First Semester:

Course Title: **Fundamentals of Computer**
Course Code: COM**411**
Semester: I
Class Load: **6** Hrs. per Week (Theory: 3 Hrs, **Practical: 3 Hrs**)
Evaluation:

External (60)+ Internal (20+20)

Course Objectives

This course introduces fundamental introduction of computer and fundamental concepts of computer science and Information technology.

Course Contents:

Unit 1. Introduction to Computer Systems **10 Hrs.**

Introduction to computers, Classification of digital computer systems, Anatomy of a digital Computer, Computer Architecture, Memory system, Memory Units, Auxiliary Storage devices, Inputs devices, Output Devices.

Unit 2. Computer Software and Software Development **6 Hrs.**

Introduction to Computer Software, Operating Systems, Programming Languages, General Software Features and Trends.

Unit 3. Database Management Systems **6 Hrs.**

Data processing, Introduction to Database Management systems, Database design

Unit 4. Telecommunications **8 Hrs.**

Introduction to Telecommunications, Computer Networks, Communication Systems, Distributed systems

Unit 5. Internet and New Technologies in Information Technology **10 Hrs.**

Internet, Multimedia tools and system, Intranets, Electronic Commerce, Hypermedia, Data Warehouses and Data Marts, Data Mining, Geographical Information System

Unit 6. Applications of Information Technology **5 Hrs.**

Computers in Business and Industry, Computers in education, training, Computers in Entertainment, science, medicine and Engineering

Laboratory works:

The main objective is to familiarize students with operating system and desktop applications using current version of windows.

Text Book:

Fundamentals of Information Technology, Alexis Leon, Mathews Leon, Leon TechWorld
Introduction to Computers, Peter Norton's, Tata McGraw-Hill
Foundations of IT, Atul Kahate, Tata McGraw hill

Course Title: **Programming in C**
Course Code: COM**41**2
Semester: I
Class Load: **6** Hrs. per Week (Theory: 3 Hrs, **Practical: 3 Hrs)**

Evaluation: External(60)+ Internal (20+ 20)

Course Objective:

The object of this course is to make the students familiar with the basic principles of programming and development of software systems. It encompasses the use of programming systems to achieve specified goals, identification of useful programming abstractions or paradigms, the development of formal models of programs, the formalization of programming language semantics, the specification of program, the verification of programs, etc.

Course Contents:

1. **Introduction** **(4 hrs)**
   History of computing and computers, Text editing and file concepts, Traditional and structured programming concept, Problems analysis, flow chart and algorithm, Program Documentation

1. **Variables and Data Types** **(3 hrs)**
   Constants and variables, Variable declaration, Variable Types, Simple input/output function, Operators

2. **Loops and Decisions** **(5 hrs)**
   Introduction, For Loop, While Loop, Do while Loop, Nested Loop, Case, break and continue statements, The if, if else, else-if and switch statements.

3. **Functions** **(6 hrs)**
   Introduction, Returning a value from a function, Sending a value to a function, Arguments, External variables, Preprocessor directives, C libraries, Macros, Header files and prototyping

4. **Arrays and Strings** **(9 hrs)**
   Introduction to Arrays, Initializing Arrays, Multidimensional Arrays, String, Functions related to the strings, Function related to Graphics

5. **Pointers** **(10 hrs)**

Pointers definition, Pointers and Arrays, Returning multiple values from functions, using pointers, Pointer Arithmetic, Pointer and Strings, Double Indirection, Pointer to Arrays

7. Structure and Unions
(5 hrs)

Definition of Structure, Nested type Structure, Arrays of Structure, Structure and Pointers, Unions

8. Files and File Handling
(3 hrs)

Operating a file in different modes (Real, Write, Append), Creating a file in different modes (Read, Write, Append)

Laboratory:

Laboratory work at an initial stage will emphasize on the verification of programming concepts learned in class and use of loops, functions, pointers, structures and unions. Final project of 10 credit hours will be assigned to the students which will help students to put together most of the programming concepts developed in earlier exercises.

Text Books:

1. A book on C by A.Kely and Ira Pohl
1. The C Programming Language by Kerighan, Brain and Dennis Ritchie

Course Title: **Physics**
Course Code: PHY**41**3
Semester: I
Class Load: **6** Hrs. per Week (Theory: 3Hrs, **Practical: 3 Hrs)**
Evaluation:

External(60) + Internal (20+20)

Course Objective:

The main objectives of this course is to make able:

1. To apply the theory of simple Harmonic motion in different elastic systems.
1. To apply theory of wave propagation and knowledge of resonance.
2. To apply and analyze the Optical properties in different optical systems.
3. To make use of fundamentals of electromagnetic equipment.
4. To use the knowledge of basic physics in computer science fields.

Course Contents:

1. Simple Harmonic Motion (3 hrs)

Equation of linear simple harmonic motion, Application of SHM in suspended spring mass system and simple pendulum, Angular simple harmonic motion and its application in Physical (Bar) pendulum, Energy consideration.

1. Waves in Elastic Media (3hrs)

Mechanical waves, Types of waves, Travelling waves, Wave speed, Power and intensity, Reflection, Refraction and interference, Standing waves, Resonance.

2. Sound Waves (4hrs)

Propagation and speed of sound wave, Displacement and pressure wave, Power and intensity, Reflection and refraction, velocity of sound from air column method, Beats, Doppler effect, Effect of high speed, Production and uses of ultrasound.

3. Geometrical Optics (3hrs)

Review of mirror and thin lens formula, Combination of lenses, Chromatic aberration, Cardinal points, Monochromatic aberration and its removal, Optical fibers.

4. Physical Optics

5.1 Interference (2 hrs)

Coherent sources, double slits, thin films, Newton's rings

5.2 Diffraction (2 hrs)

Fraunhoffer diffraction at single slit and double slit, diffraction grating.

5.3 Polarization **(4 hrs)**

Breuester's law, Malus law, Double refraction, NIcol prism, Plane, elliptical and circular polarization, Half wave plate, Full wave plate, Optical activity and polarimeter.

6. Electrostatics **(5hrs)**

Electric field, Gauss's Law, Electrical potential, E and V of dipole, Capacitance, Dielectrics and energy, Three electric vectors.

7. Electricity and Magnetism

7.1 Current Flow **(4 hrs)**

Current and current density, Resistance and resistivity, Ohm's law Energy, Combination of resistances, Kirchhoff's law network equation.

7.2 Magnetism **(5hrs)**

Magnetic field, Magnetic force on a current, Ampere's law, Force between parallel conductor, Biot& Savart's law, Faradays law of induction, Flux linkage, Lenz's law, Self induction, Inductance, LR circuit, Energy and Energy density in Magnetic field.

7.3 Magnetic Properties of Matter **(2 hrs)**

Poles, Dipoles, Paramagnetism, Diamagnetism, Ferromagnetism, and three magnetic vectors.

8. Electromagnetism **(8hrs)**

LC oscillation, Analog to SHM, Electromagnetic oscillation, Resonance, Displacement current, Maxwell's equation. Electromagnetic waves, Waves on transmission line, Waveguide, Travelling waves, Waves in free space.

Experiments:

1. To find out the refractive index of the liquid using convex lens by parallax method.

1. To find the refractive index of the liquid using convex lens by parallax method.
2. To determine the value of the acceleration due to gravity (in the lab) and radius of gyration using bar pendulum.
3. To find the refractive index of the material (of given prism) using a spectrometer.
4. To determine the pole strength of bar magnet by neutral point method keeping the magnet vertical.
5. To find the wavelength of sodium light by measuring the diameters of Newton's rings.

6. To determine the frequency of A.C. mains and compare the mass per unit length of two given wires.
7. To determine the wavelength of sodium light using a plane diffraction grating.

1. To determine the Velocity of Sound in air at room temperature with the first resonance air column and two tuning forks.
1. To determine the specific rotation of sugar solution using half-shade polarimeter.
2. To find the (low) resistance using Carry Foster Bridge.

Text Books:

1. David Halliday and Robert Resnik, Physics I &II , H.S. Poplai for Wiley Eastern Limited, New Delhi.
1. Subrahmanyam and BrijLal, *A Text Book of Optics*, S. Chand and Company Ltd., New Delhi.

Reference Books:

1. H.C. Verma, *Concepts of Physics*, Bharati Bhawan (P&D)
1. J.M. Pradhan and S.K. Gupta, *Text Book of Physics*, Surya Publication, India.
2. D.N. Vasudeva, *Fundamental of Magnetism and Electricity*, S Chand and Company Ltd, New Delhi.
3. David J, Griffiths, *Introduction to Electrodynamics*, Prentice Hall of India Ltd., New Delhi.

Course Title: **Basic Mathematics** I
Course Code: MAT**41**4
Year/Semester: I
Class Load: 6 Hrs. per Week (Theory: 3Hrs+ Tutorial 3Hrs)
Evaluation: External(60) +Internal (20+ 20)

Course Objectives

This module aims to provide the students with the basic mathematical skills required to IT and computing courses.

Detailed Course

Unit 1: Set Theory and Real Number System **5 Hrs**

Concept, notation and specification of sets, Types of sets, Relation between sets and their Venn diagrams, Operations on sets Laws of algebra of sets (without proof), Number of elements in a set and the problems relating up to three sets.Sets of numbers (Natural numbers, Integers, Rational lumbers, Irrational numbers, Real numbers), Representation of real numbers on the real line. Properties (addition multiplication, cancellation, distributive, order) of real numbers (without proof), Inequalities and their properties. Intervals, Modulus of a real number and its properties. *Numerical Exercises.*

Unit 2: Complex Numbers **5 Hrs**

Definition of a complex number, Integral powers of i, Algebra of complex numbers (sum. difference, multiplication, division), Properties of complex numbers, Conjugate of a complex number and its properties, Modulus of a complex number and Its properties, Representation of *a* complex number by a point in a plane (Argand's diagram), Polar representation of a complex number, Square roots of a complex number, DeMoivre's theorem (statement -only) and its application to find up to cube roots of a complex number. *Numerical* ***Exercises.***

Unit **3:** Functions, Limits and Continuity **5 hrs**

Constant and variable. Concept of functions, Types of functions. Graphic representation of algebraic, logarithmic and exponential functions, Computation of functional values, Domain and range of a function. Application of functions to business and economics.

Idea of a limit, Limit of a function at a particular point and at infinity, Properties of limits (without proof) and use in evaluating limits involving algebraic functions.

Concept of continuity and discontinuity, Test of continuity and discontinuity for simple algebraic function *Numerical Exercises*

Unit 4: Differentiation and its Application **5 Hrs**

Average rate of change, Definition of derivative, Derivative and slope of tangent to the curve. Differentiation by (the first principle of algebraic, logarithmic and exponential functions, Methods of differentiation (power rule, sum rule, product rule. quotient rule chain rule), Differentiation of implicit and parametric functions. Higher order derivatives (up to 3' order)

Unit 5: Integration and Its Application **7Hrs**

Concept of integration, Techniques of integration (Standard forms. Substitution method, Integration by parts), Integration of algebraic, logarithmic and exponential functions Definite integral, Methods of evaluating definite Integrals, Area under a curve, Application of integration in business and economics (including consumer's surplus and producers surplus). *Numerical Exercises*

Unit 6: **Differential Equations** **6 Hrs**

Introduction Differential equation. Ordinary differential equation, Order and degree of a' differential equation, Solution of a differential equation, General and particular solutions.

Equations of the first order and first degree

a) variables separated from

b) homogeneous equations

c) linear equations

Numerical Exercises *(without involving* ***trigonometric*** *functions)*

Unit 7: Vectors **5 Hrs**

Definition **of *a*** vector '.i a plane **and** space, Directed line segment, Magnitude of a vector, types of vectors, Multiplication of a vector by **a scalar.** Addition of vectors, Parallelogram law **of addition** of vectors, Collinear and coplanar vectors, **Linearity** dependent and independent **vectors. Scalar** product of two vectors, Orthogonal vectors. Vector product of two vectors, ***Numerical Exercises***

Unit 8:Matrices and **Determinants** **7 Hrs**

Introduction of matrices, Types of matrices, Equality of matrices, Algebra of matrices, Transpose of a matrix. Determinant of a matrix, Minors and cofactors of matrix, Properties of determinants (without proof) and some simple problems. Singular and non-singular matrix. Adjoint and inverse of matrices,

Solution of a system **of** non-homogeneous linear equations upto three variables (Cramer's rule, Inverse matrix method. Gaussian elimination method).

Text Books:

1. *Mathematics for Economics,* Taro Yamane, Prentice-Hall of India. New Delhi, *2nd* Edition (An Elementary Survey)
2. *Calculus with Analytic Geometry,* George B. Thomas and Ross L Finney, Addison - Wesley, 9th Edition
3. Basic *Mathematics* - B-C Bajracharya. M K Publishers, 2nd Edition (A text book for BBA / BIM).

Course Title: **Digital Logic**
Course Code: COM **41**5
Semester: I
Class Load: 6 Hrs. per Week (Theory: 3 Hrs**Practical: 3 Hrs**)
Evaluation: External(60)+ Internal (20 +20)

Course Objective:

The objective of this subject is to acquaint students with basics of Boolean algebra and familiarize the students with the fundamental building blocks of the digital domain Students will be able to design simple digital devices and implement them Laboratory work is essential in this module

Detailed Course

Unit 1: **Number system (3 hrs)**

a. Decimal system
b. Binary system
c. Hexadecimal system
d. Octal system
e. Conversion from one number system to another
f. Basic operations on the above bases
g. BCD codes, gray codes and alphanumeric codes

Unit 2:Introduction to digital techniques (3 hrs)

a. Analog and digital signals and systems
b. Advantages of digital electronics techniques
c. Application of digital signals
d. Conversion of analog signal to digital signal

Unit 3: **Digital Design fundamentals (6 hrs)**

a- logic gates, symbols, truth tables
b. Realization of logic gates using universal gates
G- Boolean algebra and their properties
d- Minimization techniques using Boolean algebra
S. Canonical forms
f. K-Maps and don't cares (K-Maps up to 4 variables only)
g. Reduction using K-Maps (SOP and POS)

Unit 4: **Combinational circuits (6 hrs)**

a. Designing a combinational logic for *a* specified behavior
b. Adders and Subtractors

c. Multiplexers and de multiplexer
d. Encoders and Decoders
e. Seven segment decoders
f. Code generators

Unit 5: **Sequential circuits (6 hrs)**

a. Difference between combinational and sequential circuits
b. Concept of clock and frequency
c. Latches as a 1- bit memory
d. Flip-flops, R-S flip-flops, J-K flip-flops, D flip-flops and T flip flops
e. Basic Flip-Flop applications

Unit 6:Counters (5 hrs)

a. Introduction to counters
b. Asynchronous counters
c. Synchronous counters
d. Up and down counters
e. Modulo counters
f. Using cascaded counters for counting larger modulus
g. Counter applications

Unit 7: Shift registers (5 hrs)

a. Introduction to shift registers
b. Serial and parallel shift registers
c. Loading and shifting
d. Left shift and right shift registers
e. Bidirectional shift registers
f. Rotating data in either direction
g. Shift register applications
h. Ring counters and Johnson counters

Unit 8: Sequential machine design (3 hrs)

a. Introduction
b. The use of clock in sequential machine design
c. Synchronous versus asynchronous design
d. State diagrams
e. Transition tables and redundant stales
f. Implementation using flip-flops with simple examples

Unit **9: Memories (2 hrs)**

a. Classification of memories
b. General storage method
c. Types of memories

i. RAM and ROM (no circuit details)

Unit 10: General programmable logic devices (2 hrs)

a. Introduction lo *various* programmable devices
   I. PLA
   ii. PAL
   iii. CPLD
   iv. FPGA

Unit 11: Logic families (2 hrs)

a. Overview of semiconductor technologies used for IC fabrication
b Basic idea of TTL, ECL, I^2L. PMOS.NMOS, CMOS and then comparison
c. Level of integration (SSI. MSI, LSI, VLSI, ULSI)

Unit 12: Miscellaneous topics (2 hrs)

a. Various digital displays
b. Clocks used in IC chips
c. Simple digital clock working principle

Text Books:

1. Floyd T. L and Jain R, P, *Digital Fundamentals,* eighth edition
2. Mano M.M, *Digital Design,* third edition
3. Mano M. M, Kime C, R ,*Logic and computer design fundamentals,* second edition