CS 5V81.012 -IMPLEMENTATION OF DATA STRUCTURES AND ALGORITHMS
MANDATORY PROJECT 4 - CRITICAL PATHS

OBJECTIVE:

To find the critical tasks and to enumerate all critical paths in the given graph.

CRITICAL PATH:

A path from a source to a destination is said to be critical if all nodes along the path are critical nodes.

Critical node:

A node is said to be critical if its earliest completion time is equal to its latest completion time.

ALGORITHM:

1. Add a dummy source and connect it to all the nodes having no incoming edges.
2. Add a dummy destination and connect all the nodes having no outgoing edges to it.
3. Calculate the earliest completion time of the tasks
4. Calculate the latest completion time of the tasks
5. Compute the critical nodes (nodes having earliest completion time equal to latest completion time)
6. Construct the critical graph containing only critical nodes and tight edges
7. Enumerate all possible paths from source to destination in critical graph

ANALYSIS OF RUNNING TIME FOR VARIOUS INPUT GRAPHS:

Input	# Vertices	#Edges	Time to enumerate all critical paths (msec)
in.txt	9	12	2
pert.10.15.txt	10	15	3
pert.100.150.txt	100	150	8
pert.100.500.txt	100	500	7
pert.1000.5000.txt	1000	5000	34
For input with many critical paths given in website	32	78	12