Reg.No. _____________

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)

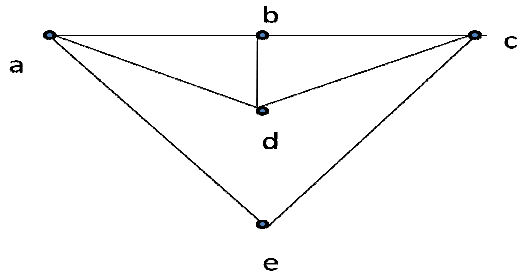
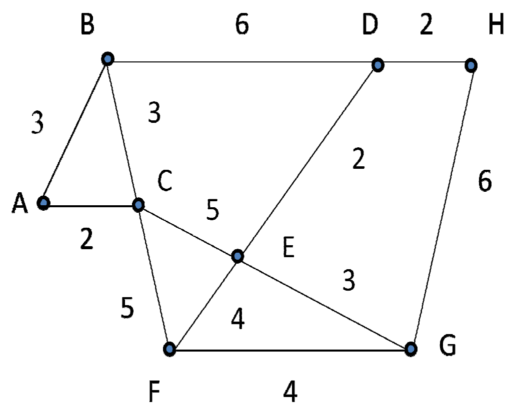
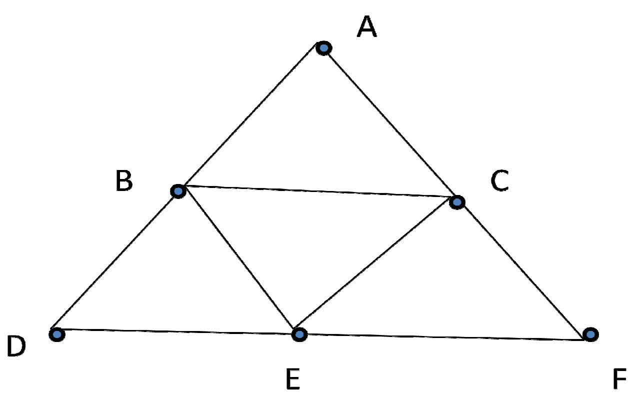
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

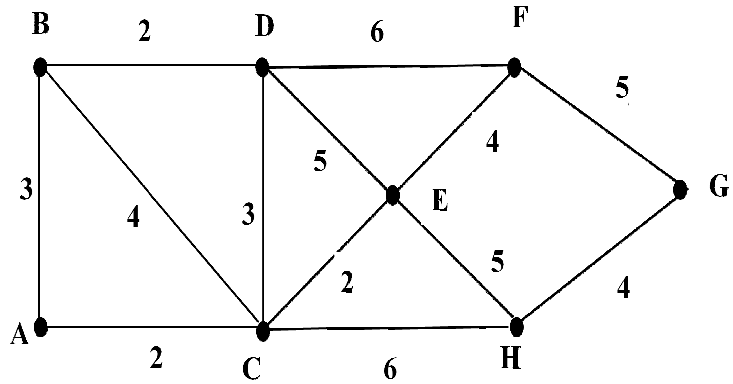
End Semester Examination – Nov/Dec – 2016

		Semester :	**2016-17 ODD**
Code :	**14MA2010**	**Duration :**	**3hrs**
Sub. Name :	**Discrete Mathematics**	**Max. marks :**	**100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	In a survey of 260 college students, the following data were obtained: 64 had taken a mathematics course, 94 had taken computer science course, 58 had taken business course, 28 had taken both mathematics and business course, 26 had taken both mathematics and computer science course, 22 had taken both computer science and business course and 14 had taken all the three types of courses. (i) How many students had not taken none of the three courses? (ii) Of the students surveyed how many had taken only computer science course?	COC1	**10**
	b.	Find GCD (190, 34) using Euclidean algorithm. Also find LCM (190, 34).	COC1	**10**
(OR)				
2.	a.	Let $A_1, A_2, ..., A_n$ be any n sets. Prove by mathematical induction that $\overline{\bigcup_{i=1}^{n} A_i} = \bigcap_{i=1}^{n} \overline{A_i}$	COC1	**10**
	b.	Solve $C_n = 3C_{n-1} - 2C_{n-2}$ with initial conditions $C_1 = 5$ and $C_2 = 3$.	COC1	**10**
3.	a.	Prove that $a \equiv b (\mathrm{mod}\, m)$ is an equivalence relation.	COC1	**8**
	b.	Let $A = \{1,2,3,4,8\}$ and the relation R is defined by $aRb, iff\ a \mid b$. Find R, domain, range, matrix representation, digraph, in degrees, out degrees of the relation R.	COC2	**12**
(OR)				
4.	a.	Let A = {a_1, a_2, a_3, a_4, a_5}. Let R be the relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$. Find (i) reflexive closure (ii) symmetric closure (iii) transitive closure using Warshall's algorithm. .	COC2	**15**
	b.	Let A = {1, 2, 3, 4, 5}. Let M_R and M_S be the matrices of the relations R and S on A given below. Compute (i) $M_{\overline{S}}$, (ii) $M_{R^{-1}}$, (iii) $M_{R\cup S}$, (iv) $M_{R\cap S}$. $M_R = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 \end{bmatrix}$, $M_S = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 \end{bmatrix}$	COC2	**5**
5.	a.	Prove that $(P(A), \subseteq)$ is a partially ordered set for any set A.	COC2	**8**

	b.	Draw the Hasse Diagram of the poset ({1, 2, 3, 4, 5, 6, 10, 12, 15, 30, 60}, /).	COC2	**12**
		(OR)		
6.	a.	Determine whether (D_{30}, /) is a lattice. Also find complements of each element.	COC2	**12**
	b.	Construct the truth table and draw the logic diagram for the Boolean polynomial $p(x_1, x_2, x_3) = (x_1 \wedge x_2) \vee (x_1 \vee (x_2' \wedge x_3))$	COC2	**8**
7.	a.	Construct a spanning tree for the connected graph given below. Use 'c' as root. 	COC3	**8**
	b.	Using Prim's algorithm, find the minimal spanning tree for the graph given below. 	COC3	**12**
		(OR)		
8.	a.	Use Fleury's Algorithm to find an Euler circuit for the graph given below. 	COC3	**15**
	b.	Find a minimum Hamiltonian circuit for the graph given below.	COC3	**5**



		<u>Compulsory:</u>		
9.	a.	Let $H = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ be a parity check matrix. Determine the (3,6) group code function $e_H : B^3 \to B^6$.	COC2	**12**
	b.	Let G be the set of nonzero real numbers and let $a * b = \frac{ab}{2}$. Show that $(G,*)$ is an abelian group.	COC3	**8**

Course Outcome :

COC1: Students will be able to develop the fundamental ideas of discrete mathematics.

COC2 : Students are able to understand the concepts of coding and decoding.

COC3: Students are able to develop modeling for computer science and engineering problems.

ALL THE BEST