BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR
B.E. 3RD SEMESTER (IT) FINAL EXAMINATIONS, 2011
Graph Theory and Application (IT 304/4)

Full Marks: 35 **Time: 2 hrs**

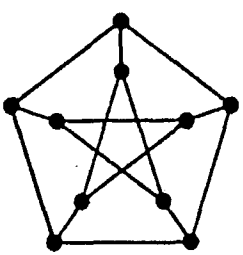
Answer any five questions

1. a) For which values of n, r, and s are the following graphs Eulerian?
   (i) the complete graph K_n
   (ii) a complete bipartite graph $K_{r,s}$. Explain. [5]
   b) Draw a graph in which an Euler line is also a Hamiltonian cycle. [2]

2. a) Define i) eccentricity of a vertex, ii) center of a graph, iii) radius of a graph, and iv) diameter of a graph. [1 x 4]
   b) What is a binary tree? [2]
   c) What is a free tree? [1]

3. a) Establish the relation between i) the rank of a connected graph G and the number of edges of a spanning tree of G, ii) the nullity of G and the number of chords of G. [2+2]
   b) Write the method to find all the spanning trees of a connected graph G. [3]

4. a) Draw the two Kuratowski graphs. [3]
   b) State the Kuratowski's theorem for planar graph. [2]
   c) Prove that the following graph is non-planar graph. [2]



5. Prove that the vertices any simple connected planar graph can be colored with five (or fewer) colors in such way that adjacent vertices are colored differently.[7]

6. Write the Breadth-First Search algorithm. Explain it with a simple graph. [7]