Reg.No. _____

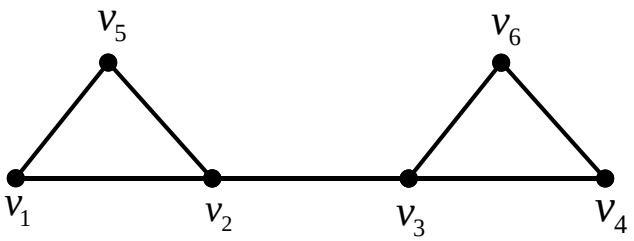
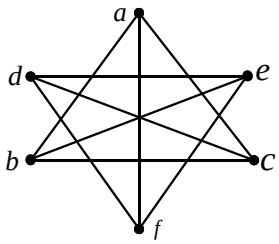
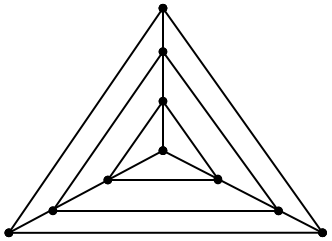
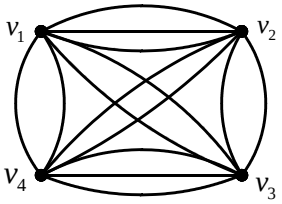
Karunya UNIVERSITY

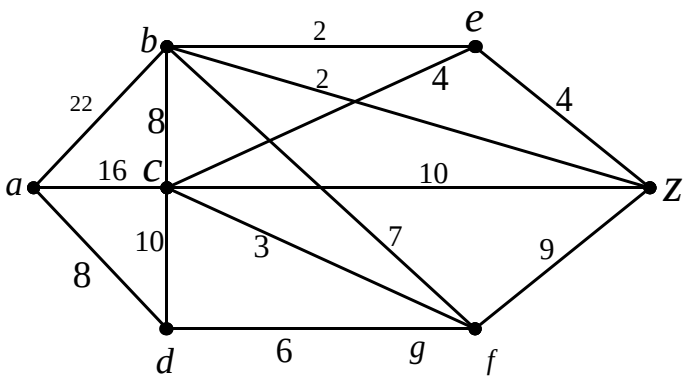
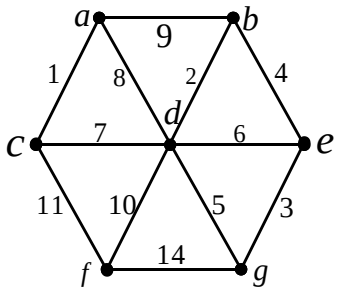
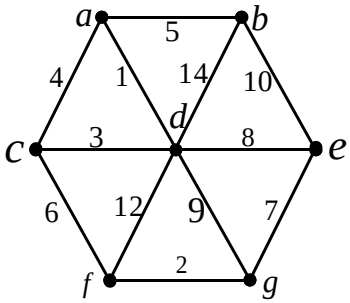
(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

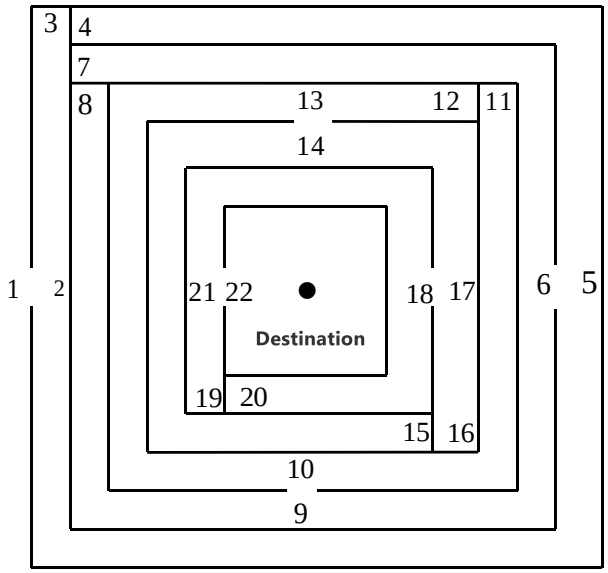
End Semester Examination – Nov/Dec – 2016

Code : 14MA3010 **Semester : 2016-17 ODD**
Sub. Name : Graph theory and algorithms **Duration : 3hrs**
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Define unicursal graph and hence prove that in a connected graph G with exactly 2k odd vertices there exists a k edge – disjoint subgraphs such that they together contain all edges of G and each is a unicursal graph	C1	**10**
	b.	Draw all the spanning trees of the following graph shown below 	C1	**10**
		(OR)		
2.	a.	Given the adjacency matrix $X(G)$ of the graph G, draw the graph G, give five observations on $X(G)$ also find X^2 and give three observations. $$\begin{array}{c} \\ v_1 \\ v_2 \\ v_3 \\ v_4 \\ v_5 \\ v_6 \end{array} \begin{array}{c} \begin{array}{cccccc} v_1 & v_2 & v_3 & v_4 & v_5 & v_6 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \end{bmatrix} \end{array}$$	C1	**20**
3.	a.	Prove that K_5 and $K_{3,3}$ are nonplanar, with diagrams.	C1	**20**
		(OR)		
4.	a.	State and prove five colour theorem. What is the chromatic number of the graph given below, assign a proper colouring of your choice.   	C1	**20**
5.	a.	Using Dijkstra's algorithm find the shortest path between the vertices a to the vertex z for the graph given below.	C2	**20**

				
		(OR)		
6.	a.	Give the Kruskal's algorithm and hence find the minimum spanning tree for the given weighted graph. 	C2	10
	b.	Give the Prim's algorithm and hence find the minimum spanning tree for the given weighted graph. 	C2	10
7.	a.	Solve the following LPP by graphical method $Min\,Z = -6X_1 - 4X_2$ Subject to $2X_1 + 3X_2 \geq 30$ $3X_1 + 2X_2 \leq 24$ $X_1 + X_2 \geq 3$ $X_1, X_2 \geq 0$	C3	**10**
	b.	Using simplex method solve the LPP $Min\,Z = X_1 - 3X_2 + 2X_3$ Subject to $3X_1 - X_2 + 2X_3 \leq 7$ $-2X_1 + 4X_2 \leq 12$ $-4X_1 + 3X_2 + 8X_3 \leq 10$ $X_1, X_2, X_3 \geq 0$	C3	**10**
		(OR)		
8.	a.	Solve the following LPP by graphical method $Max\,Z = 100X_1 + 40X_2$	C3	**10**

		Subject to $5X_1 + 2X_2 \le 1000$ $3X_1 + 2X_2 \le 900$ $X_1 + 2X_2 \le 500$ $X_1, X_2 \ge 0$		
	b.	Using simplex method solve the LPP $Max\, Z = X_1 + 4X_2 + 5X_3$ Subject to $3X_1 + 6X_2 + 3X_3 \le 22$ $X_1 + 2X_2 + 3X_3 \le 14$ $3X_1 + 2X_2 \le 14$ $X_1, X_2, X_3 \ge 0$	C3	**10**
		Compulsory:		
9.	a.	Represent the maze given below by means of a graph such that a vertex denotes either a corridor or a dead end, as numbered. An edge represents a possible path between two vertices. Solve the maze.  	C1	**10**
	b.	Draw a graph with 36 vertices representing the squares of a chessboard. Join these vertices appropriately by edges, each representing a move of the knight. Find the degree of each vertex.	C1	**10**

ALL THE BEST