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# W-3315(A)

## M.A./M.Sc. (Fourth Semester) Examination, (Second Chance) June-2020

### MATHEMATICS

**Paper - 407**

### Advanced Graph Theory

***Time : Three Hours***

***Maximum Marks : 85***

***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.