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), December 2021

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)

		CO
1.	Using truth table show that $p \Leftrightarrow q \equiv (p \Rightarrow q) \wedge (q \Rightarrow p)$.	[1]
2.	Over the universe of animals, let A(x): x is a whale, B(x): x is a fish and C(x): x lives in water. Express the following statements using quantifiers. (a) There exists an animal which doesnot live in water. (b) There exists a fish that is not a whale. (c) Every whale that lives in the water is a fish.	[1]
3.	Using the principle of mathematical induction prove that P(n): 1+ 3+ 5+...+ (2n-1) = n^2	[2]
4.	State Pigeonhole Principle .Write an example.	[2]
5.	Find GCD and LCM of the numbers 120 and 500.	[3]
6.	State Chinese Remainder Theorem.	[3]
7.	Define Complete graph and Bipartite graph. Give example for each.	[4]
8.	Define Euler path and Euler circuit. Give example for each.	[4]
9.	Write the value of the expression + 4 / * 2 3 + 1 – 9 ↑ 2 3	[5]
10.	Define a rooted tree. Draw an example.	[5]

PART B

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

MODULE I

		CO	Marks
11.	Show that the following statement is a contingency $\big(p \Rightarrow (q \wedge r)\big) \Rightarrow \sim (p \Rightarrow q)$	[1]	(6)

OR

CO **Marks**

12. Given the following open statements. [1] (6)

p(x): $x > 0$, q(x): x is odd , r(x): x is a perfect square ,

s(x): x is divisible by 3 , t(x): x is divisible by 2

Write the following statements in symbolic form

i. Atleast one integer is odd
ii. There exists a positive integer that is odd
iii. If x is odd , then x is not divisible by 2
iv. No odd integer is divisible by 2
v. There exists an odd integer divisible by 2
vi. If x is odd and x is perfect square , then x is divisible by 3

MODULE II

CO **Marks**

13. If nth term of arithmetic progression is $a + (n-1)d$, then show by the principle of mathematical induction that the sum of n terms of arithmetic progression is $\frac{n}{2}\{2a + (n-1)d\}$. [2] (6)

OR

CO **Marks**

14. Use the principle of mathematical induction to prove that $\frac{1}{1\cdot 3} + \frac{1}{3\cdot 5} + \frac{1}{5\cdot 7} + \cdots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$, $n \in N$ [2] (6)

MODULE III

CO **Marks**

15. Solve the following simultaneous congruences [3] (6)

$x \equiv 2(mod 3)$, $x \equiv 4(mod 7)$, $x \equiv 6(mod 10)$

OR

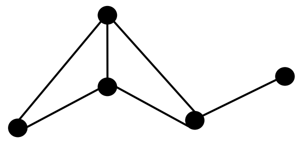
CO **Marks**

16. Find gcd of 427 and 616. Express it in the form $427x + 616y$ [3] (6)

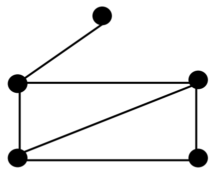
MODULE IV

CO **Marks**

17. Check whether the graphs shown below are isomorphic. Give reasons for your answer. [4] (6)



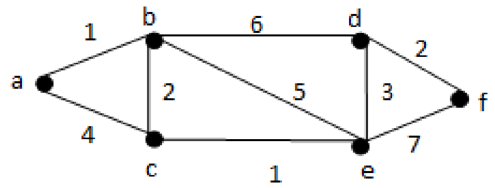
(A)



(B)

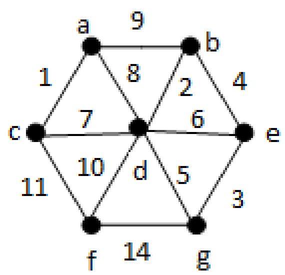
OR

		CO	Marks
18.	Apply Dijkstra's algorithm to the graph given below and find the shortest path from a to f	[4]	(6)



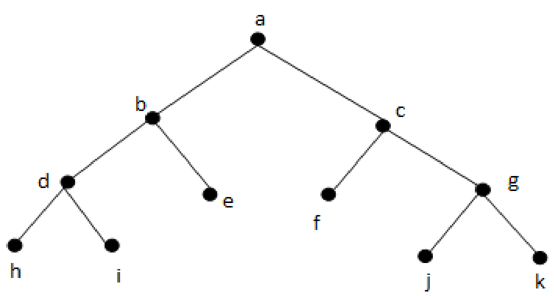
MODULE V

		CO	Marks
19.	Apply Kruskal's algorithm to find the minimal spanning tree of the following graph	[5]	(6)



OR

		CO	Marks
20.	Find the preorder , inorder and postorder searches of the binary tree shown in the figure below	[5]	(6)



****