



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



III SEMESTER B.TECH (CSE/ I&CT/CC)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ENGINEERING MATHEMATICS III [MAT 2105]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

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

	Express the Boolean expression						
1A.	$E(x_1, x_2, x_3) = x_1 \wedge \overline{((x_1 \wedge \overline{x_3}) \vee (\overline{x_1} \wedge x_2 \wedge x_3))}$ in both conjunctive and						
	disjunctive normal forms.						
1B.	Use a generating function to count all selections of 6 objects from 3 types of objects with repetition up to 4 times of each type. Also model the problem with unlimited repetition.	3					
1C.	Show that any group with at most 5 elements is abelian.	3					
2A.	Define the complement \overline{G} of a graph <i>G</i> . Prove that, for any graph <i>G</i> with 6 vertices, either <i>G</i> or \overline{G} has a triangle.						
2B.	Show that the formula $Q \lor (P \land \neg Q) \lor (\neg P \land \neg Q)$ is a tautology.						
2C.	Prove that the number of partitions of n in which no integer occurs more than twice is equal to the number of partitions of n in which no part is divisible by 3.	3					
3A.	The subgroup N of a group G is a normal subgroup of G iff every left coset of N in G is same as a right coset of N in G.	4					
3B.	Prove that, if the join operation is distributive over the meet operation in a lattice then the meet operation is distributive over the join operation.	3					
3C.	Show that in a simple graph G with at least 2 vertices, there are at least 2 vertices of the same degree.	3					
4A.	Let a,b,c be elements in a lattice (A,\leq) . Show that	4					

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	i) $a \lor (b \land c) \le (a \lor b) \land (a \lor b)$	$a \lor c$)										
	ii) $(a \wedge b) \lor (a \wedge c) \le a \land (a \wedge c) < a \land (a \land (a \land c) < a \land (a \land c) <$	$b \lor c)$										
4B.	Prove that the number of partitions of an integer n with no part greater than k is equal to the number of partitions of n with at most k parts.									3		
4C.	Show that $S \lor R$ is tautologic	ally implie	es by	у (Р	$P \lor Q$)^($P \rightarrow$	R) /	\(<i>Q</i>	$\rightarrow S$)	3
5A.	For the following network, in shortest path from A to all oth corresponding spanning tree.	nplement her vertice			e gr			n to raw	the			4
5B.	Let (G,*) be a group. For a	any a, b in	G,	(a *	b) ⁻¹	= b ⁻	⁻¹ * a	-1				3
5C.	a) Give an example for a selb) Show that a self-compliment	f-complinentary gra	nent ph l	ary nas 4	grap 4 <i>n</i> c	oh. or 4	<i>n</i> +1	ver	tice	s.		3