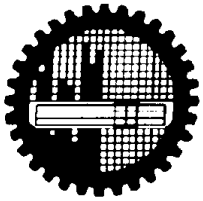

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 100

Sessional Primitives

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Course Number: CSE 100
Course Title: Introduction to Computer Systems
Credit Hour: 2
Contact Hour per Week: 4 Hours
Server Needed (If any): No
Additional Requirements (if any):

- The following software are needed for learning basic computer usage and performing programming assignments
  - Windows XP
  - Microsoft Office (Word, Excel and PowerPoint)
  - Internet Explorer or Mozilla Firefox
  - Microsoft Visual C++ 6.0 or Eclipse
- Connectivity to the Internet is required for demonstrating the Internet and the World Wide Web (WWW).

Themes To Be Covered:

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This course consists of both theory and lab classes. In the first seven weeks, the lab classes mostly deal with theoretical concepts. It is up to the instructor to arrange the lab classes according to the course materials. However a rough guideline of both theory and lab classes are presented at the end of this document.

Title: Introducing Computers and Their Uses
Outline: This will be covered in the first class of the course. Here the students will be introduced to computers and their uses in different spheres of our day to day activities. This class may also have some discussion on other CSE courses.
Online Task: None
Offline Task: None
Mode of evaluation: Not applicable
Suggested Percentage Weight: Not applicable

Title: Hardware Basics
Outline: In this class the students will become familiar with common hardware present in a personal computer system. Different hardware will be categorized according to the operations they typically perform (e.g. processing, input, output). Placement of different hardware in the motherboard and their basic activities will also be discussed. In the lab, the instructor will also show the internal components of a personal computer.
Online Task: None
Offline Task: None
Mode of evaluation: Not applicable

Suggested Percentage Weight: Not applicable

Title: Operating System (OS) Basics
Outline:

- Needs of an operating system
- Basic activities performed by an operating systems
- Examples of popular operating systems
- Types of operating systems
  - PC OS
  - Network OS
  - Embedded OS
- Different aspects of an example OS (e.g. Windows XP)

Online Task: None
Offline Task: None
Mode of evaluation: Not applicable
Suggested Percentage Weight: Not applicable

Title: Networking, Internet and WWW
Outline:

- What is a computer network?
- Uses of computer network
- Different types of computer networks (e.g. LAN, WAN etc.)
- History of the Internet
- Internet services
- World Wide Web (WWW) and related technologies
- Using a web browser
- E-mail

Online Task: None
Offline Task: None
Mode of evaluation: Not applicable
Suggested Percentage Weight: Not applicable

Title: Application Software
Outline:

- Why do we need software?
- Different types of application software with examples
  - Word processing software (e.g. Microsoft Word)
  - Presentation software (e.g. Microsoft PowerPoint)
  - Spreadsheet software (e.g. Microsoft Excel)

Online Task: There can be an online assignment where the students will be asked to prepare a word document using different formatting options, tables, images etc.
Offline Task: The can be an offline assignment where the students will be asked to prepare a PowerPoint presentation on a particular topic.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of requirement fulfillment. For the online task it will be seen whether the students have incorporated all the required contents with proper formatting. For the offline task innovation, design sense and richness of content will be used as evaluation criterion.
Suggested Percentage Weight: 5-10%

Title: Number Systems
Outline:

- Introducing different number systems
  - Binary
  - Decimal
  - Octal
  - Hexadecimal
- Conversion between different number systems
- (N-1)'s and N's complement representation of numbers

Online Task: Students will be asked to convert some numbers from one number system to another. However instead of taking a dedicated test on number systems, the test can be added to the quizzes.
Offline Task: Students will be asked to convert some numbers from one number system to another. However instead of taking a dedicated test on number systems, the test can be added to the quizzes.
Mode of evaluation: Exam scripts will be collected and evaluated.
Suggested Percentage Weight: 5-10%

Title: Algorithms, Flowcharts and Pseudo code
Outline:

- What is algorithm?
- Why do we need algorithm?
- How to represent algorithm?
- What is a flowchart?
- How to draw flowcharts?
- How to write pseudo code?
- Decisions and iterations
- It is better to continue this theme for at least two weeks so that students become confident in programming logic and algorithms.

Online Task: Students will be asked to solve a problem using flowchart and then write the corresponding pseudo code.
Offline Task: Students will be asked to solve a problem using flowchart and then write the corresponding pseudo code.
Mode of evaluation: Exam scripts will be collected and evaluated.
Suggested Percentage Weight: 5-10%

Title: Introduction to Programming and the C Programming Language
Outline:

- Why is computer programming?

- Different types of programming languages
- Needs for a compiler
- Introduction to the C programming language

Online Task: None
Offline Task: None
Mode of evaluation: Not applicable
Suggested Percentage Weight: Not applicable

Title: C Programming – Variables, Input, Output
Outline:

- Basic sequential programming
- Declaring and using variables
- Using “printf” to output strings and variables
- Using “scanf” to input from keyboard

Online Task: There can be 2 online tasks focusing this theme.
Offline Task: There can be 2 or 3 offline tasks in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Title: C Programming – Using arithmetic operators
Outline:

- Basic sequential programming
- Program with medium complexity that uses arithmetic operators

Online Task: There can be 2 online tasks focusing this theme.
Offline Task: There can be 2 or 3 offline tasks in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Title: C Programming – Using more library functions and conditional statements
Outline:

- Using functions from math.h and conio.h
- Simple conditional logic programming

Online Task: There can be 2 online tasks focusing this theme.
Offline Task: There can be 2 or 3 offline tasks in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: C Programming – Using complex conditional statements and logical operators
Outline:

- Complex conditional statements having multiple if-else-if and nested if-else-if
- Using logical and relational operators

Online Task: There can be 1 or 2 online task(s) focusing this theme.
Offline Task: There can be 1 or 2 offline task(s) in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Title: C Programming – Using loops - 1
Outline:

- Programming repetitive activities using “while” loop
- Single level loop only

Online Task:

- There can be 1 or 2 online task(s) focusing this theme.

Offline Task: There can be 1 or 2 offline task(s) in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Title: C Programming – Using loops - 2
Outline:

- Programming repetitive activities using nested “while” loop
- Using logical and relational operators

Online Task: There can be 1 or 2 online task(s) focusing this theme.
Offline Task: There can be 1 or 2 offline task(s) in the same week focusing this theme.
Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Semester End Assessment:

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Term Assignment:

There will be no term assignment in this course.

Final Viva:

- There will be no final viva in this course. Every submission of online or offline assignments will be associated with on-site viva.

Quiz:

- There will be 2 quizzes based on the course materials covered in the classes (both theory and lab). The quiz will consist of True/False, MCQ and short questions.
  - Quiz – 1
    - Exam date: 8th week
    - Syllabus: Materials covered up to and including week 7
  - Quiz – 2
    - Exam date: 13th week
    - Syllabus: Materials covered up to and including week 12. However materials included in Quiz – 1 may be excluded in Quiz – 2.

Mark Distribution:

- Online assignments: 35%
- Offline assignments: 15%
- Quiz – 1: 25%
- Quiz – 2: 25%

Reference Material:

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Books:

- Introduction to Computers
  - Sixth Edition (Indian Adapted Edition)
  - **Author**: Peter Norton
  - **Publisher**: Tata McGraw-Hill Publishing Company Limited
- Teach Yourself C
  - **Author**: Herbert Schildt
  - **Publisher**: Tata McGraw-Hill

Website (if any):

Handout:

- Materials provided in the theory and sessional classes.
- The following file contains theory and sessional materials used by Dr. Masud Hasan and Ahmed Khurshid in January 2008 semester.
  - CSE100-Course-Contents.zip

Others:

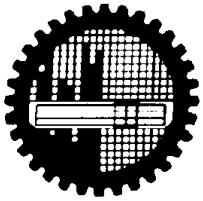
Theory Class Schedule:

Week	Theory Topic	Description
1	Computer Fundamentals, Overview of CSE Courses	• Introducing Computers and their uses • Arrangement of CSE courses • Short description of core/important CSE courses
2	Hardware Basics	• Computer hardware fundamentals
3	Operating System (OS) Basics	• Needs for an OS • Types of OS • Activities of OS • OS examples
4	Computer Networks and the Internet	• Networking basics • Introducing the Internet • Introducing WWW • Introducing Email
5	Number System	• Introduction to binary number system • Why do computers use binary number system? • Relation between binary, decimal, octal and hexadecimal number system • 1's and 2's complement representation of negative numbers
6	Flowchart, Algorithm, Pseudo code	• Approaching a problem statement to solve it • Flowchart symbols • Using flowchart to present a solution to a problem/task • Using pseudo code to prepare an algorithm to solve a problem
7	Programming Concepts, Languages, C Basics	• Introducing machine language and high level languages • Need for compilers • Introduction to C
8	Variables, Operators	• Data types • Difference between variables and constants • Using operators (arithmetic)
9	Using Library Functions	• Need for library functions • Using header files (stdio.h, conio.h, math.h)
10	Condition	• if, if-else, if-else-if • Relational and logical operators
11	Loop 1	• while loop only
12	Loop 2	• Searching, sorting etc.
13	Review	• Further study guideline
14	Reserve day	

Lab Class Schedule:

Week	Lab Topic	Description
1	Lab introduction	• Working strategy at the lab • Submission scheme of online/offline assignments • Marking scheme • Quiz • Course objectives • Course outline • Books
2	Computer architecture overview, Hardware and Operating System (OS) basics	• PC internals • Hardware basics • Interconnection between devices • Understanding input, process, output and input-output devices
3	Survey of PC, Network and Embedded Operating Systems, Windows XP	• Different types of OS • Using Windows • Basic Windows applications (notepad, paint, calculator etc.)
4	Application software	• Introducing Microsoft Word and PowerPoint
5	The Internet	• Browsing the Web using Internet Explorer and Mozilla Firefox • Introducing URL and IP address • Using Yahoo mail • Using Google search engine
6	Flowchart practice	• Practicing flowcharts and pseudo code using various problems
7	Flowchart practice and Visual Studio / Eclipse introduction	• More practice on flowcharts • Compilation process of a C program • Using VC++ or Using Eclipse
8	Flowchart assignment	• Preparing a flowchart based on a problem statement and writing pseudo code
9	C Programming assignment	• Simple C programming assignment using input and output statements
10	Assignment on variables, operators	• Assignment on multiple variable usage, input, output, simple arithmetic manipulation
11	Assignment on library functions and conditions	• Using basic library functions from stdio.h, conio.h and math.h • Assignment on conditional statements and branching logic (simple problems)
12	Assignment on conditions	• Assignment on conditional statements and branching logic (complex problems) • Using logical and relational operators
13	Assignment on loops (1)	• Using loops for repetitive input, output

Week	Lab Topic	Description
		• One level loop only
14	Assignment on loops (2)	• Using multilevel loop to perform sorting, searching etc. • Printing star, pyramid structure using multilevel loops



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 106

Sessional Primitives

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Course Number: CSE 106
Course Title: Structured Programming Language Sessional
Credit Hour: 1.5
Contact Hour per Week: 3
Server Needed (If any): No
Additional Requirements (if any): As the course emphasizes on online assignment, a total of 32 functional PC should be kept available.

Themes To Be Covered:

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Title: The title and outline of each lab is summarized below:
Outline (within 50-100 words):

- **Introductory Class**: Introduction to Turbo C and Visual Studio 6.0 compilers; first program "*Hello World*", Concept of header files; Code indentation.
- **Data types**: Basic data types; Arithmetic expressions; Type casting, Debugging techniques.
- **Conditional statements**: If-Else; If – Else If – Else; Switch-Case; Break; Continue.
- **Loop**: Basic loops For, While, Do-While; Nested loop.
- **Bitwise Operators**: Bit operations using five bitwise operators.
- **Function**: Parameter passing and value returning; Passing by value; Passing by address; command line arguments.
- **Scope of Variables**: local, global and static variables.
- **Recursion**: Recursive execution of function; Concept of recursion tree; Understanding of recursive functions through stack.
- **Array**: Use of array with function; Multidimensional array; Searching element in array: Linear searching, Binary searching; Sorting elements of array: Bubble sort.
- **String**: Basic string operations like copy, compare, append, reverse etc; Work with string of integers: addition, subtraction and multiplication of big numbers.

- **Pointer**: Dynamic memory allocation and de-allocation; Passing and returning pointer from functions; Use of pointers with functions.

- **Structure**: Use of structure with function; Work with array/pointer of structures; Structure within structures (nested structures).

- **File**: Basic operations like read-write, copy, append, compare etc; Work with array of structures using fread-fwrite functions.

Online and Offline Task: A combination of online and offline assignments are to be provided.

Mode of Evaluation (Presentation, Quiz or Viva): Individual code implementation and evaluation. Late submissions are to be highly discouraged.

Suggested Percentage Weight: 40-50%

Semester End Assessment:

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Term Assignment:

Name of the Term Assignment: The range of assignments may vary widely.

Here few conventional project categories are listed:

- Game playing: Different types of single and multi-players games are implemented. Advanced conception of Artificial Intelligence may be incorporated as per advisor's discretion.
- Database oriented: Using the basic file operations trivial database management system is developed. Options of data insert, remove, update, and basic query are kept.
- Utility tools: Tools like Paint Brush, Calculator, Graph Plotter, Digital Diary (organizer) etc. are developed.
- Puzzle Simulation: Different puzzles are played by users. Advanced conception of Artificial Intelligence may be incorporated for automation of computer-playing.
- Algorithm Simulation: Different sorting algorithms, graph algorithms etc. are simulated in graphics mode.

Basic Requirement of the Term Assignment: Basic understanding of modular programming, graphics and mouse utility functions.

Total Duration of the Assignment: 7 weeks.

Presentation Requirement: No.

Demonstration Requirement: Depending on the term project, demonstration may be conducted by respective advisors.
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Reporting Requirement: As per advisor's decision.

Mark Distribution: suggested percentage weight is 30-40%.

Mark Distribution of a Particular Deliverable: No.

Schedule of the Assignment: Each student should present his/her progress to his/her supervisor in every one/two week interval.

Final Viva:

Viva should be conducted by the respective project advisor (not any panel of teachers).

Quiz:

- **Necessity of conducting quiz:** Quiz needs to be conducted based on the modular programming paradigms. Quiz must not include specific project oriented questions.
- **Type of questions:** MCQ, True/False, Small code snippet (like, possible outputs, any existing bug etc.)
- **Weight:** 20%-30% depending on the number of online and/or offline assignments.

Reference Material:

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Books/Papers:

- THE C PROGRAMMING LANGUAGE by Kernighan, Ritchie
- C: HOW TO PROGRAM by Deitel
- LET US C by Yashwant Kanetkar
- TEACH YOURSELF C by Herbert Schildt
- PROGRAMMING WITH C by Schaums Outline Series

Website (if any): NONE
Handout (if any): NONE
Others: NONE

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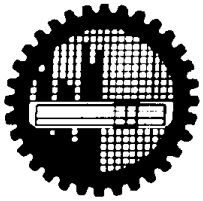

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 202

Sessional Primitives

Course Number: CSE 202
Course Title: Object Oriented Programming Language Sessional
Credit Hour: 1.5
Contact Hour per Week: 3 Hours
Server Needed (If any): No
Additional Requirements (if any): The following software are needed for performing programming assignments

- Microsoft Visual C++ 6.0 or Eclipse
- Java Software Development Kit (J2SDK) (latest available version)

Themes To Be Covered:

Title: OOP Basics

Outline: This theme focuses on preliminary concepts of OOP like classes, encapsulation, member variables, member functions and using objects in the main program. Students will perform the tasks individually.

Online Task: There can be 1 or 2 online tasks in the same week focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Closer look at classes

Outline: This theme focuses on constructors, destructors and passing objects to and returning objects from functions. Memory allocation and de-allocation in constructor and destructor are highly emphasized. Effect of destructor call on local objects is carefully analyzed. Pointers to objects are also included in this theme.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.
Suggested Percentage Weight: 5-10%

Title: Arrays and Pointers of Objects

Outline: This theme focuses on using arrays of objects and pointers to objects.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Function Overloading and Default Arguments

Outline: This theme focuses on using overloaded functions and default arguments. This theme also includes using copy constructors.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Operator Overloading

Outline: This theme focuses on using overloaded operators. Based on the knowledge of function overloading and references, this theme tries to develop some useful classes having well-known operators in their interfaces.

Online Task: There can be 1 online task focusing this theme. This task may be based on some useful classes like Matrix (with addition, subtraction and multiplication operations), String (with copy and concatenation operation) etc.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Inheritance – 1

Outline: This theme focuses on inheritance feature of C++. This theme deals with single inheritance only.

Online Task: There can be 1 online task focusing this theme. The assignment will be based on simple single inheritance structure such as [Shape, Circle and Rectangle] and [Person, Teacher, Student].

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Inheritance – 2

Outline: This theme focuses on advanced inheritance feature of C++. This theme deals with multiple inheritance.

Online Task: There can be 1 online task focusing this theme. The assignment will be based on complex inheritance structure such as [Shape, 2D, 3D, Circle, Sphere] and [Circle, Rectangle, RoundedRectangle].

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Virtual Functions

Outline: This theme focuses on run-time polymorphism feature of C++. This theme deals with using inheritance, virtual functions and function overriding. Here base class pointers will be used to hold derived class objects to achieve run-time polymorphism.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Using Templates

Outline: This theme focuses on using templates in C++. This theme deals with implementing common data structures like stack and queue whose development are greatly enhanced with the use of templates.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Exception Handling

Outline: This theme focuses on exception handling of C++. This theme can also be merged with some previous themes based on templates and virtual functions.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: File Input/Output in C++

Outline: This theme focuses on disk I/O in C++. Concepts of streams and usage of various stream classes present in C++ library are emphasized.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: Java Basics

Outline: This theme focuses on OOP in Java. The assignments focus on coding methodology of Java and using common classes from JFC (Java Foundation Classes) library.

Online Task: There can be 1 or 2 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Title: GUI Programming and Event Handling

Outline: This theme focuses on GUI programming using Java Swing. The assignments focus on using the Swing library classes to design simple GUI. Mouse and keyboard event handling are also included in the assignments.

Online Task: There can be 1 online task focusing this theme.

Offline Task: There can be 1 or 2 offline tasks in the same week focusing this theme.

Mode of evaluation: Both the online and offline assignments will be judged on the basis of coding performed by the students. There will also be a viva while reviewing the code of the students.

Suggested Percentage Weight: 5-10%

Semester End Assessment:

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Term Assignment:

Name of the Term Assignment:

- Digital Logic Circuit Designer
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Basic Requirement of the Term Assignment:

- The theme of this assignment is to develop a fully functional software product performing some specific activities with nice user interface. Most of the cases Java will be used as the development platform. But if the teachers allow then students may also use Microsoft Visual C++ or other C++ development environments. As this assignment requires knowledge of most of the features of the programming language, it is better to declare this assignment after covering sufficient materials in the theory class. It is better to distribute the assignments by 6^{th} week so that students have sufficient time to design and develop the software. There can be at most 2 students per term assignment.
- The following topics should be given proper emphasis in the term assignment
  - GUI
  - Event handling
  - Exception handling
  - File I/O (if required)
  - Multithreading (if required)
  - Networking (if required)
  - Database connectivity (if required)

Total Duration of the Assignment: 7 to 8 weeks

Presentation Requirement: No formal presentation is required for this course.

Demonstration Requirement: Each term assignment will be supervised by a teacher involved in the course. The supervisor will track the on going development of the software. The supervisor will help the students to understand the requirements and activities of the software. He will have a weekly meeting with each term assignment groups to monitor work in progress. This will ensure that the software is developed from scratch and not copied from some other source.

Reporting Requirement: No formal report is required in this course. But at the end of the term, students will submit their source code along with a READ_ME file that will list the installation and execution procedure of the developed software.

Mark Distribution: (Term assignment will carry 20-30% of the total course weight)

- Requirement analysis and viva: 15%
- Software design and viva: 15%
- Implementation and coding: 40%
- Successful completion of the software: 10%
- Final Viva: 10%
- Coding convention and use of comments: 10%

Mark Distribution of a Particular Deliverable:

- There is generally no division in a deliverable in this course. The general mark distribution given above is typically followed.

Schedule of the Assignment:

- Distribution of assignments: 6^{th} week
- Finalizing requirements and design: 7^{th} week

- Verifying coding structure and software modules: 9th week
- Final submission: 12th week

Final Viva: The supervisor of each term assignment will take weekly viva of the students. The final viva will be taken during the final submission of the software. The weight of final viva is given in the "Marks Distribution" section.

Quiz: There will be a quiz based on all the online and offline assignments performed. The quiz will consist of True/False, MCQ and short questions. Term assignment related questions will be avoided as all the students will not be involved in similar term assignments. The weight of the quiz will be 20-25% of the total course weight.

Reference Material:

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Books:

- Teach Yourself C++
  - Third Edition
  - **Author**: Herbert Schildt
  - **Publisher**: Tata McGraw-Hill
  - **Year of Publication**: 1998
- Java How To Program
  - Sixth Edition
  - **Author**: H.M. Deitel, P.J. Deitel
  - **Publisher**: Deitel; Prentice-Hall (Pearson Education Inc.)
  - **Year of Publication**: 2005

Website (if any):

Handout:

- Materials provided in the theory and sessional classes.
- The following file contains theory and sessional materials used by Ahmed Khurshid in June 2007 semester.
  - OOP-Course-Contents.zip

Others:
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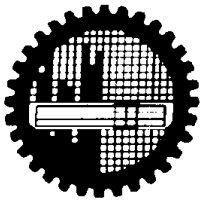

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 206

Sessional Primitives

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Course Number: CSE 206N
Course Title: Digital Logic Design Sessional
Credit Hour: 1.5
Contact Hour per Week: 3
Server Needed (If any): No
Additional Requirements (if any): No

Themes to Be Covered:

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Title: Implementing circuit with basic gates
Outline (within 50-100 words): This lab introduces students to basic logic gates and ICs. Students learn how to implement Boolean functions in a digital circuit using logic gates.
Online Task: Implementation of (some) three Boolean functions using logic gates.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing.

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Truth tables and simplification using Boolean algebra.

Outline (within 50-100 words): In this lab students simplifies a given Boolean function and implements the simplified function in a digital circuit that results in optimum number of gate usage.
Online Task: Simplification of given Boolean functions and implementation using logic gates.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Truth tables and K-maps.
Outline (within 50-100 words): In this lab students transform a problem description to an equivalent Boolean function, then simplify it using K-map and finally implement the function in a digital circuit.
Online Task: Find the Boolean function that corresponds to a given problem specification, simplify it using K-map and then implement using logic gates.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Encoder and Decoder Circuits.
Outline (within 50-100 words): This lab introduces students to some MSI circuits, namely encoder and decoder. Students learn how to implement complex Boolean functions using MSI circuits instead of using basic gates.
Online Task: Implementation of given Boolean functions using encoders and decoders.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Design using Multiplexers.
Outline (within 50-100 words): In this lab students learn a very interesting (as well as useful) technique of implementing complex Boolean functions using multiplexers.
Online Task: Implementation of some given Boolean functions using multiplexers.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Arithmetic circuit design.
Outline (within 50-100 words): In this lab students learn how to design a digital circuit that performs useful arithmetic operations such as addition and subtraction.
Online Task: Design and implementation of digital circuits that perform comparison and subtraction operation.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Circuit design using IC 7483.
Outline (within 50-100 words): In this lab students learn how to use a commercially available adder IC 7483 to perform arithmetic operations.
Online Task: Implementation of given arithmetic operations (addition and subtraction) using 7483.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Flip-Flops.
Outline (within 50-100 words): This is the first experiment related to sequential circuits. It introduces students to the "FLIP-FLOP" - basic building block of any sequential circuit.
Online Task: Implementation of S-R and master slave J-K flip flop.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Registers.
Outline (within 50-100 words): Registers are integral component of any microprocessor system. Registers are used to store data for fast access. They also allow performing useful operations on the stored data such as shift and rotate.
Online Task: Design and implement a 4-bit universal shift register.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.

- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Counters.
Outline (within 50-100 words): In this lab students learn how to design counters using flip flops
Online Task: Design and implementation of synchronous and asynchronous counters using T FLIP FLOPs.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Title: Sequence Detector.
Outline (within 50-100 words): A sequence detector detects a given sequence from a binary stream (sequence of 0’s and 1’s). Such a circuit has wide range of applications such as recognizing number in a digital telephone. In this lab students learn how to design and implement a sequence detector in digital circuit.
Online Task: Design and implementation of a digital circuit that detects a given sequence.

Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Problem Specification.
- Required Instruments.
- Truth Table.
- Circuit diagram with pin number.
- Answer to some given questions related to the experiment.
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Report writing

Suggested Percentage Weight:

- For successful completion of the experiment (each group member will get): 30/Total number of experiments performed.
- For submitted report: 10/Total number of experiments performed.

Semester End Assessment:

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Term Assignment: N. A

Name of the Term Assignment:
Basic Requirement of the Term Assignment:
Total Duration of the Assignment:
Presentation Requirement:
Demonstration Requirement:
Reporting Requirement:
Mark Distribution:
Mark Distribution of a Particular Deliverable:
Schedule of the Assignment:

Final Viva: Since all the experiments are performed in group, viva is necessary for individual evaluation. There are two viva's. The first viva is on Experiments 1-6 and the second one on Experiments 7-11. A total of **35%** marks of complete evaluation is equally distributed to the two viva's.

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Quiz: Questions asked in the viva may not be uniform from section to section. Moreover time available for evaluating each student through viva is not sufficient. Besides some students fail to perform in viva due to time pressure. Hence a general quiz (written exam) is essential. Quiz covers all the important materials in experiments 1-11. Quiz holds 25% marks.

Reference Material:

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Books/Papers: *Digital Design*, **Morris M. Mano** (3rd edition)
Website (if any): Generally not necessary
Handout (if any): Generally not necessary
Others: Generally not necessary
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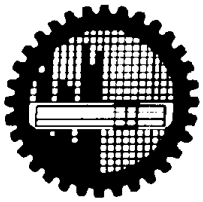

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 208

Sessional Primitives

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Course Number: CSE 208
Course Title: Algorithms Sessional
Credit Hour: 0.75
Contact Hour per Week: 2.5 hrs
Server Needed (If any): None
Additional Requirements (if any): Visual Studio 6 or .NET, Turbo C++, Borland C++, jdk1.5 (or later), Kawa, JCreator.

Themes to Be Covered:

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Title 1: Time/Space complexity
Outline (within 50-100 words): Measure the time/space complexity after doing the same thing in two different ways.
Online Task: x
Offline Task: Implement primality testing in different ways (naïve method, miller-rabin, sieve) and compare their time/space requirement.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Weight equals a single home assignment.

Title 2: Single source shortest path
Outline (within 50-100 words): Modeling and solving problems using Dijkstra/Bellman-ford algorithm.
Online Task: Negative cycle detection, counting number of connected components in undirected graph, finding a node in a directed graph which is a good meeting place for two persons from two different nodes.
Offline Task: x
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 3: Depth First Search
Outline (within 50-100 words): Modeling and solving problems using DFS algorithm.
Online Task: Testing a graph contains any cycle, testing if a node belongs to any cycle.
Offline Task: Topological sorting.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 4: Breadth First Search
Outline (within 50-100 words): Modeling and solving problems using BFS algorithm.
Online Task: Finding farthest node of a node, finding all nodes at distance k.
Offline Task: Finding shortest path in a N x M size grid with obstacles given types of moves (for example, chess knight, chess king etc)
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 5: Backtracking
Outline (within 50-100 words): Modeling and solving problems using Backtracking algorithm.
Online Task: Modifying home task.
Offline Task: Solving CSP problem (like, SEND+MORE=MONEY), Sum of subset, Knight's Hamiltonian tour in chess board, Sudoku game.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 6: Dynamic Programming
Outline (within 50-100 words): Modeling and solving problems using Dynamic programming.
Online Task: Modifying home task.
Offline Task: 0/1 Knapsack, Multi-stage graph, String editing, Matrix chain multiplication, Optimal binary search tree.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 7: Greedy Algorithm
Outline (within 50-100 words): Modeling and solving problems using Greedy algorithm.
Online Task: Modifying home task.
Offline Task: Huffman compress/decompress, Minimum spanning tree, Job scheduling, Stable matching.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Title 8: Divide and Conquer Algorithm

Outline (within 50-100 words): Modeling and solving problems using Divide and conquer strategy.
Online Task: Modifying home task.
Offline Task: Binary search, Selection, Closest pair point, Inversion number, skyline problem, O(lg n) integer multiplication, Convex hull, Balance factor of binary search tree.
Mode of Evaluation (Presentation, Quiz or Viva): Viva on task.
Suggested Percentage Weight: Online task weights twice than offline task.

Semester End Assessment:

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Term Assignment: None

Final Viva: None

Quiz:

1. A single quiz based on the assignments. In case the topics differ in different sub sections (A1, A2, B1, B2) then question set will have appropriate alternatives for each sub section.
2. True-false, MCQ and Short questions.

Reference Material:

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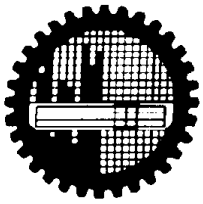
Books/Papers:

1. Fundamentals of Computer Algorithms, Sahni et al;
2. Introduction to Algorithms, 2nd Edition, Cormen et al;

Website (if any):

1. http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-046JFall-2005/LectureNotes/index.htm
2. http://nirjon.googlepages.com/courses (See CSE 208)

Handout (if any): None
Others: None



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 210

Sessional Primitives

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Course Number: CSE 210N
Course Title: Digital Electronics and Pulse Techniques Sessional.
Credit Hour: 1.5
Contact Hour per Week: 3
Server Needed (If any): No
Additional Requirements (if any): No

Themes to Be Covered:

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Title: Study of DL and DRL gates.
Outline: Many logic families have been produced as individual components, each containing one or a few related basic logical functions, which we can be used as "building blocks" to create systems or as so called "glue" to interconnect more complex integrated circuits. In this experiment, students will be introduced with two basic logic families. In a *diode logic* (DL) system the logical gates are implemented by using diodes. Similarly *diode transistor logic* (DTL) uses diodes and transistors.

Online Task: Implementation of some given DL and DTL gates and observing how they work for different input conditions.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of transistorized NOT gate.
Outline: In this experiment students will explore a transistorized NOT gate. This is based on the switching (ON/OFF) property of the

transistor. Students will explore how the circuit behaves in different input conditions and for different values of the used resistors.
Online Task: Implementation and analysis of the given transistorized NOT gate.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of a TTL NAND gate with totem-pole output.

Outline: In this experiment students will explore the *transistor-transistor logic* (TTL) family by examining a TTL-NAND gate. This circuit also incorporates the concept of totem-pole output.
Online Task: Implementation and analysis of the given TTL NAND gate and measuring voltages at different points for all possible input combinations.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of RTL NOR gate.
Outline: In this experiment students will be introduced with the *resistor-transistor logic* (RTL). Though the gate is no longer used in

design, RTL is elegantly simple and hence may be used conveniently to develop concepts in connection with all types of gates. Here we will analyze a RTL NOR gate and it's working principal.

Online Task: Implementation and analysis of the given circuit.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of an ECL OR/NOR gate.
Outline: All the other logic forms considered so far (DTL, TTL, RTL) suffer from a common and fundamental limitation on their speed of operation. This limitation occurs because in all these logic types transistors are driven into saturation, resulting in an increased propagation delay time. This consideration prompts to inquire whether a logic form is possible in which transistors are switched from cutoff to an operating point in the active region. It is possible to establish a transistor in its active region, with stability, by introducing negative feedback through the simple expedient of using a large emitter resistor. And *emitter coupled logic* (ECL) does the same thing. In this experiment we will examine the operation of an ECL OR/NOR gate.
Online Task: Implementation and analysis of the given ECL OR/NOR gate.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5

Title: Implementation of clocked SR Flip Flop using RTL NOR gate.
Outline: SR flip flop is one of the important class of Flip Flops. In this experiment we shall implement a negative logic clocked SR Flip Flop. In this purpose we will use RTL NOR gate as a building gate. Students will analyze how the circuit will behave for every input condition. Students will also analyze the race around condition.
Online Task: Implementation and analysis of the given circuit.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Digital to Analog converter.
Outline: Digital to Analog converter (DAC) fundamentally converts finite precision numbers (usually fixed-point binary numbers) into a physical quantity (current, voltage or electric charge). Here we shall implement a 4-bit digital to analog converter for which the input is a 4-bit binary code and the output is its equivalent voltage. Here Students will consider the resolution, linearity, accuracy etc. of the DAC.
Online Task: Implementation of the D/A converter and measuring the output voltage for various combinations of the 4-bit binary input.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of Diode Clipping and Clamping circuits.
Outline: In this experiment students will implement some simple clipping and clamping circuits and analyze their behavior. Clipping circuits are used to select for transmission that part of an arbitrary waveform which lies above or below some reference level.
Clipping circuits are also referred to as voltage limiters. Clamping circuits are used to prevent another circuit from exceeding a certain predetermined voltage level. We shall analyze some diode clipping and clamping circuits.
Online Task: Implementation of the given circuits and observation of the output wave shape in the oscilloscope for different input waves.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of High-pass and Low-pass RC circuit.
Outline: A *resistor-capacitor* circuit (RC circuit) or RC filter or RC network is an electric circuit composed of resistors and capacitors driven by a voltage or current source. The 1^{st} order RC circuit, composed of one resistor and one capacitor, is the simplest example of an RC circuit and is the subject of this article. In this experiment students will be introduced with both the high pass and low pass RC circuits.
Online Task: implementation of the given circuit and Observation of the output wave shapes in the oscilloscope for various inputs (step voltage, square wave, triangular wave etc.) with various RC constants.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of Comparator circuits.
Outline: In this experiment students will implement and analyze comparator circuits (using Op-Amp).
Online Task: Implementation of the given circuit and observation of the output wave shapes in the oscilloscope for various inputs (step voltage, square wave, triangular wave etc.) with various RC constants.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Title: Study of Schmitt Trigger and Wave Shape generator.
Outline: In this experiment students will implement and analyze Schmitt trigger circuit and some wave shape generators (square wave, Triangular wave).
Online Task: Implementation of the circuits and observation of the outputs in the oscilloscope for different inputs.
Offline Task: Preparation of report (1 report/group) on the experiment performed. The report contains the followings:

- Objective
- Circuit diagram
- Answer to some given questions related to the experiment.
- Calculations
- Overall discussion on the experiment.

Mode of Evaluation (Presentation, Quiz or Viva):

- Testing and verification of the circuit implemented by each group for the desired input/output combinations.
- Evaluation of the report.

Suggested Percentage Weight: 5%

Semester End Assessment:

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Term Assignment: N. A

Final Viva: Viva is necessary for individual evaluation. Two viva should be taken, one after the midterm and another after completion of rest of the experiments.

Quiz:

3. A single quiz based on the assignments.
4. True-false, MCQ and Short questions.

Reference Material:

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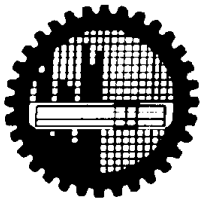
Books/Papers:

3. Digital Integrated Electronics – Taub & Schilling;
4. Integrated Electronics – Jacob Millman, Christos C. Halkias
5. Pulse, Digital and Switching Waveforms – Jacob Millman, Herbert Taub

Website (if any): None

Handout (if any): None

Others: None



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 214

Sessional Primitives

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Course Number: CSE 214
Course Title: Assembly Language Programming
Credit Hour: 1.5
Contact Hour per Week: 3
Server Needed (If any): None
Additional Requirements (if any): Operating System: Linux with the packages for nasm (netwide assembler), gdb (gnu debugger), ddd (data display debugger) and kdbg (k debugger)

Themes to Be Covered:

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Title: Introduction
Outline (within 50-100 words):
Lecture is given on chapter 1 of the book "PC Assembly Language".
Online Task: NONE
Offline Task: NONE
Mode of Evaluation (Presentation, Quiz or Viva): Not evaluated.
Suggested Percentage Weight: NIL

Title: Lecture on basic instructions and control structures.
Outline (within 50-100 words):
Lecture is given on chapter 2 of the book "PC Assembly Language".
Online Task: Practice on chapter 2
Offline Task: NONE
Mode of Evaluation (Presentation, Quiz or Viva): Not evaluated.
Suggested Percentage Weight: NIL

Title: Lecture on bit operations and array
Outline (within 50-100 words):
Lecture is given on chapter 3 and chapter 5 of the book "PC Assembly Language".
Online Task: Practice on chapter 2, 3 and 5
Offline Task: Sorting and others
Mode of Evaluation (Presentation, Quiz or Viva): Not evaluated.
Suggested Percentage Weight: NIL

Title: Lecture on subroutine
Outline (within 50-100 words):
Lecture is given on chapter 4 of the book “PC Assembly Language”.
Online Task: Assignments on basic instructions, control statements and array.
(Pyramid construction, sorting, input-output)
Offline Task: String subroutines
Mode of Evaluation (Presentation, Quiz or Viva): Online performance, viva
Suggested Percentage Weight: 5%-10%

Title: Assignment on subroutine
Outline (within 50-100 words):
Online assignment is given.
Online Task: String function (compare, catenation, copy, etc).
Offline Task: NONE
Mode of Evaluation (Presentation, Quiz or Viva): Online performance, viva
Suggested Percentage Weight: 5%-10%

Title: Assignment on previous classes
Outline (within 50-100 words):
Online assignment is given comprising of all the topics taught before. Instructor is free to choose assignments.
Online Task: Given.
Offline Task: NONE
Mode of Evaluation (Presentation, Quiz or Viva): Online performance, viva
Suggested Percentage Weight: 5%-10%

Title: Lecture on midterm assignment
Outline (within 50-100 words):
Arbitrary precision calculator (addition, subtraction, multiplication)
Online Task: NONE
Offline Task: Midterm assignment
Mode of Evaluation (Presentation, Quiz or Viva): N/A
Suggested Percentage Weight: 15%

Title: Working with **recursion** in assembly language
Outline (within 50-100 words): the students will implement the following programs in assembly with recursion:

a) Computation of factorials
b) Computation of nCr and nPr
c) Computation of k^n
d) Showing movements of disks in the Tower of Hanoi problem for three pegs and n disks

e) Quicksort

Online Task: At least one of the above programs

Offline Task: The remaining programs

Mode of Evaluation (Presentation, Quiz or Viva): Execution of Code with Viva on

a) Recursion in assembly and
b) Parameter passing techniques in assembly.

Suggested Percentage Weight: at least 10%

Title: Working with **structure**s and **table**s in assembly language

Outline (within 50-100 words): Students will implement the following program. A **table** of N entries (N is some pre specified number), each entry of a particular **structure** data type, will be taken. The **structure** data type can be a student record or any thing like that, with a key field that will be unique for each of its instances. The students will implement any sorting algorithm on this table based on the particular key field in the **structure** data type.

Online Task: none

Offline Task: the complete program

Mode of Evaluation (Presentation, Quiz or Viva): Execution of Code with Viva on

a) Syntax for declaring **structure**s in assembly and
b) The **XLAT** instruction.

Suggested Percentage Weight: at least 10%

Title: Implementation of a simple **text editor** in Linux

Outline (within 50-100 words): Students will implement a simple text editor that will handle

a) Editing
b) Deleting and un-deleting and
c) Saving and displaying of previously saved files

Online Task: none

Offline Task: the complete program

Mode of Evaluation (Presentation, Quiz or Viva): Execution of Code with Viva on

a) The overall techniques and design of the program,
b) Craftiness and capability of the student in writing programs through separate modules, handling data structures (e.g., a stack for records of delete and undelete operations), and efficient coding (e.g., does the student realize that **xor eax, eax** is more efficient than **mov eax, 0** ?)

Suggested Percentage Weight: at least 20%

Semester End Assessment:

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Term Assignment:

Name of the Term Assignment: Implementation of a **UNIX Shell** with some basic commands.
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Basic Requirement of the Term Assignment: Understanding of the following UNIX commands with some common flags.

a) cd
b) ls
c) cp
d) touch
e) mkdir
f) rm
g) rmdir

Total Duration of the Assignment: Two weeks
Presentation Requirement: NONE
Demonstration Requirement: The complete working shell.
Reporting Requirement: Overall design of the solution (how they have organized everything in subprograms and data structures.)
Mark Distribution: Each student will have to implement at least six commands, 40% for the shell and 10% for each of the commands.
Mark Distribution of a Particular Deliverable: NONE
Schedule of the Assignment:
First week: shell with at least two commands
Second week: the complete program

Final Viva: (Tentative schedule: on 12th week) On:

a) 80x86 commands,
b) Assembling and linking programs,
c) Debugging programs,
d) Subprogram and macro usage,
e) Structure and table usage,
f) Linux system calls, and
g) Linking assembly programs with programs in other language like C.

Quiz: (Tentative schedule: on 13th week) The same syllabus as that for the viva.

Reference Material:

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Books/Papers:

a) PC Assembly Language, by Paul Carter
b) IBM PC Assembly Language and Programming, by Peter Abel
c) Assembly Language for the IBM PC, by Kip R. Irvine

Website (if any): NONE
Handout (if any): NONE
Others: NONE
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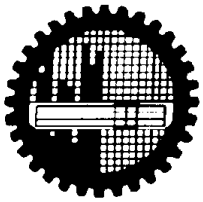

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 304

Sessional Primitives

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Course Number: CSE304
Course Title: Database Sessional
Credit Hour: 1.5
Contact Hour per Week: 3.0
Server Needed (If any): database server (Oracle 10g)
Additional Requirements (if any): Mysql Server (in future), Visual Studio .NET (in future).

Themes To Be Covered:

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Title: Basic concepts on Database
Outline (within 50-100 words):
Concepts of Data Table, Primary Key and foreign key
Online Task: none
Offline Task: none
Mode of Evaluation (Presentation, Quiz or Viva): none
Suggested Percentage Weight: none

Title: DDL and Introduction to Oracle
Outline (within 50-100 words):
Tasks on create table, primary key, foreign key, select statement.
Online Task: 01
Offline Task: choice of instructor
Mode of Evaluation (Presentation, Quiz or Viva):
Suggested Percentage Weight: 5%

Title: Entity Relationship Diagram
Outline (within 50-100 words):
Students will be given a scenario and they will draw the ERD.
Online Task: 01
Offline Task: none
Mode of Evaluation (Presentation, Quiz or Viva):
Suggested Percentage Weight: 10%

Title: Data Manipulation Language
Outline (within 50-100 words):

a. Basic SQL: string operation, alias, date, like, between, etc.
b. SQL: joining, insert, delete, update statement
c. Advanced SQL: set operation, aggregate function, having clause, except clause, in clause, etc.
d. Advanced SQL: subquery, nested-subquery, etc.

Online Task: may be 2 or 3
Offline Task: may be 2 or 3
Mode of Evaluation (Presentation, Quiz or Viva):
Suggested Percentage Weight: 20%

Title: PL/SQL
Outline (within 50-100 words):
Trigger, Stored Procedure, Function, etc.
Online Task: 01
Offline Task: 01
Mode of Evaluation (Presentation, Quiz or Viva):
Suggested Percentage Weight: 10%

Title: Database Administration
Outline (within 50-100 words):
Data backup and recovery, Performance tuning
Online Task: 01
Offline Task: none
Mode of Evaluation (Presentation, Quiz or Viva):
Suggested Percentage Weight: 10%

Semester End Assessment:

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Term Assignment:

Name of the Term Assignment: Database Application Software development

Basic Requirement of the Term Assignment:

a. Privileged menu access, installation parameters editable in configuration file.
b. User friendly interface: search option, printable reports with standard tools like crystal reports/ jasper reports, data validation
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c. Database Design: ERD, Normalized schema with integrity constraints.
d. Use of advanced features of database like PL/SQL.
e. Automated data backup and recovery.

Total Duration of the Assignment: 7 weeks
Presentation Requirement:
Presentation 1: Features, ERD, Schema, etc.
Presentation 2: Progress and UI
Demonstration Requirement:
PowerPoint presentation
Reporting Requirement:
Features, ERD, Schema
Mark Distribution:
Presentation 1: 10%
Presentation 2: 10%
Final Submission: 20%
Mark Distribution of a Particular Deliverable:
Schedule of the Assignment:
Presentation 1: week 4
Presentation 2: week 8
Final Submission: week 12

Final Viva: none

Quiz: A quiz on the topics covered in the class will be held on 13th week. The quiz will carry 20% of the total marks.

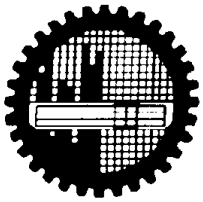
Reference Material:

Books/Papers:

a. **Oracle Database 10g: The Complete Reference (Osborne ORACLE Press Series)**
b. Database System Concepts, *Fifth Edition,* Avi Silberschatz, Henry F. Korth, S. Sudarshan, **McGraw-Hill**

Website (if any):
www.oracle.com

Handout (if any): none
Others: none



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 314

Sessional Primitives

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Course Number: **CSE314N**
Course Title: Operating Systems
Credit Hour: 0.75
Contact Hour per Week: 0.75
Server Needed (If any): None
Additional Requirements (if any): Linux as OS, Linux Kernel source code (latest stable version)

Title: **Shell commands and shell scripts**
Outline (within 50-100 words): Linux offers some useful commands to its users for shell operation. It also provides users with the facility of scripting to perform some tasks. In this lab, students are familiarized with those basic shell commands and the powerful operations of shell scripts.
Online Task: 2
Offline Task: 0
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 15% - 20%

Title: **Inter Process Communication Problems**
Outline (within 50-100 words): Processes/ threads often need to communicate each other if they work on a common goal. In this lab, students get the practical experience of implementing such problems.
Online Task: 0
Offline Task: 1 (for each section different problem is assigned)
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 10% - 15%

Title: **Shaking Hands with Kernel (Adding System Calls)**
Outline (within 50-100 words): In this lab, Linux kernel and its components are discussed briefly to the students. Then, students (in a group of 2 students) have to add a new system call and test its functionality from user mode within existing Linux kernel.
Online Task: 0
Offline Task: 1 (group work)
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 15%
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Title: **Nachos**
Outline (within 50-100 words):
Nachos is an instructional operating system that runs on MIPS architecture. It is designed by Thomas Anderson and his students at University of California, Berkeley. It is originally written in C++. Nachos runs as a user-process on a host OS. Nachos already implemented some basic features for OS. It is the responsibility of students to enhance its functionality and provide better performance for the users such as, multiprogramming support, paging, virtual memory implementation, file system and so on.
Online Task: 0
Offline Task: 2 (group work)
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 40% - 45%

Final Viva: 0%

Quiz: 15% - 25%

Reference Material:

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Books/Papers:

1. Beginning Linux Programming – Wiley, 3rd edition.
2. Advanced UNIX: A programmer's Guide - Stephen Prata.
3. Understanding Linux Kernel (2nd edition) – D. P. Bovet and Marco Cesati

Website (if any):

There are many related web sites for Nachos.

Handout :

1. A RoadMap to Nachos.pdf, source: website
2. LinuxPrimer.pdf, source: website
3. Linux Shell Commands.ppt – written and composed by Rifat Shahriyar
4. Linux Shell Scripts.ppt – written and composed by Rifat Shahriyar
5. Introduction to Nachos.ppt – written and composed by Moazzem Hossain
6. Nachos -2.ppt – written and composed by Moazzem Hossain & Chowdhury Sayeed Hyder.
7. Linux Kernel.ppt – written and composed by Chowdhury Sayeed Hyder

Others:

1. Sample scripts.zip – composed by Rifat Shahriyar.
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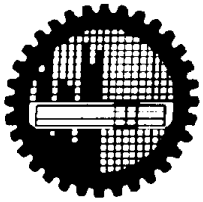

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 316

Sessional Primitives

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Course Number: CSE 316N
Course Title: Microprocessors and Microcontrollers Sessional
Credit Hour: 0.75
Contact Hour per Week: 1.5 Hour
Server Needed (If any): None
Additional Requirements (if any): MTS-88.C, I/O Boards

Themes To Be Covered:

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Title: Basic data transmission and reception through 8255 (Mode 0, Mode 1)
Outline: Understand the way CPU sends and receives data from other devices
Online Task: Connect I/O Board – 01 with MTS-88.C for basic data transmission through 8255.
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Title: Detection the number of pulses and displaying them
Outline: Using the CPU through 8255 to carry out counting function
Online Task: Connect I/O Board – 02 with MTS-88.C for counting pulses through 8255.
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Title: Basic LED matrix control, ON/OFF, Flash and Shift through 8255
Outline: Understand the way CPU sends and receives data from other devices and basic LED matrix control
Online Task: Connect I/O Board – 03 with MTS-88.C, Display group number in different modes
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Title: Microprocessor based DC motor control
Outline: Control DC motor through 8255 using I/O Board - 07

Online Task: Connect I/O Board – 07 with MTS-88.C for Controlling DC motor (Clock-wise, Anti-Clock-Wise Rotation, Start and Stop)
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Title: Microprocessor based Keyboard and 7-Segment display controlling through 8255
Outline: Controlling Keypad and 7-Segment display through 8255
Online Task: Connect I/O Board – 08 with MTS-88.C for controlling keypad and 7-Segment display
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Title: Microprocessor based traffic signal controlling
Outline: Control traffic signal system trough 8255 in auto and Manual mode
Online Task: Connect I/O Board – 09 with MTS-88.C for controlling traffic signal through 8255.
Offline Task: N/A
Mode of Evaluation: Experiment and Viva
Suggested Percentage Weight: 10%

Semester End Assessment:

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Term Assignment:

None

Final Viva:

Final viva is taken over the experiments done in Lab. It may carry 10% weight.

Quiz:

Quiz is taken based on experiments done in Lab. It may carry 30% weight.

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Reference Material:

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Books/Papers: MTS-88.C manual and User Guide
Website (if any):
Handout (if any):
Others:
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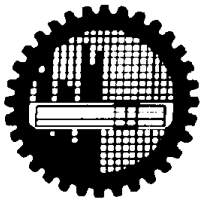

Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 318(O), 402(N)

Sessional Primitives

Course Number: CSE 318 (O) / CSE404 (N)
Course Title: Artificial Intelligence Sessional
Credit Hour: 0.75
Contact Hour per Week: 1.5
Server Needed (If any): N/A
Additional Requirements (if any): SW: Swi-Prolog

Themes To Be Covered:

Title: Introduction to Prolog

Outline (within 50-100 words): What is Prolog, Need for non-procedural language like prolog, principle of Logic Programming, Facts, Rules, Queries, Logical Variables, Unification, Basic Syntax of Swi-Prolog, How to run a simple program in Swi-Prolog, Debugging.

Online Task: To write and execute some simple prolog programs using Swi-Prolog.

Offline Task: Two problems based on the topics mentioned in outline section.

Mode of Evaluation (Presentation, Quiz or Viva): Viva

Suggested Percentage Weight: 10 percent

Title: Working with Recursion and Lists

Outline (within 50-100 words): Recursive Rules, creating loops using recursion, Composing Recursive Programs, Arithmetic Operations, Lists as data structure, manipulation of lists.

Online Task: Practicing programs based on recursion and Lists.

Offline Task: Two problems based on the topics mentioned in outline section.

Mode of Evaluation (Presentation, Quiz or Viva): Viva

Suggested Percentage Weight: 10 percent

Title: Cuts and Negations

Outline (within 50-100 words): program efficiency in recursion, Backtracking in prolog, Cuts for Efficiency, introduction to different types of cuts (i.e. Green Cuts, Red Cuts), usage of cuts with application, Negation.

Online Task: Practicing Programs based on Cuts and Negations.

Offline Task: Two problems based on the topics mentioned in outline section.

Mode of Evaluation (Presentation, Quiz or Viva): Viva

Suggested Percentage Weight: 10 percent

Title: Overall test on prolog

Outline (within 50-100 words): The main idea here is to test the students' acquired knowledge on Prolog. Students should be given problems based on previous assignments on prolog. This may be a 1-hour instant test.

Online Task: Few small problems to be solved instantly.

Offline Task: None

Mode of Evaluation (Presentation, Quiz or Viva): Demo

Suggested Percentage Weight: 20 percent

Title: Solving Problems by Searching

Outline (within 50-100 words): Informed Search Algorithms (A^* Search, RBFS), Constraint Satisfaction Problems, Adversarial Search Algorithms (MiniMax Algorithm, α-β Pruning Algorithm).

Online Task: None

Offline Task: One problem based on any of the topics mentioned in outline section.

Mode of Evaluation (Presentation, Quiz or Viva): Viva

Suggested Percentage Weight: 10 percent

Semester End Assessment:

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Term Assignment: **N/A**

Name of the Term Assignment:
Basic Requirement of the Term Assignment:
Total Duration of the Assignment:
Presentation Requirement:
Demonstration Requirement:
Reporting Requirement:
Mark Distribution:
Mark Distribution of a Particular Deliverable:
Schedule of the Assignment:

Final Viva: None

Quiz: 30 percent

Attendance: 10 percent

Reference Material:

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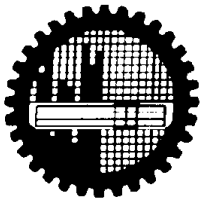
Books:

1. Leon Sterling and Ehud Shapiro, “Art of Prolog”, The MIT Press.
2. Alan G Hamilton, “The Professional programmers guide to prolog”, PITMAN PUBLISHING.

Website (if any):

1. P-99: Ninety-Nine Prolog Problems: https://staff.hti.bfh.ch/hew1/informatik3/prolog/p-99/
2. Prolog Tutorials: http://www.cs.nuim.ie/~jpower/Courses/PROLOG/
3. Tutorial: http://www.csupomona.edu/~jrfisher/www/prolog_tutorial/contents.html
4. SWI-Prolog for MS-Windows: http://club.telepolis.com/nivel_0/ia/windows.html

Handout (if any): None
Others: None



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 404

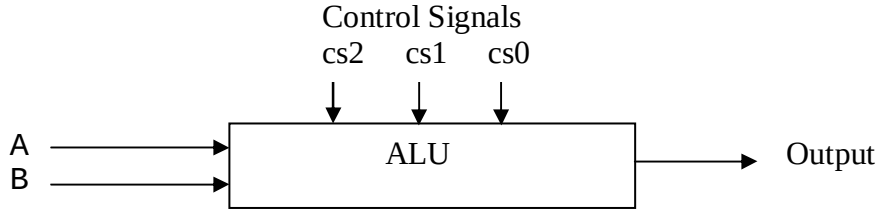
Sessional Primitives

Course Number: CSE 404N
Course Title: Digital System Design Sessional
Credit Hour: 1.5
Contact Hour per Week: 3
Server Needed (If any): None
Additional Requirements (if any): Different types of LSI/MSI/SSI Chips, Trainer Board, Multimeter, Bread Board, Logic Probe, Wire, etc.

Themes To Be Covered

Title: 4-bit Arithmetic Logic Unit (ALU) circuit design and implementation.

Outline: Students need to design and implement a 4-bit ALU that takes two 4-bit numbers as input and performs 8 arithmetic operations and 4 logic operations on them depending on the 3-bit control signal.



Each group of students is given six functions that the ALU should be able to perform. No two groups in one section are given the same set of functions. Besides, the sequence of control signals is different from section to section.

Online Task: None

Offline Task: Circuit Design and implementation

Mode of Evaluation (Presentation, Quiz or Viva):

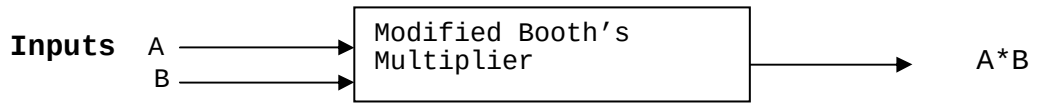
1. Presentation of design
2. Viva to evaluate individual knowledge and contribution to the design
3. Demonstration of implemented circuit

4. Viva to evaluate individual contribution of the group members in the implementation of the design

Suggested Percentage Weight: 25%

Title: Modified Booth's Multiplier circuit design and implementation.

Outline: The objective is to design a sequential circuit with Micro programmed Control Unit. The students need to implement a modified Booth's multiplier for 8-bit multiplication.



Online Task: None

Offline Task: Circuit Design and implementation

Mode of Evaluation (Presentation, Quiz or Viva):
1. Presentation of design
2. Viva to evaluate individual knowledge and contribution to the design
3. Demonstration of implemented circuit
4. Viva to evaluate individual contribution of the group members in the implementation of the design

Suggested Percentage Weight: 25%

Title: Simple 4-bit Computer design and simulation.

Outline: Students need to design 4-bit Computer. Each group will be given 28 instructions. Their circuit must support the specified 28 instructions that are assigned to them. There will be two stage pipeline, 1^{st} one for instruction Fetch unit and the 2^{nd} one for Execution unit. The control unit should be micro programmed. Like previous assignment, no two groups have the same instruction set.

Online Task: None

Offline Task: Circuit Design and Simulation

Mode of Evaluation (Presentation, Quiz or Viva):
1. Presentation of design
2. Viva to evaluate individual knowledge and contribution to the design
3. Demonstration of simulation of the circuit

Suggested Percentage Weight: 25%

Final Viva

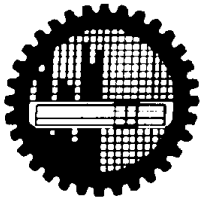
As the students have to face viva for each of the assignments, we need not to take any final viva.

Quiz

We feel quiz is necessary to judge the students overall knowledge of this course and the assignments. During the viva, we can ask a very few questions due to time limit. That is not sufficient to judge a students individual knowledge of the assignment. Quiz makes the students study the overall and in-depth information about the theme and therefore helps him/her learn. Hence, we suggest that quiz is necessary. The suggested percentage weight is 25%. The questions will be based on the basic things a student needs to know to perform the assignments. These questions are related to the design and to the implementation. Question types are MCQ, True/False and short questions.

Reference Material:

Books/Papers: Moris Mano, Malvino, Patterson, Hayes, Jaki
Website (if any): None
Handout (if any): None
Others: None



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 410

Sessional Primitives

Course Number: CSE410
Course Title: Computer Graphics
Credit Hour: 0.75
Contact Hour per Week: 1.5
Server Needed (If any): No
Additional Requirements (if any): High Performance PC with at least 64MB Graphics Card

Themes To Be Covered:

Title: 2D Rotation, Translation and Scaling Transformation.

Outline (within 50-100 words): The objective of this assignment is to clarify how different affine transformations such as rotation, translation, scaling etc. are performed using matrix multiplication. A very basic 2D object e.g. a triangle or a rectangle can be animated using composite transformations. As a first assignment of this course, it will also explain how OpenGL is used from Visual C++.

Online Task: This assignment should be given online.

Offline Task: Nil

Mode of Evaluation (Presentation, Quiz or Viva): Assignment + Viva

Suggested Percentage Weight: 5% to 10%

Title: 3D Modeling

Outline (within 50-100 words): In this assignment students learn how to construct a 3D environment having simple 3D objects. Basically these objects don’t have complicated curved surfaces. They can be built from

simple polygons. For example, in the previous years in this assignment we built a football stadium, a cricket stadium, a merry-go-round etc. After completing this assignment, students have a clear idea how transformation is used to build a larger and complex object from smaller and simpler components. In this assignment we also incorporate camera movement options i.e. the user can move forward/backward, upward/downward or left/right. The user can also rotate i.e. he can change the direction in which he is looking to. There are three different types of rotations, roll, pitch and yaw. After adding all these options the user can easily see the whole environment.

Online Task: This assignment can be partially done online (40% to 60%).
Offline Task: The complete assignment can be given offline.
Mode of Evaluation (Presentation, Quiz or Viva): Presentation + Viva
Suggested Percentage Weight: 10% to 20%

Title: 3D Modeling and Lighting & Shading
Outline (within 50-100 words): In this assignment lights are added in the 3D environment. For developing realistic environment lighting is essential. The scene built in the second assignment can be chosen for this assignment or a new scene can be developed. In the previous years both of these strategies have been followed. There are different types of light and the scene should have lights which are appropriate for it. In some environments a moving light, e.g. a torch can be added which will help the viewer to see in dark. Users must be provided with options of putting these lights on or off so that the effects of lighting can be clear.

Online Task: Nil
Offline Task: This is an offline assignment
Mode of Evaluation (Presentation, Quiz or Viva): Presentation + Viva
Suggested Percentage Weight: 10% to 20%

Title: 3D Modeling, Lighting & Shading and Texture Mapping
Outline (within 50-100 words): Besides lights, texture mapping is used in this assignment. Texture mapping can make a scene very realistic. Adding lights and texture in an environment is tricky and complex and usually it takes much effort to get the expected result. The base environment can be a totally new one or the environment built so far. In the previous years, usually the base environment was made more complex as the term went on i.e. more complex objects were added in the scene gradually.

Online Task: Nil
Offline Task: This is an offline assignment
Mode of Evaluation (Presentation, Quiz or Viva): Presentation + viva
Suggested Percentage Weight: 15% to 25%

Title: Curved Surface Rendering

Outline (within 50-100 words): Curved surface modeling is a major topic of Computer Graphics. So, we usually give an assignment on curve surface modeling. The assignment can be totally a new one with one or more objects made of curved surfaces or we can add these objects in the scene previously built. In the later case we have to make sure that these objects are consistent with the scene.

Online Task: Nil
Offline Task: This is an offline assignment
Mode of Evaluation (Presentation, Quiz or Viva): Presentation + Viva
Suggested Percentage Weight: 10% to 20%

Title: Ray Tracing
Outline (within 50-100 words): Building a ray tracer is a big assignment. This assignment can only be given if enough weeks are left. Usually we give a base code in which the students add functionalities. In the previous years simple objects like Sphere, Cylinder, Cube, Plane etc. were added in the ray tracer and shadowing, reflection etc. were implemented.

Online Task: Nil
Offline Task: This is an offline assignment.
Mode of Evaluation (Presentation, Quiz or Viva): Presentation + Viva
Suggested Percentage Weight: 10% to 20%

Semester End Assessment:
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Final Viva: No final viva is needed

Quiz: A final quiz is usually taken and it covers all the topics on which the assignments were given. It usually bears 20% to 30% marks.

Reference Material:
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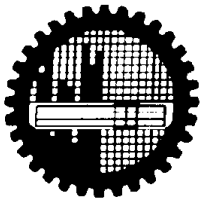
Books/Papers:
1. Computer Graphics Using OpenGL By F.S. Hill, JR.
2. Computer Graphics Principles & Practice By Foley, VanDam, Feiner and Hughes

3. OpenGL Programming Guide (Red Book) By OpenGL Architecture Review Board.

Website (if any):
Handout (if any):
Others:



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 474(N), CSE 320(O)

Sessional Primitives
Course Number: CSE 320/ CSE 474
Course Title: Pattern Recognition Sessional
Credit Hour: 0.75
Contact Hour per Week: 3 hours in alternate week
Server Needed (If any): Not needed
Additional Requirements (if any):

Themes to Be Covered:

1. **Bayesian Classifier**
2. **Linear Classifier**
3. **Reward and Punishment Algorithm**
4. **Pocket Algorithm**
5. **Non linear Classifier (Neural Network with Back Propagation Algorithm)**
6. **Vitterbi algorithm**
7. **Image Matching Algorithm**
8. **Edit Distance**
9. **Clustering.**

For each theme describe the following topics:

Title: Bayesian Classifier.
Outline: Bayesian Classifier is a probabilistic classifier of patterns based on Bayes' Theorem. Bayes' Theorem is simple mathematical formula to calculate conditional probability. The problem is specified as: Given a classification task of M classes, ω_1, ω_2, ω_3, …, ω_M and an unknown pattern, which is represented by a feature vector **x**, a classifier has to be developed where **x** is classified on a class ω_i depending on the probabilities $P(\omega_2|\mathbf{x})$, i = 1,2, …,M. Several variations of Bayes' Classifier is possible depending on how the probability $P(\omega_2|\mathbf{x})$ is calculated.
Online Task: In an online assignment, students have to develop a naïve Bayes' Classifier. In this task, some training patterns are given with their associated classes.

These patterns are used to identify the underlying probability density function of the patterns. Using this probability density functions, the probability $P(\omega_i|\mathbf{x})$ is determined using Bayes' Theorem and classified into the class i for which $P(\omega_i|\mathbf{x})$ is maximum among all i.

Offline Task: In the offline task, generally some variations in the application of Bayes' Theorem may be focused. Introduction of Loss Matrix, Multi-class Classification etc. are examples of them. Generally either an online or an offline task is given.

Mode of Evaluation: Viva

Suggested Percentage Weight: 10% of total weight.

Title: Linear Classifier (Perceptron algorithm):

Outline: Linear classifier is a simple pattern classifier which focuses on determining linear decision surfaces which can be used to classify the patterns. The surfaces take the form,

$$g(x) \equiv \mathbf{w}^T \mathbf{x} + w_0 = 0.$$

To compute the unknown parameters defining the decision hyperplane in case of two class case, Perceptron Algorithm is used. Given an instance of training patterns, Perceptron algorithm converges if the classes are linearly separable.

Online Task: In an online assignment, students have to implement the perceptron algorithm.

Offline Task: No offline task is given under this title.

Mode of Evaluation: Viva

Suggested Percentage Weight: 10% of total weight.

Title: Reward and Punishment algorithm

Outline: It is a variant of perceptron algorithm. It is used to classify patterns that are linearly separable. In this algorithm, all the patterns are entered one by one. After each input, if the input vector is classified correctly by current weight vector, then nothing is done. Otherwise, the weight vector is changed by either adding or subtracting a given amount. If the algorithm does not converge after all the patterns are entered, then the whole process is repeated.

Online Task: This problem should be given as online task.

Offline Task: No offline task

Mode of Evaluation (Presentation, Quiz or Viva): Viva

Suggested Percentage Weight: 5% of total weight.

Title: Pocket algorithm
Outline: It is another variant of perceptron algorithm. A basic requirement for the convergence of the perceptron algorithm is the linear separability of the classes. If this is not true, as is usually the case in practice, the perceptron algorithm does not converge. Pocket algorithm, a variant of the perceptron algorithm, was suggested which converges to an optimal solution even if the linear separability condition is not fulfilled.
Online Task: This problem should be given as online assignment.
Offline Task: No offline task.
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 5% of total weight.

Title: Non linear Classifier (Neural Network and Back Propagation Algorithm):
Outline: Non linear classifiers are used to classify the patterns that are not linearly separable. Neural network accompanied with Back Propagation Algorithm is used to develop these types of classifiers. Neural network has to be trained using Back Propagation algorithm and it should be able to classify test pattern accordingly.
Online Task: No online task.
Offline Task: In the offline task, students have to develop a neural network and train it using back propagation algorithm. Overall a non linear classifier is developed.
Mode of Evaluation: Viva.
Suggested Percentage Weight: 10% of total weight.

Title: Edit Distance Algorithm.
Outline: Edit distance is a kind of template matching algorithms. In this algorithm, a test pattern has to be matched with some given reference patterns. In general, words are used as patterns. At first, some words are stored in a dictionary. When a new word is entered, this algorithm matches the input word with each of the dictionary word and tells which word of the dictionary has a best match with the given word. Any programming language can be used.

Online Task: This problem should be given as online assignments. Some variations can be made in this algorithm. For example, the cost of addition, deletion and substitution can be changed. Students may be asked to show the set of changes necessary to convert the input word into the best matched word of the dictionary.
Offline Task: No offline task.
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 5% ot the total weight.

Title: Image matching Algorithm
Outline: There are several image matching algorithms. 2D logarithmic search is one of the commonly used image matching algorithms. In this problem, two images will be used – one is larger and one is smaller. Smaller image must be the part of the larger image. The larger image is called test image and smaller image is called reference image. The problem is to find the position of smaller image in the larger image. Pixel by pixel matching will incur a huge computational cost. Therefore, some heuristics should be used to define some points. The smaller image will be matched in these predefined points. Any programming language can be used.
Online Task: No online task
Offline Task: This problem should be given as offline task. Students should be encouraged to use their own heuristics along with the original ones as long as it does not deviate much from the original algorithm and it does not increase computational cost to a significant amount.
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 10% of total weight.

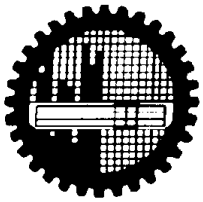
Title: Viterbi algorithm
Outline: Viterbi algorithm is used in context dependent pattern recognition problem. This problem defines that classification of a pattern depends not only on its own values but also on the values of other patterns and relationship among the classes. Given **m** classes and **n** patterns/observations, there are $\mathbf{M^N}$ ways to classify these **n** patterns into **m** classes. Viterbi algorithm uses dynamic programming method to find out the best possible sequence of classification.
Online Task: No online task

Offline Task: This problem should be given as offline task
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 10% of total weight.

Title: Clustering
Outline: Clustering falls into unsupervised learning problems. Given a set of points, clustering divides the points into groups based on similarities. In most cases, similarity may be based on distances among the points. There are several algorithms for clustering. Some well known algorithms are 1) k-means algorithm, 2) Ward's method and 3) Single link algorithm. Any programming language may be used.
Online Task: This problem should be given as online assignment. If all clustering algorithms are given as assignments, then two or more sessional classes may be required.
Offline Task: No offline task.
Mode of Evaluation (Presentation, Quiz or Viva): Viva
Suggested Percentage Weight: 10% of total weight.

Semester End Assessment:
Term Assignment: No term assignment is needed
Final Viva: No final viva is needed.
Quiz: A quiz is recommended on topics covered in sessional.
Suggested Percentage of Quiz: 25% of total weight

Reference Material:
Books/Papers: 1. Pattern Classification by Richard O. Duda, Peter F. Hart and David G. Stork
2. Pattern Recognition by Sergios Theodoridis and Konstantinos Koutroumbas
Website (if any): Not applicable.
Handout (if any): Not applicable.
Others: Not applicable.



Bangladesh University of Engineering and Technology

Department of C.S.E.

Course Number: CSE 484(N), CSE 408(O)

Sessional Primitives

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Course Number: CSE 408N
Course Title: Computer Interfacing Sessional
Credit Hour: 0.75
Contact Hour per Week: 1.5 Hours
Server Needed (If any): No
Additional Requirements (if any):

- The following software are needed for presentation of hardware design
  - Microsoft PowerPoint 2003 or later
  - Adobe Acrobat Reader 7.0 or later
- The following hardware components are required for the development of term projects
  - Bread boards
  - A/D converter
  - D/A converter
  - 3 state buffer
  - Multiplexer
  - Basic logic gates (AND/OR/NOT)
  - Encoder/Decoder
  - Motor
  - 7 segment display
  - LCD display board
  - Web camera (Wireless + USB)
  - Microcontrollers (8051, Atmega32)
  - Microcontroller writer
  - Other required hardware as needed for different projects

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Themes To Be Covered:

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There is no weekly assignment in this course. Students are involved in developing a hardware + software product from the very beginning of the semester. There are 4-5 students in each group.

Semester End Assessment:

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Term Assignment:

(Taking Taxi meter as an example)
Name of the Term Assignment:

- Taxi meter

Basic Requirement of the Term Assignment:
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- The theme of this assignment is to develop a fully functional hardware + software product performing some specific activities with easy to use interface.

Total Duration of the Assignment:

- 12 weeks

Presentation Requirement:

- There will be a presentation in the 2nd available week for each group to propose a design for the product to be developed.

Demonstration Requirement:

- Each term assignment will be supervised by a teacher involved in the course. The supervisor will track the on going development of the project. The supervisor will help the students to understand the requirements and activities of the product to be developed. He will have a weekly meeting with each term assignment groups to monitor work in progress. Each group will submit their pin-level design in the 3rd class. The final demonstration will be arranged in the 12th week. In the mean time the supervisor will track implementation activities of different groups in the Interfacing Lab.

Reporting Requirement:

- At the end of the project each group will submit a formal report containing all the features of the developed product and design details.

Mark Distribution: (Term assignment will carry 100% of the total course weight)

- Requirement analysis, presentation and viva: 25%
- Hardware design, pin-level diagram and viva: 25%
- Implementation: 30%
- Successful completion of the project: 10%
- Final Viva: 10%

Mark Distribution of a Particular Deliverable:

- There is generally no division in a deliverable in this course. The general mark distribution given above is typically followed.

Schedule of the Assignment:

- Distribution of assignments: 1th week
- Presentation on product features and viva: 3rd week
- Submission on pin-level diagram and viva: 5th week
- Modification of design (if any): 7th week
- Progress monitoring of implementation and viva: 9th week
- Final submission and viva: 12th week

The file “Interfacing-Course-Contents.zip” submitted by Ahmed Khurshid contains a file named “CSE-408N-Task-Schedule” that gives a working schedule of 14 weeks for this course.

Final Viva:

- The final viva will be taken during the final submission of the project. The weight of final viva is given in the "Marks Distribution" section.

Quiz:

- As different groups will perform different activities during the project, it is difficult to design a common quiz test for the students. So it is better not to take quiz in this course.

Reference Material:

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Books:

- Microprocessors and Interfacing
  - Second Edition
  - **Author**: D. V. Hall
- The Intel Microprocessors
  - Seventh Edition
  - **Author**: B. B. Brey
- Computer Peripherals
  - Third Edition
  - **Author**: Cook and White

Website (if any):

Handout:

- Materials provided in the theory and sessional classes.
- The following file contains theory and sessional materials used by Ahmed Khurshid in January 2008 semester.
  - Interfacing-Course-Contents.zip

Others:
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