



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

PGM 4435
GRAPH THEORY

TIME:3HRS
MARK:75

Answer any **FIVE** questions

5x15=75

1. Prove that a graph G is bipartite if and only if it contains no odd cycle.
2. State Kruskal's algorithm to find a minimum weight spanning tree for a connected weighted graph. Also prove that the spanning tree constructed using Kruskal's algorithm is a minimum weight spanning tree.
3. Prove that a connected graph has an euler trail if and only if it has at most two vertices of odd degree.
4. Let G be a graph and let u and v be non adjacent vertices in G such that $d_G(u) + d_G(v) \geq p$. Prove that G is Hamiltonian if and only if $G + uv$ is Hamiltonian.
5. State and prove Tutte's theorem
6. Prove that a graph with $v \geq 3$ is 2-connected if and only if any two vertices of G are connected by at least two internally-disjoint paths.
7. Prove that for any graph G , $\chi(G) \leq \Delta(G) + 1$.