Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec– 2017**

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| **Code :** | **17MA3010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **GRAPH THEORY AND ALGORITHMS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | State and prove max flow- min cut theorem and hence find the maximum flow from A to Z in the graph given below | CO1 | 10 |
| b. | Determine whether the following graphs are isomorphic by mapping the vertices and edges. | CO 1 | 10 |
| (OR) | | | | |
| 2. | a. | Find the , , , fuse vertices  and  in , find  and  in the following graphs | CO1 | 10 |
| b. | Prove that a graph is disconnected if and only if its vertex set can be partitioned into two nonempty, disjoint subsets and such that there exists no edge in whose one end vertex is in subset and the other in subset . | CO1 | 10 |
| 3. | a. | Prove that every tree has either one or two centers. | CO1 | 10 |
|  | b. | What is the number of spanning trees the graph  have? Enumerate them. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | Give the cut-set matrix of the graph given below and write down five observations on it. | CO1 | 10 |
|  | b. | Prove that a graph is Eulerian if and only if everyvertices are of even degree. | CO1 | 10 |
| 5. | a. | State and prove Euler’s formula. Give the planar representation of the graphs given and verify Euler’s formula in it. | CO2 | 10 |
|  | b. | Prove that is not planar. | CO2 | 5 |
|  | c. | Prove that in a simple connected planar graph with  region  edges and  vertices the following inequalities hold.  i. ii. | CO2 | 5 |
| (OR) | | | | |
| 6. | a. | State and prove the five colour theorem. | CO2 | 10 |
|  | b. | Prove that every tree with two or more vertices is two chromatic. | CO2 | 10 |
| 7. | a. | Give the Prim’s algorithm and hence find the minimum spanning tree for the given weighted graph. | CO2 | 10 |
|  | b. | Give the algorithm for the Breadth first search and hence find the spanning tree for the graph given. | CO2 | 10 |
| (OR) | | | | |
| 8. |  | Using Dijkstra’s algorithm, find the shortest path between the vertices  to the vertex for the graph given below. | CO2 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Solve the following LPP by graphical method    Subject to | CO3 | 10 |
|  | b. | Using simplex method solve the LPP    Subject to | CO3 | 10 |

ALL THE BEST