Bangladesh University

Department of CSE
Mid term Examination, Spring Semester 2025
Course Code: CSE-2201
Course Title: *Algorithm*
Batch: 67th (Day)
Course Teacher: Nurul Amin Nahid

Time: 1.5 hours | Total Marks: 20

Answer any four set questions below.

1. (a) Analyze the time complexity of Selection Sort in the best and worst cases. (2)
   (b) Given an unsorted array [12, 5, 8, 2, 3, 10, 15], show the iterations for sorting the array using Insertion Sort. (3)

2. (a) What is the worst-case time complexity of Quick Sort, and how can it be improved? (2)
   (b) Illustrate the operation of PARTITION on the array A using quick sort- (3)

   A= {10, 16, 8, 12, 15, 6, 3, 9, 5}

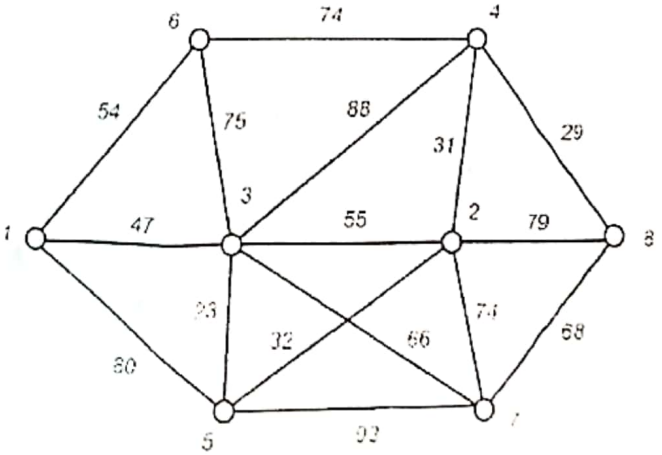
3. (a) What is the minimum spanning tree? Is it possible to have more than one spanning tree from a single graph? Justify your answer. (2)
   (b) Assume that a thief enters a store and wants to steal items to maximize their total value. The store has the following items, each with a given weight and value: (3)

Item	Weight (kg)	Value ($)
1	10	60
2	20	100
3	30	120

The thief's knapsack can carry at most **50 kg**.
Show step-by-step procedures to determine the maximum value the thief can obtain using **Fractional Knapsack Algorithm.**

4. (a) Write down the procedure or algorithm of bubble sort and how you swap numbers. (2)
   (b) Construct the Huffman tree and find the binary codeword for the characters with frequencies: A (10), B (15), C (30), D (16), E (29). (3)

5. (a) What is divide and conquer approach? Does merge sort clearly follow the divide and conquer approach? Justify your answer. (2)
   (b) Apply Prim's algorithm to the given weighted graph and find the MST. (3)



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Department of CSE
Mid-Term Examination, Spring Semester-2025
Microprocessor & Assembly Language
Course Code: CSE- 2203
Batch: 67 (Day)

Time: 1 hour 30 min | Total Marks: 20

Instructions: *1. Answer any 4 (total) out of the 5 questions.*
2. Read the questions carefully and answer accordingly.
3. If you have a problem understanding any question, ask your teacher not your classmate.
*4. **Instructor Name: Md. Ibrahim Hosen Sojib***

1. (a) In modern computing, special-purpose processors such as DSPs, GPUs, and FPGAs are often used alongside general-purpose microprocessors. Analyze the advantages and challenges of integrating these specialized processors with a conventional microprocessor-based system. 3
   (b) Explain the difference between a microprocessor and a microcontroller. 2

2. (a) Define the terms "clock speed" and "word length" in microprocessors. 2
   (b) Compare and contrast the performance of RISC vs. CISC architectures in modern computing. Which one is more suitable for embedded systems, and why? 3

3. (a) A four stage pipeline has the stage delays as 150, 120, 160 and 140 ns respectively. Registers are used between the stages and have a delay of 5 ns each. Assuming constant clocking rate, what will the total time taken to process 1000 data items? 2
   (b) How multiple priority interrupts are handled using parallel method? Describe with a neat diagram. 3

4. (a) Analyze how the Bus Interface Unit and Execution Unit work in parallel in the 8086. How does this pipelining affect system performance, and what are its limitations? 3
   (b) Explain the pins of 8086: (i) BHE (ii) ALE 2

5. (a) How does the choice of DMA transfer mode impact overall system performance, CPU utilization, and real-time processing? 3
   (b) A stack memory location has a physical address of 45F10H. If SS = 45E0H, find the corresponding SP value. 2

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Department of CSE
Mid Term Examination, Spring Semester 2025

Course Code: CSE-2205
Course Title: Statistics
Course Teacher: Shahnaz Parvin
Batch: 67 (A & B) (DAY)

Time: 1.5 hours **Total Marks: 4×5=20**

Carefully read and follow all of the instructions given below.

i. **Carefully fill out the front page of the answer script with all the requested information.**
ii. **Read the questions attentively and answer accordingly.**
iii. **It is strictly forbidden to employ any unfair methods or keep phone during the exam.**
iv. **Make sure to keep the exam room noise-free, and BEST OF LUCK.**

Answer any 4 questions from below.

1. Discuss about the characteristics of statistics.

2. Calculate mean, median and mode for the following data pertaining to marks in statistics out of 140 marks for 80 students in a class:-

Marks more than	0	20	40	60	80	100	120
No. of students	80	76	50	28	18	9	3

3. Calculate the average deviation and coefficient of average deviation of the two income groups of five and seven workers working in two different branches of a firm:

Branch I Income (tk)	Branch II Income (tk)
5000	4000
5200	5000
5400	5200
5600	5400
5800	5600
	5800
	6800

4. Present the following information in a suitable tabular form supplying the figures not directly given:
"In 2019 out of total 3000 workers in a factory 2440 were members of a trade union. The number of women workers employed was 380, out of which 220 did not belong to any trade union"
"In 2000 the number of union workers was 2700 of which 2100 were men; the number of non-union workers was 400 among which 200 were women".

5. Represent the following data by a Pie Diagram.

Cheque clearared in Bangladesh in Clearing house in the years 2022,2023

Centers	2022 (amount tk)	2023 (amount tk)
Dhaka	829	2670
Rajshahi	1070	2443
Sylhet	108	274
Other centers	313	615
Total	2320	6002

Bangladesh University

Department of CSE
Final Examination, Spring Semester 2025
Course Code: CSE-2201
Course Title: *Algorithm*
Batch: 67th (Day)
Course Teacher: Nurul Amin Nahid

Time: 2 hours | Total Marks: 40

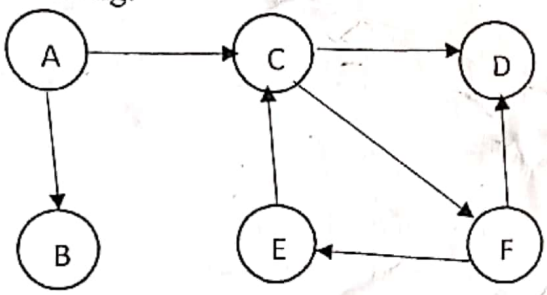
Answer any four set questions below.

1. (a) What is the main advantage of the Bellman-Ford algorithm over Dijkstra's algorithm? And what is its time complexity? (2)

   (b) Given the sequence [10, 5, 9, 33, 21, 50, 41, 60], find the Longest Increasing Subsequence (LIS) using dynamic programming. Show the DP table step-by-step. (4)

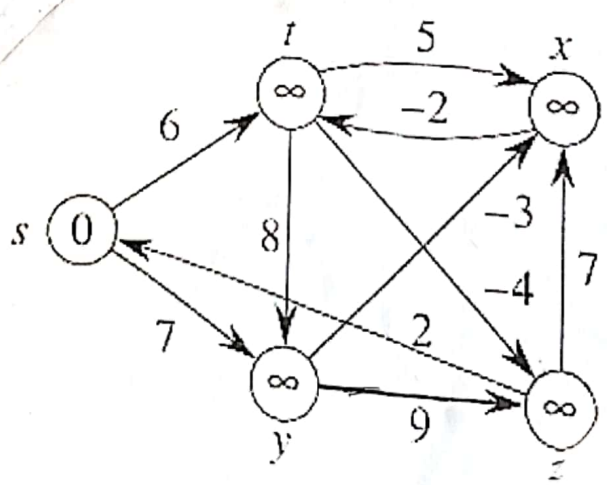
   (c) Compute the LCS for the strings ABCBDAB and BDCAB. Show the steps. (4)

2. (a) Do you think it is possible to sort the vertices of the following graph using Topological sort? If it is, sort the vertices and if it doesn't justify your understanding. (4)

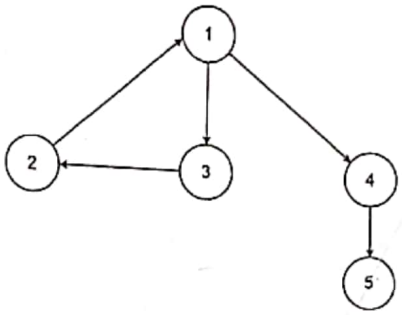


   (b) Solve the 0/1 Knapsack problem for items with weights [3, 2, 2, 5] and values [10, 15, 25, 12] with a knapsack capacity of 5. Construct the DP table. Trace which items are included in this optimal solution. (6)

3. (a) Apply the Bellman-Ford algorithm on the given graph to find the shortest path from source vertex S. *(6)*



(b) Find all the strongly connected components in the given directed graph using Kosaraju's algorithm. (4)



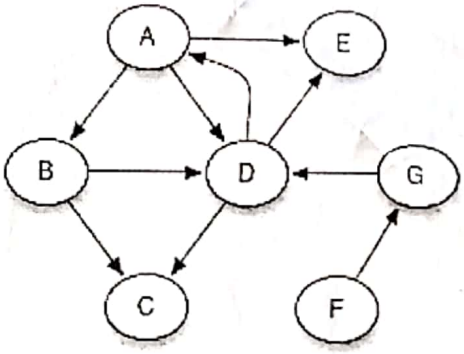
4. (a) Analyze the time complexity of Floyd Warshall algorithm. (2)

(b) Write the recurrence relation for the rock climbing (stairs climbing) problem. (2)

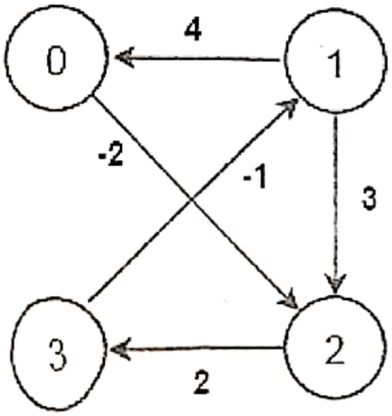
(c) The following table represents the rating of the least dangerous path. Solve the rock-climbing problem using dynamic programming and trace the rating for optimal solution. (6)

3	2	5	4	8
5	7	5	6	1
4	4	6	2	3
2	8	9	5	8

5. (a) Perform both DFS and BFS traversal on the following graph starting from vertex A. (6)



(b) Find the all-pairs shortest path using Floyd-Warshall algorithm for the graph below. (4)



Bangladesh University

Department of CSE
Final Examination, Spring Semester-2025
Microprocessor & Assembly Language
Course Code: CSE- 2203
Batch: 67 (Day)

Time: 2 hours | Total Marks: 40

Instructions: *1. Answer any 4 (total) out of the 6 questions.*
2. Read the questions carefully and answer accordingly.
3. If you have a problem understanding any question, ask your teacher not your classmate.
*4. **Instructor Name: Md. Ibrahim Hosen Sojib***

1. (a) Answer the following short questions: 3
   i. What is the maximum memory size that 8086 can address?
   ii. What is the purpose of the instruction pointer (IP) in 8086?
   iii. What is the size of each register in the 8086 microprocessor?
   (b) Is it possible for the 8086 microprocessor to move data directly across memory locations? 2
   (c) Why are segment registers used in the 8086 microprocessor? Provide a detailed explanation of their role and function. 5

2. (a) Explain the following instructions: 2
   i. CALL SUBROUTINE
   ii. JMP NEXT
   (b) The opcode for MOV is 100010 and XOR is 001100. Convert the following instructions in machine code: XOR CL, [1234H] 3
   (c) How does the 8086 microprocessor access data using different addressing modes? Describe each addressing mode with a clear explanation. 5

3. (a) Define assembly level programming. 1
   (b) If [BX]=0050H, [DS]=2000H, [00500H]=80H, [20050H]=08H, [CX]=5000H. Then what will be the contents of CX, if MOV CL, [BX] instruction is executed? 3
   (c) Sarah, a junior weather analyst, decided to record the daily temperatures of her hometown to analyze the weather trend. She measured the temperature once a day and stored the values manually. Here are her 7-day temperature readings (in °C): 25, 28, 27, 26, 29, 30, 28. Now write an assembly program to find the average temperature. 6

4. (a) Draw the circuit configuration of the 8086 microprocessor when operating in minimum mode. 5
   (b) How are the control signals for all operations generated in the 8086 microprocessor when operating in maximum mode, using the 8288 bus controller and decoding S2, S1, and S0? 5

5. (a) What is the difference between memory interfacing and I/O interfacing? 2
   (b) Describe the function of the $\overline{CS}$ pin in the 8255A and its interaction with the A0 and A1 address lines. Explain the conditions under which different parts of the 8255A are selected. 4
   (c) Describe the control word format for 8255A with neat diagram. 4

6. (a) How DMA operations are performed? 3
   (b) Explain the modes of 8257 DMA controller. 3
   (c) Describe the pins of 8257 DMA controller: i. IOW ii. MARK 4

Bangladesh University

Department of CSE
Final Examination, Spring Semester 2025

Course Code: CSE-2205
Course Title: Statistics & Probability
Course Teacher: Shahnaz Parvin
Batch: 67 (A & B) (DAY)

Time: 2 hours **Total Marks: 4×10=20**

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Answer any 4 questions from below.

1. Find Karl Pearson's coefficient of correlation between capital employed and profit obtained from the following data:

Capital Employed (Rs crores)	Profits Obtained (Rs crores)
10	2
20	4
30	8
40	5
50	10
60	15
70	14
80	20
90	22
100	50

2. In the following table are recorded data showing the test scores made by salesman on an intelligence test and their weekly sales.

Salesman	Test Scores	Sales (000)
1	45	2.0
2	75	6.5
3	50	3.5
4	60	5.0
5	80	4.5
6	90	6.0
7	85	6.5
8	40	2.5
9	80	5.5
10	55	4.5

Calculate the regression line of sales on test score and estimate the most probable weekly sales volume if a salesman makes a score of 70.

3. Calculate the trend values by the method of least squares from the data given below and estimate the milk consumption for the year 2027

Year	Milk Consumption (million liters)
2018	102
2019	101
2020	105
2021	112
2022	114
2023	118
2024	124
2025	129
2026	134

4. From the following data prepare index number for real wages of workers.

Year	2014	2015	2016	2017	2018	2019
Wages (tk)	2000	2500	3110	3600	3900	4000

5. Discuss about the tests of hypothesis.