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W-3315(A)<br>M.A./M.Sc. (Fourth Semester) Examination, (Second Chance)<br>June-2020<br>MATHEMATICS<br>Paper - 407<br>Advanced Graph Theory<br>Time : Three Hours<br>Maximum Marks : 85<br>Minimum Pass Marks : 29

Note : Attempt all questions.

## Unit-I

Q.1. Prove that a connected graph is an Euler graph if and only if it can be decomposed into circuits.

## Unit-II

Q.2. What do you understand by a cut set in a graph? Explain by drawing a graph and prove that a set is a cut set of a connected graph G. Iff it contains at least one branch of every spanning tree of G .

## Unit-III

Q.3. Define regions in a graph and prove that a connected planar graph with $n$ vertices and $e$ edges has $e-n+2$ regions.

## Unit-IV

Q.4. a) Prove that a graph with atleast one edge is 2 - chromatic if and only if it has no circuits of odd length.
b) Write a short note on colouring of a graphs and chromatic number.

Unit - V
Q.5. Explain the Kruskal algorithm and use it to. Find the minimal spanning tree of the following graph.


