APPLIED SOCIOLOGY

BEG207SH

Year: II Semester: IV

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
2	-	-	10	-	40	-	50

Course Objective: The objective of this course is to provide fundamental knowledge on the social, cultural, economic, and political aspects of society to the engineering students.

Course Contents:

1. Introduction **3 Hrs**

1.1 Definition and Meaning of Sociology
1.2 Relationship of sociology with engineering
1.3 Application of sociological Knowledge in identification, implementation and evaluation of social and technical issues

2. Social and Cultural Change **3 hrs**

2.1 Process
2.2 Factors of social and cultural change (economy, technology, education, demography)
2.3 Resistance of socio-cultural change
2.4 Technological changes and its consequences

3. Understanding Development **6 hrs**

3.1 Definition and Approaches of Development
3.2 Indicators of Development
3.3 Development Planning
3.4 Features of Developing Countries
3.5 Role of indigenous and appropriate technology
3.6 Empowering and mobilizing community people

4. Process of Transformation **5 hrs**

4.1 Modernisation
4.2 Globalization
4.3 Migration
4.4 e-Governance
4.5 e-Commerce

5. Patterns of Politico-Economic System **8 hrs**

5.1 Division of labor
5.2 Flow of capital, labor, goods and culture
5.3 Economy (Types of production, shift in economy)
5.4 Emergence of political power
5.5 Political System (Nation Building Process and Use of power, political regime)
5.6 Concept of state
5.7 Conflict as a social process

6. Characteristics of Nepali Society and Culture **5 hrs**

6.1 Historical Development of Nepalese Society
6.2 Demographic composition
6.3 Issue of gender, caste and ethnic group
6.4 National integration and differentiation

Reference Books:

1. Inkels, Alex, "What is Sociology? Introduction in the Discipline & Profession", Prentice Hall of India
2. Foster G. M., "Traditional Culture and Impact of Technological Change"
3. Regmi Rishikeshav Raj, "Dimension of Nepali Society & Culture"
4. Rao, C. N. S., "Principle of Sociology with an Introduction of Social Thought", S. Chand & Company Ltd.
5. Bidel & Bidel, "Community Development"

Communication Systems
BEG332EC

Year: II **Semester: IV**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	1	3/2	20	25	80	-	125

Course Objective: To familiarize the students of Computer Engineering with basic principles of analog and digital communication.

Course Contents:

1. Signals and Systems **6 Hrs**

1.1 Definition, Types, Representation and Properties of signals used in Communication system
1.2 Review of Fourier series and Fourier transforms
1.3 Energy and power signal; Parseval's theorem
1.4 Types and Properties of systems
1.5 Block Diagram of General Communication System and concept of bandwidth
1.6 Noise and its effect on communication systems

2. Continuous Wave Linear Modulation **7 Hrs**

2.1 Need for modulation
2.2 Time domain expression, spectral representation, power, and transmission bandwidth of DSB-AM, DSB-SC, SSB, VSB
2.3 Generation methods of DSB-AM, DSB-SC, SSB
2.4 Demodulation of AM Signals: Square law, envelope detection, synchronous detectors
2.5 Introduction to Phase Locked Loop (PLL), PLL as a Universal detector of AM Signals
2.6 Super heterodyne receiver for standard AM radio
2.7 Threshold effects in AM

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
3.3 Narrow band and wide band FM
3.4 Generation methods of FM: Direct Method and Armstrong Method
3.5 Demodulation of FM: Limiter discriminator method and PLL
3.6 Introduction to Stereo FM transmission and reception
3.7 Threshold effects in FM

4. Introduction to Digital Communication System **8 Hrs**

4.1 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 effects, reconstruction of original analog signal
4.3 Pulse Amplitude Modulation, bandwidth requirement and reconstruction methods

4.4 Pulse Code Modulation
4.5 Quantization noise in PCM
4.6 Need for companding in PCM
4.7 Introduction to DPCM, DM, ADM and ADPCM and comparison with PCM

4 Hrs

5. Base-band Digital Communication System

5.1 Introductions to Information Theory: Definition of Information and Entropy
5.2 Shannon's channel capacity theorem and the information rate, Nyquist data rate
5.3 Base-band (BB) digital communication system, Line coding schemes-NRZ, RZ, Manchester, AMI
5.4 Inter-symbol Interference

3 Hrs

6. Modulated Digital Data Communication System

6.1 ASK, FSK, PSK and QAM
6.2 M-ary data communication systems and its impact on bandwidth

3 Hrs

7. Multiplexing Systems

7.1 Introduction to Multiplexing, types of multiplexing – TDM, FDM
7.2 DM in telephony hierarchy
7.3 T1 and E1 hierarchy in digital telephony and calculation of data rate
7.4 Introduction to Multiple Access Techniques – FDMA, TDMA, CDMA

7 Hrs

8. Examples of Communication Systems

8.1 Satellite communication system-block diagram and working
8.2 Terrestrial microwave links - block diagram and working, concept and its application
8.3 Optical fiber links-block diagram, advantages of optical fiber, types, attenuation and dispersion characteristics and their impact on system performance
8.4 Cellular mobile communication - GSM system architecture and system features
8.5 Communication Systems in Nepal: Past and Present

Laboratory:

1. Modulation and Demodulation of DSBAM, DSBSC and SSB
2. Modulation and Demodulation of FM
3. Sampling and Reconstruction of signal
4. Digital Modulation Techniques – ASK, FSK and PSK
5. Field visit to demonstrate different communication systems

References:

1. S. Haykin, "An Introduction to Analog & Digital Communication", (Latest Edition)
2. Leon W. Couch , "Digital & Analog Communication System", (Latest Edition), Pearson Education Asia
3. B. P. Lathi, "Modern Digital & Analog Communication Systems", (Latest Edition)
4. J. Proakis, M. Saheli, "Communication Systems Engineering", Prentice Hall, New Jersey

Database Management System

BEG276CO

Year: II Semester: IV

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Course Objective: The course objective is to provide fundamental concept, theory and practices in design of database and implementation of database management system.

Course Contents:

1. Introduction (5 hrs)

1.1 Data, Database and DBMS
1.2 Objectives of Database
1.3 Needs of DBMS for organization and others.
1.4 Data abstraction, Data Independence
1.5 Schema and Instances
1.6 Three schema Approach
1.7 Database administrator and Users
1.8 DBMS Languages

2. Data Models (4 hrs)

2.1 Conceptual, Logical and Physical model
2.2 Hierarchical, Network and Relational Data Models
2.3 Object-Based Model, Entity Relationship Model(ER Model)
2.4 Components of ER diagram
2.5 Role of ER diagram
2.6 Entity Relationship diagram Methodology
2.7 Converting ER model into relations

3. Relational Model (5 hrs)

3.1 Definitions and terminology
3.2 Structure of Relational databases
3.3 Relational Algebra and calculus
3.4 Pitfalls of relational Model

4. Structured Query Language (SQL) (5 hrs)

4.1 Overview
4.2 DDL (create, alter, drop)
4.3 DML (insert, delete, update, select)
4.4 TCL (commit, rollback, save point)
4.5 DCL (grant, revoke)
4.6 Aggregate Queries
4.7 Set operations and joins
4.8 Triggers and Views

5. Relational Database Design and Normalization (8 hrs)

5.1 Integrity Constraints: Domain constraint, Entity Integrity, Referential Integrity
5.2 Functional dependency
5.3 Inference rules for functional dependency
5.4 Decomposition of Relation
5.5 Closure Set of Functional Dependency and attributes
5.6 Dependency preservation
5.7 Normalization, Role of Normalization
5.8 Normal Forms (1NF, 2NF, 3NF)
5.9 BCNF and 3NF
5.10 Multi-valued Dependency and 4NF
5.11 Join dependency and 5NF

6. Database Security (3 hrs)

6.1 Importance of database security

6.2 Different levels of security
6.3 Confidentiality, Authentication ,Authorization, Non-Repudiation
6.4 Security and Views
6.5 Access control: Discretionary and Mandatory
6.6 Encryption and Decryption

7. Query Processing (2 hrs)

7.1 Introduction to Query Processing
7.2 Query Cost
7.3 Representing Queries using query tree
7.4 Query Optimization
7.5 Query Decomposition

8. Filing and File Structure (3hrs)

8.1 Storage devices
8.2 Buffer Management
8.3 File Organization (sequential , indexed sequential, hashed file)
8.4 Hash Collision: Detection and Resolution
8.5 Data Dictionary Storage

9. Concurrency Control (5hrs)

9.1 Database transaction, transaction properties and states
9.2 Needs of Concurrency Control
9.3 Scheduling
9.4 Characterizing Schedule : Based on Serializability and Recoverability
9.5 Concurrency Control Techniques : Lock based, Two-phase locking and Time-stamp based protocols
9.6 Multiple granularity locking
9.7 Deadlock Handling

10. Database Recovery (3 hrs)

10.1 Importance of database recovery
10.2 Failure Classification
10.3 Log based recovery: Deferred & Immediate in Single/Multi User Environment
10.4 Write Ahead Logging Protocol
10.5 Shadow paging
10.6 Backup-recovery
10.7 Dumping

11. Advanced Database Models (2 hrs)

11.1 Distributed Model
11.2 Multimedia model
11.3 ORDBMS (Object Relational Database Management Systems)

Laboratory:

There shall be at least 12 laboratory classes based on design of database using SQL and RDBMS.

Reference Books:

1. Ramez A. Elmasri & Shamakant Navathe, “Fundamentals of Database Systems”, Benjamin / Cummings, Publishing Co. Inc.
2. Korth & A. Silberschatz, “Database System Concepts”, McGraw Hill
3. G. C. Everest, “Database Management”, McGraw Hill

Discrete Structure

BEG274CO

Year: II **Semester: IV**

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

Course Objective: On completion, students will be able to explain and apply the basic methods of discrete (non continuous) mathematics in Computer engineering. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, computer systems and compiler design.

Course Contents:

1. **Mathematical Preliminaries** **(5 hrs)**
   - 1.1 Sets and subsets
   - 1.2 Operations on sets
   - 1.3 Basic Number theory
   - 1.4 Principle of counting , permutation and combinations
   - 1.5 Pigeonhole Principle
2. **Logic and Proof** **(10hrs)**
   - 2.1 Proposition and truth values
   - 2.2 Compound propositions
   - 2.3 Tautology and contradiction
   - 2.4 Logical equivalence
   - 2.5 Normal forms
   - 2.6 Logical inferences, rules of inference
   - 2.7 Introduction to Predicate Logic
   - 2.8 Mathematical Induction
3. **Relation** **(10 hrs)**
   - 3.1 Introduction
   - 3.2 Relation on sets
   - 3.3 Some operations on sets
   - 3.4 Types of relation in a set
   - 3.5 Properties of relations
   - 3.6 Representation of relations
   - 3.7 Compositions of relations
   - 3.8 Closure of relations
   - 3.9 Transitive closure and Warshall's Algorithm
4. **Recurrence Relation** **(7hrs)**
   - 4.1 Recurrence relation with theorems
   - 4.2 Particular solution
   - 4.3 Solution to non linear recurrence relation
   - 4.4 Generating Functions
   - 4.5 Application of recurrences to algorithm analysis
   - 4.6 Integer functions
5. **Graph Theory** **(9 hrs)**
   - 5.1 Graph and its types
   - 5.2 Adjacency and degree
   - 5.3 Walk, path, trails and circuits (cycle)

5.4 Types of Graphs (Regular graph, complete graph, cycle graph, connected graph, simple graph and bipartite graph)
5.5 Shortest path problems
5.6 Eulerian graph
5.7 Hamiltonian graph
5.8 Sub-graph
5.9 Transport Network

6. **Language , Grammar and Automata** **(4 hrs)**
   6.1 Introduction
   6.2 Strings
   6.3 Languages
   6.4 Regular expressions
   6.5 Grammars
   6.6 Finite-state Automata

Reference Books:

1. Bernard Kolman, Rober C. Busby, Sharon Ross, "Discrete Mathematical Structure", Pearson Education Pvt. Ltd. India
2. Joe L. Mott, Abraham Kandel, Thoedore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", India, Prentice Hall, 2004
3. Kenneth H. Rosen, "Discrete Mathematics & its Applications", New Delhi, Tata McGraw Education, 2007
4. R. Johnsonbough, "Discrete Mathematics", India, Prentice Hall, 1999

Free & Open Source Programming

BEG275CO

Year: II Semester: IV

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

Course Objective: To provide basic concept of Free and Open Source Programming and its applications.

Course Contents:

1. An Overview to Free and Open Source Software (FOSS) **(5hrs)**

1.1 Introduction
1.2 The FOSS Philosophy
1.3 History and evolution of FOSS
1.4 Design Logic, Source Code, Binary Code
1.5 Examples of Open Source software products
1.6 Emerging applications of FOSS philosophy in various sectors.

2. Classification of Free and Open Source Software **(5hrs)**

2.1 Free Software
2.1 Open Source Software
2.3 Proprietary Software
2.4 Other existing Software models
2.5 Open Standards
2.6 Open Content
2.7 Benefits and Shortcoming of FOSS
2.8 Strengths and weakness of FOSS
2.9 Comparison of FOSS and Proprietary software

3. Licensing **(4hrs)**

3.1Types of licensing
3.2 Commercial License versus Open Source License
3.3 Open Source Software Licensing, Types of OSS licenses, OSS licensing strategies

4. Web Basics **(3 Hrs)**

4.1 Web Browsers, Web Servers
4.2 Types of Web Pages & its processing in WWW
4.3 HTTP, HTTPS, HTTP Transaction
4.4 FTP & its types

5. Web Development with HTML & DHTML **(6 Hrs)**

5.1 Introduction to HTML
5.2 HTML Assistants, Editors, Convertors, Images and Multimedia, Linking Documents, Tables, Frames, Image Maps, Forms, CSS

6. Introduction to JavaScript **(4 Hrs)**

6.1 Basic Introduction
6.2 Functions
6.3 Error Handling
6.4 Dialog Box
6.5 Form Validation

7. Open Source Programming with PHP **(10 Hrs)**

7.1 Introduction
- a. Syntax
- b. Operators
- c. Variables
- d. Constants
- e. Control Structures
- f. Language Constructs and Functions

7.2 Arrays
- a. Enumerated Arrays
- b. Associative Arrays
- c. Array Iteration
- d. Multi-Dimensional Arrays
- e. Array Functions

7.3 Functions
- a. Syntax
- b. Arguments
- c. Variables
- d. References
- e. Returns
- f. Scope of Variables

7.4 File Handling
- a. Files
- b. Reading
- c. Writing
- d. File System Functions

8. Databases Connectivity in PHP **(4Hrs)**

8.1 SQL
8.2 Basic SQL Queries (CRUD)
8.3 Database Connectivity

9. Session and Cookies **(4Hrs)**

9.1 Introduction to session
9.2 Create session
9.3 Destroy session
9.4 Cookies

Laboratory:

There shall be lab exercises to cover all the theoretical concept of the Free & Open Source Programming.

Reference Books:

1. "Free & Open Source Software, A General Introduction", by Kenneth Wong & Phet Sayo, Published by IOSN APDIP
2. The Cathedral & the Bazaar, Musings on Linux & Open Source by an Accidental Revolutionary; by Eric S. Raymond
3. HTML, DHTML, JavaScript & PHP, Ivan Bayross (Latest Edition)
4. Beginning of PHP, WROX, PHI Publishing House
5. Professional PHP Programming, Jesus M. Castagnetto, Harish Rawat, Deepak T. Veliath

Microprocessor

BEG231EC

Year: II Semester: IV

Course Objective: The objective of this course is to provide fundamental knowledge to understand the operation, programming and application of 8085 and 8086 microprocessor.

Course Contents:

1. Introduction 2 hrs

1.1 Evolution of microprocessor
1.2 Block diagram of Microcomputer System
1.3 Application of microprocessors

2. Intel 8085 Microprocessor 8 hrs

2.1 Internal Architecture
2.2 Pin diagram and pin function
2.3 Addressing modes
2.4 Instruction Set
2.5 Timing diagram for I/O read write and memory read write

3. Intel 8086/8088 Microprocessor 8 hrs

3.1 Internal Architecture
3.2 Pin diagram and pin function
3.3 Addressing modes
3.4 Instruction Set
3.5 Timing diagram for I/O read write and memory read write

4. Assembly Language Programming 10 hrs

4.1 Introduction to assembly language programming
4.2 Assembler instruction format: Opcodes, mnemonics and operands
4.3 Assembler operation: Sample assembly language program and code generation, assembler directives
4.4 One pass and two pass assembly
4.5 Macro assemblers, linking
4.6 Programs using 8085 and 8086

5. I/O Interface 8 hrs

5.1 Introduction to I/O Port Addressing and Decoding
5.2 Serial interface device: RS-232 serial data standard and interface
5.3 Simplex, half duplex and full duplex operation using RS-232 Port
5.4 Connection to printer and null modem
5.5 Parallel communication
5.6 8255 Programmable Peripheral Interface and Interface Device: block diagram, internal structures, and modes of initialization, and interfacing to a microprocessor
5.7 Programmable Communication Interface 8251

6. Interrupts 3 hrs

6.1 Introduction Basic Interrupt Processing
6.2 Different types of Interrupts of 8085/8086/8088

7. Memory Interface 4 hrs

7.1 Introduction to Memory Devices
7.2 Address Decoding
7.3 8085 Memory Interface
7.4 8086 Memory Interface

8. Comparative Study of higher series of Intel Microprocessor 2 hrs

Laboratory

1. Familiarization with 8085 microprocessor trainer kit, simulator
2. Data transfer instructions
3. Arithmetic and logical instructions
4. Subroutine and branching instructions
5. Stack operations
6. Timers and delay
7. Code conversion
8. Familiarization with assembly language program, assembling and micro assembler (MASM)
9. Operations related to data transfer, arithmetic and logical instruction in 8086
10. Operation related to case conversion (Upper case to lower case and vice-versa)

Reference Books:

1. Douglas V. Hall, "Microprocessors & Interfacing: Programming & Hardware", 2nd Ed., Tata McGraw Hill, 2006
2. Peter Abel, "IBM PC Assembly Language & Programming", 5th Ed., Pearson Education / Prentice Hall of India Pvt. Ltd, 2007
3. Ramesh S. Gaonkar, "Microprocessor – Architecture, Programming & Applications with the 8085", Penram International Publisher, 5th Ed., 2006