



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



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

END SEMESTER MAKE-UP EXAMINATIONS, DEC 2015/JAN 2016

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.

1A.	Show that a lattice (A, \leq) is distributive iff for any elements a, b, c in the lattice, we have $(a \lor b) \land c \leq a \lor (b \land c)$.	4					
1 B .	Find the number of five digit numbers formed by permuting the digits $0,1,2,3,4$ that are divisible by 4.						
1C.	Let $(G,*)$ be a group and H be a nonempty subset of G. Then prove that $(H,*)$ is a subgroup of G iff for any $a,b \in H$, $a*b^{-1} \in H$.	3					
2A.	If G is a tree with p vertices and q edges, then prove that G is connected and $p = q+1$.						
2 B .	Show that $(P \land \neg Q) \lor Q \lor (\neg P \land Q) \Leftrightarrow P \lor Q$.	3					
2C.	How many of the first 1000 integers are not divisible by 2, 3, 5 or 7?	3					
3A.	Prove that there is a one to one correspondence between the elements of a subgroup and the elements of the left coset.	4					
3B.	Prove that in a distributive lattice, if an element has a complement then this complement is unique. Give an example of a distributive lattice.	3					
3C.	Prove that every tree has either one or two centers.	3					

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	4A.	A. time with unrestricted repetition is ${}^{n+m-1}C_m$. Also find the number of compositions of a positive integer <i>n</i> into exactly m parts.											4	
	4B .	For the following network, implement Dikjstra's algorithm to find the shortest path from a to all other vertices in the graph. Draw the corresponding spanning tree.												3
	4C.	Show the following equivalation $P \lor (P \land Q) \Leftrightarrow P$ b)	Alences: $P \lor (\neg P \land Q) \lt$	$\Rightarrow P$	$\vee Q$.									3
	5A.	How many permutations o is not in the k^{th} position?	f 1, 2, 3,	, n a	re tl	nere	inv	whic	ch th	ne n	umt	oer k	C	4
	5B.	Show that every subgrou	up H of a	cycl	ic g	grou	рC	ð is	сус	clic.				3
	5C.	Define degree of a vertex. in a graph G is an even man even number of vertices	Show that th umber. Henc 3.	ie su e, sl	im c now	of th tha	e de t ev	egre	es o cubi	f ve ic gi	rtice raph	es has	8	3