BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

SYLLABUS (PROBIDHAN-2016)

COMPUTER TECHNOLOGY

TECHNOLOGY CODE: **666**

6th SEMESTER

DIPLOMA IN ENGINEERING

PROBIDHAN-2016

COMPUTER TECHNOLOGY

6th Semester

Sl. No.	Subject Code	Name of the Subject	T	P	C	Marks				
						Theory		Practical		Total
						Cont. Assess	Final Exam	Cont. Assess	Final Exam	
1	66661	Principals of Software Engineering	2	6	4	40	60	50	50	200
2	66662	Microprocessor & Interfacing	2	3	3	40	60	25	25	150
3	66663	Microcontroller Application	0	6	2	-	-	50	50	100
4	66664	Database Management System	2	3	3	40	60	25	25	150
*5	6666X	Optional Subject -1	2	3	3	40	60	25	25	150
6	69054	Environmental Studies	2	0	2	40	60	-	-	100
7	65852	Industrial Management	2	0	2	40	60	-	-	100
Total			**12**	**21**	**19**	**240**	**360**	**175**	**175**	**950**

***** 6666X **Optional Subjects-**I

Group	Subjact code	Subjact Name
Network Maintenance Group	66665	Network & Data Center Operation
Automation System Group	66666	PLC Automation System
Software Developer Group	66667	Web Mastering
Multimedia Developer Group	66668	Multimedia & Animation

66661 Principles of Software Engineering T P C
2 6 4

OBJECTIVES

• Tostudy the approachesof application of engineering to software.
• To develop knowledge and skill to apply systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software.

SHORT DESCRIPTION

Concept of software engineering, Basics of Software development life cycle (SDLC), Project management, Requirements analysis, Design basics, Analysis & Design tools, Design strategies, User Interface design, understanding of Design complexity, Software implementation, Testing and quality assurance, Maintenance, CASE tools overview;

DETAIL DESCRIPTION

Theory:

1. Understand the concept of software engineering

1.1 Definesoftware engineering.
1.2 Describe the evolution of software engineering.
1.3 List software evolution laws.
1.4 Describe E-Type software evolution laws.
1.5 Describe software paradigms.
1.6 State the need of software engineering.
1.7 List the characteristics of good software.

2.Understand the basics of software development life cycle (SDLC)

2.1 Describe the software development life cycle activities.
2.2 Describe software development paradigm (Waterfall model, Iterative model, spiral model, agile development)
2.3 Describe agile development.
2.4 State the agile manifesto.
2.5 List agile manifesto items.
2.6 List key principles of agile.
2.7 Describe agile methodologies

3. Understand the software project management

3.1 State the need of software project management.
3.2 Describe role of software project manager.
3.3 List software management activities.
3.4 Describe configuration management.
3.5 Describe project management tools.

4. Understand software requirement engineering

4.1 Describe software requirement engineering process.

4.2 List requirement elicitation process.
4.3 Describe requirement elicitation techniques.
4.4 List software requirements characteristics.
4.5 Describe types of software requirements.
4.6 Describe the role of software system analyst.
4.7 List software metrics and measures.

5. Understand the software design basics, analysis and design tools

5.1 Describe software design levels.
5.2 Statemodularization and concurrency.
5.3 State coupling and cohesion
5.4 Describe design verification.
5.5 State data flow diagram, structure charts.
5.6 Describe Hierarchical Input Process Output (HIPO) diagram.
5.7 State pseudo code.
5.8 Describe decision table.
5.9 Describe entity relationship model.
5.10 State data dictionary.

6. Understand software design strategies

6.1 Define structured design.
6.2 Describefunction-oriented design.
6.3 Describe object oriented design.
6.4 Describe software design patterns.
6.5 Describe software design approaches.

7. Understanduser interface design

7.1 Describe command line interface (CLI).
7.2 Describe graphical user interface (GUI).
7.3 State user interface design activities.
7.4 List GUI implementation tools.
7.5 State user interface golden rules.

8. Understand software design complexity

8.1 DescribeHalstead's complexity measures.
8.2 DescribeCyclomatic complexity measures.
8.3 State function point

9. Understand software implementation

9.1 Describe structured programming.
9.2 State functional programming.
9.3 State programming style and coding guideline.
9.4 Describe software documentation
9.5 State software implementation challenges.

10. Understand software testing process

10.1 Describe software validation and verification

10.2 State manual vs automated testing
10.3 Describe testing approaches
10.4 State testing levels
10.5 Describe testing documentation
10.6 State testing vs quality control & assurance and audit

11. Understand software maintenance overview

11.1 Describe types of maintenance
11.2 List cost of maintenance
11.3 State maintenance activities
11.4 State software re-engineering
11.5 Describe component reusability

12. Understand Scrum agile method

12.1 Describe scrum framework and sprints
12.2 Sate scrum roles
12.3 State scrum master roles
12.4 Describe scrum events (sprint, planning, daily scrum meeting, sprint review, retrospective)
12.5 State artifacts
12.6 State user stories
12.7 Describe burn down charts
12.8 State estimation process
12.9 State scrum tools and benefits

Practical:

1. Measure the complexity of a given source code based on
    a. Halstead's Complexity Measures
    b. Measure cyclomatic complexity of a give code or software.
    c. Identify code blocks
    d. Draw Flow chart
    e. Draw flow graph
2. Measure function point of a given software.
3. Draw a data flow diagram from a given case study.
4. Draw structure chart form a given case study
5. Draw a HIPO diagram for a software requirement.
6. Do requirement analysis for a given case study and prepare requirement document
    a. Gather user requirement
    b. Write sample SRS
    c. Apply Requirement Elicitation Techniques to validate requirements
7. Identify Modules from a case study
    a. Identify Modules
    b. Identify sequential and concurrent units
8. Identify coupling and cohesion From a object oriented design
9. Write a function requirement on structured English model
10. Write pseudo – code of a given problem
11. Prepare a decision table from a given problem
12. Draw entity relationship model from a given case study.
13. Write a object oriented design from a given case study
    a. Write the objects, class
    b. Write Modules
    c. Draw object relationship diagram
14. Design a prototype implementation of a software using GUI
    a. Identify the GUI requirements
    b. List down application specific GUI requirements
    c. Draw a prototype implementation
    d. Draw a prototype design using GUI tools
15. Write a functional code for a given problem
    a. Functional programming approach
    b. Object oriented approach
16. Write a sample software following provided coding guideline
17. Write sample software documentation
    a. Requirement documentation
    b. Design documentation
    c. Technical documentation (code commenting and explanation)
    d. User documentation user guide
18. Write re-usable code or module

a. Write sample library module
b. Version control using tools (git, svn)
c. Writemachine independent code

19 Write Test documentation
a. Write test case for a given problem
b. Write Unit test cases
c. Write Functional test cases
d. Write user interface test cases
e. Write a automated test program

20 Practice sample scrum using any open source tools
a. Practice scrum events
b. Prepare sample artifacts for a project
c. Write user stories
d. Prepare burn down chart
e. Practice estimation planning poker

REFERENCE BOOKS AND URL.

1. Software engineering – A practitioner's approach - Mc GRAW – HILL by Roger S. Pressman
2. Introduction to system analysis and design – Prentice Hall by IgroHawryszkiewycz

Related URL links:

3. http://www.vumultan.com/Books/CS605-Software%20Engineering%20Practitioner%E2%80%99s%20Approach%20%20by%20Roger%20S.%20Pressman%20.pdf
4. https://www.tutorialspoint.com/software_engineering/index.htm
5. https://www.tutorialspoint.com/scrum/index.htm

66662 Microprocessor & Interfacing

T	P	C
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AIMS

- To be able to acquire the knowledge on microprocessor, microcomputer.
- To be able to develop the knowledge and skill on the architecture and assembly language programming of 16- bit microprocessor
- To be able to acquire the knowledge and skill on memory, interrupt and I/O interfacing.

SHORT DESCRIPTION

Basic conception of microprocessor and microcomputer; Architecture and addressing mode of Intel 8086μp; Instruction timing of Intel 8086 μp; Memory, input /output and interrupt interfacing of Intel 8086 μp; Interfacing principle and peripheral devices; programming of Intel 8086/8088; Intel x86 family, multi-core processor idea;

DETAIL DESCRIPTION

Theory:

1. **Understand the concept of microprocessor and microcomputer.**
   - 1.1. Define the microprocessor and microcomputer.
   - 1.2. Distinguish between microprocessor and microcomputer.
   - 1.3. Distinguish between microprocessor and microcontroller.
   - 1.4. Describe the block diagram of simple microcomputer.
   - 1.5. Describe the evaluation of microprocessor (4, 8, 16, 32 & 64 bit microprocessor)
   - 1.6. Mention the main characteristics of different types of microprocessor.
2. **Understand the architecture of 8086 microprocessor.**
   - 2.1. Mention the general features of 8086/8088 microprocessor.
   - 2.2. Describe the pin and signal diagram of 8086/8088 microprocessor.
   - 2.3. Distinguish between maximum and minimum mode of 8086/8088 microprocessor
   - 2.4. Describe the architecture of 8086 microprocessor.
   - 2.5. Describe the register structure of 8086 microprocessor.
   - 2.6. Explain the instruction execution sequence of 8086 microprocessor.
   - 2.7. Mention the difference between 8086 and 8088 microprocessor.
3. **Understand the memory interface of the 8086 microprocessor.**
   - 3.1. Sketch the 8086 system memory interface.
   - 3.2. State the meaning of even & odd address boundaries.
   - 3.3. Describe the organization of IBM address space of 8086 microprocessor.
   - 3.4. Explain the generation of physical memory address showing the relationship between logical segment address & offset and physical memory address.
   - 3.5. Describe the hardware organization of the memory address space of 8086.
   - 3.6. Describe the memory read and write bus cycle of 8086 microprocessor. Explain the technique to de-multiplex the system bus.
4. **Understand the 8086 addressing mode and programming concept.**
   - 4.1. Describe the addressing mode of 8086 microprocessor.
   - 4.2. Describe the software model of the 8086 microprocessor.

4.3. Explain the effect in registers before and after the instruction execution for different addressing modes of 8086 microprocessor.
4.4. Describe the 8086 instruction set.
4.5. Explain the instruction format of 8086 microprocessor.

5. Understand the input / output interface and peripheral devices of the 8086 microprocessor.

5.1. Describe the 8086 system I/O interface.
5.2. Describe the I/O address space of the 8086 system.
5.3. Describe the I/O read and I/O write bus cycle of 8086 microprocessor.
5.4. Define programmable peripheral.
5.5. Mention the commonly used support chips and purpose of those.
5.6. Describe the operation of PPI using block diagram.
5.7. Configure the control word of the control register of PPI for simple I/O operations.

6. Understand the interrupt interface of the 8086 microprocessor.

6.1. Mention the types of interrupts.
6.2. Describe the common features of different types of interrupts.
6.3. Sketch the map of interrupt vector table.
6.4. State the function and use of each address pointer or vector.
6.5. Describe the function, format and operation of interrupt instructions.
6.6. Describe the external hardware interrupt interface of the 8086 microprocessor.

7. Understand the assembly language programming of 8086 family.

7.1. Define the assembler pseudo instructions.
7.2. Describe the use of assembler directives (i. e. SEGMENT, ENDS, ASSUME, DUP, etc.)
7.3. Describe the use of program development tools (i.e. editor, assembler, linker, locator debugger and emulator.)
7.4. Explain the sequential, IF-THEN-ELSE, WHILE-DO and REPEAT-UNTILL structure in 8086 assembly language with pseudo code and flow chart.
7.5. Write assembly language programs.

8. Understand the new features of other x86 series microprocessor.

8.1. List some 16 bit microprocessor of different company with brief specification.
8.2. State the meaning of real mode and protected mode operation of Intel 80286 microprocessor.
8.3. Describe the protected mode memory addressing technique.
8.4. List the names of other x86 family processors including Pentium series and state the brief specification.
8.5. Define superscalar architecture of Pentium processor.
8.6. State the function of BIST in Pentium processor.
8.7. State multiprocessing and parallel processing.
8.8. Define multi-core processors (i.e. Dual core, Quad core, core ix).
8.9. Write down the advantages of multi-core processors.

9. Understand the real world interfacing

9.1. Describe the interfacing of LED Display with program to the microprocessor.
9.2. Describe the interfacing of seven segment LED display with program to the microprocessor.
9.3. Describe the interfacing of Multiple Digit Display with program to the microprocessor.

9.4. Describe the method of interfacing of stepper motor to the microprocessor.

Practical:

1. Perform the task to develop and execute an assembly language program for solving arithmetic problems using 8086/88μp trainer or MASM type tools or software simulator.
2. Perform the task to develop and execute an assembly language program for solving logical problems using 8086/88μp trainer or MASM type tools or software simulator.
3. Perform the task to develop and execute an assembly language program to compute 1's or 2's complement of binary number using 8086/88μp trainer or MASM type tools or software simulator.
4. Perform the task to transmit data from a microprocessor to an I/O using Intel 8086/8088 based microprocessor trainer or MASM type tools or simulator software.
5. Perform the task to receive data from an I/O to the microprocessor using Intel 8086/8088 based microprocessor trainer or MASM type tools or simulator software.
6. Perform the task to develop and execute an assembly language program/ Subroutine to produce time delays of different durations using 8086/88μp trainer or MASM type tools or software simulator.
7. Perform the task to develop and execute assembly language programs that implement the branching and looping structures using 8086/88μp trainer or MASM type tools or software simulator.
8. Build a simple computer prototype using 8086/8088 processor with memory, I/O interface and simple I/O devices

Reference Books:

1. Digital Computer Electronics - Malvino- Brown
2. Microprocessor And Microcomputer Based System Design - Mohamed Rafiquzzaman..
3. Microprocessors and Interfacing: Programming and Hardware - Douglas V. Hall
4. The Intel Microprocessors - Barry B. Brey
5. Microprocessor & Interfacing - A.P. Godse & D.A. Godse
6. The 8086 and 80286 Microprocessor - Avatar Singh

66663 Microcontroller Application

T	P	C
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AIMS

To develop knowledge and skill on programming and interfacing to embedded systems using microcontroller.

SHORT DESCRIPTION

The microcontroller features, architecture, programming and the real world interfacing.

DETAIL DESCRIPTION

PRACTICAL:

1. Interpret the basics of microcontroller

1.1. Express embedded system and microcontroller
1.2. Observe the difference between microcontroller and microprocessor
1.3. Find the application fields of microcontroller
1.4. Find the different manufacturer of microcontroller
1.5. Find the different features of microcontroller

2. Identify the requirement of microcontroller application

2.1. Find the main features of PIC microcontroller
2.2. Demonstrate the architecture of mid-range MCU (microcontroller)
2.3. Find different types of software development tools
2.4. Find different types of hardware development tools
2.5. Find some mid-range PIC MCU that are suitable for easy-to-start like PIC 16F84A, PIC16F628A, PIC16F676, PIC 16F72 etc.

3. Design schematic diagram for making LED flashing system

3.1. Select a simple PIC series mid-range MCU for LED flashing project, for example, PIC 16F84A, PIC16F628A, PIC16F676, PIC 16F72 or any other suitable PIC MCU.
3.2. Identify required input-output devices for building LED flashing system
3.3. Interpret operation procedure of selected I/O devices
3.4. Interpret the interface system of selected I/O devices with selected MCU
3.5. Interpret the interface of different signals and pin of the selected MCU
3.6. Sketch the connection diagram of the power pins of MCU with power supply in schematic design
3.7. Sketch the connection diagram of the crystal with clock signal related pin in schematic design. Internal clock source can be used as well.
3.8. Sketch the connection diagram of other system pin of MCU, for example, like reset etc. with necessary components or power supply if necessary.
3.9. Sketch the connection diagram of the I/O device and other parts if necessary with MCU to complete the schematic design.

4. Develop program for MCU based LED flashing system using C

4.1. Interpret the internal architecture
4.2. Interpret the structure of internal registers for special function of the PIC series mid-range MCU
4.3. Interpret the use of configuration work of PIC MCU
4.4. Interpret the program structure of C Language

4.5. Interpret the use the library function in the program
4.6. Use the C language to develop program for LED flashing system

5. Build and simulate the LED flashing program

5.1. Interpret the use of MPLAB/MPLAB X/MPLAB xpress
5.2. Build the hex file using IDE for PIC MCU for LED flashing system
5.3. Interpret the simulation process in MPLAB/MPLAB X
5.4. Perform the simulate on the developed program for LED flashing system

6. Flash/burn the MCU and construct the circuit of LED flashing system

6.1. Interpret the use MCU flashing/programming tool, for example, PIC Kit 2/3/4, MPLAB ICD 3 etc.
6.2. Flash/program the produced hex file into MCU
6.3. Construct the circuit according to the schematic design using project board and required parts or training kit etc.
6.4. Apply the power and observe the operation

7. Debug the circuit using debugger hardware

7.1. Interpret the operation of debugger
7.2. Install the debugger software
7.3. Connect the debugger hardware with the computer and the MCU
7.4. Start the debugging operation and perform step by step instruction/statement execution

8. Make a project of a MCU based LED running system

8.1. Design the schematic diagram for MCU based LED running system
8.2. Develop the program in C language or PIC Assembly language for LED running system
8.3. Build the hex file of the program
8.4. Simulate the program
8.5. Flash the hex file into MCU
8.6. Construct the circuit and observe the operation
8.7. Debug the program
8.8. Collect the case/box for packing the project
8.9. Packaging the circuit in the case/box
8.10. Make report on the project and perform the presentation of the project output

9. Perform the construction of a MCU based timing pulse generation system

9.1. Design the schematic diagram for MCU based timing pulse generation system
9.2. Develop the program in PIC Assembly language
9.3. Build the hex file of the program
9.4. Simulate the program
9.5. Flash the hex file into MCU
9.6. Construct the circuit and observe the operation
9.7. Debug the program

10. Perform the construction of a MCU based system to display hexadecimal digit using LED 7-segment display unit

10.1. Design the schematic diagram
10.2. Develop the program
10.3. Build the hex file
10.4. Simulate the program
10.5. Flash the hex file into MCU

10.6. Construct the circuit and observe the operation

11. Perform the construction of a MCU based system to display character using LED dot matrix display unit

11.1. Design the schematic diagram
11.2. Develop the program
11.3. Build the hex file
11.4. Simulate the program
11.5. Flash the hex file into MCU
11.6. Construct the circuit and observe the operation

12. Perform the construction of a MCU based system to control the direction and steps of a stepper motor

12.1. Design the schematic diagram
12.2. Develop the program
12.3. Build the hex file
12.4. Simulate the program
12.5. Flash the hex file into MCU
12.6. Construct the circuit and observe the operation

13. Perform the construction of a MCU based system to control the speed of a DC motor

13.1. Design the schematic diagram
13.2. Develop the program
13.3. Build the hex file
13.4. Simulate the program
13.5. Flash the hex file into MCU
13.6. Construct the circuit and observe the operation

14. Perform the construction of a MCU based ADC (Analog to digital converter) interface system

14.1. Design the schematic diagram
14.2. Develop the program
14.3. Build the hex file
14.4. Simulate the program
14.5. Flash the hex file into MCU
14.6. Construct the circuit and observe the operation

15. Perform the construction of a MCU based DAC (Digital to analog converter) interface system

15.1. Design the schematic diagram
15.2. Develop the program
15.3. Build the hex file
15.4. Simulate the program
15.5. Flash the hex file into MCU
15.6. Construct the circuit and observe the operation

16. Make a project of a MCU based traffic light interface system for controlling the direction and movement of vehicles at a junction of 4 roads

16.1. Design the schematic diagram

16.2. Develop the program
16.3. Build the hex file
16.4. Simulate the program
16.5. Flash the hex file into MCU
16.6. Construct the circuit and observe the operation
16.7. Collect the case/box for packing the project
16.8. Packaging the circuit in the case/box
16.9. Make report on the project and perform the presentation of the project output

17. Perform the construction of a MCU based LCD (Liquid Crystal Display) interface system to display information

17.1. Design the schematic diagram
17.2. Develop the program
17.3. Build the hex file
17.4. Simulate the program
17.5. Flash the hex file into MCU
17.6. Construct the circuit and observe the operation

18. Perform the construction of a MCU based system to count pulses

18.1. Design the schematic diagram
18.2. Develop the program
18.3. Build the hex file
18.4. Simulate the program
18.5. Flash the hex file into MCU
18.6. Construct the circuit and observe the operation

19. Perform the construction of a MCU based active low push switch interface system

19.1. Design the schematic diagram
19.2. Develop the program
19.3. Build the hex file
19.4. Simulate the program
19.5. Flash the hex file into MCU
19.6. Construct the circuit and observe the operation

20. Perform the construction of a MCU based 2-state switch interface system

20.1. Design the schematic diagram
20.2. Develop the program
20.3. Build the hex file
20.4. Simulate the program
20.5. Flash the hex file into MCU
20.6. Construct the circuit and observe the operation

21. Perform the construction of a MCU based LDR (Light dependent resistor) interface system

21.1. Design the schematic diagram
21.2. Develop the program
21.3. Build the hex file
21.4. Simulate the program
21.5. Flash the hex file into MCU
21.6. Construct the circuit and observe the operation

22. Make a project of a MCU based temperature sensor interface system

22.1. Design the schematic diagram
22.2. Develop the program
22.3. Build the hex file
22.4. Simulate the program
22.5. Flash the hex file into MCU
22.6. Construct the circuit and observe the operation
22.7. Collect the case/box for packing the project
22.8. Packaging the circuit in the case/box
22.9. Make report on the project and perform the presentation of the project output

REFERENCE WEB ADDRESS AND BOOKS

1. PIC16F84A Data sheet, IDE manual, PIC series MCU datasheet - http://www.microchip.com
2. User Manual for PIC Training Kit - http://www.microprocessorinstitute.org

66664 Database Management System

T	P	C
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AIMS

- To be able to acquire the knowledge and skill in the database system concept.
- To be able to familiarize with data models in database systems.
- To be able to acquire the knowledge and skill in the Relational databases
- To be able to acquire the knowledge and skill in the Integrity & security.
- To be able to acquire the knowledge and skill in the Data storage, Transactions & concurrency control and Database system architecture.

SHORT DESCRIPTION

Database system concept; Data models; Relational databases, Integrity & security, Data storage, Transactions & concurrency control, cursor and Database system architecture.

DETAIL DESCRIPTION

Theory:

1. Understand the basic concept of database system.

1.1 Define database management system.
1.2 Explain the purpose of database management system.
1.3 Mention the difference between conventional file system and database management system.
1.4 Mention the advantages & disadvantages of database management system.
1.5 Define data abstraction, instances and schemas.
1.6 Mention the types of schema.
1.7 Data type concept.

2. Understand the concepts of database languages, users, manager and administrator.

2.1 Describe the database languages with examples.
2.2 Describe the basic operation of DDL, DML and data dictionary.
2.3 Describe the different types of database system users.
2.4 Example the different tasks of database manager.
2.5 Describe the functions of a database administrator.
2.6 Describe the functional components of a database system.

3. Understand the data models.

3.1 Define the entity, entity set and data model.
3.2 Mention the meaning of E-R diagram symbol.
3.3 Describe the E-R diagram for different mapping constrains.
3.4 State different types of attribute uses in E-R diagram.
3.5 State the techniques to convert E-R diagram to table.
3.6 Describe the different types of data models with examples.
3.7 Describe the constraints in entity-relationship (mapping, cardinalities and existences) with diagrams..
3.8 State the meaning of different types of keys in RDBMS (primary key and foreign key, super key, candidate key).
3.9 Distinguish between strong and weak entity sets.

3.10 Describe the schema diagram with example.

4. **Understand the relational database Query language.**
   - 4.1 Define query language.
   - 4.2 Mention the different among SQL, QBE and Datalog.
   - 4.3 Describe the fundamental operations of relational algebra(**select, project, union, set difference, Cartesian product, rename, set intersection, natural joint, division** and **assignment**).

5. **Understand the SQL and PL/SQL.**
   - 5.1 Mention the several parts of SQL and PL/SQL.
   - 5.2 Explain five clauses of SQL expression (**select, from, where, group by and having**).
   - 5.3 Describe the uses of SQL set operations (**union, intersect,** and **except**).
   - 5.4 Describe the uses of SQL aggregate functions (**avg, min, max, sum**, **count, upper, lower, initcap, string operation etc.**).
   - 5.5 Describe the technique to add, remove and change information with SQL (**delete, insert,** and **update**).

6. **Understand the integrity and security.**
   - 6.1 Define integrity constraint.
   - 6.2 Describe the referential integrity in SQL.
   - 6.3 Describe the assertions in RDBMS.
   - 6.4 Define the triggers and need for triggers in RDBMS.
   - 6.5 Define the security in RDBMS.
   - 6.6 Describe the protection of database.
   - 6.7 Define encryption and authentication in database.
   - 6.8 Mention the technique of encryption.

7. **Understand the relational database design.**
   - 7.1 Define the normalization.
   - 7.2 Mention the need for normalization.
   - 7.3 Describe the term redundancy in RDBMS.
   - 7.4 Explain the three stages/rules of normalization in database management system (1NF, 2NF, and 3NF)
   - 7.5 Describe the overall database design process.

8. **Understand the data-storage media.**
   - 8.1 List the physical storage media.
   - 8.2 Describe the storage-device hierarchy used for database storage.
   - 8.3 Define the RAID.
   - 8.4 Describe the different levels of RAID.
   - 8.5 Describe the choice of RAID levels.

9. **Understand the Transactions and concurrency controls.**
   - 9.1 Define transaction and concurrent execution in DBMS.
   - 9.2 Mention the properties of the transaction.
   - 9.3 Explain the transaction state with diagram.
   - 9.4 Mention the reasons for allowing concurrency.

10. **Understand the database system architecture.**
   - 10.1 Define centralized, parallel and distributed database system.

10.2 Explain the homogeneous and heterogeneous databases.

10.3 Explain the structure of server (Centralized and client server), parallel and distributed database system architecture.

10.4 Describe the advantages and disadvantages of server, parallel and distributed database system architecture.

11. Understanding the cursor statement

11.1 Declare a cursor that defines a result set in a stored procedure

11.2 Open the cursor to establish the result set.

11.3 Fetch the data into local variables as needed from the cursor, one row at a time.

11.4 Close the cursor when done.

12. Database Backup and Restoring System.

PRACTICAL:

1. Arrange the necessary hardware and operating system for installing MS-Access, SQL Server or Oracle.
2. Create a new database for the result process application using MS-Access, SQL server or Oracle.
3. Create tables such as Student Information, Department Information, Subject Information, Year information and Mark Information (including):
   I. Create a new user/database and permission assign.
   II. Create a table space.
   III. Create a new table with appropriate data types.
   IV. Define primary key, Foreign key, candidate key and different constraints.
   V. Drop primary key and foreign key.
   VI. Save the table structure
   VII. Edit a table structure
   VIII. Insert a record, Update the record and Delete the row.
   IX. Alter a field with Field Name, DataType, Length etc.
   X. Change or remove a key field
4. Create relationship among tables using inner join or outer join.
   I. Create a query involving only one table.
   II. Query linked tables and create a form from a query.
   III. Create a total query to find the GPA of each student of particular year.
5. Create data entry form for entering data in Student Information, Department Information, Subject Information, Year Information and Mark Information tables.

Then apply Normalization (1NF, 2NF and 3NF) on result process database.

6. Use Auto Report to create table reports of result process. Use the report wizard to create a grade sheet /mark sheet/transcript, Merit list and tabulation sheet.
7. Perform the task to install Oracle Database Language and Invoking SQL Plus.
8. Perform the task to manipulate data in data base management system (select, project, union, set difference, cartesian product, rename, set intersection, natural joint, division and assignment).
9. Perform the task to view, delete and update data into a table (delete, insert, and update) and perform the task to modify the structure of a table.
10. Perform the task to work with grouping data from tables and manipulate dates by SQL in Oracle
11. Perform the task to work with Sub Queries, JOINS, Indexes, Trigger, transaction, process, Parameterized cursor, 'DUAL' and SYSDATE, functions, different Type of constraints in PL/SQL.

12. Perform the task to work with View, sequences and Security in SQL including user and administrative level.
13. Create a stored procedure, declare some variables, create a cursor and use it by writing some query statement in the looping area after open the cursor. Then close the cursor.
14. Perform the task to work with Concurrency Control (Implicit and explicit lock) and error handling in PL/SQL
15. Backup a database and Restore it after taking the backup.

REFERENCE BOOK

1. Database System Concepts – Henry F. Korth.
2. Successful projects in ACCESS - P.M Heathcote
3. SQL, PL/SQL
4. Introduction To Oracle 10g SQL Volume-1
5. Introduction To Oracle 10g SQL Volume-2
6. Introduction To Oracle 10g PL/SQL Volume-1
7. Introduction To Oracle 10g PL/SQL Volume-2

References Web Site:-

www.java2s.com/Tutorial/Oracle/CatalogOracle.htm
www.docs.oracle.com

Optional Subjects-I

(Network Maintenance Group)

66665 Network & Data Center Operation

T	P	C
2	3	3

AIMS

- To be able to develop knowledge, skill and attitude in Client-Server Environment, Network protocol and security, user privilege.
- To be able to acquire knowledge, skill and attitude of network architectures, protocols, standards, connectivity, services, security and management.
- To be able to acquire knowledge skill of Data Center Policies & Procedures, Floor Inventory & Management, Commissioning & Decommissioning of Data Center.
- To be able to acquire knowledge skill of Data Center Micro Cleaning, Pest Control, Cooling System, Maintenance Regime, Fire Protection Systems Management.
- To be able to learn knowledge and skill of Raised floor & suspended ceiling, Power Infrastructure, Cooling Infrastructure, Fire Protection, Physical Security and Safety.
- To be able to Design Data Center, Understanding tier, sizing and defining layout, associated costs,

SHORT DESCRIPTION

Computer Network, Media Access Techniques, CSMA/CA, CSMA/CD, Client-Server Network, Server-Domain, Protocol and OSI Reference Model, TCP/IP Protocol Suite. Network Architectures and Standards, IPv4 & IPv6, Network & Base Address, IP Address & MAC Address, Subnet & Subnet-Mask, Network connectivity and services, Network security and management. Cloud Network, Cloud Computing, Big Data, Data Center, Data Center Servers, Design of Data Center, Data Center Safety, Security & Management. Data Center Maintenance & Repair.

DETAIL DESCRIPTION

Theory:

1. Understand the Server based and peer computer networks.

1.1 Define client, Server and peer computer in a network.
1.2 Describe the Server-based Network and Domains.
1.3 Describe the roles of common types of servers.
1.4 Mention the deference between DNS and DHCP Server
1.5 State the function of Forward and reverse lookup zones.
1.6 Describe basic features of LAN, VLAN and Inter-VLAN routing.

2. Understand the Media access control design issues for LAN System.

2.1 Mention different techniques of media access control.
2.2 Describe the round robin/ polling, reservation and contention based access control techniques.
2.3 Define collision on a contention based network.
2.4 Describe the operation of CSMA/CD access control.
2.5 State the operation of token ring and token bus access control.
2.6 Describe the comparison of media access control techniques (i, e, CSMA/CA Vs CSMA/CD, CSMA/CD Vs Token passing, CSMA/CD Vs Demand priority access control).

3. Understand the OSI model and TCP/IP protocol architecture.

3.1 List the name of standard organizations responsible for network standards.
3.2 Draw the layers of the OSI reference model.
3.3 Describe the protocols and functions of each layers of OSI model.
3.4 Define Routing Protocol- RIPv2, OSPF, IGRP, EIGRP, EGP and BGP.
3.5 Describe the term Routed Protocol- IP and IPX.
3.6 Mention the layers of TCP/IP protocol architecture.
3.7 Explain the functions of each layer of TCP/IP protocol architecture.
3.8 Explain the role of TCP/IP protocol interface.
3.9 Describe Network Address Translation (NAT) and Port Address Translation (PAT).
3.10 Compare the layering structure of TCP/IP suite and OSI model.

4. Understand the IEEE 802.x standards, Ethernet and FDDI.

4.1 State the objective of the 802 project model.
4.2 Describe the important features of the IEEE 802 categories.
4.3 State the relation between standard IEEE 802 and OSI model.
4.4 Mention Ethernet Specification of 100 base 2 and 100 base 5 cabling system.
4.5 Describe the features of demand priority access LAN/100 base VG Any LAN.
4.6 Describe the working procedure of FDDI.
4.7 Describe Optical Devices- Isolator, Circulator, Splitters, Couplers, Filters and Concentrators.
4.8 Describe the role of dual counter rotating ring in the event of device or cable failure in FDDI.
4.9 Describe the operation of Optical Transport Networking (OTN).
4.10 Describe the functions of Network devices- Router, Layer 2 Switch, Layer 3 Switch, Wireless Router, and Wireless Access Point (WAP).

5. Understand the concept of cloud networking

5.1 Define cloud computing and storage.
5.2 State the concept of big data.
5.3 Define Virtual Private Server and storage management.
5.4 State different types of storage topology (single hop, multihop, Dynamic)
5.5 State the concept of NoSQL Database for cloud system.
5.6 Define Apps and social media data mining.

6. Understand the Concept of Data Center

6.1 Define Data Center and various types of servers.
6.2 Describe Data Center Certification and types of Data Center.
6.3 State the Organizational Structure of Data Center
6.4 Describe the Operations Management of Data Center- Business, Topology, SFI, ITI, Floor & Site.
6.5 Describe responsibility of Data Center NOC Manager and Data Center S&S Manager.

7. Understand the Data Center Management

7.1 Define Cost & Asset Management of Data Center
7.2 Describe the Equipment Lifecycle Management of Cost & Asset.
7.3 State the Techniques of Asset Management - Buy or Lease Evaluations.
7.4 Define Vendor Management and Crises Management
7.5 State the term RAS, RFP, RFI, RFT, RFQ, IFB

8. Understand Data Center Day-to-Day Operation, Safety, Security Management

8.1 Define Data Center Policies & Procedures
8.2 Describe Data Center Floor Management, Inventory and Documentation Management

8.3 Describe the procedure of Data C enter Commissioning & Decommissioning
8.4 State the techniques of Data Center Micro Cleaning and Pest Control
8.5 Describe the Cooling System Maintenance Regime and Fire Protection Systems Management

9. Understand Data Center Monitoring & Management

9.1 Define M&M Goals.
9.2 Describe the types of Monitoring & Management Systems.
9.3 Describe the Environment Monitoring System (EMS).
9.4 Describe the Electrical Power Management System (EPMS).
9.5 State the techniques of Building Management System (BMS).
9.6 Describe the Network Management System (NMS) and Data Center Infrastructure Management (DCIM).
9.7 Describe the Business Service Management (BSM) and Support & Help Desk Management.
9.8 Describe the technique to make M&M Reporting & Analytics

10. Understand Data Center Safety, Security Management and Maintenance & Repair

10.1 Define Safety Priorities & Plans of Data Center.
10.2 Describe the Emergency Types & Plans of data Center
10.3 Describe Security Controls & Management, Visitor Types and Access.
10.4 State the Data Center Maintenance Regimes.
10.5 Describe Data Center Maintenance Grades, Maintenance Scope, Budget, skillsets.
10.6 Describe Maintenance Contracts MTBF and TTR

PRACTICAL:

1. **Review to Identify the Network Devices & Accessories.**

1.1 Twisted Pair Cable, Co-axial cable and Fiber Optic Cable.
1.2 RJ-45, BNC Connectors, MT-RJ, LC, MTP/MPO, MU, SFF, SC and their constructional features.
1.3 Network Interface Cards, Cable Tester and Crimper, Modems, Hubs, Repeater, Switch & Router
1.4 Make a straight through cable, Cross over cable.
1.5 Make a Console cable and Patch cable.
1.6 Install Network Interface Card (NIC) into the PC and Laptops
1.7 Connect straight or cross cable among PCs or Switch and Test the connectivity among PCs using Ping Command.
1.8 Configure the TCP/IP in each PC, Laptops and Routers.

2. **Establish a Client–Server Local Area Network using** Linux Red Hat Server
3. Install Windows server (2012/2016) into a PC.
4. Configure TCP/IP to server and client PCs.
5. Perform the task to configure the Active Directory
6. Perform the task to configure the DNS, DHCP in Windows & Linux Server
7. Perform the task to configure File Server, Mail Server, Web Server and Proxy Server
8. Perform installation of Apps for Cloud Computing in PC's and Laptops.
9. Observe and fixed Raised Floor/Suspended Ceiling for Data Center.
   9.1. Uniform, concentrated and rolling load definitions
   9.2. Applicable standards
   9.3. Raised floor guidelines
   9.4. Signal Reference Grid, grounding of racks
   9.5. Disability act and regulations
   9.6. Suspended ceiling usage and requirement

10. Install and Check Power Infrastructure for Data Center

10.1. Power infrastructure layout from generation to rack level
10.2. ATS and STS systems
10.3. Redundancy levels and techniques
10.4. Three-phase and single-phase usage
10.5. Power distribution options within the computer room
10.6. Power cabling versus bus bar trunking
10.7. Bonding versus grounding
10.8. Common Mode Noise and isolation transformers
10.9. Distribution boards, form factors and IP-protection grades
10.10. Power quality guidelines
10.11. Real power versus apparent power, Generators
10.12. How to size and calculate load in the data center
10.13. Static and dynamic UPS systems, how they operate and energy efficiency option

11. Install and Setup Equipment Racks for Data Center

11.1 Rack standards, properties and selection criteria
11.2 Security considerations
11.3 Power rail/strip options

12. Setup Cooling Infrastructure for Data Center

12.1 Temperature and humidity recommendations
12.2 Cooling measurement units and conversion rates
12.3 Sensible and latent heat definitions
12.4 Differences between comfort and precision cooling
12.5 Overview of different air conditioner technologies
12.6 Raised floor versus non-raised floor cooling
12.7 Placement of air conditioner units and limitations to be observed
12.8 Supplemental cooling options

REFERENCE BOOKS

1. Data & Computer Communications, –by Willian Stallings
2. Computer Networks, - by Andrew S. Tanenbaum.
3. Data Center Essentials, - Certified Data Center Professional.
4. Learning Red hat Linux-By Bill Mc Carty.
5. Linux- By Kamaran Hossain
6. YouTube Link- https://www.youtube.com/watch?v=XZmGGAbHqa0
   https://www.youtube.com/watch?v=0uRR72b_qvc
   https://www.youtube.com/watch?v=q2pG0B9e4QA

Optional Subjects-I

(Automation System Group)

Optional Subjects-I
(Software Developer Group)

66667 *Webmasterting*

T	*P*	*C*
2	**3**	**3**

AIMS

- To be able to acquire the knowledge and skills on domain & domain registration.
- To be able to acquire the knowledge and skills on web hosting.
- To be able to published web site.
- To be able to admin Cpanel & dashboard.
- To be able to upload web contents.
- To be able to acquire the knowledge and skills on the integrity & security of a website.
- To be able to acquire the knowledge on cloud hosting & SEO.

SHORT DESCRIPTION

Webmastering, domain & domain registration, web hosting, feature ofhosting server, web publishing, administration cpanel, dashboard, cloud hosting, web maintenace & backup, SEO.

DETAIL DESCRIPTION

Theory:

1. **Understand the basic concept of webmastering.**
   - 1.1 Define webmastering.
   - 1.2 State the web mastering functions.
   - 1.3 State the job responsibilities of web master.
   - **1.4 State the skills become a good webmaster.**
   - 1.5 Monitor the webmaster tools.
2. **Understand the concepts of domain & domain registration.**
   - 2.1 Define domain & sub-domains.
   - 2.2 Describe domain registration process.
   - 2.3 State the functions of domain registration authotity.
   - 2.4 Describe the functions of BTCL & BTRC.
3. **Know the web hosting & hosting server.**
   - 3.1 Define web hosting.
   - 3.2 Describe the web hosting process.
   - 3.3 State the hosting server.
   - 3.4 State the web hosting company's activities.
   - 3.5 List the Bangladeshi web hosting company.
4. **Understand web publishing.**
   - 4.1 Define the Web publishing.

4.2 State the functions of web publishing media.
4.3 State web publisher's activities.
4.4 Describe the different way of web publishing.
4.5 Describe the functions of FTP server.

5. Understand the concept of Cpanel.
5.1 Define the Cpanel.
5.2 Describe Cpanel activities.
5.3 State the Cpanel components.
5.4 Explain the functions of Cpanel components.

6. Know the dashboard.
6.1 Define Dashboard.
6.2 Describe Dashboard fuctions.
6.3 State the Dashboard components.
6.4 Describe the functions of each dashboard components.

7. Understand the web content uploading & updating.
7.1 Classify web content.
7.2 Describe the different types of web contents.
7.3 Describe contentens uploading steps.

8. Understand the user management.
8.1 Define web user.
8.2 State different type of web user.
8.3 Describe the different user rights.

9. Understand the cloud hosting.
9.1 Define cloud hosting.
9.2 Describe the benifits of cloud hosting.
9.3 Monitor popular clould hosting platforms.

10. Understand the website routine maintenance.
10.1 State the functions of site promotion, sending out email, voicemail, newsletters, etc
10.2 State routine maintenance of a website.
10.3 State the web backup process.

11. Understand the web security.
11.1 Define site traffic.
11.2 State port forwarding.
11.3 State the differnt cyber attacks.
11.4 Explain the functions of firewall.

12. Understand the Marketing & SEO (SEARCH ENGINE OPTIMIZATION).
12.1 Study on marketing of websites on various platforms including other sites and search engines.
12.2 Define SEO on a website.
12.3 State a SEO friendly website
12.4 Describe the process of SEO on a website.

PRACTICAL:

1. Web site hosting activities.

1.1 Purchase a domain.
1.2 Register a domain.
1.3 Renew a registered domain.
1.4 Install & configure a web server on local computer.
1.5 Pusbish a web site on local computer for LAN.
1.6 Manage a online hosting server.
1.7 Pusbish a web site on online hosting server.

2. Works on database & contents management.

2.1 Create & manage a databse.
2.2 Publish a new article in existing web site.
2.3 Modify and update a published content.
2.4 Restrict access a article for specific users.

3. Manage Cpanel .

3.1 Create and manage email accounts.
3.2 Manage security settings.
3.3 Set up domains, subdomains, addon domains, parked domains and redirects.
3.4 Manage files, folders and monitor your disk space usage.
3.5 Access databases and track your website's performance.

4. Perform Dashboard management activities.

4.1 Manage existing dashboard components.
4.2 Add new a dashboad component.
4.3 Manage dashboard access control.

5. Manage user accounts.

5.1 Authorize a registered user.
5.2 Manage user access control.
5.3 Add/remove user.

6. Perform maintenace of a web site.

6.1 Perform a routine maintence of published website.
6.2 Perform whole website backup.
6.3 Perform automated website backup.
6.4 Practice on database backup.
6.5 Practice on problem identification & sloving procedures.

7. Manage Web security activities.

7.1 Perform on Cyber security.
7.2 Configure Firewall & port forwarding
7.3 Prevent Ddos attacks.

8. Perform SEO optimization for the site .

8.1 Plan for SEO.
8.2 Perform the activities for SEO of site.

REFERENCE BOOK:

1. Webmastering For Dummies- Daniel A. Tauber

REFERENCES WEB SITE:

1. http://www.btrc.gov.bd
2. https://www.eicra.com
3. https://cloud.google.com

Optional Subjects-I

(Multimedia Developer Group)