

(Pages : 3)

H – 2975

Reg No. :
Name :

Eighth Semester B.Tech. Degree Examination, November 2019

(2013 Scheme)

13.805.2 GRAPH THEORY (FR)

Elective IV

Time : 3 Hours

Max. Marks : 100

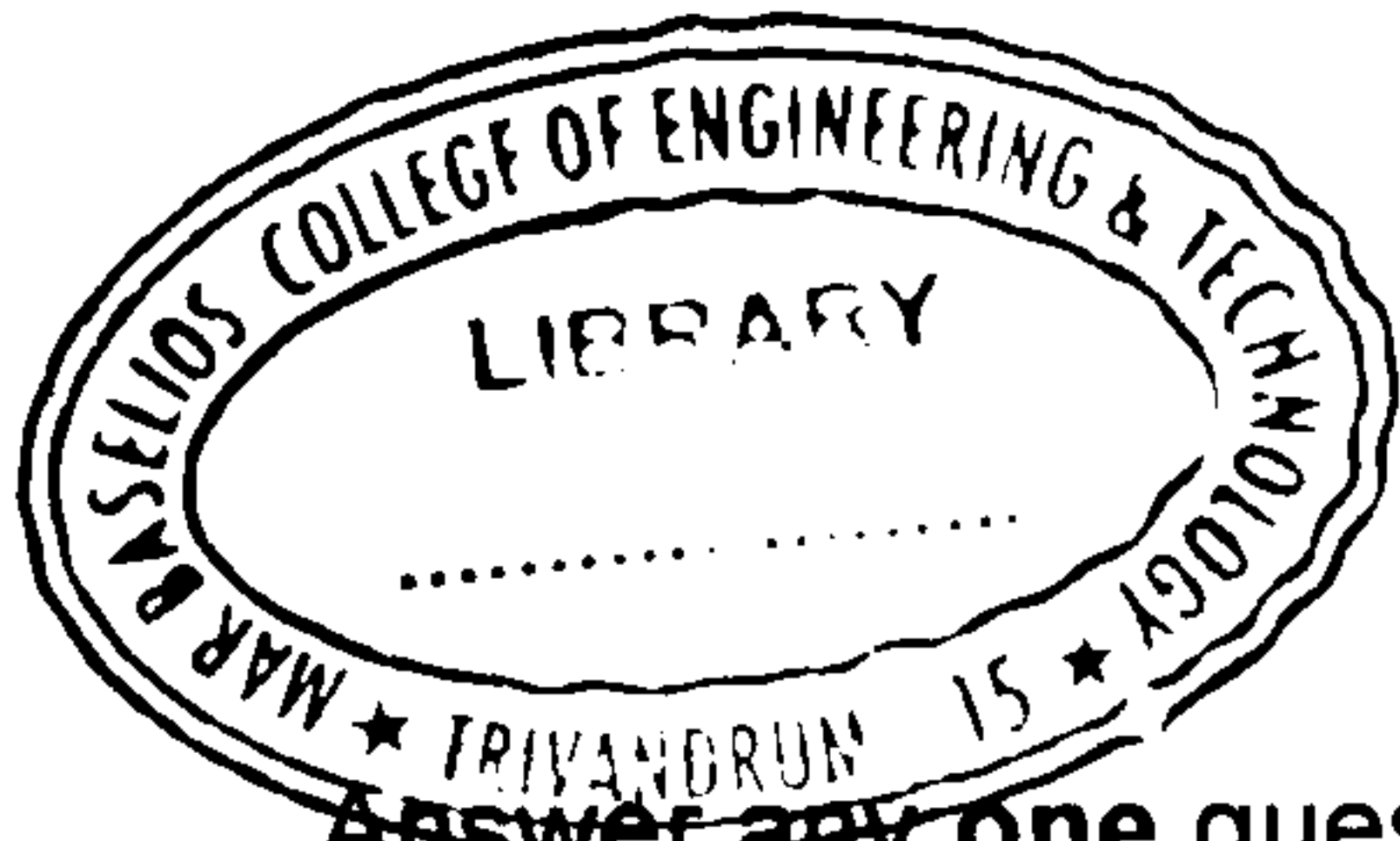
PART A

Answer **all** questions, Each question carries 4 marks.

1. Explain the terms rank and nullity of a graph. How are they related?
2. What do you mean by a self-dual graph? Give an example.
3. Define the adjacency matrix and successor listing representations of a graph with an example.
4. Give the definition of a sequential machine with an example
5. Explain the terms in-degree and out-degree in a directed graph. How are they related? Give an example.

P.T.O.



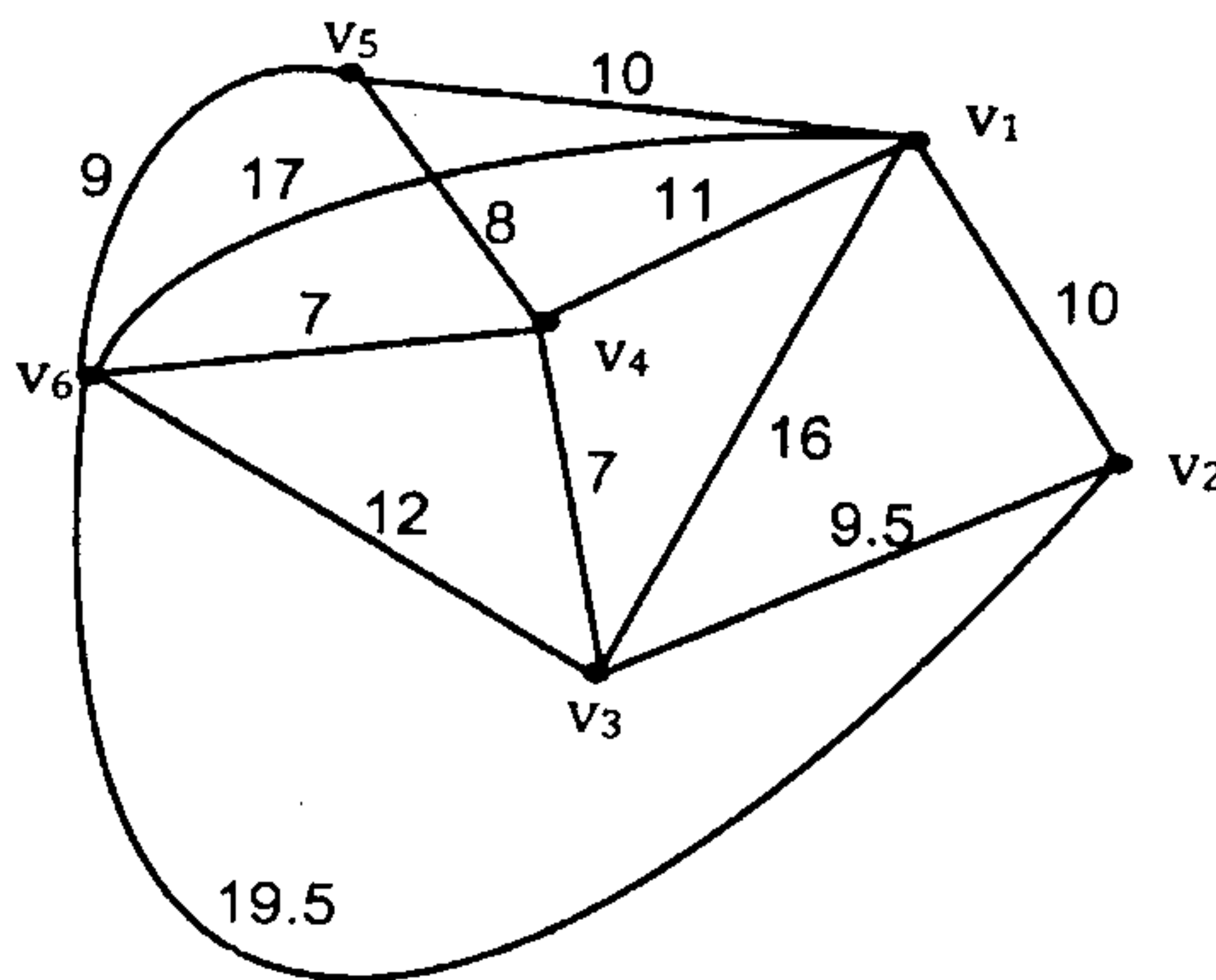


PART B

Answer any one question from each module, Each question carries 20 marks

MODULE 1

6. (a) Find the minimum spanning tree of the following graph using Prim's algorithm. (10)

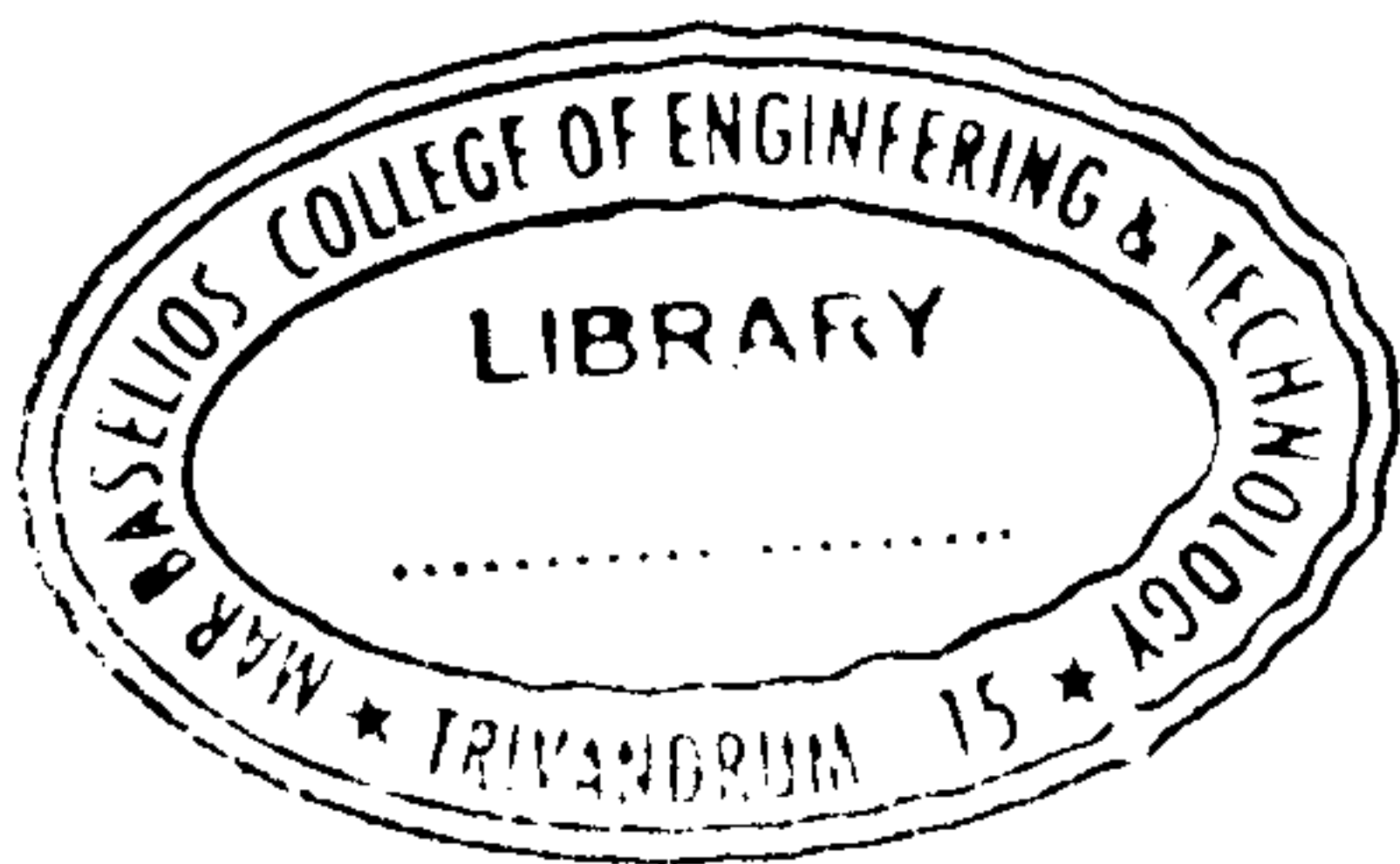


- (b) Prove that a simple graph with n vertices and k components have at most $(n-k)(n-k+1)/2$ edges. (10)
7. (a) State Cayley's theorem. Draw all the possible trees of four labeled vertices. (10)
- (b) Explain the six difference operations on graphs with examples. (10)

MODULE 2

8. (a) Prove that in the vector space of a graph, the circuit subspace and the cut-set subspace are orthogonal to each other. (10)
- (b) How long is a longest circular (or cyclic) sequence of 1's and 0's such that no subsequence of r bits appears more than once is the sequence? Construct one such longest sequence. (10)





9. (a) What is an Arborescence? Prove that an arborescence is a tree in which every vertex other than the root has an in-degree of exactly one. (10)
- (b) State and prove Euler's formula and its corollary. (10)

MODULE 3

10. (a) Explain the algorithm to find the shortest path between all pairs of vertices in a graph G with an example. (10)
- (b) What is the graph isomorphism problem? Explain a heuristic procedure to check whether two graphs are isomorphic or not. (10)
11. (a) Explains the depth-first search algorithm in a graph G with an example. (10)
- (b) Explain the algorithm to find out the number of components in a given graph G . (10)

MODULE 4

12. Design a sequential machine to respond to an arbitrary input sequence of 0's and 1's. The machine should produce an output of 1 whenever there appears a set of four consecutive input bits of value greater than 9 in a serial 8-4-2-1 BCD code (the least significant bit comes to the machine first). Whenever the value of a four-bit sequence is 9 or less, the output should be 0. Also reduce the number of states in the sequential machine if possible and assign states to it. (20)
13. (a) Write a note on m -cubes and its properties. Draw the graphs of 3-cube and 4-cube. (10)
- (b) Write a note on graphs in coding theory. (10)

