MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH. (CCE/CSE/ICT)
END SEMESTER EXAMINATIONS, JANUARY 2022
SUBJECT: ENGINEERING MATHEMATICS III [MAT 2155]
REVISED CREDIT SYSTEM
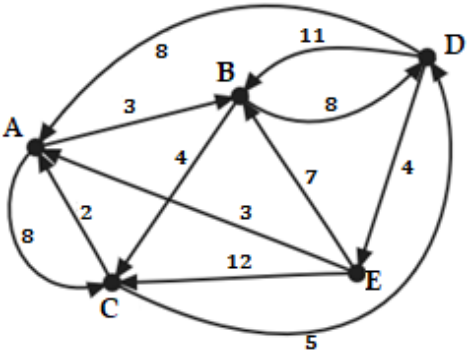
PART B

Time: 1 Hour 15 Minutes   Date: 27-01-2022   Max. Marks: 20

Instructions to Candidates:

❖ Answer **ALL** the questions.
❖ Missing data may be suitably assumed.

1.	Let $(A, \vee, \wedge, ^-)$ be a Boolean algebra, and $b \in L$. Show that if $a_1, a_2, \ldots, a_k$ are all those atoms of A such that $a_i \leq b$, $i = 1, \ldots, k$, then $$b = a_1 \vee a_2 \vee \cdots \vee a_k.$$	**3**
2.	Show that the number of partitions of n into exactly k parts equals the number of partitions of $n - k$ in which no part is larger than k.	**3**
3.	(i) Prove that in a group, every element has a unique inverse. (ii) If H is a subgroup of a finite group G, show that any two left cosets of H are either identical or disjoint.	**3**
4.	Show that a connected graph is bipartite if and only if it has no odd cycles.	**3**
5.	(i) Demonstrate that r is a valid inference from the premises $p \to q$, $q \to r$, and p. (ii) Show that $(\exists x)M(x)$ follows logically from the premises $(\forall x)[H(x) \to M(x)]$ and $(\exists x)H(x)$.	**4**
6.	Using Dijkstra's algorithm, find the shortest paths from **A** to all the other vertices. 	**4**