Purbanchal University

Bachelor in Information Technology (BIT)

Year: I **Semester: II**

S.N	Course Code	Course description	Credits	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Total (Hrs)
1	BIT102SH	Mathematics - II	3	3	2	-	5
2	BIT130EC	Electronics Devices & Circuits	3	3	1	2	6
3	BIT173CO	Digital Logic	3	3	1	2	6
4	BIT176CO	Object Oriented Programming in C++	3	3	1	2	6
5	BIT179CO	Project – II	2	-	-	4	4
6	BIT191MS	Financial management & Accounting	3	3	1	1	5
		Total	**17**	**15**	**6**	**11**	**32**

Mathematics - II

BIT303SH

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	2	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course Objective

The aim of this course is to expose students to theory of complex variables, differential equations, Laplace transform and Fourier series and integrals applied to signal processing.

Course contents

1. **Differential equation of the first order** **[8 Hrs]**
   - 1.1 Variable separable
   - 1.2 Exact differential equations
   - 1.3 Homogeneous equations
   - 1.4 Linear differential equation
   - 1.5 Simultaneous differential equations
   - 1.6 Equations of higher degree
   - 1.7 Some applications

2. **Linear differential equations** **[5 Hrs]**
   - 2.1 Homogeneous equation of second order
   - 2.2 Methods of determining particular integrals and application
   - 2.3 Vibrations of a particle (SHM)

3. **Laplace transforms** **[6 Hrs]**
   - 3.1 Definition
   - 3.2 Laplace transform of some elementary functions
   - 3.3 Properties of Laplace transforms
   - 3.4 Transforms of derivatives
   - 3.5 Definition of inverse Laplace transforms
   - 3.6 Properties of inverse transform
   - 3.7 Use of partial fractions
   - 3.8 Use of Laplace transforms in solving ordinary differential equations

4. **Fourier series and integrals** **[9 Hrs]**

4.1 Definitions and derivatives

4.2 Odd and even functions

4.3 Half range series

4.4 Change of scale

4.5 The Fourier integral and Fourier transforms

5. **Partial differential equations** **[8 Hrs]**

5.1 Basic concepts

5.2 Formation of P. D. equations

5.3 Solution of P. D. equations (simple cases)

5.4 The wave equation, Poisson's equation, Own dimensional heat flow & Laplace equation

6. **Functions of a complex variable** **[6 Hrs]**

6.1 Basic definitions

6.2 Functions of a complex variable

6.3 Limit, continuity and differentiation

6.4 Cauchy Riemann equations

6.5 Analytic functions

6.6 Harmonic functions

6.7 Complex exponential, trigonometric and hyperbolic function

7. **Complex series, residues and poles** **[3 Hrs]**

7.1 Taylor's theorem

7.2 Laurent's series

7.3 Zeros, singularities and poles

7.4 Residues

Reference books

- "*Engineering Mathematics*", Vol. II, S. S. Sastry, Prentice Hall of India
- Praleigh J. B., "*Calculus with Analytical Geometry*", Addison Wesley Pub, Co, Inc (1980)
- Bajpai A. C., Calus I. M. & Fairley J. A. "*Mathematics for Engineers & Scientists*", Vol-I. John Wiley & Son 91973)
- Goldstain I. J., Lay D. C. & Schinder D. I., "*Calculus and its Applications*", Prentice Hall Inc. (1977)
- Spiegel M. R., "*Theory & Problems of Advanced Calculus*", Scham Publishing Co.
- Srivastava R. S. L, "*Engineering Mathematics*", Vol.II, Tata McGraw Hill Publishing Co. (1980)
- Potter & Goldberg, "*Mathematical Methods*", Prentice Hall of India

Electronic Devices & Circuits

BIT130EC

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective

The main objectives of this course are to understand working principles and basics of semiconductor devices, the method for analysis of semiconductor devices and introduction to IC and operational amplifier.

Course contents

1. **Two port network** **[4 Hrs]**

   Tow port circuit and circuit parameters

   Forward and reverse transfer functions

   Voltage and current controlled sources

   Gain (current and voltage gains), input and output resistances calculation of two port network

2. **Semiconductor diode** **[10 Hrs]**

   Semiconductor materials – elemental and compound

   p-n junction diode – biasing of p-n junction diode (no bias, forward bias, reverse bias)

   The V-I characteristics

   Zener diode and its characteristics

   Zener and avalanche breakdowns

   Applications of diode as half wave rectifier and full wave rectifier

   Clipping and claming circuits

3. **Bi-polar junction transistor (BJT)** **[5 Hrs]**

   Construction of a BJT

   CB, CE and CC configurations

   Input and output characteristics

   α's, β's and their relationships

4. **BJT biasing** **[6 Hrs]**

   Introduction, need, types of biasing

   Designing BJT as an amplifier in CE configuration with voltage divider bias

5. **The junction field effect transistor (JFET)** **[4 Hrs]**

   Construction and types
   The pinch-off voltage and its importance
   Biasing and load line
   V-I characteristics
   Configuration of JFET

6. **The metal oxide semiconductors FET** **[3 Hrs]**

   Construction and types
   Load line and biasing
   V-I characteristics

7. **Feedback and oscillator circuits** **[6 Hrs]**

   Feedback concepts, practical feedback circuits
   Feedback amplifier – phase and frequency consideration
   Oscillator principle
   Wein-bridge oscillator
   Crystal oscillator circuits

8. **Operational amplifier** **[7 Hrs]**

   Introduction
   Properties of an ideal OPAMP
   Applications of OPAMP: Adder, Sub-tractor, Comparator, Inverter, Integrator, Differentiator

Laboratory

- Familiarization with electronics components
- Characteristics of diode, zener diode
- Input and output characteristics of CB, CE and CC configurations
- Input and output characteristics of JFET
- Input and output characteristics of nMOS
- Input and output characteristics of CMOS
- Inverting and non-inverting OPAMP
- Integrator and differentiator design using OPAMP
- Design of comparator using OPAMP

Reference books

- R. Boylested & L. Nashelesky, “Electronics Devices & Circuit Theory”, 4th edition, Prentice Hall of India
- A. S. Sedra & K. C. Smith, “Microelectronic Circuits, 6th edition, Oxford University Press
- Theoderre S. Bogart, “Electronic Device & Circuits”
- Milliman & Halkais, “Electronic Device & Circuit”, McGraw Hill

Object Oriented Programming in C++

BIT176CO

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	1	2	20	50	80	-	150

Course Objective

The objective of this course is to introduce students to the programming methodology using the C++ language. This module should be associated with laboratory experiments to augment the concepts taught in the class.

Course contents

1. **Introduction to object oriented programming** **[2 Hrs]**
   - 1.1 Procedural language vs OOP
   - 1.2 Characteristics of object-oriented languages
   - 1.2.1 Objects
   - 1.2.2 Classes
   - 1.2.3 Inheritance
   - 1.2.4 Reusability
   - 1.2.5 Polymorphism & overloading
   - 1.3 Applications of OOP

2. **C++ programming concept** **[3 hrs]**
   - 2.1 Introduction to programming in C++
   - 2.2 Extraction operator (>>)
   - 2.3 Insertion operator (<<)
   - 2.4 Type conversion: automatic conversion, cast
   - 2.5 Arrays and pointers in C++
   - 2.6 New and delete operators
   - 2.7 Manipulators
   - 2.8 Const
   - 2.9 Enumeration

3. **Functions used in C++** **[4 Hrs]**
   - 3.1 Introduction to functions
   - 3.2 Passing arguments to functions
   - 3.3 Returning values from functions

3.4 Reference arguments

3.5 Returning by reference

3.6 Functions overloading: different number of arguments, different kinds of arguments

3.7 Default arguments

3.8 Inline functions

4. **Classes and objects** **[6 Hrs]**

4.1 Introduction

4.2 Access specifier (public, private and protected)

4.3 Accessing class members

4.4 Defining member functions

4.4.1 Member function inside the class body

4.4.2 Member function outside the class body

4.5 “this” pointer

4.6 Constructor & destructor

4.6.1 Types of constructor

4.6.1.1 Default constructor

4.6.1.2 Parameterized constructor

4.6.1.3 Copy constructor

4.6.2 Overloaded constructors

4.7 Static data member

4.8 Static member functions

4.9 Passing objects as arguments

4.10 Friend functions & friend classes

5. **Operator overloading** **[6 Hrs]**

5.1 Introduction to operator overloading

5.2 General rules for overloading operator

5.3 Operator overloading restrictions

5.4 Overloading unary and binary operators

5.5 Operator overloading using friend functions

5.6 Data conversion

5.6.1 Conversion between basic types and object

5.6.2 Conversion between object and basic types

5.6.3 Conversion between objects of different classes

6. **Inheritance** **[6 Hrs]**

6.1 Introduction & benefits of inheritance

6.2 Types of inheritance

6.3 Inheritance: base classes & derived classes

6.4 Using constructors and destructors in derived classes

6.5 Abstract base class

6.6 Public, private and protected inheritance

6.7 Ambiguity in multiple inheritance

6.8 Containership

7. **Virtual functions and polymorphism** **[5 Hrs]**

7.1 Introduction

7.2 Early vs late binding

7.3 Virtual functions

7.4 Pure virtual functions and abstract classes

7.5 Virtual base classes

8. **File handling** **[6 Hrs]**

8.1 Introduction

8.2 Opening and closing file

8.2.1 Opening file using constructor

8.2.2 Opening file using open () and open() file modes

8.3 Basic functions of seekg(), seekp(), tellg(), tellp()

8.4 Sequential input/output operations

8.4.1 put() and get() functions

8.4.2 write() and read () functions

8.5 Reading and writing a class objects

9. **Templates** **[3 Hrs]**

9.1 Introduction to templates

9.2 Function templates

9.3 Class templates

10. **Namespaces** **[2 Hrs]**

10.1 Using namespace

10.1.1 Using the scope resolution operator

10.1.2 Through “using” keyword

11. **Exception handling** **[2 Hrs]**

11.1 Introduction to exceptions

11.2 Exception handling model

11.3 Exception handling construct: try, catch, throw

Reference books

- Robert Lafore, “Object-Oriented Programming in C++, Galgotia, Publication, India
- E. Dalagurusamy, “Object Oriented Programming with C++, McGraw Hill 4/e
- Deitel & Deitel, “C++ How to Program”, 3/e Prentice Hall
- Yashavant Kanetkar, “Let Us C++”, BPB Publication, New Delhi

Financial Management and Accounting

BIT191MS

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	1	1	20	50	80	-	150

Course Objective

The basic objective of this course is to familiarize the students with the fundamentals of financial management and accounting so as to enable them to understand the financial decision making process and the need and use of accounting information in the process, and to develop an understanding of the financial and accounting aspects of information technology.

Course contents

1. **Nature of financial management** **[3 Hrs]**
   Meaning and importance objectives-profit vs wealth maximization, functions, financial management in new millennium-globalization of business and information technology

2. **Time value of money** **[3 Hrs]**
   Concept, present values and future values

3. **Capital budgeting** **[4 Hrs]**
   Importance, generating ideas for capital projects, projects classifications, capital budgeting decision rules-payback period, NPV and IRR, comparison of NPV and IRR

4. **Working capital** **[5 Hrs]**
   Concept of working capital, cash management, receivables management inventory management, financing working capital

5. **Capital structure** **[4 Hrs]**
   Meaning of capital structure, optimum capital structure, business and financial risks, determining optimum structure, factors affecting capital structure policies

6. **Dividends** **[4 hrs]**
   Dividends and retained earnings, optimum dividend policy, factor affecting dividend policies, types of dividend policy, other forms of dividend stock dividends-stock dividends, stock splits, stock repurchase

7. **Nature of accounting** **[4 Hrs]**

   Meaning, importance, basic accounting concepts, principles and standards: double entry system of accounting, rules of double-entry-equation rule and types of account rule

8. **Accounting process** **[5 Hrs]**

   Journalizing and subdivision of journal, ledger posting, preparation of trial balance

9. **Financial statement** **[5 Hrs]**

   Meaning types- income statement, B/S, preparation of financial statements

10. **Financial analysis** **[4 Hrs]**

    Meaning, types, ratio analysis, uses and limitation of ratio analysis

11. **Cash flow statement – direct method** **[4 Hrs]**

Laboratory

Emphasis should be on using accounting package (e.g. Tally, Facts etc) to prepare final accounts of any organization.

Reference books

- Eugene F. Brigham & Joel F. Houston, "*Fundamentals of Financial Management*", Harcourt Asia Pte, Singapore, Indian Edition, 2001.
- T. S. Gerewal, "*Introduction to Accounting*", S. Chand & Co, New Delhi.
- Lawrence J Gitman, "*Principles of Managerial Finance*", Addison Wesley Longman (Singapore) Pvt. Ltd, Indian Reprint, 2001.
- Surendra Pradhan, "*Basics of Financial Management*", Educational Enterprises, Kathmandu

Digital Logic

BIT173CO

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective

To provide the concepts used in the design and analysis of digital systems and introduces the principles of digital computer organization and design.

Course contents

1. **Number systems** **[5 hrs]**

   Introduction

   Comparison between analog and digital system

   Number system and conversion, signed and unsigned numbers, fraction conversion

   Binary coded decimal, gray code, alphanumeric code and error codes

2. **Boolean algebra and logic gates** **[6 Hrs]**

   Introduction to Boolean algebra

   Basic theory and properties of Boolean algebra

   Boolean functions

   Logical operations

   Logic function and gates

   IC digital logic families

3. **Simplification of Boolean functions** **[6 hrs]**

   K-Map

   Two and three variable maps

   Four variable maps

   Product of sums, sum of product simplification

   NAND and NOR implementation

4. **Combinational logic** **[8 Hrs]**

   Design procedure

   Adders

   Substractors

   Code conversion

Analysis procedure

Multilevel NAND circuits
Multilevel NOR circuits

5. **Combinational logic with MSI and LSI** **[8 Hrs]**
   Binary parallel adder

   Decimal adder

   Magnitude comparator

   Decoders

   Multiplexers

   Read only memory

   Programmable logic array (PLA)

6. **Sequential logic** **[6 Hrs]**
   Difference between sequential and combinational circuit

   Concept of memory, flip-flop as 1-bit register

   RS, JK, T, D and master slave flip flops

   Design procedure

   Design with state equation and state reduction table

Laboratory

- Familiarization with logic gates
- De Morgan's law
- Multiplexer and de-multiplexer
- Encoder and decoder
- Half adder and half subtractor
- Full adder and full subtractor
- RS, JK, TD and master slave flip flops
- Shift registers
- Ripple counters and synchronous counters
- Simulation using suitable software

Reference book

- Floyd T. L & Jain R. P, "*Digital Fundamentals*", 8th edition
- Morris Mano, "*Logic & Computer Design Fundamentals*", Pearson education
- William I, Fletcher, "*An Engineering Approach to Digital Design*", Prentice Hall of India, New Delhi, 1990
- A.P. Malvino & Jerald A. Brown, "*Digital Computer Electronics*", 1995
- D. D. Hodegs & H.G. Jackson, "*Analysis & Design of Digital Integrated Circuits*", McGraw Hill, New York, 1983

Project - II

BIT179CO

Year I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
-	-	4	Theory	Practical	Theory	Practical	100
			-	60	-	40	

Course Objective

To design and complete the software project in an object oriented language. On the completion of the project, student will be able to develop small scale software in C++ programming language.

Course contents

There should be a total of 60 hours covering important features of object oriented programming. A software development project will be assigned to students in a group (up to 4). A relevant topic shall be identified and instructed to each group. Students must develop the assigned software, submit written report and give oral presentation.

General procedure

- Topic selection
- Information gathering
- System requirements and specifications
- Algorithms and flowcharts
- Coding
- Implementation
- Documentation

The project document shall include the following:

- Technical description of the project
- System aspect of the project
- Project tasks and time schedule
- Project team members
- Project supervisor
- Implementation of the project