

KATHMANDU UNIVERSITY
End Semester Examination
August, 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 : AUG 27 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

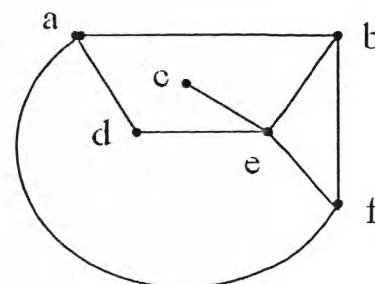
Question No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Correct Answer										

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

1. A graph G with n vertices have m number of vertices with odd degree, then for some k , we have:
 A. $m = k$ B. $m = 2k$ C. $m = 2k + 1$ D. $m = n - k$

2. Which one of the statement, regarding a binary tree, is **not true**?
 A. It is a 2-ary tree.
 B. The number of vertices is always odd.
 C. The number of vertices of degree 3 is the difference between the number of vertices and the number of leaves.
 D. The relation between the number of leaves p , and the number of vertices n is given by the relation: $n = 2p - 1$.

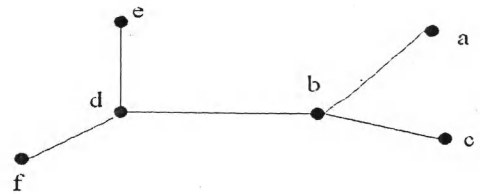
3. The size of the given graph is equal to:
 A. 6 B. 8
 C. 12 D. 18



4. For a given set of 5 vertices, the number of isomorphic as well as non-isomorphic graphs that can be constructed are equal to:
 A. 2^5 B. 2^6 C. 2^7 D. 2^8

5. The number of digits in the value of $100!$ is:
 A. 100 digits B. 138 digits C. 158 digits D. 160 digits
6. The first graph of Kuratowski's, K_5 has:
 A. 10 edges B. 15 edges C. 20 edges D. 25 edges
7. In a bipartite graph a complete matching of V_1 into V_2 exists if there is a positive integer m for which:
 A. degree of every vertex in $V_1 = m \leq$ degree of every vertex in V_2 .
 B. degree of every vertex in $V_1 = m =$ degree of every vertex in V_2 .
 C. degree of every vertex in $V_1 \geq m \geq$ degree of every vertex in V_2 .
 D. degree of every vertex in $V_1 \leq m \leq$ degree of every vertex in V_2 .

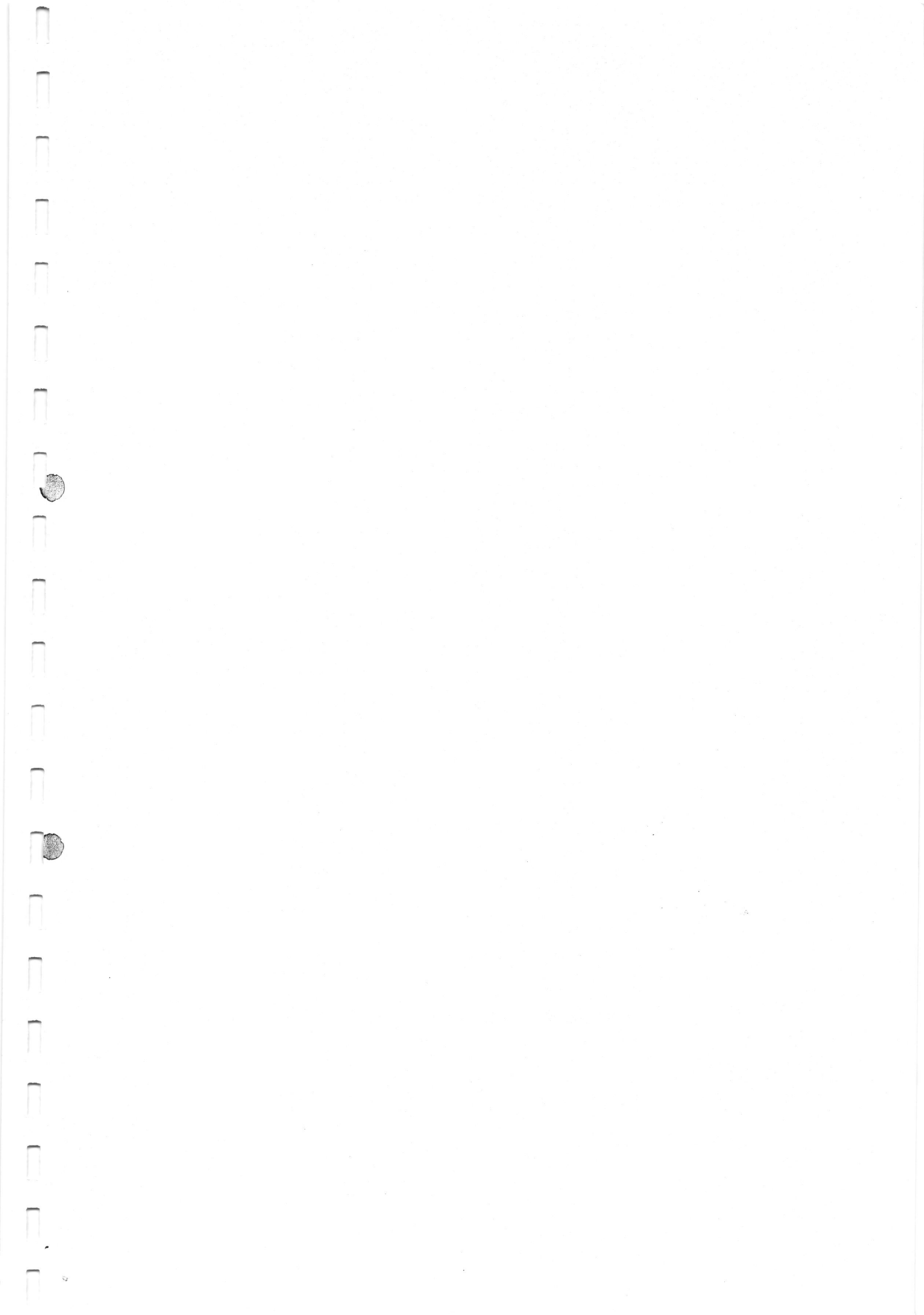
8. The radius of the given graph is equal to:
 A. 2 B. 3
 C. 4 D. 6



9. The number of non-isomorphic trees that can be constructed with 6 vertices is equal to:
 A. 5 B. 6 C. 7 D. 8
10. For a connected graph with n vertices and e edges, the nullity μ is calculated using the formula:
 A. $\mu = e + n$ B. $\mu = e - n$ C. $\mu = e + n + 1$ D. $\mu = e - n + 1$
11. The chromatic number of a tree with 9 vertices is equal to:
 A. 2 B. 3 C. 6 D. 9
12. Which one of the following statement regarding the chromatic number of a graph with n vertices is **not true**?
 A. $\chi(G) \leq n$ B. $\chi(G) \leq \Delta(G) + 1$ C. $\chi(G) \leq \Delta(G) - 1$ D. $\chi(G) \leq \Delta(G)$
13. 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.
14. Which of the postulate of the Boolean algebra is **not correct**?
 A. $x + 1 = 1$ B. $x + x' = 0$ C. $x \cdot x = x$ D. $x \cdot x' = 0$
15. The independence number of the graph C_5 , $\beta(C_5)$ is equal to,
 A. 2 B. 3 C. 4 D. 5
16. A graph has a dual if and only if the graph is:
 A. planar B. bipartite C. regular D. complete

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17. In a simple, connected planar graph with r regions, n vertices and e edges, the correct inequality is:
A. $2e \geq 3r$ B. $3e \geq 2r$ C. $e \leq 3n + r$ D. $e \leq 2n + r$
18. The relation between the transmission matrix T and the primitive connection matrix Q in a Contact Network is given by the relation:
A. $T = Q^n$ B. $T = Q^{-1}$ C. $T = Q^{n-1}$ D. $T = Q^{n+1}$
19. The latest time by which an event k must be realized without increasing the project duration is called:
A. The earliest event time B. The latest event time
C. The critical time D. The dummy time
20. Which one of the statements related to the Binary Search Tree (BST) given below is **true**?
A. The left subtree of a node can only have the values less than the node.
B. The left subtree of a node can only have the values greater than the node.
C. The left subtree of a node can only have the values less than and equal to that node.
D. The left subtree of a node can only have the values greater than and equal to that node.



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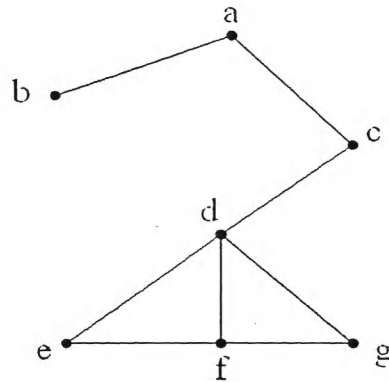
Level : B. Sc.
Year : III
Time : 2 hrs. 30 mins.

Course : COMP 323
Semester: II
F. M. : 40

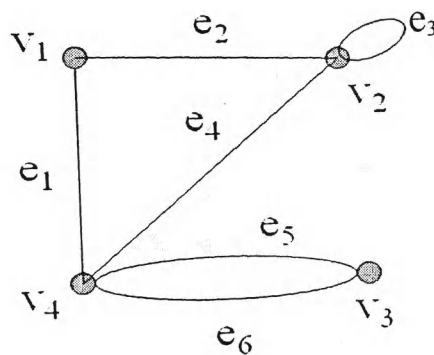
SECTION "B"
(Short answer questions)
[6 Q. \times 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Find the following for the given graph: [2+ 2]
a. Degree of the vertices b & f.
b. Neighborhood of the vertices a & d.



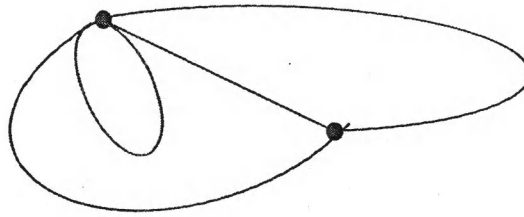
2. Consider the hypercube graph Q^K for $K = 4$. Write down the set of all the vertices of Q^4 . How many numbers of edges does this graph have? [2 + 2]
3. Write the adjacency matrix and incidence matrix for the given graph. [2 + 2]



4. What do you mean by regular polyhedra? Verify the Euler formula for number of faces, number of edges and number of vertices of the Octahedron. [1 + 3]
5. Draw the shortest and longest binary tree with 15 vertices. [2 + 2]

6. Draw the dual graph of the given graph.

[4]



7. Define Chromatic number of a graph. Finds the Chromatic number of a Petersen graph. [1 + 3]

SECTION "C"

(Long answer questions)

[2 Q. \times 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Define a diagraph. What are the relations between diagraph and binary relations? Represents the binary relation "greater than" on a set of five numbers $\{3, 4, 5, 7, 8\}$ with an appropriate diagraph. Write the set of all these binary relations. [1 + 3 + 2 + 2]

9. Four applicants a_1, a_2, a_3 and a_4 are available to fill six vacant positions p_1, p_2, p_3, p_4, p_5 and p_6 .

Applicant a_1 is qualified to fill position p_2 and p_5 .

Applicant a_2 is qualified to fill position p_2 and p_5 .

Applicant a_3 is qualified to fill position p_2 and p_5 .

Applicant a_4 is qualified to fill position p_1, p_2, p_3, p_4 or p_6 .

Draw an appropriate graph to represent this situation.

Find the deficiency of this graph.

[2 + 6]

10. Consider the following contact network. Find the switching function of the contact network between the vertices a and b. Write this switching function in the normal form.

[6 + 2]

