KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2018

Marks Scored:

Level : B.Sc.
Year : III

Course : COMP 323
Semester: II

Exam Roll No.:

Time: 30 mins.

F. M. : 10

Registration No.:

Date MAR 0 4 2018

SECTION "A"

[20 Q. × 0.5 = 10 marks]

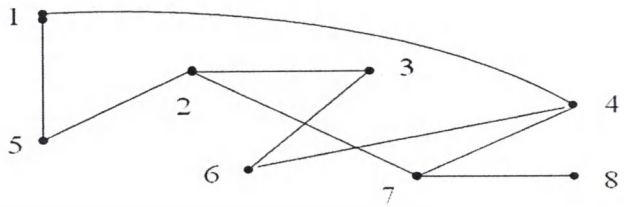
Write the most appropriate answer in the space given in the 'Correct Answer' row in the ANSWER BOX given below.

ANSWER BOX

Question No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Correct Answer										

Question No.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Correct Answer										

1. The order of the given graph is:
   A. 3.
   B. 4.
   C. 8.
   D. 9.



2. Which of the statement regarding a complete graph $K_{6,3}$ is **true**?
   A. It has 3 vertices.
   B. It has 3 edges.
   C. It is a 3-regular graph.
   D. The sum of the degrees of this graph is 18.

3. Which one statement among the following statements related to adjacency matrix of a graph is **true**?
   A. The elements of the adjacency matrix is 0 and 1 only.
   B. The elements of the major diagonal of any adjacency matrix are all 0.
   C. The elements of the adjacency matrix have mirror image about the major diagonal.
   D. The value of the element about the vertex with a loop is 1.

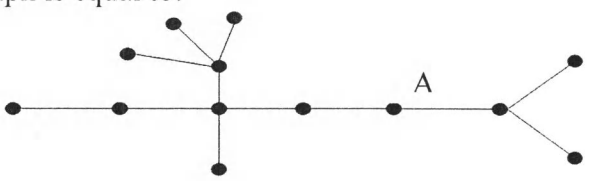
4. The number of non-isomorphic graphs that can be constructed from 5 vertices is:
   A. 20
   B. 25
   C. 32
   D. 34

5. The number of edges in a Peterson graph is:
   A. 10
   B. 15
   C. 20
   D. 25

6. The sum of degrees of all the vertices of a k-cube graph for k = 4 is :
   A. 16 B. 32
   C. 48 D. 64

7. The value of 2^{100} has:
   A. 20 digits B. 30 digits
   C. 21 digits D. 31digits

8. The eccentricity of the vertex A in the given graph is equal to:
   A. 2
   B. 3
   C. 4
   D. 6



9. The maximum level of a binary tree with 11 vertices is equal to:
   A. 5 B. 6
   C. 10 D. 11

10. Octahedron is a regular polyhedral with:
   A. 6 edges
   B. 8 edges
   C. 8 faces
   D. 8 vertices

11. The chromatic number of graph C_5 is equal to:
   A. 2 B. 3
   C. 4 D. 5.

12. The relation between the chromatic number $\chi G)$ and the clique number $\omega(G)$ is:
   A. $\chi G) > \omega(G)$ B. $\chi G) < \omega(G)$
   C. $\chi G) \geq \omega(G)$ D. $\chi G) \leq \omega(G)$

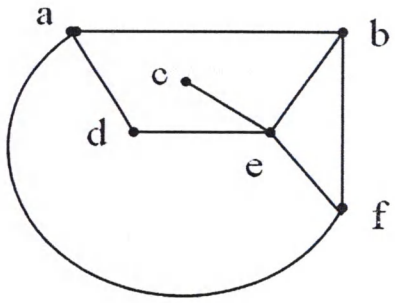
13. The number of different coloring of a complete graph K_4 with 4 different colors is:
   A. 16 B. 24
   C. 120 D. 360.

14. Which one of the following statement is **true**?
   A. A maximal matching is a matching to which no edge in the graph can be added.
   B. A maximal matching is a matching of the largest number of edges.
   C. A maximal matching is always a complete matching.
   D. A maximal matching is always a maximum matching.

15. Let $S_1 = \{2, 8\}$, $S_2 = \{8\}$, $S_3 = \{5, 7\}$, $S_4 = \{2, 4, 8\}$, $S_5 = \{2, 4\}$ be a family of sets. Then the SDR of $X = \{S_1, S_2, S_3, S_4\}$ is:
   A. {2, 8, 5, 2}. B. {2, 8, 5, 4}
   C. {8, 8, 7, 4}. D. {2, 8, 7, 4}

16. In a bipartite graph G with deficiency $\delta(G)$, the maximal number of vertices in set V_1 that can be matched into V_2 is equal to:
    A. number of vertices $V_1 + \delta(G)$
    B. number of vertices $V_1 - \delta(G)$
    C. number of vertices $V_1 * \delta(G)$
    D. number of vertices $V_1 / \delta(G)$

17. Which one of the set is the covering for the given graph?
    A. {b, d, e}
    B. {b, d, f}
    C. {a, b, d}
    D. {b, d, e, a}



18. In the Boolean algebra, we have $X + X' = ?$
    A. X
    B. X′
    C. 1
    D. 0.

19. The relation between the transmission matrix T and the primitive connection matrix Q in a Contact Network is:
    A. $T = Q^n$.
    B. $T = Q^{n-1}$.
    C. $T = Q^{n+1}$.
    D. $T = Q^{-1}$.

20. In an Activity Network, length of the longest path from 1 to k is T(k) and the latest event time is T′(k), then the total slack S_{ij} of an activity is given by the relation:
    A. $s_{ij} = T(j) - T(i) - t_{ij}$.
    B. $s_{ij} = T(j) - T'(i) - t_{ij}$.
    C. $s_{ij} = T'(j) - T(i) - t_{ij}$.
    D. $s_{ij} = T'(j) - T'(i) - t_{ij}$.

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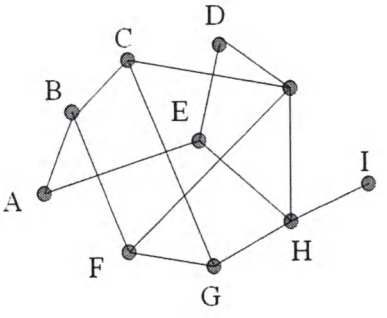
SECTION "B"
Short Answer Questions
[6 Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Describe the Königsberg Bridge. Draw the graph of the problem. Why Euler gave a negative proof of the problem? [1 + 1+ 2]

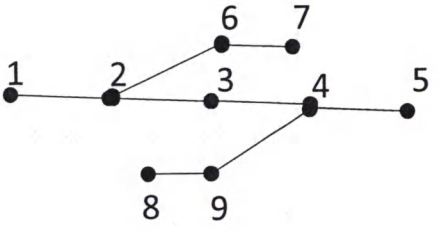
2. Draw the given graph in the bipartite form. Write down the partite sets. [2 + 2]



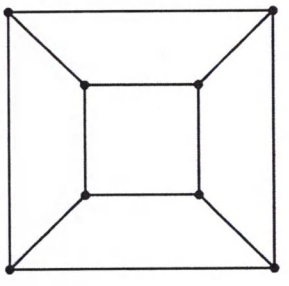
3. Draw 3-regular graph with 7 vertices. Verify the First Theorem of Graph Theory for this graph. [2 + 2]

4. Represent the given graph as: [2 + 2]

   i. Two linear arrays,
   ii. Successor listing.



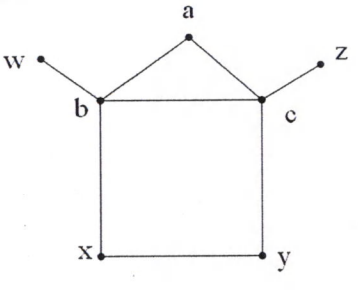
5. What is a Hamiltonian Circuit? Draw the Hamiltonian Circuit for the given graph. [1 + 3]



6. Using Stirling Formula, find the number of digits in the value of 100!. [4]

7. Draw the graphs G-bc and G/bc for the given graph. [2 +2]

G



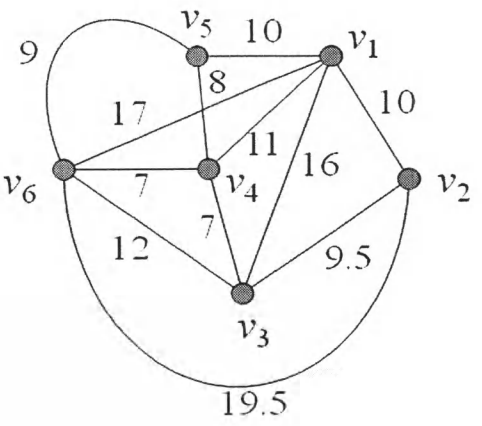
SECTION "C"

Long Answer Questions

[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Use the Prim's algorithm to find the shortest spanning tree for the given graph. Also draw this shortest spanning tree. [6 + 2]



9. How do you find the chromatic number of a graph? Use the idea of coloring a graph to solve the following problem.

In assigning frequencies to cellular phones, a zone gets a frequency to be used by all vehicles in the zone. Two zones that interfere must get different frequencies.

How many different frequencies are required if there are six zones, a, b, c, d, e, f and zone a interferes with zone b; b interferes with a, c, and d; c interferes with b, d, and e; d interferes with b, c, and e; e interferes with c, d, and f; and f interferes with e only?

First draw the graph to represent this situation and then solve the problem. [2 + 2 + 4]

10. Consider the following activity network. For this network tabulate the earliest and latest event times in the tabular form. From the obtained table find the Critical Path. [6 + 2]