UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer Organization & Architecture
Course Code: MCA101
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course examines the basic organization of digital computer and discuss about all the components of it like memory, ALU, Input-Output devices etc. The Topics to be covered (tentatively) include:

- Necessity of digital computer
- Basic working principal of digital computer
- Processing of high level computer language at the hardware level
- Basic concept of microprocessor
- Basic design of ALU and control unit
- Various addressing modes and bus structure
- I/O subsystem
- Concept of pipeline
- Memory unit

Objectives:

The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
2. An ability to understand the functions of various hardware components and their building blocks
3. An ability to understand and appreciate Boolean algebraic expressions to digital design
4. An in depth understanding of sequential & Combinational circuits
5. An in depth understanding of realization of different combinational/sequential circuits
6. An in depth understanding of different stages of an instruction execution
7. An in depth understanding of how different hardware components are related and work in coordination
8. An ability to understand computer buses and input/output peripherals
9. An ability to understand memory hierarchy and design of primary memory

Course Contents:

Unit 1: Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. Commonly used number systems. Fixed and floating point representation of numbers.

Unit 2: Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. Design of ALU. Fixed point multiplication -Booth's algorithm. Fixed point division-Restoring and non-restoring algorithms. Floating point - IEEE 754 standard.

Unit 3: Memory unit design with special emphasis on implementation of CPU-memory interfacing. Memory organization, static and dynamic memory, memory hierarchy, associative memory.Cache memory, Virtual memory. Data path design for read/write access.

Unit 4: Design of control unit - hardwired and microprogrammed control. Introduction to instruction pipelining. Introduction to RISC architectures. RISC vs CISC architectures.
I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA.

Text Books

1. M. Morris Mano & Michael D. Ciletti (2013), Digital Design, 5th Edition, PHI.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky (2011), Computer Organization, 5th Edition, McGraw-Hill.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer P**rogramming** with C
Course Code: MCA102
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

Computers are so widely used in our day-to-day lives that imagining a life without them has become almost impossible. Learning computer fundamentals is a stepping stone to having an insight into how these machines work. Once the student is aware of the basic terminology that is commonly used in computer science, he/she can then go on to develop useful computer programs that may help solve a user's problem. Since computers cannot understand human languages, special programming languages are designed for this purpose. C is one such programming language. Being the most popular programming language, it is used in several different software platforms such as system software and application software. A few other programming languages such as C++ and JAVA are also based on C. Hence, mastering the C is prerequisite to become a successful computer engineer.

Objectives:
1. Learn how to solve common types of computing problems.
2. Learn data types and control structures of C
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs

Learning Outcomes:
Upon successful completion of the course, a student will be able to:
1. Appreciate and understand the working of a digital computer
2. Analyze a given problem and develop an algorithm to solve the problem
3. Improve upon a solution to a problem
4. Use the 'C' language constructs in the right way
5. Design, develop and test programs written in 'C'

Course Contents:
Unit 1: Introduction to Computers – Generations, Classifications, Applications, Basic Organization. Input and output devices. Basic concept of Computer memory, Computer software and networks.

Unit 2: Number system – Decimal, Binary, Octal, Hexa-decimal. Conversion of numbers, Addition and subtraction of two numbers. Two's compliment, Multiplication and division of binary numbers. Working with fractions, signed number representation in binary form, Logic gates.

Unit 3: Introduction to C – compiling and executing C programs, using comments, keywords, identifiers, Data type, variables, constants, input/output statements in C, operators in C, type conversion and type casting.

Unit 4: Decision Control and looping statements – conditional branching statement, iterative statements, nested loops, break and continue statements, goto statement.

Unit 5: Arrays – Declaration, accessing elements of array, storing values, calculating the length of array, two dimensional arrays. Strings – reading and writing strings, suppressing input, string taxonomy, string operations – using and without using library function, array of strings.

Unit 6: Functions – Declaration, prototype, definition, function call, return statement, passing parameters to the function, scope of variable, storage classes, recursive functions.

Unit 7: Pointers – introduction, declaration, Pointer expression and arithmetic, null pointer, generic pointer, passing arguments to functions using pointer, pointers and arrays, passing an array to function, difference between array name and pointer, pointers and strings, array of pointers, function pointers, pointers to pointers, dynamic memory allocation, drawbacks of pointers.

Unit 8: Structure, nested structure, array of structure, union, array of union variable, unions inside structure. Files – Reading –writing etc. Preprocessor directives.

Text Books

1. Brian Kernighan and Dennis Ritchie, The C Programming Language, 2nd Edition, Prentice Hall PTR, 1988.
2. Reema Thareja, Computer fundamentals and Programming in C, oxford university press, 2012.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of the Course: Business Systems & Applications
Course Code: MCA103
L-T Scheme: 3-1 **Course Credits: 4**

Introduction: Business system application, especially e-business systems, use computer and web-based technology to deliver existing business models or promote new ones. This module examines existing business systems, applications and environments, as well as emerging ones that support these business models and system management. The primary focus is on the various business systems, applications and management and understanding how an enterprise framework and integration of disparate application environments facilitate functioning of business and enable development of new models.

Objectives: The objective of this course is to develop in students an understanding of the concepts, skills and techniques required to become an effective systems analyst who will work with others to create information systems for businesses

Course Outcomes:

On successful completion of this module, students should be able to:

1. Fully understand how e-business systems can contribute to broader enterprise management issues

2. Comprehensively evaluate and critically analyze various business systems (including e-business systems), applications and management

3. Compare and evaluate alternative business application environments that enable business systems

4. Demonstrate a good understanding of architectural options for implementing and facilitating business systems and management

5. Research and evaluate interdependencies between business systems and the rest of the enterprise management environment

6. Critically analyze the impact of business systems and applications on enterprise performance and development of society.

7. Demonstrate interpersonal skills and the ability to work effectively with others to achieve common goals.

Course Contents:

UNIT-1: Use of computers for managerial applications, Technology issues and data processing in organisations, Introduction to Information Systems, shift in Information system thinking, latest trends in Information Technology.

UNIT-2: Computer Based Information Systems- office automation systems. Decision making and MIS, transaction processing systems.

UNIT-3: Decision support system, Group Decision Support, Executive Information systems, DSS generator.

UNIT-4: Introduction to: Artificial Intelligence Based Systems, End user computing, Distributed data processing.

UNIT-5: Deciding on IS architecture, IT leadership & IS strategic planning.

UNIT-6: Introduction to: IS strategy and effects of IT on competition.

UNIT-7: Introduction to: ERP, re-engineering work processes for IT applications, Business Process Redesign.

UNIT-8:Knowledge engineering and data warehouse.

Books:

1.Management Information System, O'Brien, TMH
2. Management Information System: A Concise Study,Kelkar,PHI

3.Decision support Systems, Janaki Raman, PHI

4 Business Information Systems, Munish Kumar, VIKAS

5.Business Application of Computers, M.M. Oka, EPH

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Discrete Mathematical Structure
Course Code: M101
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

Discrete mathematics is mathematics that deals with discrete objects. Discrete objects are those which are separated from (not connected to/distinct from) each other. Integers (aka whole numbers), rational numbers (ones that can be expressed as the quotient of two integers), automobiles, houses, people etc. are all discrete objects. On the other hand real numbers which include irrational as well as rational numbers are not discrete. As you know between any two different real numbers there is another real number different from either of them. So they are packed without any gaps and cannot be separated from their immediate neighbors. In that sense they are not discrete. In this course we will be concerned with objects such as integers, propositions, sets, relations and functions, which are all discrete. We are going to learn concepts associated with them, their properties, and relationships among them among others.

Objectives:

To introduce students to language and methods of the area of Discrete Mathematics. The focus of the module is on basic mathematical concepts in discrete mathematics and on applications of discrete mathematics in algortihms and data structures. To show students how discrete mathematics can be used in modern computer science (with the focus on algorithmic applications).

Learning Outcomes:
Knowledge:

1. Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
3. Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.
4. Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples.
5. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Application:

1. Introduction to combinatorics: counting techniques, pigeonhole principle, inclusion-exclusion.
2. Recurrence relations, solving recurrences using generating functions.
3. Master Theorem for solving recurrences.
4. Graphs. Basic graph algorithms. Trees. Applications of graphs.
5. Applications of linear algebra and matrix algebra in algorithms (e.g., in web searching).
6. Algorithmic applications of random processes and Markov chains, for example, cover time in graphs and card shuffling.
7. Partitions, enumerations with symmetries.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Course Contents:

Module I:

Introduction to Propositional Calculus: Propositions, Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Bi-conditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF; Predicates and Logical Quantifications of propositions and related examples.

Module II:

Theory of Numbers: Well Ordering Principle, Divisibility theory and properties of divisibility; Fundamental theorem of Arithmetic; Euclidean Algorithm for finding G.C.D and some basic properties of G.C.D with simple examples; Relation and Lattices: POSET, Hasse Diagram, Minimal , Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices.

Module III:

Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon- hole Principle, Principles of inclusion and exclusions; Recurrence relations: Formulation/Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method.

Module IV:

Graph Coloring: Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring.

Matchings: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems.

Text Books

1. Rosen:Discrete mathematics and application(7^{th}ed),McGraw Hill
2. Satyanarayana&shyam Prasad :discrete mathematics and graph theory,PHI

References

1. Kishorshinde: Discrete Structure, Everest publishing house
2. HariParihar&RituAgarwal, discrete mathematical structures, ashirwad

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Business English & Communication
Course Code: HU101
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course can enhance the drafting and understanding skills of engineering students.

Objectives:

1. This Course has been designed to impart advanced skills of Technical Communication in English through Language Lab. Practice Sessions to 1ST Semester UG students of Engineering &Technology.
2. To enable them to communicate confidently and competently in English Language in all spheres.

Learning Outcomes:

Knowledge:

1. This course will help the students to learn English very easily. Even the Hindi medium students can translates easily.
2. The technical communication will help the students to improve their speaking skills and drafting skill for engineering students.

Course Contents:

Unit 1: ENGLISH LANGUAGE GRAMMAR-Correction of Errors in Sentences Building Vocabulary Word formation Single Word for a group of Words Fill in the blanks using correct Words Sentence Structures and Transformation Active &Passive Voice Direct &Indirect Narration (MCQ Practice during classes).

Unit 2: READING COMPREHENSION-Strategies for Reading Comprehension Practicing Technical & Non Technical Texts for Global/Local/Inferential/Referential comprehension; Précis Writing

Unit 3: TECHNICAL COMMUNICATION-the Theory of Communication–Definition & Scope Barriers of Communication Different Communication Models Effective Communication (Verbal/Nonverbal) Presentation / Public Speaking Skills (MCQ Practice during classes)

Unit 4: MASTERING TECHNICAL COMMUNICATION- Technical Report (formal drafting) Business Letter (formal drafting) Job Application (formal drafting) Organizational

Unit 5: GROUP DISCUSSION–Principle & Practice

Text Books

1. Board of Editors: Contemporary Communicative English for Technical Communication Pearson Longman, 2010
2. Technical Communication Principle sand Practice by Meenakshi Raman, Sangeeta Sharma (Oxford Higher Education)
3. Effective Technical Communication by Barun K. Mitra (Oxford Higher Education).
4. P C WREN & H.MARTIN (English language & grammar)

References

1. D.Thakur: Syntax Bharati Bhawan, 1998
2. Longman Dictionary of Contemporary English (New Edition) for Advanced Learners
3. Internet

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Micro Programming & Architecture Lab
Course Code: MCA191
L-T-P Scheme: 0-0-3 **Course Credits: 2**

Objective:
To learn the fundamental aspects of computer architecture design and analysis. This lab course provides a comprehensive introduction to understand the underlying of VHDL (VHSIC Hardware Description Language) which is a hardware description language used to describe a logic circuit by function. In particular defined data flow, behaviour or structure. It can also be used as a general purpose parallel programming language i.e. commands, which correspond to logic gates, are executed (computed) in parallel, as soon as a new input arrives. The emphasis of the course will be placed on understanding HDL programming using xilinx to implement different type of circuit.

Learning Outcomes:
Students can understand the functions, structures and history of VHDL programming. Understand the data flow model, behaviaral model, structural model.

Course Contents:

Unit –I: Implement AND NOT ,OR Gate, Implement basic gates using data flow model Behavioral model and Structural model

Unit –II: Implement NAND, NOR ,XOR Gate, Implement Few gates using data flow model Behavioral model and Structural model. Individually find each and every gates out put.

Unit –III: Implement Half Adder and Full Adder, Write the code for the same circuit in different type like data flow, behavioral and structural method.

Unit –IV: Implement Half Subtractor and Full Subtractor, Write the code for the same circuit in different type like data flow, behavioral and structural method.

Unit –V: Implement Flip-Flop, S-R Flip Flop, J-K Flip Flop, D Flip Flop, T Flip Flop

Text Book:

1. “Essential of Computer Architecture”, Douglas E. Corner, Pearson

References:

1. “Computer Organization and Design” David A. Patterson, John L. Hennessy, Elsevier.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Programming Lab (C)
Course Code: MCA192
L-T-P scheme: 0-0-3 **Course Credit: 2**

Introduction:
This course is designed to familiarize students with the basic components of a computer, so as to be able to operate it and be able to interact with it, and carry out simple tasks. In addition, it will initiate the students into the discipline of Programming. It aims to start off the development of problem solving ability using computer programming. This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug. Students are introduced to the design principles for writing good programs regardless of the hardware and the software platforms.

Objective:
Students will develop their ability to design, develop, test and document structured programs in C language.

Learning Outcomes: Students should be able to
1. Understand the basic terminology used in computer programming
2. Write, compile and debug programs in C language.
3. Use different data types in a computer program.
4. Design programs involving decision structures, loops and functions.
5. Explain the difference between call by value and call by reference
6. Understand the dynamics of memory by the use of pointers.
7. Enhance programming skills through problem solving and code development of small-size software applications.
8. Improve self-learning, teamwork and communication skills through project development practices.
9. Engage in continuing professional development under minimal guidance.

Course Contents:
Exercises that must be done in this course are listed below:
1 Introduction to C programming
2 Structured Program Development in C
3 Flowchart and Algorithm
4 C Program Control
5 C Functions
6 C Arrays
7 C Pointers
8 C Characters and Strings
9 C Structures, Unions, Bit Manipulations and Enumerations

References
1. Yale N. Patt and Sanjay J. Patel, Introduction to Computing Systems, from bits & gates to C & beyond, 2nd Edition, 2004.
2. Deitel and Deitel, C How to Program, 7th Edition, 2013.
3. Venugopal Prasad, Mastering C, Tata McGraw Hill.
4. Complete Reference with C, Tata McGraw Hill.
5. Drmey, How to solve it by Computer, PHI.
6. Kerninghan and Ritchie, The C Programming Language.