INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
MA20013 - Discrete Mathematics
Problem Sheet 3 Spring 2019

Problem 1. *Show that a graph G can not exist with vertices of degreees $2, 3, 4, 4$, and 5.*

Problem 2. *Let G be a graph of order $n \geq 2$, and suppose that for every vertex v of G, $deg(v) \geq \frac{(n-1)}{2}$. Prove that G is connected.*

Problem 3. *Prove that every $u-v$ trail contains a $u-v$ path, and every circuit contains a cycle.*

Problem 4. *Let G be a connected graph containing only even vertices. Prove that G cannot contain a bridge,*

Problem 5. *Give an example of a connected graph containing more bridges than the cut-vertices.*

Problem 6. *Give an example of a connected graph containing more cut-vertices than the bridges.*

Problem 7. *If G is a connected graph on n vertices other than the complete graph. If e is a bridge of G, then, show that e is incident with a cut-vertex in G.*

Problem 8. *Let G be graph of order n and size m so that $m \geq n \geq 3$. Show that G must contain a cycle.*

Problem 9. *Let G be a graph such that for every vertex v of G, $deg(v) \geq 2$. Show that G contains a cycle.*

Problem 10. *Let T be a tree on $n (\geq 3)$ vertices. Show that T contains two vertices of degree 1.*