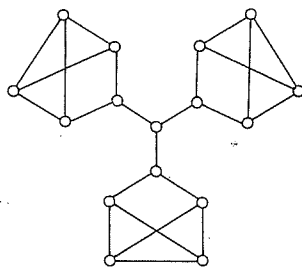


1. Give the definitions of the following terms. (30 points)
 - (a) Forest
 - (b) Independence number of a graph G , $\alpha(G)$
 - (c) Chromatic index of a graph G , $\chi'(G)$
 - (d) Dominating set of a graph G
 - (e) Crossing number of a graph G , $cr(G)$
 - (f) Random graph model, $G(n, p)$

2. Find a graph to satisfy the following conditions respectively. (30 points) (Explain your answers.)
 - (a) A tree T with $|T| = 11$ and $\Delta(T) = 3$.
 - (b) A graph G with $\alpha(G) = 4$ and the domination number of G , $\gamma(G) = 3$.
 - (c) A 4-regular graph G which has no 1-factors.
 - (d) A graph G of order 101 which contains no K_4 and G has the maximum number of edges.
 - (e) A connected graph G with $cr(G) = 2$.

3. Find $\alpha(G)$, $\chi'(G)$ and $\gamma(G)$ of the following graph G . (15 points) (Explain your answers.)



4. Choose three of the following six statements to prove them. (45 points)
 - (a) Let G be a connected planar graph with p vertices, q edges and f regions. Then $p - q + f = 2$.
 - (b) If n is odd, then $\chi'(K_n) = n$.
 - (c) A graph G is bipartite if and only if G contains no odd cycles.
 - (d) $R(3,4) = 9$.
 - (e) In random graph model, almost all graphs are of diameter 2.
 - (f) If G is a $2k$ -regular connected graph, then G contains k edge-disjoint 2-factors.