Reg.No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER MCA END SEMESTER EXAMINATION FEBRUARY 2021

SUBJECT: COMPUTATIONAL MATHEMATICS [MAT 4151]

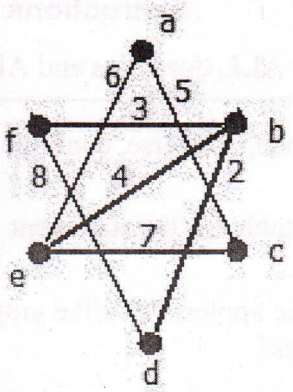
Date of Exam: **22-02-2021** Time of Exam: **2pm-5pm**

Max. Marks: 50 Time: 3 Hours

Instructions to Candidates:

- Answer **ALL** questions and All 5 questions carry equal marks.

1A.	i) Write the inverse, converse, contrapositive of the statement $(P \wedge Q) \rightarrow R$ ii) Find the truth table for the statement $\neg P \rightarrow (\neg Q \wedge P)$	**4**
1B.	If 65% of students like apples, 75% like grapes then what percentage of students like both apples and grapes?	**3**
1C.	Show that the set B = {2, 4, 6, 8} is an abelian group with respect to multiplication modulo10	**3**
2A.	There are three bags: first containing 1 white, 2 red, 3 green balls: second containing 2 white, 3 red, 1 green balls and third containing 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Find the probability that the balls are so drawn came from the second bag.	**4**
2B.	Find the identity element and inverse element for the group $(\mathbb{R} - \{0\}, *)$ defined by $(a * b) = \frac{ab}{2}$	**3**
2C.	Two defective tubes are mixed up with two good ones. The tubes are tested, one by one, until both defectives are found. What is the probability that the last defective tube is obtained on (a) the second test, (b) the third test and (c) the fourth test ?	**3**
3A.	Check whether the statement $\left[\left((P \wedge Q) \vee (\neg P \vee (\neg Q \wedge \neg R))\right) \wedge (\neg P \wedge \neg Q)\right] \leftrightarrows \neg(P \wedge R)$ is a tautology or contradiction or satisfiable.	**4**
3B.	From 6 positive and 8 negative numbers, 4 numbers are chosen at random(without replacement) and multiplied. What is the probability that the product is positive ?	**3**
3C.	In a survey of 60 people it is found that 25 like to drink milk, 26 coffee and 26 tea. Also 9 of them like both tea and milk, 11 like milk and coffee, 8 like coffee and tea, 8 like none of the three. Using Venn diagram, i) find the number of people who like all the three drink ii) find the number of people who like exactly one of the three drink.	**3**
4A.	Define the following with an example i)Isomorphic graphs ii) regular graph iii) planar graph iv) Tree	**4**

4B.	A function is defined as $f(x) = \begin{cases} 0, & if\ x < 1 \\ \frac{2}{7}(x+2), & if\ 1 \le x \le 2 \\ 0, & if\ x > 2 \end{cases}$ (a) Show that *f(x)* is a probability density function (*pdf*) (b) Find cumulative distribution function(*cdf*) (c) Find mean and variance	**3**
4C.	Prove that for any Graph G with six vertices, G or $\overline{G}$ contains a triangle.	**3**
5A.	Show that H = {1, 2, 4} is a sub group of G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7.	**4**
5B.	How many of the first thousand positive integers have distinct digits?	**3**
5C.	Find the minimal spanning tree of the following graph using Kruskal algorithm 	**3**