```
% Number of nodes
N = 25; % Change this value as per your requirement

% Weights for each edge
weights = rand(N) * 10; % Random weights from 0 to 10

% Adjacency matrix
adjMatrix = weights + weights'- diag(diag(weights + weights'));
G = graph(adjMatrix);

% Visualize the network with customized node color
nodeColor = 'red';
figure;
plot(G, 'NodeColor', nodeColor);


% Calculate Degree Centrality
degreeCentrality = centrality(G, 'degree');
disp('Degree Centrality:');
disp(degreeCentrality);



%Calculate ShortestPath
shortestPaths = distances(G);
disp('Shortest Paths:');
disp(shortestPaths);

%Calculate Betweenness Centrality
betweennessCentrality = centrality(G, 'betweenness');
disp('Betweenness Centrality:');
disp(betweennessCentrality);

%Calculate Network Diameter
diameter = max(max(shortestPaths));
disp('Network Diameter:');
disp(diameter);

%Calculate Closeness Centrality
closenessCentrality = centrality(G, 'closeness');
disp('Closeness Centrality:');
disp(closenessCentrality);

%Example groups
group = [1 2 1 2 1];

%Calcualte Network Modularity
[Q,Qv] = modularity(adjMatrix,group);
disp('Modularity:');
disp(Q);


%Calculate Network Resilience
resilience = zeros(N, 1);
for i = 1:N
    tempAdjMatrix = adjMatrix;
    tempAdjMatrix(i, :) = 0;  % Remove node i and its connections
    tempAdjMatrix(:, i) = 0;
    [bins, ~] = conncomp(graph(tempAdjMatrix));
```

```
    resilience(i) = max(bins);  % Measure connectivity
end

disp('Resilience Index:');
disp(resilience);
```

```
Degree Centrality:
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
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    24
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    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24
    24

Shortest Paths:
  Columns 1 through 7

         0   11.5259    8.4707   10.8826    4.1072    9.1569    9.1627
   11.5259         0    5.2152    7.0488    7.4187   10.8232    8.9731
    8.4707    5.2152         0    4.7480   10.2260    6.7073    9.7602
   10.8826    7.0488    4.7480         0    8.0996    6.2360    9.7135
    4.1072    7.4187   10.2260    8.0996         0   10.1218    9.5517
    9.1569   10.8232    6.7073    6.2360   10.1218         0   11.6139
    9.1627    8.9731    9.7602    9.7135    9.5517   11.6139         0
   11.1810    8.7509    6.4502    1.7022    9.6803    7.9381   11.4157
    5.1532    9.7715    5.1406    5.8592    6.1180    4.0037   12.8883
    8.7412    8.6268    6.9124    7.8371    9.5996    8.7701    9.6605
   10.8963    9.0110    9.9123    8.8426    7.0596    9.0042    8.1679
    7.5274    7.4131    8.1262    8.6456    8.3858    7.5564    8.4467
    5.7188    7.8396    8.7810    9.8096    7.9476   11.1126    3.4439
    9.9008    6.2239   11.2573    8.5345    5.7936   11.2422   11.6556
    6.8956    5.0104    5.9116    4.8419    7.3286   11.0779    6.2769
    5.5161    9.1679    3.9527    8.2744    6.2733    8.9789   10.9670
    8.7858    6.9005    7.8017    6.7320    9.2187   11.8166    8.1670
    8.6420    5.5679    8.4609    3.7129    4.5348    5.6132    6.0007
    8.8898    7.0045    7.9058    6.8361    6.7827   10.0241    4.2827
    7.3000    4.2259    8.2621    5.0549    3.1928    6.9552    7.3427
   10.7647    8.8784   10.2131    9.1434    7.8453    9.6152    7.2927
   10.1568    6.5001    1.8263    6.5743   10.5876    8.3397   10.3565
    9.6953    8.1870    6.0651    1.3171    7.1540    4.9188    8.6198
```

```
  7.7913    6.7979   10.4749    6.0980    5.7648    8.9575    8.4123
  6.4988    9.2643    4.0491    7.2048    7.4636    2.6582   11.6486

Columns 8 through 14

 11.1810    5.1532    8.7412   10.8963    7.5274    5.7188    9.9008
  8.7509    9.7715    8.6268    9.0110    7.4131    7.8396    6.2239
  6.4502    5.1406    6.9124    9.9123    8.1262    8.7810   11.2573
  1.7022    5.8592    7.8371    8.8426    8.6456    9.8096    8.5345
  9.6803    6.1180    9.5996    7.0596    8.3858    7.9476    5.7936
  7.9381    4.0037    8.7701    9.0042    7.5564   11.1126   11.2422
 11.4157   12.8883    9.6605    8.1679    8.4467    3.4439   11.6556
       0    7.5614    9.5392   10.5447   10.3478   11.5118   10.2366
  7.5614         0    7.2881   11.3542    8.4588    9.8000    9.8586
  9.5392    7.2881         0    6.9696    1.2138    6.9639    5.9726
 10.5447   11.3542    6.9696         0    5.7558    6.6015   11.1058
 10.3478    8.4588    1.2138    5.7558         0    5.7502    7.1863
 11.5118    9.8000    6.9639    6.6015    5.7502         0    9.0677
 10.2366    9.8586    5.9726   11.1058    7.1863    9.0677         0
  6.5441    8.9515    6.1673    4.0007    7.3810    9.2280    9.2189
  7.4859    8.5798   10.8651    9.9265   12.0789   11.2349    8.7424
  7.6844   10.3869    4.2771    5.8908    5.4909   11.1181    7.4331
  5.4150    6.8876    7.7487    9.6952    6.5350    6.0967    5.6550
  8.5382    8.7115    8.1614    5.9949    9.3752    7.7265   11.2130
  6.7570    5.5457    6.4068    8.8333    5.1930    4.7547    4.3130
 10.8456    5.6115   10.4688    8.3022    9.8455    6.8045    4.9173
  8.2764    6.9669    5.0862    8.0860    6.2999    6.9547    9.4311
  3.0193    4.5421    6.5199   10.1597    7.3285    8.7159    7.2173
  7.6720    8.1177    7.6474    8.5152    6.4336    4.9685    6.8850
  8.9070    1.3456    8.3270   11.6624    7.1132    8.4544    8.5840

Columns 15 through 21

  6.8956    5.5161    8.7858    8.6420    8.8898    7.3000   10.7647
  5.0104    9.1679    6.9005    5.5679    7.0045    4.2259    8.8784
  5.9116    3.9527    7.8017    8.4609    7.9058    8.2621   10.2131
  4.8419    8.2744    6.7320    3.7129    6.8361    5.0549    9.1434
  7.3286    6.2733    9.2187    4.5348    6.7827    3.1928    7.8453
 11.0779    8.9789   11.8166    5.6132   10.0241    6.9552    9.6152
  6.2769   10.9670    8.1670    6.0007    4.2827    7.3427    7.2927
  6.5441    7.4859    7.6844    5.4150    8.5382    6.7570   10.8456
  8.9515    8.5798   10.3869    6.8876    8.7115    5.5457    5.6115
  6.1673   10.8651    4.2771    7.7487    8.1614    6.4068   10.4688
  4.0007    9.9265    5.8908    9.6952    5.9949    8.8333    8.3022
  7.3810   12.0789    5.4909    6.5350    9.3752    5.1930    9.8455
  9.2280   11.2349   11.1181    6.0967    7.7265    4.7547    6.8045
  9.2189    8.7424    7.4331    5.6550   11.2130    4.3130    4.9173
       0    8.6785    1.8901    8.3732    1.9942    7.0312    4.3015
  8.6785         0    9.6706    9.9808    6.6843    8.6388   10.8660
  1.8901    9.6706         0   10.2633    3.8843    8.9213    6.1917
  8.3732    9.9808   10.2633         0    9.9115    1.3420    5.9945
  1.9942    6.6843    3.8843    9.9115         0    9.0253    6.2957
  7.0312    8.6388    8.9213    1.3420    9.0253         0    4.6525
  4.3015   10.8660    6.1917    5.9945    6.2957    4.6525         0
  4.0853    5.7790    5.9755    8.7368    6.0795    7.3948    8.3869
  6.1590    9.5915    8.0492    2.6191    7.2924    3.9611    8.6137
  9.6032   11.2108   11.4933    3.3442    8.9726    2.5720    7.2245
  9.3601    8.0018   11.2503    8.2332    7.3660    6.8912    6.9571

Columns 22 through 25
```

```
   10.1568    9.6953    7.7913    6.4988
    6.5001    8.1870    6.7979    9.2643
    1.8263    6.0651   10.4749    4.0491
    6.5743    1.3171    6.0980    7.2048
   10.5876    7.1540    5.7648    7.4636
    8.3397    4.9188    8.9575    2.6582
   10.3565    8.6198    8.4123   11.6486
    8.2764    3.0193    7.6720    8.9070
    6.9669    4.5421    8.1177    1.3456
    5.0862    6.5199    7.6474    8.3270
    8.0860   10.1597    8.5152   11.6624
    6.2999    7.3285    6.4336    7.1132
    6.9547    8.7159    4.9685    8.4544
    9.4311    7.2173    6.8850    8.5840
    4.0853    6.1590    9.6032    9.3601
    5.7790    9.5915   11.2108    8.0018
    5.9755    8.0492   11.4933   11.2503
    8.7368    2.6191    3.3442    8.2332
    6.0795    7.2924    8.9726    7.3660
    7.3948    3.9611    2.5720    6.8912
    8.3869    8.6137    7.2245    6.9571
         0    7.8914    9.9668    5.6815
    7.8914         0    4.7809    5.8877
    9.9668    4.7809         0    8.9464
    5.6815    5.8877    8.9464         0

Betweenness Centrality:
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0
     0

Network Diameter:
   12.8883

Closeness Centrality:
    0.0417
    0.0417
    0.0417
    0.0417
```

```
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
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    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417
    0.0417

Modularity:
    0.0107

Resilience Index:
     2
     2
     2
     2
     2
     2
     2
     2
     2
     2
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     2
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     2
     2
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     2
```

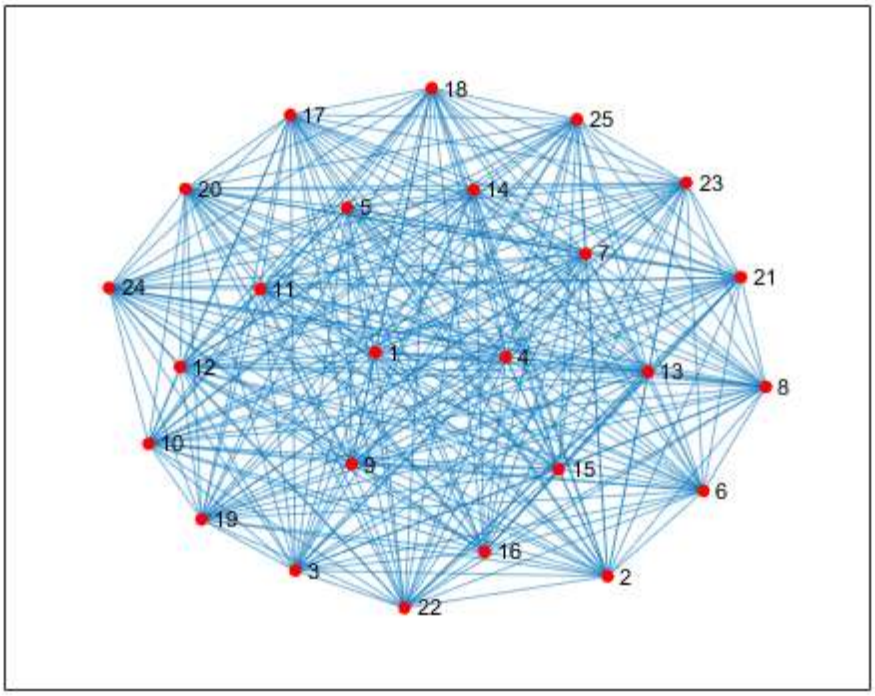

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