Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
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A Constituent Institution of Manipal University

III SEMESTER B.TECH. (CS/ICT/CC- ENGINEERING)

END SEMESTER MAKE UPEXAMINATIONS, JAN 2017

SUBJECT: ENGINEERING MATHEMATICS III [MAT 2105]

REVISED CREDIT SYSTEM
(11/11/2015)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	Let $E(x_1,x_2,x_3)=(x_1 \wedge x_2)\vee(x_1 \wedge x_3)\vee(\overline{x_2} \wedge x_3)$ be a Boolean expression over the two-valued Boolean algebra. Write $E(x_1,x_2,x_3)$ in both DNF and CNF.	**4 Marks**
1B.	In a Boolean lattice $(A,\le)$, for any elements $a,b \in A$, prove that (i) $\overline{a \wedge b}=\overline{a}\vee\overline{b}$ (ii) $\overline{a \vee b}=\overline{a}\wedge\overline{b}.$	**3 Marks**
1C.	If the meet operation is distributive over the join operation in a lattice, then prove that the join operation is also distributive over the meet operation.	**3 Marks**
2A.	Prove that the number of partitions of n in which no integer occurs more than twice as a part is equal to the number of partitions of n into parts not divisible by 3.	**4 Marks**
2B.	For $n=5$ and marks $1,2,3,4,5$ with initial permutation 12345, obtain the 35th and 100th permutations in a) Lexicographical order b) Fike's order.	**3 Marks**
2C.	Find the r-digit number of ternary sequences with digits 0, 1, 2, that contains at least one 0, at least one 1, and at least one 2.	**3 Marks**
3A.	In the following network, find the shortest distance to the vertices A,C,D,E from B using Dijkshtra's Algorithm.	**4 Marks**

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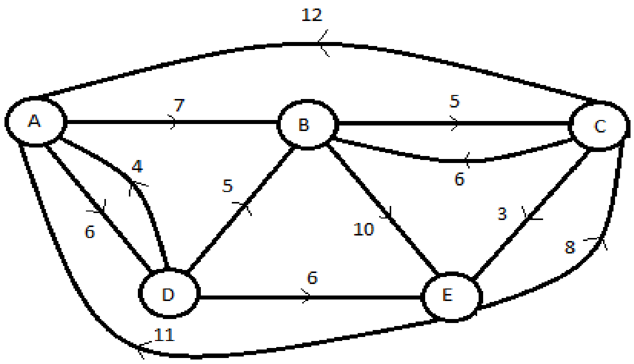

3B.	Show that, if diameter of $\overline{G}$ is greater than or equal to 3 then diameter of G is less than or equal to 3. Hence show that diameter of a self-complementary graph is either 2 or 3.	**3 Marks**
3C.	Show that a graph G is a tree if and only if between every pair of vertices there exists a unique path.	**3 Marks**
4A.	If A works hard, then either B or C will enjoy themselves. If B enjoys himself, then A will not work hard. If D enjoys himself, then C will not enjoy himself. Therefore, if A works hard, then D will not enjoy himself. Show that these statements constitute a valid argument.	**4 Marks**
4B.	Show that the number of partitions of n is equal to the number of partitions of $2n$ which have exactly n parts.	**3 Marks**
4C.	Prove that a nonempty subset H of a group $(G,*)$ is a subgroup of G if and only if $a*b^{-1}\in H$ for every $a,b\in H$.	**3 Marks**
5A.	Show that from $(\exists x)[F(x)\wedge S(x)]\rightarrow(\forall y)[M(y)\rightarrow W(y)]$ and $(\exists y)[M(y)\wedge\neg W(y)]$ the conclusion $(\forall x)[F(x)\rightarrow\neg S(x)]$ follows.	**4 Marks**
5B.	Show that every group of prime order is abelian.	**3 Marks**
5C.	Prove that, any two left cosets of H in G have same number of elements.	**3 Marks**