H Roll No. .....

TCS–304

B. TECH. (CSE) (THIRD SEMESTER) MID SEMESTER EXAMINATION, 2018

GRAPH THEORY

Time : 1:30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)

   (a) Total number of edges in a complete graph is ..... .

   (b) The sum of degrees of all vertices is ..... .

   (c) The number of labelled trees with n vertices is ..... .

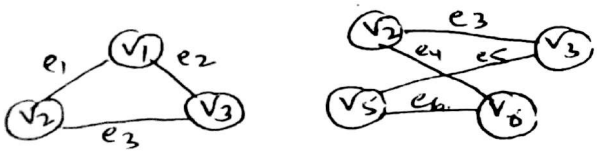
   (d) Complete bipartite graph is represented as ..... .

   (e) A tree with n vertices has ..... edges.

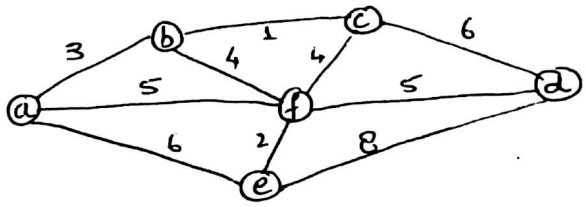
2. Attempt any *five* parts : (3×5=15 Marks)
   (a) Define walk, path, circuit and trail.
   (b) Draw a graph which is Euler but not Hamiltonian and Vice Versa.
   (c) Explain Travelling Salesman problem.
   (d) Draw the following graph :
   K_6 and W_9.
   (e) What is a bipartite graph ? Explain with example.
   (f) What are centre, radius and diameter of a tree ?

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Prove that a given connected graph is Euler if and only if all vertices are of even degree.
   (b) Prove that the number of vertices of odd degree in a graph is always even.
   (c) Find the union, intersection, ring sum and complement of the graphs given below :



4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Prove that every tree has one or two centres.
   (b) Prove that in a full binary tree with n vertices, the number of pendant vertices is $\frac{n+1}{2}$.
   (c) Find the minimal spanning for the graph given below :



5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Prove that a non-trivial tree has two or more pendant vertices.
   (b) Consider a tree with n_1 vertices of degree 1, 4 vertices of degree 2, 5 vertices of degree 3 and 6 vertices of degree 4. Find n_1.

P. T. O.

(c) Find the maximum flow in the network given below :