

TB146630A

Reg. No.....

Name.....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017

SEMESTER VI - MATHEMATICS

MAT6DM - DISCRETE MATHEMATICS

Time: Three Hours

Maximum Marks: 80

PART A

I. Answer all questions. Each question carries 1 mark.

1. Define a graph using an example.
2. Give an example of 3-regular graph.
3. Define Euler graph with an example
4. Explain maximal non-Hamiltonian graph.
5. Draw the graph representing the bridges of Konigsberg.
6. Write the meaning of Cryptography.
7. Define polyalphabetic cipher.
8. Define running key.
9. Define poset with an example.
10. Explain sublattice.

(10x1=10)

PART B

II. Answer any eight questions. Each question carries 2 marks.

11. Define a simple graph and also explain the term loop.
12. Define (i)complete graph (ii)empty graph
13. Explain spanning tree.
14. Distinguish between trail and path of a graph.
15. Define closure of a graph.
16. Write a note on Chinese Postman problem.
17. Define the terms (i)plain text (ii)cipher text.
18. Write an example of super increasing sequence.
19. Encrypt the message 'ALL THE BEST' using Caesar cipher.
20. Define the terms (i) complete lattice (ii) semi lattice
21. In any lattice prove the modular inequality.
22. Draw the diagram corresponding to the poset $(\wp(X), \subseteq)$ where $X = \{1,2,3\}$

(8x2=16)

PART C

III. Answer any six questions. Each question carries 4 marks.

23. Let G be an acyclic graph with n vertices and k connected components then prove that G has $(n - k)$ edges.

24. Given any 2 vertices u and v of a graph G , then prove that every $u - v$ walk contains a $u - v$ path
25. Let G be a graph in which the degree of every vertex is at least two. Then prove that G contains a cycle..
26. Let G be a simple graph with n vertices and let u and v be non-adjacent vertices in G such that $d(u) + d(v) \geq n$. Let $G + uv$ denote the super graph of G obtained by joining u and v by an edge. Then prove that G is Hamiltonian if and only if $G + uv$ is Hamiltonian.
27. Write a note on Personnel Assignment problem.
28. Write a note on Knapsack Cryptosystem.
29. Encipher the message 'ONE IF BY DAWN' using Vignere cipher with K as seed.
30. Show that product of two lattices is a lattice.
31. Show that a lattice L is a chain if and only if every nonempty subset of it is a sublattice.

(6x4=24)

PART D

IV. Answer any two questions. Each question carries 15 marks.

32. State and prove theorem due to Whitney.
33. Prove that a connected graph G is Euler if and only if the degree of every vertex is even.
34. Using Hill's cipher encrypt the message 'BUY NOW' using the congruence

$$C_1 \equiv 2P_1 + 3P_2 \pmod{26}$$

$$C_2 \equiv 5P_1 + 8P_2 \pmod{26}$$
35. (i) If (P, \leq) is a poset with greatest element 'U' such that every nonempty subset S of P has infimum then prove that P is a complete lattice.
 (ii) Show that union of two sublattice may not be a sublattice.

(2x15=30)