Purbanchal University

Bachelor in Information Technology (BIT)

Year: II **Semester: IV**

S.N	Course Code	Course description	Credits	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Total (Hrs)
1	BIT231EC	Communication System	3	3	1	2	6
2	BIT271CO	Computer Organization	3	3	1	-	4
3	BIT274CO	Web Technology-I	3	3	-	3	6
4	BIT276CO	Database Management System	3	3	1	2	6
5	BIT279CO	Project – IV	2	-	-	3	3
6	BIT281CO	Discrete Mathematics	3	3	1	-	4
7	BIT292MS	Marketing Management	2	2	1	-	3
		Total	**19**	**17**	**5**	**10**	**32**

Communication System

BIT231EC

Year: II **Semester: IV**

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 familiarize students of information technology with the basic principles of electronic communication.

Course contents

1. **Signals and systems** **[6 Hrs]**
   - 1.1 Definition, types and properties of signals used in communication systems
   - 1.2 Definition and block diagram of general communication system
   - 1.3 Basics of Fourier series and Fourier transform
   - 1.4 Noise and its effect on communication system

2. **Continuous wave linear modulation** **[8 Hrs]**
   - 2.1 Need for modulation
   - 2.2 Time domain expression, spectral representation, power, transmission bandwidth of DSB-AM, DSB-SC, SSB and VSB
   - 2.3 Generation method of DSB-AM, DSB-SC, SSB and VSB
   - 2.4 Demodulation of AM signals: square law, envelop and synchronous detectors
   - 2.5 Introduction of phase locked loop (PLL)
   - 2.6 Introduction to stereo FM
   - 2.7 The super-heterodyne receiver for standard AM radio

3. **Non-linear modulation** **[7 Hrs]**
   - 3.1 Definition, time domain representation and transmission bandwidth of single tone modulated FM and PM
   - 3.2 Transmission bandwidth for FM, Carlson's rule, narrow-band and wide-band FM
   - 3.3 Generation methods of FM: direct method and Armstrong method
   - 3.4 Demodulation of FM: limiter-discriminator method and PLL
   - 3.5 Introduction to stereo FM transmission and reception

4. **Introduction to digital communication system (DCS)** **[8 Hrs]**

4.1 Basic block diagram of digital communication system, advantages and disadvantages of analog communication system

4.2 Nyquist sampling theorem, sampling of band limited analog signals, spectrum of sampled signals, aliasing effect, reconstruction of original analog signal

4.3 Sampling theorem for band-pass signals

4.4 Pulse amplitude modulation (PAM), bandwidth requirement and reconstruction method

4.5 Pulse code modulation (PCM): sampling, quantization and encoding

4.6 Quantization noise in PCM

5. **Baseband digital communication system** **[4 Hrs]**

5.1 Introduction to information theory, definition of information, entropy, signaling rate and information rate

5.2 Shannon's channel capacity theorem: implications and limitations

5.3 Concept of baseband (BB) digital communication system

5.4 Inter symbol interference (ISI), zero conditions for ISI

6. **Modulated digital data communication system** **[4 Hrs]**

6.1 Line coding schemes: NRZ, RZ, Manchester and AMI

6.2 Digital carrier systems: ASK, FSK, PSK and DPSK

6.3 M-ary data communication system: QPSK

7. **Multiplexing systems** **[2 Hrs]**

7.1 Introduction to multiplexing

7.2 Basic principles of FDM and TDM

8. **Introduction to various communication systems** **[6 Hrs]**

8.1 Satellite communication system: block diagram and working principle

8.2 Terrestrial microwave links

8.3 Optical fiber links: block diagram, advantages and disadvantages

8.4 Cellular mobile communication: GSM system architecture and features

8.5 Communication systems in Nepal: past and present

Laboratory

There shall be 8 experiments related to basic principles of communication systems as decided by the course instructor.

Reference books

- S. Haykin, "*An Introduction to Analog & Digital Communication*".

- Leon W. Couch II, "*Modern Digital & Analog Communication Systems*", Pearson education Asia
- B. P. Lathi, "*Modern Digital & Analog Communication Systems*", Oxford University Press.
- J. Proakis & M. Salehi, "*Communication Systems Engineering*", Prentice Hall, New Jersey
- D. Roddy & J. Coolen, "*Electronic Communications*", PHI
- A. Sharma & R. Sinha, "*Modern Electronic Communication*", DRPC, New Delhi

Computer Organization

BIT271CO

Year: II **Semester: IV**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course Objective

The main objective of this course is to provide the concepts of computer architecture as well as computer organization and design.

Course contents

1. **Introduction** **[2 Hrs]**
   - 1.1 Introduction to computer architecture
   - 1.2 Design principles for modern computers

2. **Computer organization and design** **[6 Hrs]**
   - 2.1 Instruction code
   - 2.2 Computer registers
   - 2.3 Computer instruction
   - 2.4 Timing and control
   - 2.5 Instruction cycle
   - 2.6 Memory reference instructions
   - 2.7 Input and output interrupt

3. **Control unit design** **[4 Hrs]**
   - 3.1 Microprogrammed control (control memory, address sequencing)
   - 3.2 Hardwired control

4. **Central processing unit** **[6 Hrs]**
   - 4.1 Instruction formats
   - 4.2 Addressing modes
   - 4.3 Data transfer and manipulation
   - 4.4 Program control
   - 4.5 RISC and CISC

5. **Pipeline and vector processing** **[6 Hrs]**
   - 5.1 Parallel processing
   - 5.2 Pipelining
   - 5.3 Arithmetic and instruction pipeline

5.4 RISC pipeline

5.5 Vector processing

5.6 Array processing

6. **Computer arithmetic** **[6 Hrs]**

6.1 Data types

6.2 Fixed-point operations

6.3 Floating-point operations

6.4 Addition and subtraction algorithms

6.5 Multiplication and division algorithms

7. **Input and output organization** **[6 Hrs]**

7.1 Peripheral devices

7.2 Input-output interfaces

7.3 Modes of transfer

7.4 Interrupt

7.5 Direct memory access

7.6 Input-output processor

8. **Memory organization** **[6 Hrs]**

8.1 Memory hierarchy

8.2 Main memory

8.3 Auxiliary memory

8.4 Cache memory

8.5 Virtual memory

8.6 Memory management hardware

9. **Multiprocessor** **[3 Hrs]**

9.1 Characteristics of multiprocessors

9.2 Interconnection structures

9.3 Cache coherence

Reference books

- M. Morris Mano, "*Computer System Architecture*".
- William Stalling, "*Computer Organization & Architecture*".
- M. Morris Mano, "*Digital Logic & Computer Design*".
- David A. Paterson & John L. Hennessy, "*Computer Organization & Design*".
- Vicent P. Heuring & Harry F. Jordan, "*Computer Systems Design & Architecture*".
- Andrew S. Tanenbaum, "*Structured Computer Organization*".
- John P. Hayes, "*Computer Architecture & Organization*".

Web Technology – I

BIT274CO

Year: II **Semester: IV**

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

Course Objective

After finishing this subject, students will be able to develop web pages using HTML and JavaScript.

Course contents

1. **Introduction to web technology** **[5 Hrs]**
   - 1.1 Web basics: web browsers, web servers, Tier technology, static and dynamic web page
   - 1.2 Web protocols: HTTP, HTTPs, FTP
   - 1.3 Introduction to free and open source software
     - 1.3.1 Characteristics, advantages and disadvantages free software, open source software and proprietary software
     - 1.3.2 Difference between free software, open source software and proprietary software
     - 1.3.3 Licensing and its types: commercial license and open source license

2. **HTML, XHTML and HTML5** **[15 Hrs]**
   - 2.1 Introduction
   - 2.2 Document metadata
   - 2.3 Basic structure of HTML
   - 2.4 Sections
   - 2.5 Grouping content
   - 2.6 Text-level semantics
   - 2.7 Embedded content
   - 2.8 Tabular data
   - 2.9 Forms
   - 2.10 Interactive elements
   - 2.11 List
   - 2.12 Links
   - 2.13 Images
   - 2.14 Frames

3. **Page designing with CSS** **[10 Hrs]**

3.1 Introduction to designing approaches

3.1.1 Table based designs

3.1.2 Table-less designs

3.2 Cascading style sheet and its properties

3.2.1 Introduction

3.2.2 CSS vs CSS3

3.2.3 CSS properties – text and fonts, color and backgrounds, the box model (dimensions, padding, margin and borders), positioning and display, lists, tables. Media

3.2.4 Converting image design to HTML (slicing)

4. **Client-side scripting** **[15 Hrs]**

4.1 Introduction

4.2 JavaScript

4.2.1 Lexical structure

4.2.2 Variables, identifiers, data types and values, scope, literals, reserved words

4.2.3 Expression and operators, statements

4.2.4 Arrays, objects (math, string, date)

4.2.5 Functions

4.2.6 Regular expression

4.2.7 Garbage collection

4.3 Objects

4.3.1 Objects and properties

4.3.2 Constructors

4.3.3 Prototype and inheritance

4.3.4 Object as an associative array

4.4 DOM and event handling

4.5 Introduction to JSON, jQuery, jQuery integration

4.6 Saving state with cookies

Laboratories

These shall be flowing lab exercises covering all features of above chapters.

Lab 1- web basic: introduction to web browsers, static and dynamic web pages, web protocols

Lab 2- HTML structure, Meta data and formatting tags

Lab 3- section and grouping

Lab 4- text-level semantics, embedded content

Lab 5- embedded content (contd…..)

Lab 6- table and forms

Lab 7- interactive elements, lists and links

Lab 8- table based design and table less design

Lab 9- CSS properties

Lab 10- converting image design to HTML (slicing)

Lab 11- introduction to JavaScript-lexical structure, variables, identifiers, data types and values, scope, literals, reserved words, expression and operators, statements

Lab 12- arrays, objects (math, string, date)

Lab 13- functions, regular expression

Lab 14- events handling, DOM, form validation

Lab 15- form validation (contd….), cookies

Reference books

- "*Open Sources: Voices from the Open Source Revolution*", Chris DiBona, Sam Ockman, Mark Stone
- "*Perspective on Free & Open Source Software*", Joseph Feller, Brian Fitzgerald, Scott A. Hissam & Karim R. Lakhani, MIT press
- "*Open Sources: Voices from the Open Source Revolution*", Chris DiBona, Sam Ockman, O'Rielly Media
- "*Murach's HTML5 & CSS3*", Zak Ruvalcaba & Anne Boehm
- "*JavaScript: The Definitive Guide*", 6th edition, David Flanagan, O' Reilly Media
- "*Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript & Web Graphics*", Jennifer Niederst Robbins, O'Rielly
- "*HTML5 Programming with JavaScript*", John Paul Mueller, Wiley
- "*HTML5 & CSS3 for the Real World*", Estelle Weyl, Louis Lazaris, Alexis Goldstein, Sitepoint

Database Management System

BIT276CO

Year: II **Semester: IV**

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 basic objective of this course is to make them familiar at using SQL and help them design database systems.

Course contents

1. **Introduction** **[3 Hrs]**
   - 1.1 Definition of database, database system, and database management system (DBMS)
   - 1.2 Characteristics of database approach
   - 1.3 Advantages of DBMS
   - 1.4 Classification of DBMS

2. **Database systems concept and architecture** **[8 Hrs]**
   - 2.1 Data models
   - 2.2 Schemas and instances
   - 2.3 DBMS architecture and data independence
   - 2.4 Database language and interfaces
   - 2.5 Database users and functions of DBA
   - 2.6 ER modeling
   - 2.7 Entity types
   - 2.8 Attributes, keys and relationship

3. **Relational model** **[8 Hrs]**
   - 3.1 Introduction to relational databases
   - 3.2 Relational algebra
   - 3.3 Relational calculus (domain relational calculus, tuple relational calculus)

4. **SQL** **[8 Hrs]**
   - 4.1 Introduction to SQL
   - 4.2 Set operations
   - 4.3 Null values

4.4 DDL, DML, DCL, TCL

4.5 Nested queries

4.6 Introduction to PL-SQL, procedures and functions

5. **Integrity constraints** **[3 Hrs]**

5.1 Entity integrity constraints

5.2 Domain integrity constraints

5.3 Referential integrity constraints

5.4 Triggers and assertions

6. **Normalization** **[7 Hrs]**

6.1 Pitfalls of relational model

6.2 Functional dependencies

6.3 Introduction to database normalization (1NF, 2NF, 3NF and BCNF)

6.4 Introduction to multi-valued dependency (MVD) and 4NF

6.5 Introduction to join dependency and 5NF

7. **Database security** **[2 Hrs]**

7.1 Concept and needs of database security

7.2 Access control: discretionary access control and mandatory access control

7.3 Encryption and decryption

8. **Database transaction and concurrency control** **[6 Hrs]**

8.1 Transaction and its properties

8.2 Methods of transactions execution

8.3 Serializability

8.4 Needs of concurrency control

8.5 Methods of concurrency control

8.6 Introduction to deadlock handling

Laboratories

There shall be lab exercise using SQL covering all topics from chapter 4 and 5.

Reference books

- "*Database System Concept*", Silberschatz et. Al., McGraw Hill
- "*An Introduction to Database System*", C. J. Date, Addison Wesley
- "*Fundamentals of database Systems*", Ramez Elmasri, Shamkant B. Navathe

Project - IV

BIT279CO

Year: II **Semester: IV**

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

Course Objective

After finishing this project, students will be able to develop database application using any RDBMS tool.

Course contents

A total of 45 lab hours covering all features of RDBMS will be assigned to every student. Every group of students (up to 3) will be assigned a project work related to developing application software using any RDBMS tool. Students must develop the assigned software, submit written report and give oral presentation.

Project evaluation criteria

The practical marks allotted for the project should be evaluated based on the following criteria.

- Title presentation – 10 marks
- Mid-term presentation – 15 marks
- Pre-final submission and presentation – 35 marks

- Project can be initiated by the project teacher or proposal can be invited by the students.
- Individual student will be assigned a project-work related to database application.
- The student should make the project, which should have practical significance and should spend three hours per week in the laboratory for 15 weeks.

Marketing Management

BIT292MS

Year: II **Semester: IV**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course Objective

The main objective of this course is to enable students to learn and apply the fundamental concepts and practices of marketing and to help them to achieve a good understanding of prevailing marketing techniques.

Course contents

1. **Marketing perspective** **[3 Hrs]**
   - 1.1 Definition of marketing
   - 1.2 The core concepts of marketing management
   - 1.3 Marketing philosophies: production concept, product concept, selling concept, marketing concept and societal marketing concept

2. **The marketing environment** **[3 Hrs]**
   - 2.1 The company's microenvironment: suppliers, marketing intermediaries, customers, competition
   - 2.2 The company's macro environment: demographic, economic, natural, technological, political and cultural environment

3. **Consumers markets and consumer buyer behavior** **[6 Hrs]**
   - 3.1 Model of consumer behavior
   - 3.2 Characteristics affecting consumer behavior
   - 3.3 Types of buying decision behavior
   - 3.4 Buyer decision process
   - 3.5 Business markets and their characteristics
   - 3.6 Business buyer behavior
   - 3.7 Business buying process
   - 3.8 Institution and government markets

4. **Market segmentation, targeting and positioning** **[5 Hrs]**

4.1 market segmentation: levels of market segmentation, basis for segmenting markets, requirements for effective segmentation

4.2 Market targeting

4.3 Positioning

4.4 Marketing mix: concept of 4Ps and 4Cs

5. **Product and services strategy** **[6 Hrs]**

5.1 Definition of a product

5.2 Levels of product

5.3 Product classification: consumer products and industrial products

5.4 Individual product decisions, product line decision and product mix decisions

5.5 Product life cycle strategies

5.6 Services marketing: nature and characteristics of a service

6. **Pricing decisions** **[6 Hrs]**

6.1 Factors to be considered while setting prices: internal and external factors

6.2 General pricing approaches: cost-based pricing, value-based pricing, competition based pricing

6.3 Pricing strategies: new product pricing strategies (market skimming pricing, market penetration pricing), product mix pricing, price adjustment strategies

7. **Distribution channels and logistics management** **[4 Hrs]**

7.1 The nature of distribution channels

7.2 Functions of distribution channel

7.3 Number of channel levels

7.4 Channel behavior and organization

7.5 Channel management decisions

8. **Integrated marketing communication strategy** **[8 Hrs]**

8.1 marketing communication (promotion) mix

8.1.1 Advertising: nature of advertising, major decision in advertising

8.1.2 Sales promotion: nature and purpose of sales promotion, major decisions in sales promotion

8.1.3 Public relations: major public relations tools, major public relations decisions

8.1.4 Personal selling: nature of personal selling, principles of personal selling

8.1.5 Direct and online marketing: the nature of direct marketing, benefits of direct marketing, customers database and direct marketing, forms of direct marketing communication, online marketing and e-commerce

8.2 Individual online presentation

9. **E-business marketing and marketing in the 21st century [4 Hrs]**

   Paper development and presentation on "E-business marketing and marketing in the 21st century". The paper should contain not less than 2000 to 3000 words in suitable format.

Reference books

- Philip Kotler & Gray Armstrong, "*Principles of Marketing*", Prentice Hall of India
- William J. Stanton, Michael J. Etzel & Bruce J. Walker, "*Fundamentals of Marketing*", McGraw Hill, Inc. USA

Discrete Mathematics

BIT281CO

Year: II **Semester: IV**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course Objective

The main objective of this course is to provide the concept of computation mathematics and provide the base for complier design.

Course contents

1. **Fundamentals** **[3 Hrs]**
   - 1.1 Sets and subsets
   - 1.2 Operation on sets
   - 1.3 Sequence
   - 1.4 Matrices
   - 1.5 Mathematical structure

2. **Logic** **[4 Hrs]**
   - 2.1 Proposition and logical operation
   - 2.2 Conditional statement
   - 2.3 Mathematical induction

3. **Counting** **[5 Hrs]**
   - 3.1 Permutation
   - 3.2 Combination
   - 3.3 The Pigeonhole principle
   - 3.4 Recurrence relation

4. **Relation and digraphs** **[8 Hrs]**
   - 4.1 Products set and partitions
   - 4.2 Relations digraphs
   - 4.3 Paths and in-relation and digraphs
   - 4.4 Properties of relations
   - 4.5 Equivalent relation
   - 4.6 Manipulation of relation

4.7 Transitive closure and Warshall's algorithms

5. **Function** **[4 Hrs]**
   5.1 Functions
   5.2 Function for computer science
   5.3 Permutation system

6. **Graphics theory** **[6 Hrs]**
   6.1 Graphs
   6.2 Euler path and circuit
   6.3 Hamilatonien path and circuit
   6.4 Transport network

7. **Order relation and structure** **[6 Hrs]**
   7.1 Partially ordered sets
   7.2 External element of a Posets
   7.3 Lattices
   7.4 Finite Boolean Algebra

8. **Trees** **[6 Hrs]**
   8.1 Trees
   8.2 Labeled tree
   8.3 Tree searching
   8.4 Undirected tree
   8.5 Minimal spanning tree

9. **Semi groups and groups** **[3 Hrs]**
   9.1 Binary operation
   9.2 Semi groups
   9.3 Groups

Reference books

- "*Discrete Mathematical Structure*", Bernard Kolman, Rober C, Busy, Sharman Ross, PHI India
- "*Applied Discrete Structure*", K. D. Joshi, New Age International Pvt. Ltd., New Delhi, India
- "*Discrete Mathematics*", B. P. Prashar, CBS Publishers & Distribution, New Delhi, India