Register No.: …… Name: ……..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER INTEGRATED M.C.A DEGREE EXAMINATION (S), SEPT 2022

(2020 SCHEME)

Course Code: **20IMCAT104**

Course Name: **Introduction to Discrete Mathematics**

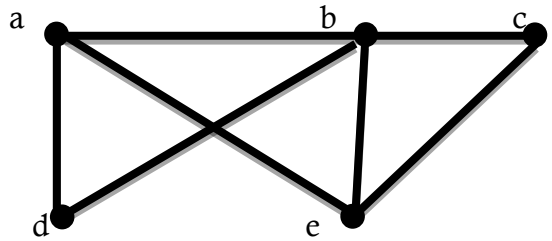
Max. Marks: **60** **Duration: 3 Hours**

Please do not carry data book, statistical tables, etc into the examination hall.

PART A

(Answer all questions. Each question carries 3 marks)

1. Find conjunction and disjunction for the given propositions
   p: "Today is Friday."
   q: "It is raining today."
2. Explain Conditional and biconditional statements using truth tables.
3. State the principle of mathematical induction.
4. State the Pigeonhole principle.
5. State the fundamental theorem of arithmetic.
6. Determine the gcd and lcm of $(2^3 3^5 7^2,\ 2^4 3^3)$.
7. Find the adjacency matrix for the graph



8. Differentiate between a pendant vertex and an isolated vertex. Give examples
9. Draw a binary tree and mention its root, internal vertices and leaves.
10. What is the value of the prefix equation ^-*33*425 ?

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

11. a) State De-Morgan's law for logical equivalence. (2)
    b) Verify those in part (a) using truth tables. (4)

OR

12. Show that the premises "Everyone in this Mathematics class has taken a course in computer science" and "Martha is a student in this class" imply the conclusion "Martha has taken a course in computer science. (6)

MODULE II

13. During a month with 30 days, a baseball team plays at least one game a day, but no more than 45 games. Use Pigeonhole principle, to show that there must be a period of some number of consecutive days during which the team must play exactly 14 games. (6)

OR

14. Show that if n is a positive integer, then $1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$. (6)

MODULE III

15. Use Euclidean algorithm to find gcd of (21, 44) and express gcd as their linear combination. (6)

OR

16. Find the smallest positive integer which is a solution of the system of congruence.

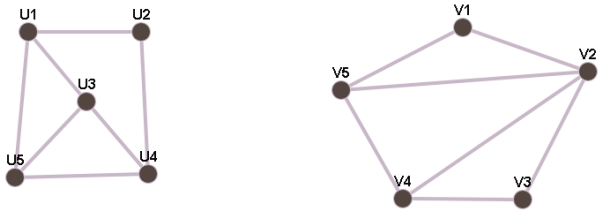
$$x \equiv 2\ mod(3)$$
$$x \equiv 3\ mod\ (5)$$
$$x \equiv 2\ mod\ (7)$$

(6)

Using Chinese remainder theorem.

MODULE IV

17. a) Define graph isomorphism (2)
    b) Determine whether the following the following graphs are isomorphic



(4)

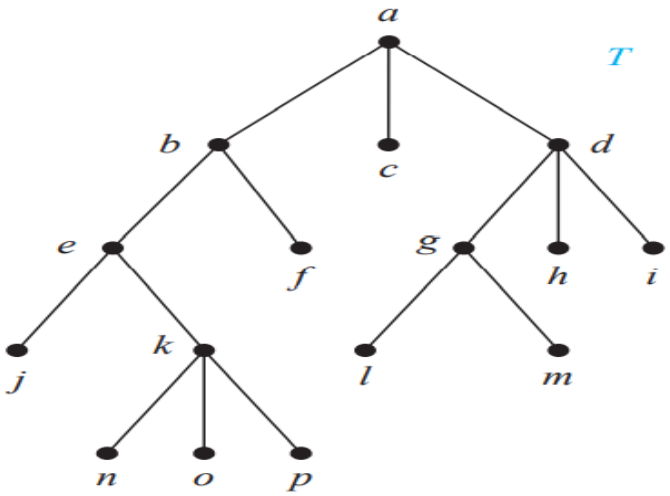
OR

18. a) Define an Euler circuit. Give an Example. Also state the necessary and sufficient condition for a multi graph to have an Euler circuit. (3)
    b) Define a Hamiltonian circuit. Give an example. Also state Dirac's theorem. (3)

MODULE V

19. a) What is in-order traversal? (2)

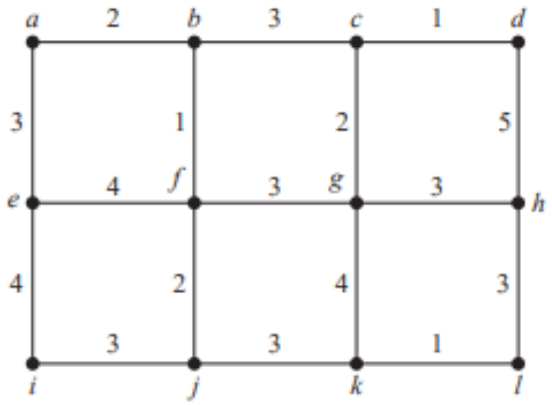
b) Find the pre order and post order traversal of the following tree



(4)

OR

20. Use Kruskal's algorithm to find a minimum spanning tree in the graph shown below



(6)

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