CSE221 Assignment Summer 24

1. [from NLH sir's quiz] A data file of 100,000 characters contains only the characters a -e and space with the frequencies indicated. **(Space has a ascii value of 32)**

Characters	**a**	**b**	**c**	**d**	**e**	**space**
Frequency (in thousands)	**45**	**13**	**12**	**16**	**9**	**5**

a. How many bits are required to save this data without any compressing (using ASCII 8 bits)?
b. Assign Fixed-Length codes (the greedy version with the highest frequent alphabet starting from code 0 then next one 1, etc) for each character to reduce the file size.

Characters	**a**	**b**	**c**	**d**	**e**	**space**
Fixed Length Code						

c. How much space (in Bits) was saved by using Fixed Length Code? (Include Table Size)
[Table size accounts for two things, table size for a One length table exam is given below]

A	001

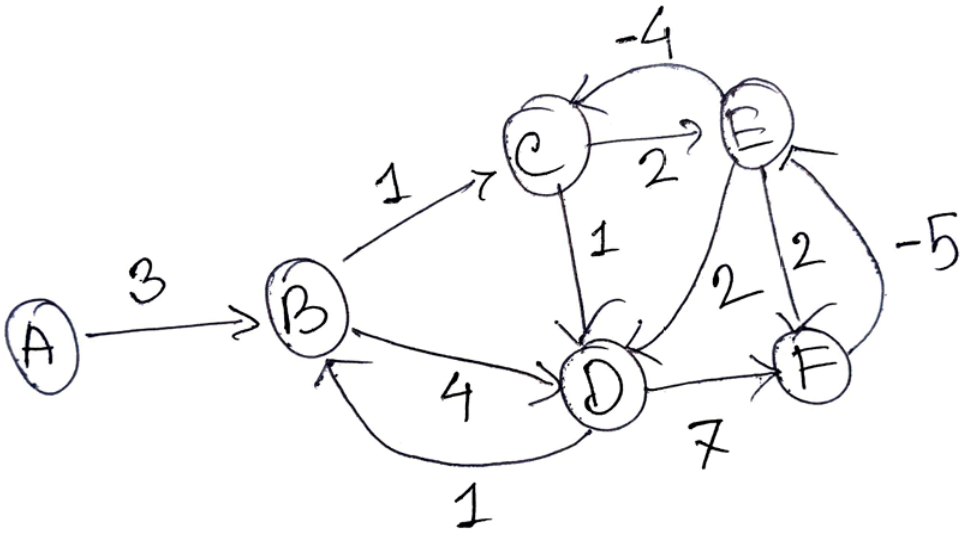
TO store the character A to 001 map, first we need A's ascii value which is of 8 bits in binary+ store the new mapped encoded value 001 meaning this table size is 8+3 = 11. Do the same for the whole table you generate]

d. Construct Huffman Tree For the given file
e. Assign huffman code to each character. [2]

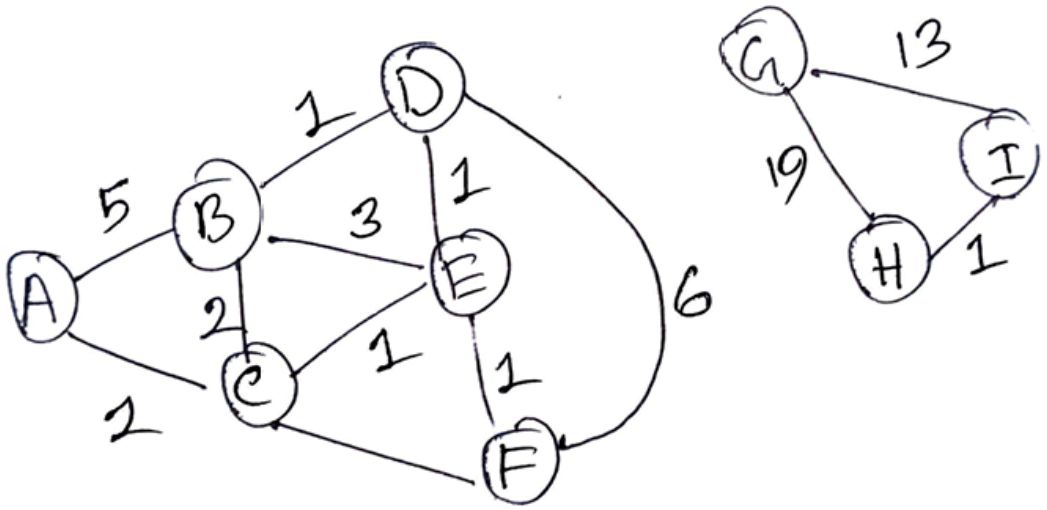
Characters	**a**	**b**	**c**	**d**	**e**	**space**
Huffman Code						

f.Encode the message "abed ec"

2. Find The Single Source Shortest Path for this graph with two algorithm
   a. **Dijkstra.** After simulation, explain whether it can solve it or not
   b. **Bellman Ford.** After simulation, explain whether it can solve it or not



3. Use two **MST algorithm** to generate the graph's MST



a. Prim's (With Source A)
b. Kruskal
c. Explain how each of the following algorithm differs in the result

4. Wye is a CSE BracU Student. The pre-advising week is approaching, and he is trying to find the most suitable course combination for next semester. As per his previous academic results, his credit limit has been set to 9. Different courses have different credits. He came up with values for thes courses by consulting with students who have already taken them. He wants to select the most valued courses.Courses, credits and values are provided below:

Course	**PHY112**	**CSE330**	**CSE331**	**CSE370**	**CSE499**
Credit	**1**	**2**	**3**	**4**	**5**
Value	**9**	**7**	**15**	**12**	**16**

a. Wye want to try all possible combinations to find the best one. Help him by simulating a suitable dynamic programming approach. Show your work in detail, then write down the selected courses.
b. Zed, a friend of Wye, adopted a slightly different approach and considered the courses based o their per-credit value. Determine whether Zed could select more valued courses than Wye. Note that, selecting a course still means taking the whole, with full credits.