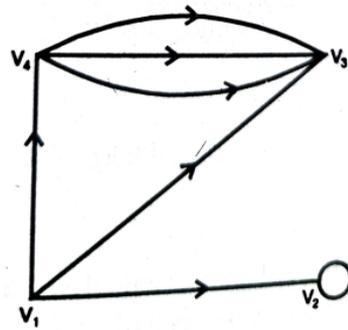
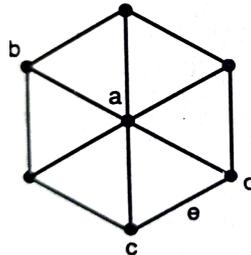


SEMESTER EXAMINATION-2021	
CLASS – MCA-I SEM... SUBJECT - COMPUTER SCIENCE	
MCA-C104 Mathematical Foundations for Computer Science	
Time: 3 hour	Max. Marks: 70 Min. Pass: 40%
Note: Question Paper is divided into two sections: A and B . Attempt both the sections as per given instructions.	
SECTION-A (SHORT ANSWER TYPE QUESTIONS)	
Instructions: Answer any five questions in about 150 words each. Each question carries six marks.	(5 X 6 = 30 Marks)
Question-1: Show that $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$ using truth table.	
Question-2: The number of bags lost by a small airline per week is approximately normally distributed with a mean of 427 bags and a standard deviation of 35 bags. What is the probability that they lose exactly 430 bags next week?	
Question-3: Prove that the sum of the n first odd positive integers is n^2 , i.e., $1 + 3 + 5 + \dots + (2n - 1) = n^2$.	
Question-4: Prove that a) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ b) $(A \cap B)' = A' \cup B'$	
Question-5: A bowl contains 10 red and 10 yellow balls a) How many balls must be selected to ensure 3 balls of the same color? b) How many balls must be selected to ensure 3 yellow balls?	
Question-6: a) How can this English sentence be translated into a logical expression? “You can access the Internet from campus only if you are a computer science major or you are not a freshman.” b) Let p be the statement “Maria learns discrete mathematics.” and q the statement “Maria will find a good job.” Express the statement $p \rightarrow q$ as a statement in English.	
Question-7: a) Define Data and Data types. b) Differentiate between discrete data and continuous data with example.	
Question-8: Prove that $\sqrt{2}$ is irrational (i.e., $\sqrt{2}$ cannot be written as a quotient of two positive integers) using the well-ordering principle.	

Question-9 a) Find the in degree and out degree and total degree of each vertex of the following



b) For the graph G shown below, draw the subgraphs (i) G-e (ii) G-a (iii) G-b



Question-10: What are the contra positive, the converse and the inverse of the conditional statement “If you work hard then you will be rewarded”

SECTION-B (LONG ANSWER TYPE QUESTIONS)

Instructions: Answer any FOUR questions in detail. Each question carries 10 marks.

(4 X 10 = 40 Marks)

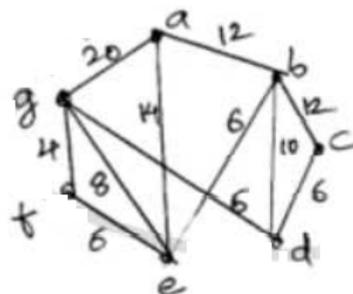
Question-11: Use the rules of inference to construct a valid argument showing that the conclusion

“Someone who passed the first exam has not read the book.”
follows from the premises

“A student in this class has not read the book.”

“Everyone in this class passed the first exam.”

Question-12: Use Dijkstra’s algorithm to find the length of the shortest path from a vertex ‘a’ to a vertex ‘d’.



Question-13: Most graduate schools of business require applicants for admission

to take the Graduate Management Admission Council's GMAT examination. Scores on the GMAT are roughly normally distributed with a mean of 527 and a standard deviation of 112. What is the probability of an individual scoring above 500 on the GMAT .

Question-14: Consider

Premises: If Claghorn has wide support, then he'll be asked to run for the senate. If Claghorn yells "Eureka" in Iowa, he will not be asked to run for the senate. Claghorn yells "Eureka" in Iowa.

Conclusion: Claghorn does not have wide support.

Determine whether the conclusion follows logically from the premises. Explain by representing the statements symbolically

Question-15: In a class of 25 students 12 have taken Mathematics, 8 have taken Mathematics but not Biology. Find the number of students who have taken Mathematics and Biology and those who have taken Biology but not Mathematics.

Question-16: Calculate Standard Deviation for the following discrete data:

Items	5	15	25	35
Frequency	2	1	1	3

Question-17: The probability of a horse A winning a race is $\frac{1}{5}$ and the probability of a horse B winning the same is $\frac{1}{4}$. What is the probability that (i) either of them will win (ii) none of them will win?

Question-18: Use Prim's algorithm to find minimal spanning tree

