COMPUTER SCIENCE
Grade XII
(Subject Code: 230)

Full Marks: 100 (75T+25P)
Teaching Hours: 150

I. Introduction:

Information Technology has become a part of contemporary society and as a potential tool in the socio-economic development of country. As Information technology manpower is the backbone for the rapid development of ICT sector in the country, government of Nepal has accordingly identified IT as a priority sector. Keeping in view the importance of computer technology in general and indispensability of its knowledge and skill to the society in general and to the students of higher secondary level in particular, the course seeks to introduce computer science to acquaint the learner with the basic skills of computer literacy.

II. General Objective:

The general objectives of its course are to:

1. help establish a strong foundation for the development of internationally competent Human Resources in the field of Information Communication and Technology;
2. help decrease the Digital Divide; and
3. fulfill the middle level ICT Human Resources.

III. Specific Objective:

After completing this course, the student will be able to:

1. state the fundamental principle of computer system mechanism and information technology;
2. identify computer recourse for any specific purpose PC based application in the real life situations;
3. solve the office automation related system problems, general networking problems, and web site design;
4. provide computing knowledge and skill to individuals or organization;
5. engage in higher study of computer science and information technological course in the country or aboard;
6. provide the services as instructor of computer sciences course in schools or institutions;
7. discuss programming tool technique and concept about database and C programming;
8. discuss the state-of-art information technology and works to change agents for spreading ICT culture in their society; and
9. encourage the students to visit the hardware and software industries, e-communities centers.

IV. Course Contents:

Unit 1: System Development Concept

1.1 Introduction: System, Information System
1.2 Types of Information System
1.3 System Analyst – roles, responsibilities and characteristics
1.4 System development Life Cycle (SDLC)
1.5 Importance and the necessity of SDLC
1.6 System Development Models: Waterfall, Prototype, Spiral
1.7 System Development Phase
  1.7.1 System Study
  1.7.2 System Analysis Feasibility Analysis
  1.7.3 Feasibility Study: Technical, Economical, Operational
  1.7.4 System Design
  1.7.5 System Development
  1.7.6 System Testing
  1.7.7 Implementation
  1.7.8 Maintenance and Reviews
1.8 Concept of System Design Tools (Context Diagram, DFD, E-R Diagram, System Flow Chart, Decision Table, Decision Tree, Use Case, UML)
1.9 Case Study

Unit 2: Database

2.2.1 Concept of Database

2.1.1 Introduction: Data, Information, Database and DBMS
2.1.2 Objectives of DBMS
2.1.3 Database Model: Relational Model ,Network Model, Hierarchical Model, Entity Relational Data Model
2.1.4 Concept of Normalization
2.1.5 Types of Normalization 1NF, 2NF, 3NF
2.1.6 Structured Query Language
2.1.7 Centralized Vs. Distributed Database
2.1.8 Data Security

2.2 Design Database using DBMS Software

2.2.1 Create a Database
2.2.2 Create Tables and Fields and its properties
2.2.3 Create a Relational Databases
2.2.4 Create and Run Queries
2.2.5 Working with Forms
2.2.6 Generate Reports
2.2.7 Formatting Forms and Reports

2.3 Project Work on DBMS Software

Unit 3: Communication and Networking

3.1 Introduction: Definition, Purpose of networking
3.2 Analog and Digital Signal, Modulation(AM, FM, PM)
3.3 Direction of communication flow(Simplex, Halfduplex,)
3.4 Types of Network: Peer-to-peer and Client/Server, LAN, MAN and WAN
3.5 LAN Topologies :Bus, Star, Ring, Tree, Mesh Topologies (Its definition, structure, advantages & disadvantages)
3.6 Transmission Media: Bound Media (Coaxial Cable, Twisted Pair cable and Optical Fiber Cable – its description, structure, advantages and disadvantages), Unbound Media (Satellite, Wireless Media, Microwave Transmission)
3.7 Network Connecting Device: Modem, NIC, Switch / Hub, Router, Gateway, Repeater, Bluetooth, IR, WiFi
3.8 OSI Reference Model – Layer wise use and function
3.9 Communication Protocol: TCP/IP, SMTP, POP3, FTP, HTTPs, Telnet protocol
3.10 Demonstration of Communication Media and Connecting Devices

Unit 4: Programming in C

4.1 Introduction:
- 4.1.1 Overview, History, Features, Advantages and Disadvantages of C Language
- 4.1.2 Structure of C program
- 4.1.3 Compiling Process
- 4.1.4 C Preprocessor and Header Files

4.2 Fundamentals of C
- 4.2.1 Character Set used in C
- 4.2.2 Use of Comments
- 4.2.3 Identifiers and Keywords and Tokens
- 4.2.4 Data Types in C
- 4.2.5 Constants and Variables
- 4.2.6 Type of Specifier
- 4.2.7 Statements – Simple and Compound Statements

4.3 Operators and Expressions
- 4.3.1 Operators : Precedence & Associativety
- 4.3.2 Expressions
- 4.3.3 Type Casting and Conversions
- 4.3.4 Introduction to Library Functions

4.4 Input/Output (I/O) Functions
4.5 Control Structures
- 4.5.1 Decisions (if, if - else, else if, switch, ?; operator)
- 4.5.2 Looping (while, do while, for)

4.6 Array and String
- 4.6.1 Definition of array and string
- 4.6.2 Types of Array – One-Dimensional and Two-Dimensional(definition, declaration, and initialization.)
- 4.6.3 String Function : strlen(), strcat(), strcmp(), strrev(), strcpy(), strlwr() , strupr()

4.7 Functions
- 4.7.1 Concept of Function, function definition, function prototype

4.7.2 Return and Void statements of a function
4.7.3 Accessing a Function – Function Call(by value, by reference)
4.7.4 Concept of Recursion

4.8 Structures and Unions
4.8.1 Definition and Difference between Structure and Union
4.8.2 Structure: Declaration, Initialization and Size of Structure

4.9 Pointers
4.9.1 Definition of Pointer
4.9.2 Address (&) and indirection (*) operator
4.9.3 Pointer Expression and Assignment

4.10 Working with Files
4.11 Concept of Data File
4.12 Sequential and Random File
4.13 Opening, Reading, Writing and Appending on/from Data File

Unit 5: Object-Oriented Programming (OOP)

5.1 Concept of OOP
5.2 Features of OOP: Class, Object, Polymorphism and Inheritance
5.3 Application of OOP
5.4 Difference between OOP and Structured Programming Language

Unit 6: Information Communication Technology and Cyber Law

6.1 Social Impact of the ICT
6.2 Digital Divide
6.3 Computer Ethics
6.4 Intellectual Properties Right
6.5 Privacy, Anonymity
6.6 Computer Crime
6.7 Concept of Cyber Law
6.8 Area of Cyber Law
6.9 Cyber Law in Nepal
6.10 IT Policy in Nepal

Unit 7: Multimedia

7.1 Introduction to Multimedia
7.2 Component of Multimedia : Text, Graphics, Audio, Video and Animation
7.3 Application of Multimedia

Unit 8: Artificial Intelligence

8.1 Concept of AI
8.2 Component of AI
8.3 Uses of AI
8.4 Ethical Aspect of AI

Unit 9: Contemporary Technology

9.1 e- Business
9.2 e-Learning
9.3 e-Governances
9.4 e-Medicine
9.5 Virtual Reality
9.6 Robotics

Unit 10: Final Project Work

10.1 Project Synopsis of the Project
10.2 Project Development using C Programming
10.3 Project Report

(Project should be assigned to individual students.)

Reference books:

1. Gurung, J.B.; Baskota, A; Baral, D.S.; Baral, D.; Niroula, R.; Dhakal, T.P., A Text
2. Book on Computer Science Part-B, Kathmandu: Bhundipuran Prakashan.
3. Subba, B.R., Computer Science Grade-XII, Kathmandu: Taleju Prakashan.
4. Baral, D.S.; Baral, D.; Ghimire; S.K. (2008), The Secretes of C Programming
5. Language, Kathmandu: Bhundipuran Prakashan.
6. Subba, B.R., Computer Programming, Kathmandu: Taleju Prakashan.
7. Khanal, R. C. (2007), Computer Concept for Grade XII, Kathmandu: Ekata
8. Publication.
9. Pudasaini, D. Shakar; Adhikari, N., A Text Book on Computer Science Grade XII,
10. Kathmandu: Buddha Academic Enterprises Pvt. Ltd.
11. Balaguruswamy, E. (2000), Programming in ANSI C, Second Edition, Tata McGraw
12. Hill Publishing Company.
13. Gottfried, B.S. (2001), Schaum's Outline Series for Programming with C, Second
14. Edition, Tata McGraw Hill Publishing Company.
15. Yashavant, P. Kanetkar (2008), Let Us C E/D, BPB Publications.