Patuakhali Science and Technology University

B.Sc. Engg. (CSE) 3rd Semester (Level-2, Semester-I) F removal Examination July-December 2019

Course code: CIT-211 Course Title: Data Structure and Algorithms

Session: 2015-16 Credit hour: 3.00 Full marks: 70 Duration: 3 hours

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

Answer any **5** of the following questions.

1. (a) What does data structure mean? 2
   (b) Write down the operations which are performed on linear data structure. 4
   (c) How to insert an ITEM into the Kth position in a linear array LA? Explain the representation of two-dimensional array in memory. 8

2. (a) What is linked list? Why it is important as a data structure? 2+2=4
   (b) How to insert an ITEM after a given node? Explain and write down the steps of algorithm. 6
   (c) Mention the scenarios of header linked list and circular linked list. 4

3. (a) Define binary tree, complete binary tree, and binary search tree. 6
   (b) Explain the representation of binary tree in memory. State the preorder traversal algorithm using stacks. 6
   (c) What are the properties of a general tree? 2

4 (a) Suppose Module A requires M units of time to be executed, where M is a constant. Find the complexity *C(n)* of the following algorithms, where *n* is the input data and b is a positive integer. 2+3=5

Algorithm 1.1

```
1  Repeat for I=1 to N
2    Repeat for J=1 to N
3      Repeat for K=1 to N
4        Module A.
       [End of step 3 loop]
     [End of step 2 loop]
   [End of step 1 loop]
5  Exit
```

Algorithm 1.2

```
1  Set J:=1
2  Repeat steps 3 and 5 while J≤N:
3    Repeat for L=1 to N
4      Module A.
     [End of step 3 loop]
5    Set J:=B×J
6  Exit
```

   (b) Briefly explain the following terms with respect to data structure and algorithm with proper example. 2+2=4
   i) Recursion
   ii) Algorithm and procedure.

   (c) Mention the operations of data structure. Sort the following array of elements by using radix sort algorithm. 1+4=5

   220,110, 99,143, 361, 423, 538, 128, 321, 543, 6

5 (a) Write a procedure to insert an element from top of the stack. Sort the following array of elements by using insertion sort algorithm. 2+3=5

   348, 143, 361, 423, 538, 128, 321, 543, 366

   (b) Compare BFS and DFS with examples and find out when to use which search technique. 2+2=4

   (c) Translate, by inspection and hand, each infix expression into its equivalent postfix expression: 2+3=5

   i) (A + B ↑ D/) / (E – F) + G
   ii) A * (B + D) / E – F * (G + H / K)

6 A Define complete graph, neighbors, tree graph. Draw the graph for the given adjacency matrix. 3+2=5

0	5	3	0	0	0	6
5	0	0	6	0	7	0
3	0	0	0	8	6	0
0	6	0	0	0	0	7
0	8	0	0	0	3	0
0	7	6	0	3	0	0
6	0	7	0	0	0	0

(b) Explain overflow and underflow. Distinguish between linear and nonlinear data structure. 2+2=4

(c) Consider the following figure A2, find a minimum path P from A to J using BFS where each edge has length 1. 5

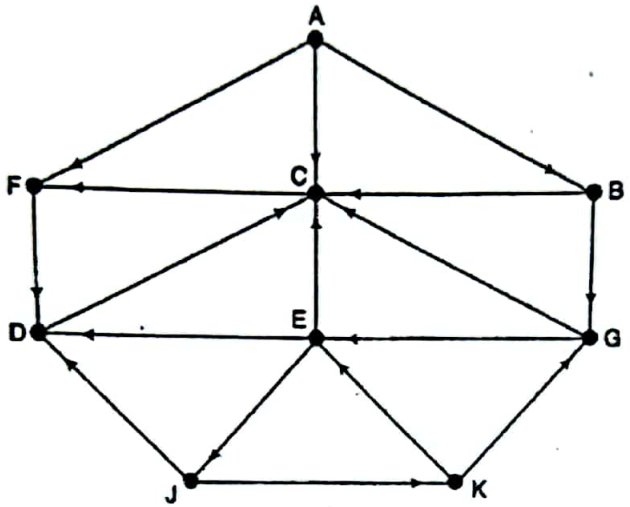


Figure: A2

Patuakhali Science and Technology University

3rd Semester (Level-2, Semester-I), **Special Repeat Examination** of B.Sc. Engg. (CSE)

Course Code: CIT-211 Course Title: Data Structure and Algorithms ৪৪-19

Credit Hour: 3.0 Full Marks: 70 Session: 2014-2015

[Figures in the right margin indicate full marks. **Split answering of any question is not recommended**. Write the full question number e.g. **1(B) (II)** before the answer paragraph]

Answer any 5 of the following questions

1 a Suppose the following numbers are stored in an array A: 07

32, 51, 27, 85. 66, 23, 13, 57

Apply the bubble sort to the array A and discuss each pass separately.

1 b Consider the linear arrays AAA(5:50), BBB(-5: 10) and CCC(18). 07

i. Find the number of elements in each array.
ii. Suppose Base (AAA) = 300 and w = 4 words per memory cell for AAA. Find the address of AAA [15], AAA[35] and AAA[55].

2 a Suppose a company keeps a linear array YEAR(1920: 1970) such that YEAR[KJ contains the number of employees born in year K. Write a module for each of the following tasks: 07

i. To print each of the years in which no employee was born.
ii. To find the number NNN of years in which no employee was born.
iii. To find the number N50 of employees who will be at least 50 years old at the end of the year. (Assume 1984 is the current year.)
iv. To find the number NL of employees who will be at least L years old at the end of the year. (Assume 1984 is the current year.)

2 b A hospital maintains a patient file in which each record contains the following data: 07
Name, Admission Date, Social Security Number, Room, Bed Number, Doctor

i. Which Items can serve as primary keys?
ii. Which pair of items can serve as a primary key?
iii. Which Items can be group items?

3 a Discuss whether a stack or a queue is the appropriate structure for determining the order in which elements are processed in each of the following situations. 07

i. Batch computer programs are submitted to the computer center.
ii. Program A calls subprogram B, which calls subprogram C, and so on.
iii. Employees have a contract which calls for a seniority system for hiring and firing.

3 b Write an algorithm for Linear Search. 07

4 a) Sort the following array of elements by using radix sort algorithm. 4

48, 243, 10, 423, 538, 128, 321, 543, 200

b) Give the advantages and disadvantages of two way list over one way list. Give the header linked list representation of the following polynomial equation. 4

$$p(x, y, z) = 2x^8y^7 - 5x^7y^3 + 5y^2 - 6xz + 4$$

c) Define header linked list. Write an algorithm to find out the number of times a given item occurs in a linked list. 6

5 a) Compare BFS and DFS with examples and find out when to use which search technique. 4

b) Translate, by inspection and hand, each infix expression into its equivalent postfix expression: 4

i) (A + B ↑ D) / (E – F) + G

ii) A * (B + D) / E – F * (G + H / K)

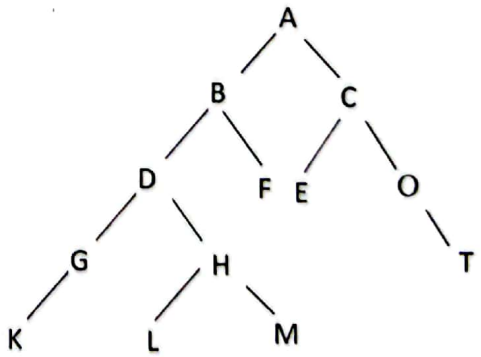
c) i) Make a minheap from the following list of elements. 6

44, 30, 50, 22, 50, 77,

ii) Build a Huffman tree from the list of elements.

Item	A	B	C	D	E	F
Weight	4	15	25	5	8	16

6 a) Define binary tree and 2-tree. Simulate (step by step processing) the inorder traversing mechanism of the following tree. 5



b) Write an algorithm to delete a node with a given ITEM of information. 5

c) What is garbage collection? Analyze the complexity of quick sort. 4

Patuakhali Science and Technology University
3rd Semester (Level-2, S-I) Final Examination of B.Sc.Engg.(CSE), January-June 2020
Course Code: AIS-211; Course Title: Accounting and Management
Full Marks: 70 Time: 3.00 Hours

(Answer any five (05) questions from the following. Split answering of any part of each question is not expected. Figures in the right margin indicate mark)

1 .a) Explain four (04) principles of scientific management suggested by F. W. Taylor. 04

b) Discuss the Max Weber's concept of Ideal organization "Bureaucracy" with its characteristic. 04

c) "Though controlling is viewed as last function of management rather it is the starting point of next year of planning". Do you agree or not? Give your argument. 03

d) Explain two factors theory of Herzberg. Which factor is more important and why? 03

2. a) Give five examples of charismatic political leaders in the word. 02

b) "Leaders are born not made". Do you agree or not? Give your judgment. 04

c) "Team manager is concerned with high production and high employee welfare while impoverished leader is concerned lower production and lower employee welfare". Explain this concept as per Blake and Mouton's Managerial Grid. 05

d) Briefly explain the equity theory developed by J. Stacy. Adams. 03

3. Write short notes: (any ten:10*1.4) 14
a) Division of work b) Unity of command c) Unity of direction d) Scalar chain
e) Subordination of individual interest to group interest f) Equity g) Discipline
h) Esprit de corps i) Authority and responsibility j) Initiative and remuneration
k) Efficiency & Effectiveness l) Vision, Mission & objective

4. a) What are the statements included in a financial statement? 04

b) Rami decided to open a computer programming service which he named Zeus. The transactions of the first month of operation are given below. Analyze the transactions using accounting equation: 10
i. On September 1, 2020, Rami invested Tk. 55,000 cash in the business.
ii. Zeus purchases for Tk. 10,600 from Harmis Ltd. computer paper and other supplies expected to last several months. The purchase is made on account.
iii. Zeus provides Tk. 13,500 of programming services for customers. The company receives cash of Tk. 11,500 from customers, and it bills the balance of Tk. 2,000 on account.
iv. Zeus receives a bill for Tk. 2,500 from the Daily News for advertising but postpones payment until a later date.
v. Zeus receives Tk. 1,200 cash from customers who had been billed for services [Transaction (iii)]

vi. Zeus receives Tk. 1,800 cash from customers for programming services it has provided.
vii. Rami withdraws Tk. 1,300 in cash from the business for his personal use.

5. a) "Shareholders of a Public Limited Company are External Users of Accounting Information." Do you agree? Why? 04

b) In August 2021, Topu Bormon opened his studio at Nilkhet. During the first month of operation, below stated transactions took place at the studio. Provide appropriate journal entries for the transactions. 10

Aug. 1: The owner invested Tk. 57,500 cash and Tk. 32,500 of photography equipment in the business.
01: Paid Tk. 2,400 cash for an insurance policy covering the next 24 months.
07: Services are performed and clients are billed for Tk. 10,000.
13: Purchased office supplies for Tk. 1,400. Cash paid Tk. 400 and remaining outstanding.
20: Received Tk. 2,000 cash in photography fees earned previously on Aug 07.
24: The client immediately pays Tk. 15,000 for services to be performed at a later date.
Adjustments:
31: Provide adjustment for Prepaid Insurance at the end of the month.

6. a) Discuss the limitations of a Trial Balance. 04

b) Presented below is a list of accounts. Prepare a classified balance sheet in good form. (No monetary amounts are to be shown.) 10

Notes Payable	Patents
Salaries and Wages Expense	Bonds Payable
Investment	Buildings
Accounts Receivable	Accounts Payable
Inventory—Ending	Sales Revenue
Advances to Employees	Equipment
Advertising Expense	Copyrights
Accumulated Depreciation—Equipment	Purchases
Retained Earnings	Prepaid Rent
Cash (on hand)	Common Stock
Land	Paid-in Capital in Excess of Par

vi. Zeus receives Tk. 1,800 cash from customers for programming services it has provided.
vii. Rami withdraws Tk. 1,300 in cash from the business for his personal use.

5. a) "Shareholders of a Public Limited Company are External Users of Accounting Information." Do you agree? Why? 04

b) In August 2021, Topu Bormon opened his studio at Nilkhet. During the first month of operation, below stated transactions took place at the studio. Provide appropriate journal entries for the transactions. 10

Aug. 1: The owner invested Tk. 57,500 cash and Tk. 32,500 of photography equipment in the business.
01: Paid Tk. 2,400 cash for an insurance policy covering the next 24 months.
07: Services are performed and clients are billed for Tk. 10,000.
13: Purchased office supplies for Tk. 1,400. Cash paid Tk. 400 and remaining outstanding.
20: Received Tk. 2,000 cash in photography fees earned previously on Aug 07.
24: The client immediately pays Tk. 15,000 for services to be performed at a later date.
Adjustments:
31: Provide adjustment for Prepaid Insurance at the end of the month.

6. a) Discuss the limitations of a Trial Balance. 04

b) Presented below is a list of accounts. Prepare a classified balance sheet in good form. (No monetary amounts are to be shown.) 10

Notes Payable	Patents
Salaries and Wages Expense	Bonds Payable
Investment	Buildings
Accounts Receivable	Accounts Payable
Inventory—Ending	Sales Revenue
Advances to Employees	Equipment
Advertising Expense	Copyrights
Accumulated Depreciation—Equipment	Purchases
Retained Earnings	Prepaid Rent
Cash (on hand)	Common Stock
Land	Paid-in Capital in Excess of Par

Patuakhali Science and Technology University

3rd Semester (Level-2, Semester-I), Final Examination of B.Sc. Engg.(CSE), January-June/2020, Session: 2018-19

Course Code: CIT-213 Course Title: Software Engineering

[Figures in the right margin indicate full marks, Splitting answer if highly discouraged]

Time: 03 Hours **Total Marks: 70**

Answer any five of the following questions

1. a) What is the most important difference between generic software product development and custom software development? What might this mean in practice for users of generic software products? [4]

   b) Briefly discuss why it is usually cheaper in the long run to use software engineering methods and techniques for software systems? [5]

   c) When describing a system, explain why you may have to start the design of the system architecture before the requirements specification is complete? [5]

2. a) Imagine that a government wants a software program that helps to keep track of the utilization of the country's vast mineral resources. Although the requirements put forward by the government were not very clear, a software company was tasked with the development of a prototype. The government found the prototype impressive, and asked it be extended to be the actual system that would be used. Discuss the pros and cons of taking this approach. [4]

   b) Suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems. Explain your answer according to the type of system being developed: [5]
   - A system to control antilock braking in a car
   - A virtual reality system to support software maintenance
   - A university accounting system that replaces an existing system
   - An interactive travel planning system that helps users plan journeys with the lowest environmental impact

   c) Write down each of the clauses in the ACM/IEEE Code of ethics for software engineers. [5]

3. a) Which method involve customer representatives directly in the development process? Describe about the iterative development methods that focus on reducing process overheads and documentation and on incremental software delivery. [4]

   b) At the end of their study program, students in a software engineering course are typically expected to complete a major project. Explain how the agile methodology may be very useful for the students to use in this case. [5]

   c) To reduce costs and the environmental impact of commuting, your company decides to close a number of offices and to provide support for staff to work from home. However, the senior management who introduce the policy are unaware that software is developed using Scrum. Explain how you could use technology to support Scrum in a distributed environment to make this possible. What problems are you likely to encounter using this approach? [5]

4. a) Identify and briefly describe four types of requirements that may be defined for a computer-based system. [4]

   b) When emergency changes have to be made to systems, the system software may have to be modified before changes to the requirements have been approved. Suggest a model of a process for making these modifications that will ensure that the requirements document and the system implementation do not become inconsistent. [5]

   c) You have taken a job with a software user who has contracted your previous employer to develop a system for them. You discover that your company's interpretation of the requirements is different from the interpretation taken by your previous employer. Discuss what you should do in such a situation? You know that the costs to your current employer will increase if the ambiguities are not resolved. However, you also have a responsibility of confidentiality to your previous employer. [5]

5 a) You have been asked to develop a system that will help with planning large-scale events and parties such as weddings, graduation celebrations, and birthday parties. Using an activity diagram, model the process context for such a system that shows the activities involved in planning a party (booking a venue, organizing invitations, etc.) and the system elements that might be used at each stage. [4]

b) Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrollment, so the registration process must include checks that places are available. Assume that the student accesses an electronic course catalog to find out about available courses. [5]

c) Should there be a separate profession of 'software architect' whose role is to work independently with a customer to design the software system architecture? A separate software company would then implement the system. What might be the difficulties of establishing such a profession? [5]

6 a) When code is integrated into a larger system, problems may surface. Explain how configuration management can be useful when handling such problems. [3]

b) Explain how the number of known defects remaining in a program at the time of delivery affects product support. [4]

c) Testing is meant to show that a program does what it is intended to do. Why may testers not always know what a program is intended for? [3]

d) Explain how advances in technology can force a software subsystem to undergo change or run the risk of becoming useless. [4]

Patuakhali Science and Technology University

3rd Semester (Level-2, Semester-I), **Final Examination** of B.Sc. Engg.(CSE), January-June/2020, **Session:** 2018-19

Course Code: **CIT-213** Course Title: **Software Engineering**

[Figures in the right margin indicate full marks, Splitting answer if highly discouraged]

Time: 03 Hours **Total Marks: 70**

Answer any five of the following questions

1. a) What is the most important difference between generic software product development and custom software development? What might this mean in practice for users of generic software products? [4]

   b) Briefly discuss why it is usually cheaper in the long run to use software engineering methods and techniques for software systems? [5]

   c) When describing a system, explain why you may have to start the design of the system architecture before the requirements specification is complete? [5]

2. a) Imagine that a government wants a software program that helps to keep track of the utilization of the country's vast mineral resources. Although the requirements put forward by the government were not very clear, a software company was tasked with the development of a prototype. The government found the prototype impressive, and asked it be extended to be the actual system that would be used. Discuss the pros and cons of taking this approach. [4]

   b) Suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems. Explain your answer according to the type of system being developed: [5]
   - A system to control antilock braking in a car
   - A virtual reality system to support software maintenance
   - A university accounting system that replaces an existing system
   - An interactive travel planning system that helps users plan journeys with the lowest environmental impact

   c) Write down each of the clauses in the ACM/IEEE Code of ethics for software engineers. [5]

3. a) Which method involve customer representatives directly in the development process? Describe about the iterative development methods that focus on reducing process overheads and documentation and on incremental software delivery. [4]

   b) At the end of their study program, students in a software engineering course are typically expected to complete a major project. Explain how the agile methodology may be very useful for the students to use in this case. [5]

   c) To reduce costs and the environmental impact of commuting, your company decides to close a number of offices and to provide support for staff to work from home. However, the senior management who introduce the policy are unaware that software is developed using Scrum. Explain how you could use technology to support Scrum in a distributed environment to make this possible. What problems are you likely to encounter using this approach? [5]

4. a) Identify and briefly describe four types of requirements that may be defined for a computer-based system. [4]

   b) When emergency changes have to be made to systems, the system software may have to be modified before changes to the requirements have been approved. Suggest a model of a process for making these modifications that will ensure that the requirements document and the system implementation do not become inconsistent. [5]

   c) You have taken a job with a software user who has contracted your previous employer to develop a system for them. You discover that your company's interpretation of the requirements is different from the interpretation taken by your previous employer. Discuss what you should do in such a situation? You know that the costs to your current employer will increase if the ambiguities are not resolved. However, you also have a responsibility of confidentiality to your previous employer. [5]

5 a) You have been asked to develop a system that will help with planning large-scale events and parties such as weddings, graduation celebrations, and birthday parties. Using an activity diagram, model the process context for such a system that shows the activities involved in planning a party (booking a venue, organizing invitations, etc.) and the system elements that might be used at each stage. [4]

b) Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrollment, so the registration process must include checks that places are available. Assume that the student accesses an electronic course catalog to find out about available courses. [5]

c) Should there be a separate profession of 'software architect' whose role is to work independently with a customer to design the software system architecture? A separate software company would then implement the system. What might be the difficulties of establishing such a profession? [5]

6 a) When code is integrated into a larger system, problems may surface. Explain how configuration management can be useful when handling such problems. [3]

b) Explain how the number of known defects remaining in a program at the time of delivery affects product support. [4]

c) Testing is meant to show that a program does what it is intended to do. Why may testers not always know what a program is intended for? [3]

d) Explain how advances in technology can force a software subsystem to undergo change or run the risk of becoming useless. [4]