

Begum Rokeya University, Rangpur
Department of Computer Science and Engineering
2nd Year 2nd Semester, B. Sc. (Engg.) Examination- 2014

Course Code: CSE 2205 (Session: 2012-2013 Regular)
Course Code: CSE 2203 (Session: 2011-2012 Improvement)
Course Title: Microprocessor and Assembly Language

Time: 3 hours

Full Marks: 50

N.B.

- a) Answer any **FIVE** of the following questions.
b) The figures at right side indicate full marks of the question.

1. a) What are the different classifications of microprocessor? 4
b) Write some features of microprocessor and microcontroller. 3
c) What are the differences between Memory mapped I/O and I/O mapped I/O? 3
2. a) Explain addressing modes of 8086 Microprocessor. 3
b) Define physical address. Discuss how physical address is generated in 8086 processor. 4
c) Explain different types of registers in 8086 microprocessor architecture. 3
3. a) Which are the different types of interrupt supported by 8086? Explain interrupt vector table of 8086. 4
b) Indicate the signals which are different when 8086 in minimum mode and in maximum mode. 3
c) What is an instruction queue? Explain. 3
4. a) Explain the bus operations in 8086. 2
b) Explain the concept of segmented memory. What are its advantages? 4
c) Define Physical address and Effective address. 2
d) Indicate the addressing modes of the destination operand and calculate its real mode address for the following instructions: (i) ADD [DI], AL; (ii) SUB BLOCK, AX; Assume DI= 5A00H, DS= 2000H, BLOCK= 4000H. 2
5. a) Explain the different categories of instruction set of 8086 with examples. 5
b) Write assembly code for: (i) Load DS with 5020H; (ii) Add the contents of memory location 2000h:0500H to contents of 3000H:0600H and store the results in 5000H:0700H. 1+2
c) What is wrong with the following instructions: (i) MOV [AX], 20H; (ii) ADD AX, BL. 2
6. a) What do you mean by assembler directive? Mention some assembler directives with their tasks. 3
b) Explain the instruction PUSH and POP with example. 4
c) Correct the following code: 3

```
MOV AH, AL
MOV CL, 05
ROL CH, CL
AND AH, 0FH
AND BL, 0FH
AAD
RET
```
7. a) Identify the addressing modes of the following instructions: (i) MOV CL, LIST[SI+2]; (ii) PUSH AX; (iii) MOV DX[DI]; (iv) JMP BX. 4
b) Explain how the DO-WHILE loop can be programmed in an 8086 processor. 3
c) Discuss signed and unsigned overflow with example. 3

[2012-13]

Begum Rokeya University, Rangpur
Department of Computer Science and Engineering
2nd Year 2nd Semester, B. Sc. (Engg.) Examination- 2014
Course: CSE 2201 (Data Structures)

A

Time: 3 hours

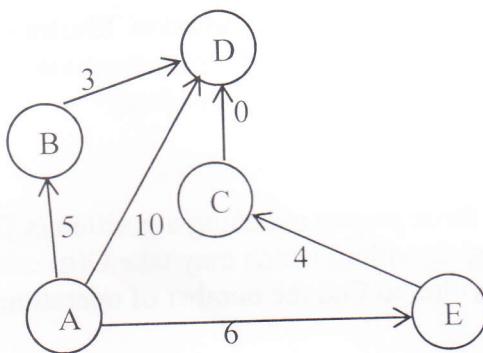
Full Marks: 50

N.B.

- a) Answer any **FIVE** of the following questions.
b) The figures at right side indicate full marks of the question.

1. a) List out the areas in which data structures are applied extensively. 1
b) What is the average case and worst case complexity analysis in computation? 3
c) Define the rate of growth as Big-O and theta notation. Illustrate then graphically. 4
d) Suppose $f(n) = 5n^2 - 4n + 1$. Find the order of magnitude of the complexity function $f(n)$ in Big-O notation where n is the size of input data. 2
2. a) What types of structure can a string be stored? 2
b) The complexity of a brute-force pattern matching algorithm is $O(n^2)$. How can you improve a pattern matching algorithm, which may take $O(n)$ complexity. 4
c) Write an edit distance algorithm to find the number of operations needed to convert one string into another. 4
3. a) What will be the postfix expression of the given infix expression: 4
 $(A+B)*C-(D+E)/F$
b) "The inorder traversal of a binary search tree produces a sorted list" – prove the statement by building a binary search tree with the following characters: 4
B A N G L A D E S H
c) Suppose the six weights 4, 15, 25, 6, 9, 20 are given. Draw a 2-tree T with the given weights so that we can find a minimum weight path length. 2
4. a) Prove that the complexity of Bubble sort algorithm is $O(n^2)$. 2
b) Suppose the following eight numbers are inserted in order into an empty binary search tree 4
T: 50, 33, 44, 22, 77, 35, 60, 40
Draw the tree T. Now, what will you do to delete the node 50?
c) Draw the binary min heap that results from inserting: 77, 22, 9, 68, 16, 34, 13, 8 in that 4 order into an initially empty binary min heap. You do not need to show the array representation of the heap. You are only required to show the final heap, although if you draw intermediate heaps, please circle your final result for ANY credit.
5. a) What happens while we want to insert an element at the beginning of a Linked List? 3
b) Suppose LIST is a header (circular) list in memory. Write an algorithm which deletes the last node from the LIST. 4
c) What is the advantage of doubly linked list over singly linked list? Illustrate with an example. 3

6. a) Suppose we choose the median of five items as the pivot in quick sort. If we have an $N = 5$ elements array, then we find the median of the elements located at the following positions: left($=0$), right($=N-1$), center (the average of left and right, rounded down), left of Center(average of left and center, rounded down), and right of Center (the average of right and center, rounded down). The median of these elements is the pivot.
What is the worst case running time of this version of quick sort? 2
- b) Illustrate the procedure to insert a node into a priority queue with a figure. 3
- c) Define a recursive function with necessary properties. Illustrate the calling procedure of recursive function to find a factorial of 5. 3
7. Use the following graph of this problem. Where needed and not determined by the algorithm,, assume that any algorithm begins at node A. 4



- a) Draw both the adjacency matrix and adjacency list representations of this graph. Be sure to specify which is which. 4
- b) Give two valid topological orderings of the nodes in the graph. 2
- c) Imagine that the graph were undirected (i.e., ignore the direction of the edges). Write the edges considered by Kruskal's algorithm in the order they are considered. Assume the algorithm terminates as soon as the MST has been completed. Write an edge between vertices A and B as (A, B). 4

Begum Rokeya University, Rangpur.

Department of Computer Science and Engineering

B.Sc. (Engg.) 2nd Year 2nd Semester Final Examination-2014 (Session: 2012-13)

Course Title: Database Management System; Course Code: CSE 2203

A

Total Marks: 50

Time: 3.00 hours

Answer any five from the given questions.

[Note: Numbers on right margin indicate the marks for each question. Answer the question sequentially]

1. a) What do you mean by modeling of data? Discuss different kinds of data models with example. 3
b) List six major steps that you would take in setting up a database for a particular enterprise. 2
c) Suppose you want to build a video site similar to YouTube. Consider the disadvantages of keeping data in a file-processing system. Discuss the relevance of each of the disadvantages to the storage of actual video data and to metadata about the video, such as title, the user who uploaded it, tags, and which users viewed it. 3
d) What are the five functions of database administrator? 2
2. a) What is SQL and PL/SQL? What do you understand by *Super Key*, *Candidate Key* and *Primary Key*? 2
b) What are the consequences of using *where* clause, *having* clause and *with* clause? Write down proper SQL query for these. 3
c) Consider the following database consisting of the following tables: 5
Party (pid, pname, leader)
Constituency (cid, cname)
Contestant (ctid, cname, ctaddr)
Election (ctid, number of votes, pname, name)
i. Display the contestant details if they secured greater than 10,000 votes.
ii. Find the number of contestants, constituency wise.
iii. Display the winner details in each constituency.
iv. Write a PL/SQL function to return the number of votes secured for a given contestant name.
3. a) Discuss various types of fundamental relational algebra operations in binary operations. 2
b) How can you define and manipulate data through PL/SQL functions, procedures and triggers? 3
c) E-R modeling (The domain to model is mountains and countries) : 5
 - A mountain has a summit position (the latitude and longitude coordinates), which identifies it uniquely.
 - A mountain can have many names: e.g. *Mount Everest* is also known as *Chomolungma* and *Sagarmatha*
 - There can be many mountains with the same name (e.g. many *Stortinden* in Norway), but not with the same summit position.
 - A mountain can lie in many countries: e.g. *Mont Blanc* is on the border of France and Italy, and hence lies in both countries.
 - Every country has a highest mountain: e.g. *Mont Blanc* is the highest mountain of both France and Italy. (We assume that every country has exactly one highest mountain, even though there might be borderline cases with countries that have no mountains and countries with many equally high highest mountain).
 - Every country has a different name.

Now, Draw an Entity-Relationship diagram for this domain. **Do not use multi-valued attributes**

4. Here is a part of a country fact box in Wikipedia: 10
name: Sweden; **capital:** Stockholm; **area:** 450,295 sq km; **population:** 9,816,431
population density: 21.8/sq km; **GDP** (Gross Domestic Product) total: \$483,724,270,387
GDP per capita (i.e. per person): \$49,277; **currency:** SEK; **time zone:** CET
time zone difference from UTC (Greenwich time): +1

We assume that all the attributes have a single value, even the time zone (which in the real world is not true of all countries). We also assume that all countries have different names and that all capitals have different names. Now, consider the task of creating a database from country fact boxes.

A

We start with a big table with the schema:

Countries(name, capital, area, population, density, gdp, gdpCapita, currency, timeZone, timeZoneDiff)

- i. What functional dependencies can you find? (You don't need to list dependencies that follow from other ones you list.)
 - ii. What keys are suggested by the functional dependencies, and why?
 - iii. Which functional dependencies violate the Boyce Codd Normal Form (BCNF), and why?
 - iv. How would you decompose the table to bring it to BCNF?
 - a) What are the new tables, their keys, and their functional dependencies?
 - b) Which dependencies could/should be treated in another way than by new tables?
5. a) When is it preferable to use dense index rather than a sparse index? Explain your answer. 2
- b) What are the causes of bucket overflow in a hash file organization? What can be done to reduce the occurrence of bucket overflow? 2
- c) Construct a B+-tree for the following set of key values: 6

(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

Assume that the tree is initially empty and values are added in ascending order. Construct B+-trees for the cases where the number of pointers that will fit in one node is as follows:

- i. Four
- ii. Six
- iii. Eight

6. a) What are the main activities of query processing and optimization? Describe each step with figure. 3
- b) How can we measure the cost of a query? Describe with a selection operation for binary search and linear search. 3
- c) "Find the names of all instructors in the Music department together with the course title of all the courses that the instructors teach." 4

*instructor(ID, name, dept name, salary)
teaches(ID, course id, sec id, semester, year)
course(course id, title, dept name, credits)*

- i. Find out the all possible expression tree for the query
- ii. Create query evaluation plan
- iii. Write down the ultimate relational algebra.

7. a) During its execution, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur
- b) Explain the distinction between the terms *serial schedule* and *serializable schedule*. 2
- c) Suppose two schedules T1 and T2 are given. Initial values of A and B are 25. Now check for the serial schedules and also their serializability. 3

<i>T₁</i>	<i>T₂</i>
READ(A, t)	READ(A, s)
t := t+100	s := s*2
WRITE(A, t)	WRITE(A, s)
READ(B, t)	READ(B, s)
t := t+100	s := s*2
WRITE(B, t)	WRITE(B, s)

- d) Why is it relatively easy to port a database from a single processor machine to a multiprocessor machine if individual queries need not be parallelized? 2

9
25

Begum Rokeya University, Rangpur
 Department of Computer Science and Engineering
 2nd Year 2nd Semester, B. Sc. (Engg.) Examination- 2014

2012-13

Course Code: MAT 2221

Course Title: Complex Variable, Laplace Transformation and Fourier Analysis

Time: 3 hours

Full Marks: 50

N.B.

- a) Answer any **FIVE** of the following questions.
- b) The figures at right side indicate full marks of the question.

- | | | |
|-------|--|---|
| 1. a) | Define Analytic function. Prove that a (a) necessary and (b) Sufficient condition that $w = f(z) = u(x y) + iv(x y)$ be analytic in a region R is the Cauchy – Riemann equations $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ are satisfied in R where it is supposed that these partial derivatives are continuous in R. | 6 |
| b) | Define singular point and pole. Locate and name all the singularities of $\frac{z^8+z^4+2}{(z-1)^3(3z+2)^2}$. | 4 |
| 2. a) | Define harmonic function. Prove that $u = e^{-x}(xsiny - ycosy)$ is harmonic. Find v such that $f(z) = u + iv$ is analytic. | 5 |
| b) | Verify Green's theorem in the plane for $\oint_C (2xy - x^2)dx + (x + y^2)dy$ where C is the closed curve of the regions bounded by $y = x^2$ and $y^2 = x$. | 5 |
| 3. a) | Define simple and multiply-connected region. State and prove Cauchy's theorem. | 6 |
| b) | Evaluate $\oint_C \frac{dz}{z-a}$ where C is any simple closed curve C and a is (a) outside C, (b) inside C. | 4 |
| 4. a) | State and prove Cauchy's integral formula. | 4 |
| b) | Prove the modulus of sum or difference of two-complex numbers is always less than or equal to the sum of their moduli. | 3 |
| c) | If $z_1 = x_1 + iy_1$ and $z_2 = x_2 + iy_2$ then prove that $\text{amp} \frac{z_1}{z_2} = \text{amp}(z_1) - \text{amp}(z_2)$. | 3 |
| 5. a) | State and prove Laurent's theorem. | 5 |
| b) | Expand $f(z) = \frac{z}{(z-1)(2-z)}$ in a Laurent series valid $ z < 1$. | 5 |
| 6. a) | Define residue. State and prove Cauchy's Residue theorem. | 5 |
| b) | Find the residue of $f(z) = \frac{z^2-2z}{(z+1)^2(z^2+4)}$. | 5 |
| 7. a) | Evaluate the coefficients of Fourier series a_0, a_n and b_n on the interval $(-\pi, \pi)$. | 5 |
| b) | Represent the following function in Fourier series $f(x) = x, -\pi \leq x \leq \pi$. | 5 |

X
 Begum Rokeya University, Rangpur
 Department of Computer Science and Engineering
 2nd Year 2nd Semester, B. Sc. (Engg.) Examination- 2014
 Course: ECO 2222 (Economics)

Time: 3 hours

Full Marks: 50

N.B.

- a) Answer any **FIVE** of the following questions.
- b) The figures at right side indicate full marks of the question.

1. a) What is the relationship between demand and price? In this context explain the demand law. 5
 b) How does the market reach at equilibrium from an initial disequilibrium situation? 5
2. a) The elasticity of demand can vary between 0 and minus infinity –discuss. 3
 b) How can one calculate elasticity? 2
 c) Briefly discuss the determinants of demand elasticity. 5
3. a) Show the utility maximizing rule both mathematically and graphically. 5
 b) Explain why in product markets the substitution and income effects work in the same direction for normal goods, but in the labor market, the income and substitution effects work in opposite directions when leisure is considered a normal good. 5
4. a) Determine optimum factors combination of a producer with the help of iso-product curves and iso-costs. 5
 b) During the early phases of industrialization, the number of people engaged in agriculture usually drops sharply, even as agricultural output is growing. Given what you know about production technology and production functions, explain this seeming inconsistency. 5
5. a) How do we know that calculating GDP by the expenditure approach yields the same answer as calculating GDP by the income approach? 4
 b) What are some of the problems in using fixed weights to compute real GDP and the GDP price index? 3
 c) Evaluate the following statement: Even if the prices of a large number of goods and services in the economy increase dramatically, the real GDP for the economy can still fall. 3
6. a) What do the CPI and the PPI measure? Why do we need both of these price indexes? 5
 b) On average, nations in X pay higher unemployment benefits for longer periods of time than does the Y. How do you suppose this would impact the unemployment rates in these nations? Explain which type of unemployment you think is most directly affected by the size and duration of unemployment benefits. 5
7. You are given the following data concerning Ecodonia, a legendary country:
 (i) Consumption function: $C = 200 + 0.8Y$
 (ii) Investment function: $I = 100$
 (iii) $AE \equiv C + I$
 (iv) $AE = Y$
 a) What is the marginal propensity to consume in Ecodonia, and what is the marginal propensity to save? 2
 b) Graph equations (iii) and (iv) and solve for equilibrium income. 3
 c) Suppose equation (ii) is changed to $(ii')/=-110$. What is the new equilibrium level of income? By how much does the tk. 10 increase in planned investment change equilibrium income? What is the value of the multiplier? 2
 d) Calculate the saving function of Ecodonia. Plot this saving function on a graph with equation (ii). Explain why the equilibrium income in this graph must be the same as in part b. 3

A

egum Rokeya University, Rangpur
Department of Computer Science and Engineering
2nd Year 2nd Semester, B. Sc. (Engg.) Examination- 2014
Course: SOC 2223 (Sociology)

Time: 3 hours

Full Marks: 50

N.B.

- i) Answer any **FIVE** of the following questions.
- ii) The figures at right side indicate full marks of the question.

1. Define Sociology. Briefly discuss the nature and scope of sociology as scientific discipline. 10
2. Define culture. What are the differences ^{between} culture and civilization? How would you explain cultural lag in your own society? 10
3. Distinguish between class and cast. Discuss the maxian analysis of class. 10
4. Define industrialization. Briefly discuss the effects of industrialization on the environment of developing world. 10
5. What is meant by juvenile delinquency? Do you think the advancement in science and technology has any connection with the increase in juvenile delinquency? Explain. 10
6. Discuss types of crime in rural and urban Bangladesh. Explain the reasons of such crime. 10
7. Write short notes (Any two).
 - a) Types of technology transfer
 - b) Environmental Disaster
 - c) Caste system
 - d) Evolutionism5x2=10