GRAPH THEORY

Tutorial – 3

1) Prove or Disprove:

   a) Every Eulerian bipartite graph has an even number of edges.

   b) Every Eulerian simple graph with an even number of vertices has an even number of edges.

2) Prove that, every n-vertex simple graph with no (r+1)-clique has at most $(1-1/r)n^2/2$ edges.

3) **The Turan graph $T_{n,r}$ is the complete r-partite graph with b partite sets of size (a+1) and (r–b) partite sets of size a, where**

   $a = \lfloor n/r \rfloor$ and b = n – ra.

   a) **Prove that,**
   $$e(T_{n,r}) = (1-1/r)n^2/2 - b(r-b)/(2r).$$

   b) **Prove that,**
   $$e(T_{n,r}) = {}^rC_2 + (n-r)(r-1) + e(T_{n-r,r}).$$