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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

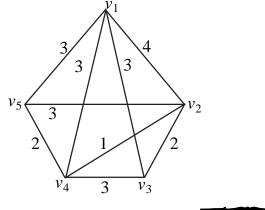
Q.3. Define regions in a graph and prove that a connected planar graph with *n* vertices and *e* edges has  $e^{-n+2}$  regions.

#### **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.



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