

# Bangladesh Open University

## School of Science and Technology

B. Sc in Computer Science and Engineering Program

152 Term (2<sup>nd</sup> Year 2<sup>nd</sup> Semester)

Final Examination

Course Code & Title: CSE22P5 Information System Analysis and Design Lab

Time: 3 hours

Total Marks: 60

A. Choose and perform one experiment by lottery from out of the following experiments. 1×40=40

Exp 1. Give a presentation of your project work.

Exp 2. A systems analyst collects the following information about a project she is working on for an auction house. To assist her, draw context and level 0 data flow diagrams.

The auction house has selling customers, who want to put up an item for sale, and buying customers, who buy an item at an auction. Selling customers ask the auction house to sell an item on their behalf. The auction house decides whether to accept the request and maintains a record for all accepted requests. Buying customers register with the auction house and participate in auctions. Auctions are conducted by giving buying customers information about an item, then taking bids. The auction determines a buying customer for each item put up for sale. The sale is completed when the buying customer pays for the item. The auction house sends a portion of the sale income to the selling customer who put up the item for sale in the first place. Of course, the auction house keeps track of all auctions (which are conducted every few weeks) and all sales at each auction.

Exp 3. Draw an Entity-Relationship diagram that describes the contents of the auction house database. You may assume that the auction house records name, phone number and address information for all customers. For each item, the auction house database contains a unique identifier (call it item#), a description, its owner, and the auction during which it was sold. For each auction, the database stores the date, the items put up for sale, who their buyer was, and their sale price.

Exp 4. Suppose you have to build an information system which stores and maintains information about all activities during a software development project. In particular, the system stores different versions of software components as they become available, external documentation in the form of reports, user and reference manuals (with different versions), stores project tasks, who was assigned to each task and when was the task completed. In addition, the system keeps track of meetings, test data, test runs, bug fixes etc.

For hardware, the project will use several workstations for project participants, as well as a central server where all the project information is kept. All machines are connected with an Ethernet LAN.

Choose software architecture for the information system. Explain carefully your choice.

Exp 5. Give a state transition diagram (STD) which accepts input strings consisting of '0's and '1's, ending with the special character '\$' and such that:

- The output of the STD is "YES" if the input is a string of the form "01\$", "0101\$", ..., "01 (n times) \$"
- The output is "NO" for all other input strings

B. Notebook on experiments.

10

C. Viva-voce.

10

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**152 Term (2<sup>nd</sup> Year 2<sup>nd</sup> Semester)**

**Final Examination**

**Course Code & Title: CSE22P3 Microprocessors and Assembly Language Lab**

**Time: 3 hours**

**Total Marks: 60**

- |           |   |                |
|-----------|---|----------------|
| <b>A.</b> | <b>Choose and perform one experiment by lottery from out of the following experiments.</b>  | <b>1×40=40</b> |
| Exp 1.    | Write a program for Multiplication on 8085 microprocessors.   |                |
| Exp 2.    | Write a program for Division on 8085 microprocessors.   |                |
| Exp 3.    | Write a program that will read a character from keyboard and display it at the beginning of the next line on 8086 microprocessor. |                |
| Exp 4.    | Write a program on 8086 microprocessor that converts a lowercase to uppercase letter.   |                |
| Exp 5.    | Write a program to display a 10x10 solid box of asterisk.   |                |
| Exp 6.    | Implementation of 7-Segment display using MDA-806.  |                |
| Exp 7.    | Implementation of dot matrix display using MDA-806.   |                |
| Exp 8.    | Write a program that performs Addition and Subtraction operation on 8085 MP.  |                |
| <b>B.</b> | <b>Notebook on experiments.</b>   | <b>10</b>      |
| <b>C.</b> | <b>Viva-voce.</b>   | <b>10</b>      |

# Bangladesh Open University

## School of Science and Technology

B. Sc in Computer Science and Engineering Program

152 Term (2<sup>nd</sup> Year 2<sup>nd</sup> Semester)

Final Examination

Course Code & Title: CSE2232 Microprocessors and Microcontrollers

Time: 3 hours

Total Marks (5x14): 70

[N.B.: Answer any 5 (five) questions. The figures in the right margin indicate the full marks. All portions of each question must be answered sequentially.]

1. (a) What do you mean by single and multi-core microprocessor systems? Briefly explain the importance of using assembly language in a microprocessor system. 2+3
- (b) Derive the contents of the flag(CF,PF,ZF,OF) register of 8086 microprocessor upon executing the following instructions:  
(i) INC ALL ; Assume AL initially contains FFh  
(ii) XOR AX, AX ; Assume Ax initially contains 8000h. 5
- (c) Write short notes on the following: 4  
(i) Microprocessor (ii) Microcontroller.
2. (a) Define Peripherals and Interfacing concepts? Briefly discuss the five basic functions of an interface. 2+3
- (b) Distinguish between the followings: 5  
(i) Polling and Interrupt (ii) Memory-mapped I/O and Isolated I/O
- (c) What is meant by priority of interrupts? If an interrupt is requested, how does 8086 microprocessor respond to it? 1+3
3. (a) Drawing the timing diagram, briefly explain the READ and WRITE operations for 8086 microprocessor. 5
- (b) What are real mode and protected virtual mode? Which microprocessor(s) does solve the smooth transition between these modes and how? 2+3
- (c) Write short notes on multiple interrupt concepts. 4
4. (a) What is Math - Coprocessor? Differentiate between CISC and RISC microprocessors. 1+4
- (b) What is data converter? What does a data converter do in peripherals and interfacing? Briefly explain with example. 1+4
- (c) Write an assembly language program to do SWAP operation amongst the values of AX and BX registers without using any other register. 4
5. (a) Write an appropriate block diagram and briefly explain the basic concept of I/O interfacing. 5
- (b) Why interrupt is necessary? How does 8086 get the address of a particular Interrupt Service Routine (ISR)? 1+4
- (c) Suppose it is given  $V_{ref} = 0.4$  volt,  $V_{in} = 1$  volt and 8-bit of resolution for using in a successive Approximation ADC. Find the 8-bit digital output for the given  $V_{in}$ . Also find the Analog value for the digital output using the Weighted Sum DAC method. 2+2
6. (a) What is the naming convention of ATMEL microcontroller? Define and distinguish between Tiny, Mega and X-Mega AVR (Advanced Virtual RISC). 2+3
- (b) Write a comparative analysis on Successive Approximation ADC, Flash ADC and Delta-Sigma ADC. 5
- (c) Suppose, you are given a range of  $V_{ref} = 0$ v and  $V_{max} = 24$ v. Calculate the resolution of a 12-bit D/A converter. 4
7. (a) Suppose, a control register of 8155 PPI has an address of 20h. If following instructions are executed in an 8085 microprocessor system, then derive the all the port functionalities (i.e., including pins) of the 8155 PPI:  
MVI A, 17h  
OUT 20h 5
- (b) What is Memory Segment? Derive the physical address of the following memory segments:  
(i) 348a H 4214 H (ii) 041A H 0F72 H 1+4
- (c) Draw the control word format for the 8255A PPI when Port-A is working in Mode-2 as an output port. 4



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**Final Examination**

**Course Code & Title: CSE22P9 Database Management System Lab**

**Time: 3 hours**

**Total Marks: 60**

**A. Choose and perform one experiment by lottery from out of the following experiments. 1×40=40**

- Exp 1.** Create the following table and insert data into it  
*employee (emp\_id, emp\_name, department, salary, address, city)*  
 (i) Alter the table by adding a column designation  
 (ii) Display the information from 'employee' table group by city.  
 (iii) Find the maximum, minimum and average salary from 'employee' table using aggregate function.  
 (iv) Delete all the records where salary is less than 10000.  
 (v) Find the total number of employees.  
 (vi) Apply triggers.

- Exp 2.** Create a table as bank and the details are as follows:

Acc_No	Cust_Name	Cus_Branch	Balance
1235	Masrafee	Gazipur	255000
1236	Sakib	Dhaka	183455
1237	Musfiq	Rajshahi	125000
1238	Sabbir	Rangpur	177777

Perform the following:

- (i) Simple select.  
 (ii) Select with where clause, comparison operator.  
 (iii) Select with between in the field Balance.  
 (iv) Update the Cus\_Branch in the second row as Chittagong.  
 (v) Find the total number of Acc\_No  
 (vi) Apply triggers.

- Exp 3.** Create the following tables and do the operations  
*book (book\_name, author, price, quantity)* and *customer (cust\_id, cust\_name, address, phone\_no)*  
 (i) Insert data into the above tables.  
 (ii) List the author of those books which price is greater than 200.  
 (iii) Find the average, minimum and maximum price of books from the above 'book' table.  
 (iv) Find the total number of customer.

- Exp 4.** Create the following tables using SQL:  
*student (ID, name, DOB, address, city)*  
*marks (ID, mark1, mark2, mark3)*  
 (i) Show all the students order by name.  
 (ii) Show all the IDs of the students from 'marks' table where mark1 is greater than 50.  
 (iii) Count the total number of students from 'student' table.

- Exp 5.** Create a table with the following query that computes an employee's gross pay and net pay using the formulas:

$$\text{Gross} = \text{Hours} * \text{Rate}; \quad \text{Net} = \text{Gross} - \text{Tax}$$

Tax is subtracted from the gross only if an employee earns more than TK.5000. Otherwise no tax will be deducted. Tax rate is 5% of gross pay. Apply function and triggers.

- Exp 6.** Create a database with two tables by forms. Then create buttons in the for delete tuple, update tuple, search desire tuple and traverse tuples.

**B. Notebook on experiments.**

**C. Viva-voce.**

10

10

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**Final Examination**

**Course Code & Title: CSE2238 Database Management System**

**Time: 3 hours**

**Total Marks (5x14): 70**

*[N.B.: Answer any 5 (five) questions. The figures in the right margin indicate the full marks. All portions of each question must be answered sequentially.]*

1. (a) What is DBMS? Mention the database applications, function of DBMS and write the advantages of using DBMS. 1+4
- (b) Define data abstraction? Explain the levels of abstraction. 1+4
- (c) What do you mean by DDL and DML? Write the main functions of database administrator. 2+2
2. (a) Define attribute in E-R model. Briefly describe different types of attribute used in E-R model with necessary example. 1+3
- (b) What do you understand by mapping cardinality? Discuss about different types of mapping cardinality using necessary example. 1+3
- (c) Consider a MAIL, ORDER database in which employees take orders for parts from customers. The data requirements are summarized as follows: 6
  - (i) The mail order company has employees, each identified by a unique employee number, first and last name, and post code.
  - (ii) Each customer of the company is identified by a unique customer number, first and last name, and post code.
  - (iii) Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock.
  - (iv) Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded.

Design an Entity-Relationship diagram for the mail order database.
3. (a) Write the formal definition of Relational Algebra with example. 2+3
- (b) Explain the basic structure of an SQL query expression with example. 4
- (c) Explain natural join and division with example. 5
4. (a) What do you understand by normalization and functional dependency? Define 1NF, 2NF and 3NF with example. 2+6
- (b) Define the following terms with example: 3+3
  - (i) Homogeneous Distributed Database (ii) Data Replication & Fragmentation.
5. (a) What do you mean by database user? 3
- (b) What is transaction? Show the steps of Read-item (READ(x)) and write-item (WRITE(x)) operation on a database transaction. 1+4
- (c) Describe the ACID properties and transaction state of transaction. 6
6. (a) Define database trigger. Explain the trigger mechanism with an example. 2+4
- (b) Define Deadlock Handling. Describe the different type of approach in deadlock prevention. 1+4
- (c) What are various protection and recovery mechanism in SQL. 3
7. (a) Write the purpose of database recovery system and explain the types of failure. 3
- (b) Describe the shadow paging technique with example. 4
- (c) When are two operations said to be conflict in a schedule. 3
- (d) Construct a B+ tree for the following set of key values: 4

8, 5, 1, 7, 3, 12, 9, 6

Consider the number of pointers in a node is 3.



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**Final Examination**

**Course Code & Title: CSE2234 Information System Analysis and Design**

**Time: 3 hours**

**Total Marks (5x14): 70**

*[N.B.: Answer any 5 (five) questions. The figures in the right margin indicate the full marks. All portions of each question must be answered sequentially.]*

- |        |  |     |
|--------|--|-----|
| 1. (a) | Define information system. Briefly describe all the categories of information system.  | 1+5 |
| (b)    | Write the characteristics of good information system. How is data converted to information? Explain with example.  | 2+3 |
| (c)    | What are the sources of information? List some primary information gathering sources.  | 1+2 |
| 2. (a) | Describe all the phase of System Development Cycle (SDLC).   | 7   |
| (b)    | What is feasibility study in information system? Describe different types of feasibility analysis.   | 1+6 |
| 3. (a) | Describe the principles of system development process.   | 7   |
| (b)    | Describe the "PIECES" framework for problem solving.   | 7   |
| 4. (a) | What do you mean by prototyping? How prototyping can improve the system?   | 1+3 |
| (b)    | Draw the data flow diagram of "Academic system of Bangladesh Open University system".  | 4   |
| (c)    | What is the importance of data modeling? Explain the data modeling of "Human Resource System of Bangladesh Open University". <i>→ explain its benefits</i> | 2+4 |
| 5. (a) | Define project.  | 2   |
| (b)    | Why do project fails? Explain.   | 1+5 |
| (c)    | Explain disaster and recovery.   | 6   |
| 6. (a) | Why system testing is essential?   | 4   |
| (b)    | What is syntax error? How does it differ from logical error?   | 1+3 |
| (c)    | Describe the factors that affect the quality of a system.  | 6   |
| 7. (a) | What do you mean by modern structured design? What are the properties of modern structured design?   | 2+5 |
| (b)    | Briefly explain various types of user interface.   | 4   |
| (c)    | What are differences between logical and physical model?   | 1   |

Data models can facilitate interaction among the designers, the application programmer and the end user.  
A well developed data model can even foster improve understanding of the organization for which the database design is developed.  
Prototyping is the conversation you have with your ideas.

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**Final Examination**  
**Course Code & Title: CSE22P7 Computer Algorithms Lab**

**Time: 3 hours**

**Total Marks: 60**

- A. Choose and perform one experiment by lottery from out of the following experiments. 1×40=40**
- Exp 1. Write a program to implement Bubble sort and Selection sort algorithm.
- Exp 2. Write a program to implement Quick Sort Algorithm.
- Exp 3. Write a program to implement Merge Sort Algorithm.
- Exp 4. Write a program to implement Dijkstra's algorithm to find shortest path of a graph.
- Exp 5. Write a program to implement Depth First Search algorithm for traversing of a graph.
- Exp 6. Write a program to implement Prim's Algorithm to find minimum cost spanning tree of a graph.
- Exp 7. Write a program to implement Kruskal Algorithm to find minimum cost spanning tree of a graph.
- Exp 8. Write a program to implement Knapsack algorithm.
- Exp 9. Write a program to implement Largest Common Subsequence.
- Exp 10. Write a program to implement Matrix Chain Multiplication.
- B. Notebook on experiments. 10**
- C. Viva-voce. 10**

[N.B.: Answer any 5 (five) questions. The figures in the right margin indicate the full marks. All portions of each question must be answered sequentially.]

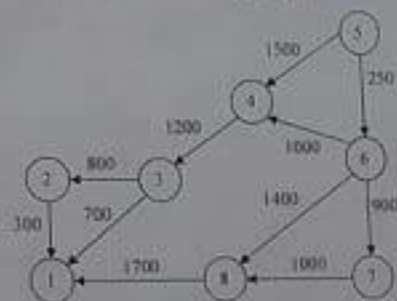
1. (a) What is algorithm? What kinds of problems are solved by algorithms? 1+2  
 (b) What do you understand by asymptotic notation? Define  $\Omega$  notation,  $\Theta$  notation and  $O$  notation with proper example. 1+6  
 (c) Calculate the time complexity of the following algorithm: 4  

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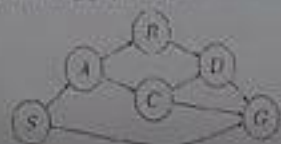
      Algorithm Revolution( $S, P, N$ )
      if ( $P=1$ ) return(1);
      else
           $P=P/2$ ;
           $S=S/4$ ;
           $N=N-2$ ;
          Revolution( $S, P, N$ );
      
```
2. (a) Define divide and conquer strategy. Give some examples for divide and conquer method. 1+1  
 (b) Write the pseudo code for quick sort algorithm. Explain quick sort algorithm with example. 2+5  
 (c) Describe how following array will be sorted in ascending order using merge sort. 5  
 [6 1 7 9 2 3 5 6 4 7 8]
3. (a) Do the following action for the given array – [2 2 4 16 7 9 8 14] 6  
 i. Build the heap  
 ii. Heapify  
 iii. Heapsort  
 (b) Suppose an array is: [6 8 1 4 5 3 7 2] – and your goal is to put it into ascending order using Selection sort. 1  
 (c) Draw a tree of recursive calls of MaxMin algorithm for the following data: 1  
 22, 13, -5, -8, 15, 60, 17, 31, 47.
4. (a) What are the main conditions to solve a Knapsack problem? What are the objectives of the problem? 2+2  
 (b) Solve the following Knapsack problem when  $n=6$ ,  $m=20$ ,  $(P_1, P_2, P_3, P_4, P_5, P_6) = (10, 5, 15, 7, 6, 18)$  and  $(w_1, w_2, w_3, w_4, w_5, w_6) = (2, 3, 5, 7, 1, 4)$ . 6  
 (c) Define Dynamic Programming. Differentiate between Greedy method and Dynamic Programming technique. 2+2
5. (a) Explain NP, P, NP-hard and NP-complete problem. Show their relationships. 2+2  
 (b) Write a non deterministic sorting algorithm. 3  
 (c) Define Longest Common Subsequence problem. Consider two strings, "HEAGAWGHEE" and "PAWHEAE". Find the longest common substring using dynamic programming technique. 1+6



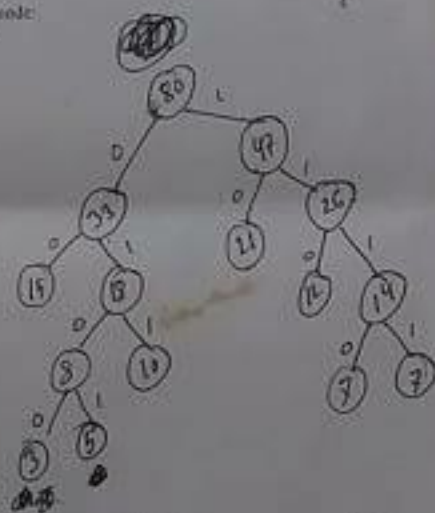
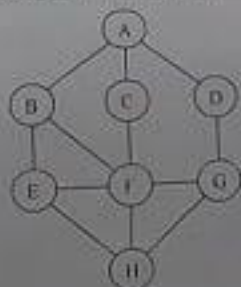
- (a) Define minimum cost spanning tree. Write down Prim's algorithm to find out the minimum cost spanning tree in a graph. Demonstrate the algorithm with an example. (1-5)
- (b) Write down the algorithm for all pair shortest path. Use Dijkstra's algorithm to find the shortest path from source S to destination V of the following graph (Assume  $S = 5$  and  $V = 2$ ). (3-1)



7. (a) Find BFS for the following graph using 'A' as the starting node:



- (b) Reconstruct the following graph in adjacency list:



- (c) What do you understand by Huffman code? Find Huffman code for the following:



Character	A	E	I	O	U	Space	T	New Line
Frequency	15	10	21	5	7	12	3	7

35 22 10 12 15 21

A = 00  
E = 011  
I = 10  
O = 0101  
U = 1110

Space = 110  
T = 0100  
New line = 1111

Huffman invented a greedy algorithm that constructs an optimal prefix code called a Huffman code.