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GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER- III EXAMINATION - SUMMER - 2018

Subject Code:3630001Date:21/05Subject Name: Basic MathematicsTime:02.30 pm to 05.00 pmTotal MathematicsTotal Mathematics		Code:3630001 Date:21/05/20	0ate:21/05/2018	
		70		
Insu	1. 2. 3.	s: Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.		
Q.1	(a)	Define the following a) Power set b) Skew symmetric matrix c) Partially ordered set d) Elementary Path e) Complete binary tree f) Union of two sets g) Transpose of a matrix	07	
	(b)(i) (ii)	Express the following using predicates, quantifiers and logical connectives. Also verify the validity of consequence: Everyone who graduates get a job. Ram is graduated Therefore, Ram got a job. Define Isomorphic graph with example?	04	
02	(9)	Verify that $(AB)C = A(BC)$ for the following matrices	07	
Q.2 A = [7	(a) 5	-7 -1 3 -5 5 4 7	07	
	-9 (b)(i)	 5] B = [4 -6 8] C = [8 3 1] 4 6 7 9 -8 -2 -2 -3 -4 With proper justification give an example of a) A bounded lattice which is complemented but not distributive. b) A bounded lattice which is distributive but not complemented. c) A bounded lattice which is both distributive and complemented 	03	
	(ii)	Draw Hasse- diagram for the following : i) $< S_{150}$, D > ii) $< S_{90}$, D >	04	
	(b)	OR Using mathematical induction show that if n is a positive integer, then $(n+1)(2n+1)$	07	
		$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{(n+1)(2n+1)}{6}$		
Q.3	(a)	Define Lower bound and Upper bound. Let P = < 2, 3, 5, 6, 9, 15, 24, 45}, D> be a poset. Draw the Hasse diagram. Find i) Maximal element. & minimal element. ii) The greatest and least element. iii) upper bound of { 9, 15 }, and l.u.b of {9,15}	07	
	(h)	iv) lower bound of {15,24} and g.l.b of {15,24} (i) Construct the truth table for the following formula	04	
	(0)	(i) Construct the train table for the following formula: ~ (\mathbf{pVq}) \Leftrightarrow (~ $\mathbf{p\Lambda}$ ~ \mathbf{q}) (ii) Prove by using direct proof method that if for all integers x , if x is odd then x ² is odd	03	

Q.3 (a) Define Subgroup of a group. Show that $\langle Z_6, +_6 \rangle$ is a cyclic group of order 6 07

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- (b) "A computer company receives 350 applications from computer graduates 07 or a job planning a line of new web servers. Suppose that 220 of these people majored in computer science, 147 majored in business, and 51 majored both in computer science and in business. How many of these applicants major neither in computer science nor in business. "
- Q.4 (a) Define equivalence relation. 07 Let Z be the set of integers and R be the relation called "Congruence modulo 5" defined by $R = \{ \langle x, y \rangle | (x - y) \text{ is divisible by 5} \}$ Show that R is an equivalence relation. Determine the equivalence classes generated by the elements of Z.
 - (b) Define Graph, Loop, Out Degree, Tree, strong omponents, weak components. 07

OR

Q.4 (a) Define multigraph and complete graph with example? 07
 Let the compatibility relation on a set {1, 2, 3, 4, 5, 6} be given by following Matrix. Construct the graph and find the maximum compatibility blocks



(b) Can we say that any square Boolean matrix will definitely represent a directed 07 graph? What does a 4X4 unit matrix represent? Draw the graph corresponding to the following Boolean matrix

How many (>=0) cycles does this graph have? Write down all the cycles. Which single edge is to be deleted to convert this graph into cyclic

Q.5 (a) Define node base of a diagraph. State its properties. Find all node base of the diagraph given below: 07



(b) Give an abstract definition of graph. When are two simple graphs said to be isomorphic? Give an example of two simple digraphs having 4 nodes and 4 edges which are not isomorphic.

OR

Q.5 (a) Give other three representation of tree expressed by (v0(v1(v2)(v3)(v4))(v5(v6)(v7)(v8)(v9))(v10(v11)(v12))) obtain binary tree 07

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