National Institute of Technology Rourkela

Computer Science and Engineering

Data Structure and Algorithms,

End Term Exam

Date: Dec 08, 2021

Time: 60 Minutes **Max. Marks: 25**

Instruction: ***1. In case of any doubt, write your assumptions, write it clearly and continue.***
2. There are 4 questions printed on both side of the paper. Attempt all the questions.
3. Do not use mobile for calculation.

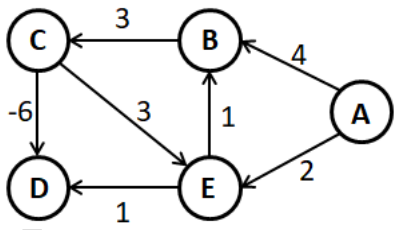
Q1. Represent the following two sparse matrices A and B using triplet. Compute the matrix multiplication of A and B from the triplet representation itself with describing every step clearly. Assume that index value starts from (1, 1). ***[5]***

$$A = \begin{matrix} 0 & 3 & 0 & 4 \\ 0 & 5 & 7 & 0 \\ 0 & 1 & 6 & 0 \end{matrix} \qquad B = \begin{matrix} 0 & 0 & 0 \\ 1 & 0 & 3 \\ 2 & 4 & 2 \\ 0 & 0 & 0 \end{matrix}$$

Q2. Sort the array A = {5, 13, 2, 25, 7, 17, 20, 8, 4} using Shell sort. Illustrate at-least two passes of the shell sort. Explain the time and space complexity of the shell sort. ***[6]***

Q3. Construct an AVL tree by inserting the following elements in the given order 1, 2, 4, 5, 6, 3, 7, 8. Explain all the steps. ***[6]***

Q4. Consider the following graph: Explain all the steps of Bellman-Ford algorithm with illustration considering the "A" as source vertex. ***[8]***



End of Paper