**Practical 4: For a given network find the following: (i) Length of the shortest path from a given node to another node; (ii) the density of the graph**

Code:

library(igraph)

# creating a matrix from a table

matt <- as.matrix(read.table(text=

                             "node  R  S  T  U

                             R  7  5  0  0

                             S  7  0  0  2

                             T  0  6  0  0

                             U  4  0  1  0", header=T))

# storing the row names in nms and removing the first column

nms <- matt[,1]

matt <- matt[, -1]

# setting the column and row names to be the same

colnames(matt) <- rownames(matt) <- nms

# replacing NA values with 0

matt[is.na(matt)] <- 0

# creating a weighted graph from the matrix

g <- graph.adjacency(matt, weighted=TRUE)

# plotting the graph

plot(g)

# calculating the shortest paths between all pairs of nodes

s.paths <- shortest.paths(g, algorithm = "dijkstra")

print(s.paths)

# calculating the shortest path between R and S

shortest.paths(g, v="R", to="S")

# plotting the graph with edge weights as labels

plot(g, edge.label=E(g)$weight)

# calculating the density of the graph

dg <- graph.formula(1-+2, 1-+3, 2++3)

plot(dg)

graph.density(dg, loops=TRUE)

graph.density(simplify(dg), loops=FALSE)

**OUTPUT**

