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# SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SECOND SEMESTER INTEGRATED MCA DEGREE EXAMINATION (S), AUGUST 2023**
**(2020 SCHEME)**

**Course Code:** **20IMCAT104**

**Course Name:** **Introduction to Discrete Mathematics**

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

## PART A

***(Answer all questions. Each question carries 3 marks)***

1. Let P(x) be the statement "$x^2 > x$." What is the truth value of the quantification ∀x P(x), where the domain consists of all integers?
2. Check whether the following is a proposition
   a. y+5=1.
   b. Read this carefully.
   c. There are no black flies in Maine.
3. State Pigeonhole Principle.
4. How many cards must be selected from a standard deck of 52 cards to guarantee that at least 3 cards of same suit are chosen?
5. How many zeros are there at the end of 10!
6. Find LCM($2^2 3^3 5^5$, $2^5 3^3 5^2$)
7. Explain Bipartite graph with example.
8. State the necessary and sufficient condition for Euler graph.
9. Define a Tree with example.
10. What is the value of the Prefix expression + - * 235/ ↑ 234.

## PART B

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

### MODULE I

11. Show that $\neg p \wedge q$, $r \rightarrow p$, $\neg r \rightarrow s$ and $s \rightarrow t$ leads to the conclusion t without using truth table. (6)

**OR**

12. Define tautology. Check whether ¬p ∧ (pVq) → q is a Tautology or not by using truth table. (6)

**MODULE II**

13. If n is a positive integer show that 1 +2 +...+ n= $\frac{(n)(n+1)}{2}$. (6)

**OR**

14. Use mathematical induction to prove that $n^3$-n is divisible by 3 whenever n is a positive integer. (6)

**MODULE III**

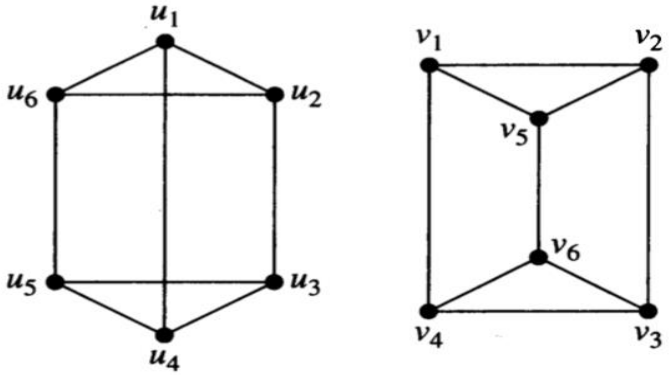
15. Find gcd(9888 , 6060) by Euclidean algorithm. (6)

**OR**

16. Solve the following system of linear congruence.
x ≡ 2 mod (3)
x ≡ 4 mod (7)
x ≡ 6 mod (10)
Using Chinese remainder theorem. (6)

**MODULE IV**

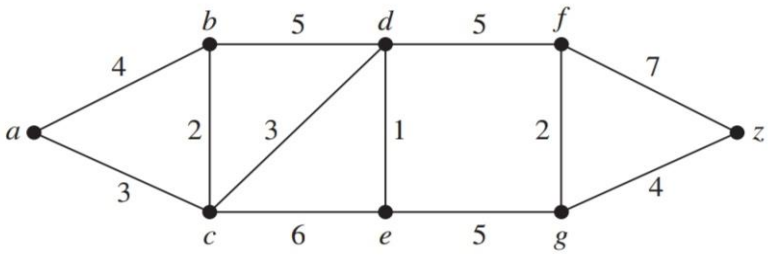
17. Show that the following graphs are isomorphic.




(6)

**OR**

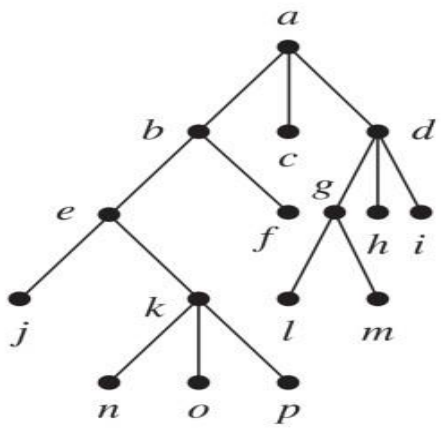
18. Use Dijkstra's algorithm to find the length of the shortest path between a and z from the following graph.




(6)

**MODULE V**

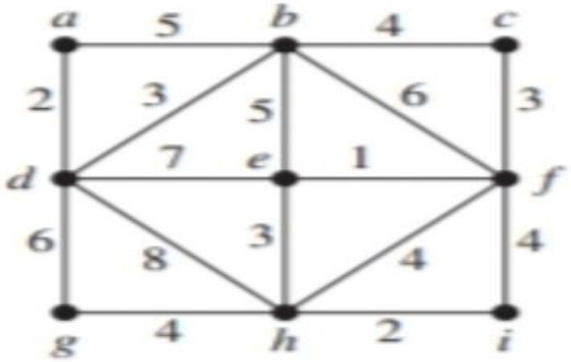
19. Find the pre order and post order traversal of the following tree




(6)

**OR**

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




(6)

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