, |E| = e, r number of regions, then

a.
$$v - e + r = 1$$

b. v - e + r = 2

c.
$$v - e + r = 3$$

d. v - e + r = 0

- 6. Konigsberg included
 - a. an island and five bridges
 - b. two islands and five bridges
 - c. two islands and seven bridges
 - d. three islands and seven bridges

- 7. A vertex v is said to be cut-vertex of a graph G if
 - a. the graph G is connected.
 - b. the graph G v is connected.
 - c. the graph G is disconnected.
 - d. the graph G v is disconnected.
- 8. A complete graph K_n is a regular graph of degree

b. n - 1

c.
$$n - 2$$

d. n - 3

- 9. A map is a ...
 - a. connected planar graph containing no bridges.
 - b. connected planar graph containing one bridges.
 - c. connected planar graph containing two bridges.
 - d. connected planar graph containing three bridges.
- 10. Every planar graph G has

a.
$$\chi(G) \leq 2$$

b. $\chi(G) \leq 3$

c.
$$\chi(G) \leq 4$$

d. $\chi(G) \geq 4$

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Level: B.Ed. / III Semester FM: 60 Time: 3.00 hrs. PM: 30

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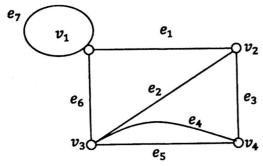
Candidates are required to give their answers in their own words as far as practicable.

Attempt All the Questions:

Group "B"

 $6 \times 5 = 30$

1. Define degree or valency of a vertex v in G. Consider the multigraph G(V, E) in the graph below. Find the degree and parity (even or odd) of each vertex of G.



- 2. Prove that the number of odd vertices in a graph is always even.
- 3. Find the incidence matrix and adjacency matrix of the following

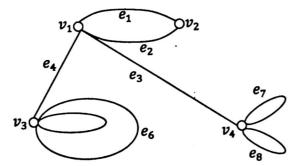
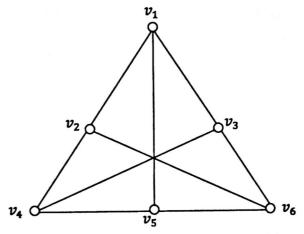


figure:



Define chromatic number. Find the chromatic number of G in the figure below:

Or



- 4. Prove that a connected graph (multigraph) G is eulerian if and only if each vertex has even degree.
- 5. Prove that every tournament T has a directed Hamiltonian path.
- 6. Define a weakly and strongly connected digraph. Prove that a digraph D is strongly connected if and only if it has a closed directed spanning path.

Or

Define out-degree and in-degree of vertex. Find the in-degree and the out-degree of each vertex v_i in the digraph D given below:

