

2013

Time: 3 hours

Full Marks: 70

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

The figures in the margin indicate full marks.

Answer from **all** the Groups as directed.

Group – A

1. Choose the correct answer of the following: 1x15=15

a) Circle has:

- i. No vertices
- ii. Only 1
- iii. ∞ vertices
- iv. None of these

b) The number of edges in a complete graph of n vertices is:

- i. n
- ii. $n(n - 1)/2$
- iii. $n(n + 1) / 2$
- iv. $n_2/2$

c) A relation R in {1, 2, 3, 4, 5, 6} is given by {(1, 2), (2, 3), (3, 4), (4, 4), (4, 5)}. This relation is:

- i. Reflexive

- ii. Symmetric
 - iii. Transitive
 - iv. Not reflexive, not symmetric and not transitive
- d) How many permutations are there of the letter taken all at a time of the word ASSESSES?
- i.
 - ii.
 - iii.
 - iv.
- e) A trail is a walk in which:
- i. No edge is repeated
 - ii. Edge is repeated
 - iii. All of these
 - iv. None of these
- f) A Recurrence relation of degree 2 is known as:
- i. Linear
 - ii. Binomial
 - iii. Quadratic
 - iv. None of these
- g) Complete graph is denoted by:
- i. K_n
 - ii. C_n
 - iii. M_n
 - iv. None of these
- h) A Recurrence Relation is said to be Homogeneous if:
- i. It contains terms that depends only on variable n
 - ii. It contains no terms that depends on variable n
 - iii. Both (i) and (ii)

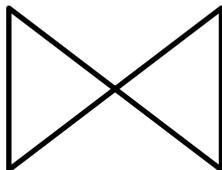
- iv. None of these
- i) The power set of $A \cup B$, where $A = \{2, 3, 5, 7\}$ and $B = \{2, 5, 8, 9\}$ is:
- 256
 - 64
 - 16
 - 4
- j) A binary tree with 27 nodes has _____ null branches.
- 54
 - 27
 - 26
 - None of these
- k) The graph $K_{3,4}$ has:
- 3 edges
 - 4 edges
 - 7 edges
 - 12 edges
- l) A partially ordered set is said to be a Lattice if every two elements in the set have:
- A unique least upper bound
 - A unique greatest upper bound
 - Both (i) and (ii)
 - None of these
- m) An undirected graph possesses an Eulerian Circuit if and only if it is connected and its vertices are:
- All of even degree
 - All of odd degree
 - All of any number

- iv. Even in number
- n) A statement that is true for all possible value of its propositional variable is called a:
 - i. Contingency
 - ii. Sets
 - iii. Absurdity
 - iv. None of these
- o) Post order traversal means:
 - i. $RT_L T_R$
 - ii. $T_L RT_R$
 - iii. $T_L T_R R$
 - iv. None of these

Group – B

Answer any **five** questions of the following: 4x5=20

2. Explain Kruskal's algorithm.
3. Find the edge-chromatic number of C_n .
4. Is a Hamiltonian graph Eulerian? Give reason for your answer.
5. What is the difference between Eulerian Graph and Eulerian Circuit.
6. Write short notes on the following:
 - a) Bipartite graph
 - b) DFS
7. State and explain Lagrange's Theorem.
8. Draw the spanning tree of the following graph:

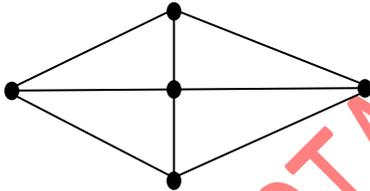


Group – C

Answer any **five** questions of the following:

7x5=35

9. Write BFS Algorithm with an example.
10. Solve the Recurrence $a_{n+1}^2 = 5 a_n^2$ where $a_n > 0$ and $a_0 = 2$ and find a_8 .
11. If $R = \{(a, b), (b, c), (c, a)\}$ is a relation in $\{a, b, c\}$. Find R^* .
12. What is Homomorphism? Explain with example.
13. Prove the following by Principle of Induction:
$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$
14. Let $f : (a, b)^*$ be given by $f(x) = ax$ for every $x \in (a, b)^*$. Show that f is one to one but not onto.
15. Find a U – V walk of length 7 for the graph.



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For more questions visit: <https://www.guptatreepoint.com/marwari-college-previous-year-question-paper/>