Semester I		
Course Code	**Course Title**	**Credit Hour**
	IT Fundamentals (BIT101)	3
	C Programming (BIT102)	4
	Digital Logic (BIT103)	3
	Basic Mathematics (MTH104)	3
	Introduction to Management (MGT105)	3
Semester II		
	Discrete Structures (BIT151)	3
	Programming in C++ (BIT152)	3
	Microprocessor and Computer Architecture (BIT153)	3
	Basic Statistics (STA154)	3
	Introduction to Marketing (MGT155)	3
Semester III		
	Data Structures and Algorithms	4
	Numerical Methods	3
	Database Management Systems	3
	Operating System	3
	Sociology	3
Semester IV		
	Computer Graphics	3
	System Analysis and Design	3
	Web Technology I	3
	Network and Data Communication	3
	Economics	3
Semester V		
	Web Technology II	3
	Intelligent Computing	3
	Software Engineering	3
	Information Security	3
	Technical Writing	3
Semester VI		
	Management Information System	3
	Dot Net Programming	3
	Mobile Application Development	3
	Research Methodology	3
	Minor Project	3
Semester VII		
	Advanced Java Programming	4
	Ecommerce	3
	Elective I	3
	Elective II	3
	Major Project	4
Semester VIII		
	Distributed and Cloud Computing	3

	Elective III	3
	Elective IV	3
	Internship	6

List of Electives

- Database Administration
- Network and System Administration
- Wireless Networking
- Advanced Database Systems
- Networking with IPV6
- Data Warehousing Data Mining
- Network Programming
- Programming with Python
- EGovernment
- Multimedia Computing
- Game Development
- IT Entrepreneurship
- Software Project Management

C Programming

Course Title: C Programming
Full Marks: 60+20+20
Course No: BIT102
Pass Marks: 24+8+8
Nature of the Course: Theory + Lab
Credit Hrs: 4
Semester: I

Course Description:

This course introduces students to structured programming concepts using the C programming language. Students will learn the fundamentals of writing, compiling, and debugging C programs. The course covers topics ranging from basic syntax to more advanced features like pointers, memory management, and file handling.

Course Objectives:

By the end of the course, students will be able to:

- Understand the basic syntax and structure of C programs.
- Write C programs using control structures, functions, and loops.
- Implement arrays, pointers, and strings in C.
- Understand dynamic memory allocation, file handling, and data structures.
- Debug and optimize C code for various use cases.

Course Contents

Unit 1: Introduction to C Programming (3 Hrs)

History and features of C, Overview of structured programming, Algorithms and Flowcharts, Setting up the C environment (compilers, IDEs), Writing and executing the first C program.

Unit 2: Basic Syntax and Structure (4 Hrs)

Program structure (preprocessor, main function), Tokens, Keywords, identifiers, constants, and variables, Data types, Input and output (using printf() and scanf()), Comments, Escape Sequences.

Unit 3: Operators and Expressions (5 Hrs)

Arithmetic, relational, logical, and bitwise operators, Increment and decrement operators

Precedence and associativity of operators, Type conversion (implicit and explicit casting).

Unit 4: Control Structures (8 Hrs.)

Conditional statements: if, if-else, if…else if ladder, nested if, switch-case, Loops: for, while, do-while, nested loops, Jump Statements: Break, continue, and Goto statements.

Unit 5: Functions in C (6 Hrs.)

Function declaration, definition, and calling, Function arguments and return values

Recursion in C, Scope and lifetime of variables (global, local, static).

Unit 6: Arrays and Strings (8 Hrs.)

Declaring and initializing arrays, Array Indexing, One Dimensional and Multidimensional Arrays, String handling and manipulation, String Functions: strlen(), strcpy(), strcmp(),strcat(), Arrays as function arguments.

Unit 7: Pointers in C (9 Hrs.)

Introduction to pointers, Pointer arithmetic and dereferencing, Call by value and call by pointers, Pointers and Arrays, Returning Pointers, Dynamic memory allocation: malloc(), calloc(), free(), realoc()

Unit 8: Structures and Unions (8 Hrs.)

Defining and using structures, Arrays of structures, Nested structures, Pointers to Structures, Unions, Enumerations, Typedef

Unit 9: File Handling (6 Hrs.)

Introduction to file handling, Reading and writing text files (fopen(), fclose(), fscanf(), fprintf()), Working with binary files, end of file, fgetc(), fputc(), fgets() and fputs() functions, Random access to files.

Unit 9: Preprocessor Directives (3 Hrs.)

Defining constants with #define, Conditional compilation (#ifdef, #endif), Macro substitution and usage.

Laboratory Works

Laboratory work focuses on reinforcing the programming concepts learned in class. Hence, each unit should incorporate ample practical lab exercises.

Recommended Book

- Byron Gottfried, Programming with C, McGraw Hill Education
- The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie
- Programming in ANSI C, E. Balagurusamy
- Let Us C, Yashavant P. Kanetkar

DETAIL SYLLABUS

Course Title: Basic Statistics
Full Marks: 60 + 20 + 20
Course No: STA154
Pass Marks: 24 + 8 + 8
Nature of the Course: Theory + Lab
Credit Hrs. : 3
Semester: II

Course Description:

This course deals with the basic concepts of statistics, data presentation & summarization techniques, probability and some probability distributions, sampling distribution, point and interval estimation of parameters. It also disseminate the knowledge of correlation and regression analysis. After completion of this course, students are expected to learn different statistical techniques and enhances the hands on capacity to analyze real data through statistical software.

Course Objective:

To provide the knowledge of data presentation & data summarization, concepts and applications of probability, probability distributions, sampling and sampling distributions, correlation and regression analysis, and hands on capacity to handle the real data using statistical software

Course Contents:

Unit 1: Basics of Statistics **5 LHRs**

Basic concept of statistics, application of Statistics in information technology(IT), limitations of statistics; variables and its types, scales of measurement, cross-sectional and longitudinal data, primary and secondary sources of data, editing, coding, and transcribing data, importance of data in IT

Unit 2: Visual Presentation of Data **3 LHRs**

Bar diagrams; Pie diagrams; Graph of frequency distribution- histogram, frequency polygon, frequency curve, cumulative frequency curves; stem and leaf display; interpretation of different diagrams and frequency curves

Unit 3: Data Summarization **7 LHRs**

Different measures of central tendency: arithmetic mean and its mathematical properties, weighted mean, median, mode, empirical relations between mean, median and mode, partition values; selection of appropriate method of measuring central tendency. Measures of variability: absolute and relative measures, range, quartile deviation, mean deviation, standard deviation and their relative measures, coefficient of variation and its applications in relevant data problems. Measures of shape of data distribution: Concept of skewness, types of skewness, Pearson's coefficient of skewness, Bowley's coefficient of skewness; Exploratory Data Analysis (EDA): Five number summary, box and whisker plots, outliers, use of five number summary and boxplots to assess the shape of data distribution. Measures of kurtosis: Concept of kurtosis, types of kurtosis, measure of kurtosis based on percentiles and their applications in the relevant field. Moments: Concept of moments, central moments and raw moments, relations between central moments and raw moments, measures of skewness and kurtosis using moments; applications of different summary measures for IT related data

Unit 4: Introduction to Probability and Mathematical Expectation **10 LHR**

Concepts of probability, definitions of probability different terms used in probability, additive and multiplicative laws of probability, conditional probabilities, Bayes theorem and its applications; Numerical examples using these probability concepts and laws; Concept of a random variable and its types, probability distribution of a random variable, mathematical expectation of a discrete random variable, standard deviation and variance of discrete random variable, addition and multiplication theorems of expectation and variance(without proof); Numerical problems related to mathematical expectations

Unit 5: Probability Distributions **6 LHR**

Concept of probability distribution, Binomial, Poisson and Normal distribution and general characteristics of each distribution; Numerical problems using these distributions focusing on IT related problems

Unit 6: Sampling and Sampling Distribution **5 LHR**

Concept of population, sample, parameter, statistics, sample survey and census, sampling and non-sampling error, types of sampling- simple random sampling(with and without replacement), systematic, stratified and cluster sampling; Sampling distribution of mean and proportion, standard error of mean and proportion; Concept of central limit theorem and its applications in

statistical analysis, point estimation, confidence interval estimation for mean & proportion and their interpretations; Numerical problems using these techniques

Unit 8: Correlation and Regression Analysis **9 LHR**

Fundamental concept of correlation and regression analysis; Simple correlation between two numerical variables, scatter plot, Karl Pearson's coefficient of correlation and assumptions for applying Pearson's correlation coefficient, properties of correlation coefficient, Spearman's rank correlation including repeated ranks, interpretation of correlation coefficient; fitting of simple linear regression model using ordinary least square(OLS) method, interpretation of regression coefficients, coefficient of determination and its interpretation, graphical method of assessing good fit of the regression model; Numerical problems related to correlation and regression analysis focusing on IT related data

Laboratory Works:

Practical (Computational Statistics):

Practical problems to be covered in the Computerized Statistics laboratory

Practical Problems

S. No.	**Title of Practical Problems** (Using any statistical software such as Microsoft Excel, SPSS, STATA, R etc. whichever convenient).	**No. of practical problems**
1	Diagrammatical and graphical presentation of data	1
2	Measures of central tendency	1
3	Measures of variability including coefficient of variation	1
4	Measures of skewness and kurtosis using method of moments, measures of skewness using box and whisker plot	2
5	Karl Pearson's correlation, scatter diagram, and Spearman's' rank correlation	1
6	Simple linear regression model and its fitting, coefficient of determination, and residual analysis	1
7	Conditional probability and Bayes theorem	2
8	Binomial, Poisson and Normal probability distributions	2

9	Sampling, sampling distribution of mean and proportion, confidence interval estimation for single mean and single proportion	3
	Total number of practical problems	**14**

Reference Books:

1. Michael Baron (2013). *Probability and Statistics for Computer Scientists.* 2nd Ed., CRC Press, Taylor & Francis Group, A Chapman & Hall Book.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, & Keying Ye(2012). *Probability & Statistics for Engineers & Scientists.* 9th Ed., Printice Hall.
3. Douglas C. Montgomery & George C. Ranger (2003). *Applied Statistics and Probability for Engineers.* 3rd Ed., John Willey and Sons, Inc.
4. Richard A. Johnson (2001). *Probability and Statistics for Engineers.* 6th Ed., Pearson Education, India
5. Sthapit Azaya Bikram, Khanal Shankar Prasad, Shrestha Gauri, Dongol Prakash Man, Regmi Sishir(2019). *Statistics-I for B.Sc. CSIT*. Asmita Books Publishers and Distributors, Kathmandu, Nepal.

Digital Logic

Course Title: Digital Logic
Course No: BIT103
Nature of the Course: Theory + Lab
Semester: I

Full Marks: 60 + 40
Pass Marks: 30 + 20
Credit Hrs: 3

Course Description:

This course highly focuses on providing knowledge of logic gates, flip-flops, as well as their implementation to develop combinational and sequential circuits. It also emphasizes on developing cost effective circuits by using the concept of timing diagrams and simplification strategies.

Course Objectives:

The main objective of this course is to make students understand the concept of circuits and their design by using appropriate logic.

Course Contents:

Unit 1: Binary Systems (5 Hrs.)

Digital Computers and Digital Systems, Binary numbers, Number base conversion, Octal and hexadecimal numbers, complements, Binary Codes, Binary Storage and Registers, Binary logic

Unit 2: Boolean algebra and Logic Gates (5 Hrs.)

Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, IC Digital Logic Families

Unit 3: Simplification of Boolean Functions (6 Hrs.)

The Map Method, Two and Three variable maps, Product of Sums Simplification, NAND and NOR implementation, Don't Care conditions, The Tabulation Method, Determinant of Prime-Implicants, Selection of Prime-Implicants

Unit 4: Combinational Logic (8 Hrs.)

Introduction, Design Procedure, Adders, Subtractors, Code Conversions, Analysis Procedure, Multilevel NAND circuits, Multilevel NOR Circuits, Exclusive-OR and Equivalence Functions

Unit 5: Combinational Logic with MSI and LSI (7 Hrs.)

Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, Read-only-Memory (ROM), Programmable Logic Array (PLA)

Unit 6: Sequential Logic (9 Hrs.)

Introduction, Flip-Flops, Triggering of flip-flops, Analysis of clocked sequential circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedures, Design of counters, Design with State Equations

Unit 7: Registers, Counters and The Memory Unit (5 Hrs.)

Introduction, Registers, Shift registers, Ripple Counters, Synchronous Counters, Timing Sequences, The memory Unit, Examples of Random Access Memories

Laboratory Works:

The laboratory works should focus on familiarizations with logic gates, designing and implementation of combinational and sequential circuits.

Ecommended Books:

1. M. Morris Mano and Charles Kime, "Logic and Computer Design Fundamentals", Pearson New International
2. Brain Holdsworth, "Digital Logic Design", Elsevier Science.
3. John Patrick Hayes, "Introduction to Digital Logic Design", Addison-Wesley.

Basic Mathematics

Course Title: Basic Mathematics

Full Marks: 60+20+20

Course No: MTH104

Pass Marks: 24+8+8

Nature of the Course: Theory + Lab

Credit Hrs: 3

Semester: I

Course Description:

This course familiarizes students with knowledge and skill of functions, limits, continuity, differentiation, integration of the function of one variable, applications of derivative and anti-derivatives, differential equations, partial derivatives, and multiple integrals. This course is intended to give theoretical knowledge on the topics of basic mathematics together with the skill of computational lab work from Mathematica and Graphing Calculator. For computational lab work, students are guided to use free computational programs such as Wolfram Cloud and graphing calculators.

Course Objectives:

After the completion of this course, students will be able to

- understand the fundamental concepts of calculus and use these concepts to formulate real-world problems into mathematical statements;
- describe and demonstrate mathematical solutions to calculus in the computer lab numerically and graphically.

Course Contents

Unit 1: Functions and Models (4 Hrs.)

Four ways to represent function, Mathematical models: a catalog of essential functions, New functions from old functions, Exponential and logarithmic functions.

Unit 2: Limits and Derivatives (8 Hrs)

The limits of a function, Calculating limits using limit laws, Continuity, Limits at infinity: Horizontal asymptotic, The derivatives and rates of change, The derivative as a function, Derivatives of polynomials and exponential functions, The product and quotient rule, the derivative of trigonometric functions, The chain rule, Implicit differentiation, Derivatives of logarithmic functions.

Unit 3: Application of differentiation (5 Hrs)

Maximum and minimum values, The mean value theorem, Indeterminate forms and l'Hospital's rule, Optimization problems.

Unit 4: Anti-derivatives (6 Hrs.)

Reviews of anti-derivatives, The definite integrals, Integration of rational function by partial fractions, Improper integrals, The fundamental theorem of calculus.

Unit 5: Application of Anti-derivatives (6 Hrs.)

Area between curves, Volumes, Volumes by cylindrical shells, Arc length, Area of surface of revolution.

Unit 6: Differential Equations (7 Hrs.)

Introduction to first order first degree differential equations, Separable equations, Linear equations, Second order linear differential equations, Non-homogeneous linear equations.

Unit 7: Partial Derivatives (6 Hrs.)

Functions of several variables, Limits and continuity, Partial derivatives, Tangent planes and linear approximations, The chain rule, Maximum and minimum values.

Unit 8: Multiple Integrals (5 Hrs.)

Double integrals over rectangles, Iterated integrals, Double integrals over general regions, Double integrals in polar coordinates, Application of double integrals, Triple integrals, Application of triple integrals.

Laboratory Works

In a computer lab, students are asked to do the following work with graphing software such as Mathematica and Graphing Calculators.

- To draw the graph of polynomial functions of different degrees, rational functions, trigonometric functions, exponential functions, and logarithmic functions in the given rectangles and squares. Also, to find the solutions (zeros) of polynomial, rational, trigonometric, exponential, and logarithmic equations.
- To find the limits, derivatives, and anti-derivatives of polynomial, rational, trigonometric, exponential, and logarithmic functions. Also, to find the extreme values in a given interval.
- To find the area between curves, volume, arc length, and area of surface of revolution.
- To find the solutions of first and second-order differential equations.
- To find partial derivatives, surface, and volume generated by the function of two or more than two variables.
- To find double integrals, and triple integrals over specified domains.
- The course instructor may ask other appropriate works related to this course in the computer lab.

Recommended Book

- James Stewart, Calculus Early Transcendentals, Cengage Learning , Delhi, India, 2012.
- Maurice D. Weir and Joel Hass, Frank R. Giordano, Thomas' Calculus, Early Transcendentals, Pearson, Delhi, 12th Edition, 2009.

Introduction to Management

Course Title: Introduction to Management **Full Marks:** 60+40

Course No: MGT105 **Pass Marks:** 30+20

Nature of the Course: Theory **Credit Hrs:** 3

Semester: I **Lecturer Hours: 45**

Course Description:

This course introduces the fundamental management concepts, focusing on their application in Business Information Technology (BIT). Topics include management functions (planning, organizing, leading, and controlling), decision-making, strategic management, team dynamics, project management, and the role of IT in driving business success. The course also explores the impact of digital transformation, innovation, and data-driven decision-making in modern organizations.

Course Objectives:

By the end of this course, students will be able to:

- Understand core management concepts and their application in a BIT context.
- Analyze management roles and responsibilities within IT-driven business environments.
- Develop decision-making attitude, skills, and knowledge to address business and IT challenges.
- Explore how digital transformation and innovation impact business strategy.
- Develop skills in team leadership, communication, and conflict resolution within IT teams.
- Learn effective project management methodologies applicable to BIT.
- Understand the importance of data-driven decision-making in business and IT.

Course Details:

Unit 1: Introduction to Management and BIT 6 LHs

The concept of management and business management; the management process; the type of managers (general, functional, and line managers); an overview of management functions (planning, organizing, leading, controlling); the role of management in BIT; the evolution of management thought; and understanding how IT influences business strategy, Article: "The Role of IT in Modern Business Strategy."

Unit 2: Planning and Strategic Management 5 LHs

Meaning, planning process and types of plans; Goal setting and strategic planning; The strategic management process; Strategic alignment of IT with business goals; Tools for strategic analysis (SWOT, PESTEL); Case study: Strategic IT alignment in business.

Unit 3: Decision-Making and Problem-Solving 5 LHs

Concept of decision making, the process of rational decision making; Types of decisions and decision-making models; Problem-solving frameworks in BIT; Data-driven decision-making and analytics; Case study: Using data to drive business decisions, Article: "Data-Driven Decision Making in Business and IT."

Unit 4: Organizing and Structuring IT Resources 6 LHs

Meaning and concept of organizational structure; Organizational structures in a digital business; Managing IT teams: roles, responsibilities, and structure; Resource allocation and IT infrastructure management; Organizational structure practices in Nepal; Case study: Organizing for innovation in IT, Article: "Effective IT Resource Management."

Unit 5: Leadership and Team Dynamics 5 LHs

Meaning of team and group, difference between team and group, importance of team in organization; Leadership styles and theories relevant to IT; Leading cross-functional and virtual teams; Team dynamics and performance management; Building effective IT teams; Position of teamwork in Nepalese organization. Activities: Simulation and case analysis, Excerpts from "Radical Candor" by Kim Scott.

Unit 6: Communication in Digital Organizations 4 LHs

Meaning of business communication, communication process; Effective communication strategies; Effective communication strategies in IT; Managing virtual and cross-functional teams; Conflict resolution and negotiation; Cultural diversity and global IT teams.

Unit 7: Controlling and Monitoring 3 LHs

The control process and its importance; key performance indicators (KPIs) and metrics in BIT; managing IT performance, risks, and security; case study: IT performance management.

Unit 8: Introduction to Project Management 4 LHs

Fundamentals of project management; Overview of project management methodologies (Agile, Scrum, Waterfall); Tools and software for managing IT projects; Case study: Project management success stories in BIT, Excerpts from "The Lean Startup" by Eric Ries.

Unit 10: Ethics and Corporate Responsibility in IT 3 LHs

Concept of ethics and CSR; Ethical issues in BIT (privacy, data protection, security); Corporate social responsibility (CSR) in IT; Sustainability and ethical decision-making in IT management, Articles on ethics and CSR in IT.

Unit 11: Emerging Trends in BIT Management 4 LHs

Trends such as AI, machine learning, cloud computing, and big data; future directions of BIT: automation, blockchain, and cybersecurity; preparing for future challenges as a BIT professional; growth of the IT business sector in Nepal; major industries—manufacturing, export-oriented, import–substitution, and service sector; and major problems of Nepalese IT business.

Recommended Books and Materials

- Essentials of Management: An International, Innovation, and Leadership Perspective" by Harold Koontz, Heinz Weihrich, and Mark V. Cannice.
- "The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries
- "Radical Candor: Be a Kick-Ass Boss Without Losing Your Humanity" by Kim Scott.
- Recent academic articles and case studies on BIT management trends.
- Stephen P. Robins & David A. Decenzo (2008). Fundamentals of Management. Delhi: Pearson Education Inc.
- Ricky W. Griffin (2012). Management Principles and Applications. New Delhi: CENGAGE Learning.

IT Fundamentals

Course Title: IT Fundamentals
Full Marks: 60+20+20
Course No: BIT101
Pass Marks: 24+8+8
Nature of the Course: Theory + Lab
Credit Hrs: 3
Semester: I

Course Description:

This course introduces students to the foundational concepts of information technology, including an overview of computer hardware and software, data representation, computer networks, database systems, security, and the application of IT in various fields.

Course Objectives:

By the end of the course, students will be able to:

- Understand basic computer and IT concepts.
- Identify different types of hardware and software.
- Explain data representation and data processing techniques.
- Understand the structure and functioning of computer networks and the internet.
- Recognize various computer security concerns and preventive measures.
- Discuss the application of IT in real-world scenarios.

Course Contents

Unit 1: Introduction to Computer (6 Hrs.)

Introduction to Computers, Characteristics of Computers, Applications of Computers, History of Computer; Generations of Computer, Classification of Computers: On the basis of Working Principle, On the basis of Power and size, On the basis of Brand, Computer Architectures: Von Neumann and Harvard Architecture, Anatomy of Digital Computers, Central Processing Unit, System Buses, Interfaces.

Unit 2: Input Output Devices (4 Hrs)

Input Devices: Keyboard, Mouse and its Types, Touch Panel, Light pen, Scanners, Touch Pad, and Microphone, Output Devices: Monitor and its Types, Printer and its Types, Plotter, Speaker.

Unit 3: Storage Systems (5 Hrs)

Primary Storage Devices: RAM and its Types, ROM, Cache memory, Registers, Secondary Storage Devices: Magnetic Tape, magnetic Disk (Hard Disk), Solid State Disks (SSD), Optical Disks and its Types, Flash Memory, SD Cards, memory Hierarchy.

Unit 4: Computer Software (5 Hrs.)

Computer Software and its Types, Operating System, History of Operating Systems, Types of Operating Systems, Functions of Operating Systems, Open Source Operating Systems, Malicious Software, Malware Vulnerability Factors, Antimalware Software.

Unit 5: Computer Arithmetic (7 Hrs.)

Introduction to Number System, Conversion from Decimal to Other Numbers Systems, Conversion from Decimal Other Numbers System to Decimal, Conversion between Binary and Octal, Conversion between Binary and Hexadecimal, Binary Arithmetic: Addition and Subtraction, 1's and 2's Complement, Subtraction Using 2's Complement.

Unit 6: Database Management Systems (6 Hrs.)

Database Systems: Data Hierarchy, Approaches of Data Management, Database and DBMS, File Management Systems, Advantages of DBMS, Limitations of DBMS, Database Instance and Schema, Data Models, Structured Query languages and its Components, Database Users, Database Administrator, Concept and Applications of Data warehouse and Data Mining.

Unit 7: Data Communication and Computer Networks (6 Hrs.)

Introduction to Communication System, Elements of Communication System, Introduction and Types of Computer Networks, Network architectures, Network Topologies, Network Devices, Uses of Networking, Transmission media: Guided and

unguided media and their Types, Modes of Data Transmission, Analog and Digital Transmission, Network Protocols: OSI and Reference Model and TCP/IP.

Unit 8: Internet and WWW (3 Hrs.)

Introduction and Applications of Internet, History of Internet, Internet Architecture, Managing the Internet, Connecting to Internet, Types of Internet Connections, Addresses in the Internet, Internet Protocols, World Wide Web, URL, Search Engine.

Unit 9: Contemporary Technologies (3 Hrs.)

Multimedia, Characteristics, Elements and Applications of Multimedia, Ecommerce, Features, Benefits and Limitations of Ecommerce, E-Learning, Characteristics, Benefits and Limitations of E-learning, E-Learning Tools and Technologies, Hypermedia and its Applications, E-Governance and its Benefits, E-Governance Models, GIS, GIS Data Types, Virtual and Augmented Reality, Bitcoin.

Laboratory Works

Laboratory Work should include Demonstration of MS-DOS Commands, Windows, Word Processor, Spreadsheet, Presentation Software, MS Access and Photoshop.

Recommended Book

- Goel, A. Computer Fundamentals. Pearson Education.
- Balagurusamy, E. Fundamentals of Computers. McGraw Hill Education.
- Sinha, P. K., & Sinha, P. Computer Fundamentals. BPB Publications.
- Leon, A., & Leon, M. Fundamentals of Information Technology. Vikas Publishing.
- Saud, AS. Computer Fundamentals and Applications, KEC Publication.

Discrete Structures

Course Title: Discrete Structures
Full Marks: 60+20+20
Course No: BIT151
Pass Marks: 24+8+8
Nature of the Course: Theory + Lab
Credit Hrs: 4
Semester: II

Course Description:

Discrete Structures introduces the mathematical foundations required in computer science. Topics include logic, set theory, relations, functions, combinatorics, graph theory, and discrete probability. These concepts are essential for algorithm analysis, data structures, and software development.

Course Objectives:

By the end of the course, students should be able to:

- Understand and apply formal logic, proofs, and reasoning techniques.
- Work with sets, relations, and functions.
- Analyze and solve combinatorial problems.
- Understand graphs and trees and their applications in computer science.
- Apply discrete probability concepts to problems.
- Model and solve real-world problems using discrete structures.

Course Contents

Unit 1: Mathematical Logic (8 Hrs)

Propositional Logic: Introduction, Logical Connectives, Truth Tables, Translating English Arguments to Propositional Logic, Inference Rules, Validity Proofs, Predicate Logic: Introduction, Quantifiers, Logical Equivalences, Rules of Inference, Proof of Validity, Translating English Arguments to Predicate Logic, Proof Methods: Direct, Indirect, and Contradiction, Contraposition.

Unit 2: Sets, Relations and Functions (9 Hrs)

Set Theory: Sets and Subsets, Set Operations (Union, Intersection, Difference, Complement), Venn Diagrams, Inclusion-Exclusion Principle, Cartesian Product, Power Sets, Representing Sets in Computers,

Relations: Relations and their Properties, Representing Relations, Closure of Relations, Equivalence Relations, Partial Ordering, Functions: Introduction, Injective and Bijective Functions, Inverse and Composite Functions, Graph of Functions, Functions for Computer Science (Ceiling Function, Floor Function, Boolean Function, Exponential Function)

Unit 3: Induction and Recursion (7 Hrs)

Mathematical Induction, Strong Induction and Well Ordering, Structural Induction, Recurrence Relation, Recursive Algorithms, Growth of Functions, Solving Homogeneous and non-homogeneous Recurrences.

Unit 4: Counting and Probability (8 Hrs.)

Counting: Basic Counting Principles (Addition and Multiplication Rules), Permutations and Combinations, Binomial Theorem, Pigeonhole Principle, Inclusion-Exclusion Principle, Probability: Introduction to Probability Theory, Conditional Probability, Bayes' Theorem, Expected Value and Variance, Randomized Algorithms.

Unit 5: Trees and Graphs (9 Hrs.)

Graphs: Graphs: Definitions and Terminology, Types of Graphs: Simple, Directed, Undirected, Weighted, Graph Representations (Adjacency List, Adjacency Matrix), Graph Traversal Algorithms (DFS, BFS), Euler and Hamiltonian Path and Circuits , Planar Graphs and Graph Coloring, Tree: Introduction, Tree Traversals, Spanning Trees, Minimum Spanning Trees (Kruskal’s Algorithm)

Unit 6: Modular Arithmetic and Number Theory (4 Hrs.)

Modular Arithmetic, Greatest Common Divisors and Euclidean Algorithm, Applications in Cryptography.

Laboratory Works

The lab work involves applying the algorithms and concepts covered in class. Students are expected to solve problems using the following concepts:

- Set operations, relations, and functions.
- Number theory algorithms.
- Counting techniques and recursive algorithms.

- Predicate logic.
- Algorithms for trees and graphs

Recommended Book

- Discrete Mathematics and Its Applications by Kenneth H. Rosen
- Concrete Mathematics: A Foundation for Computer Science by Graham, Knuth, and Patashnik
- Introduction to Graph Theory by Douglas B. West

Microprocessor and Computer Architecture

Course Title: Microprocessor and Computer Architecture **Full Marks:** 60+20+20

Course No: BIT153 **Pass Marks:** 24+8+8

Nature of the Course: Theory + Lab **Credit Hrs:** 3

Semester: II

Course Description:

This course provides an in-depth understanding of microprocessors and computer architecture. It covers the internal organization of microprocessors, instruction sets, memory hierarchy, and various components of computer systems. Topics include the study of modern processor architectures, pipelining, cache memory, and input/output mechanisms.

Course Objectives:

By the end of this course, students should be able to:

- Understand the fundamentals of SAP architectures.
- Demonstrate assembly language programming for 8085.
- Describe and evaluate different CPU designs, including pipelined and parallel architectures.
- Analyze memory hierarchies, including caches and virtual memory systems.
- Understand how input/output devices interact with the CPU and memory.

Course Contents

Unit 1: Overview of Microprocessor (4 Hrs)

Components of a Microprocessor: Registers, ALU, Control and Timing, System Buses, Microprocessor Systems with Bus Organization, Introduction to SAP1 and SAP2

Unit 2: 8085 Microprocessor (7 Hrs)

Functional Block Diagram and Pin Configuration, Timing and control Unit, Registers, Data and Address Bus, Intel 8085 Instructions, Operation Code and Operands, Addressing Modes, Interrupts, Flags, Institutions and Data Flow inside 8085, Basic Assembly Language Programming Using 8085 Instruction Sets

Unit 3: Register Transfer Language (4 Hrs)

Microoperation, Register Transfer, Language, Register, Register Transfer, Control, Function, Arithmetic Microoperations, Binary Adder, Binary Adder-Subtractor, Arithmetic Circuit, Logic Microoperations, Applications of Logic Microoperations, Shift Microoperations, Logical Shift, Circular shift, Arithmetic Shift.

Unit 4: Basis Computer Architecture (7 Hrs.)

Instruction Code, Operation Code, Stored Program Concept, Registers and memory of Basic Computer, Common Bus System for Basic Computer, Instruction Format, Instruction Set Completeness, Control Unit of Basic Computer, Control Timing Signals, Instruction Cycle of Basic computer, Determining Type of Instruction, Memory Reference Instructions, Input-Output Instructions, Program Interrupt & Interrupt Cycle.

Unit 5: Control Unit (3 Hrs.)

Control Word, Microprogram, Control Memory, Control Address Register, Address Sequencing, Conditional Branch, Mapping of Instructions, Subroutines, Microinstruction Format, Symbolic Microinstructions.

Unit 6: Central Processing Unit (4 Hrs.)

Major Components of CPU, CPU Organizations (Single Accumulator Organization, General Register Organization, Stack Organization), Instruction Formats, Addressing Modes, Data Transfer and manipulation, Program Control, Subroutine Call and Return, Types of Interrupt, RISC vs CISC.

Unit 7: Pipelining (5 Hrs.)

Parallel Processing, Multiple Functional Units, Flynn's Classification, Pipelining: Concept and Demonstration with Example, Speedup Equation, Floating Point addition and Subtraction with Pipelining, Instruction Level Pipelining: Instruction Cycle, Three & Four-Segment Instruction Pipeline, Pipeline Conflicts and Solutions, Concept of Vector Processing.

Unit 8: Computer Arithmetic (4 Hrs.)

Addition and Subtraction with Signed Magnitude Data, Addition and Subtraction with Signed 2's Complement Data, Booth Multiplication, Division of Signed magnitude Data, Divide Overflow.

Unit 9: IO Organization (4 Hrs.)

Input-Output Interface: I/O Bus and Interface Modules, I/O vs Memory Bus, Isolated vs Memory-Mapped I/O, Asynchronous Data Transfer: Strobe, Handshaking, Modes Of Transfer: Programmed I/O, Interrupt-Initiated I/O, Direct memory Access, Overview of Priority Interrupt, Input-Output Processor.

Unit 10: Memory Architecture (3 Hrs.)

RAM and ROM Chips, Memory address Map, Memory Connection to CPU, Associative Memory, Read Operation, Write Operation, Cache Memory: Locality of Reference, Hit & Miss Ratio, Mapping (Direct, Associative, Set Associative).

Laboratory Works

The laboratory exercises should be performed using the 8085 trainer kit. The programming tasks should include base conversions, arithmetic operations, conditional branching, and similar concepts.

Recommended Book

- Ramesh S. Gaonkar: Microprocessor Architecture, Programming, and Applications with 8085, prentice Hall
- Morris Mano: Computer system Architecture, Third Edition, prentice Hall
- Computer Architecture: A Quantitative Approach" **by** John L. Hennessy, David A. Patterson.

Introduction to Marketing

Course Title: Introduction to Management **Full Marks:** 60+40
Course No: MGT155 **Pass Marks:** 30+20
Nature of the Course: Theory **Credit Hrs:** 3
Semester:II **Lecturer Hours: 45**

Course Description:

This course provides an introduction to the fundamental concepts and practices of marketing with a special focus on digital marketing strategies, data analytics, and the role of technology in business. The course covers key topics such as marketing strategy, consumer behavior, digital marketing channels, content marketing, social media, SEO, and data-driven decision-making. BIT students will learn how to leverage technology and data to develop effective marketing strategies that align with business objectives.

Course Objectives:

This course will help students understand core marketing principles in a digital context, focusing on digital marketing tools, strategies, and the role of technology in transforming marketing practices. It will cover consumer behavior analysis and market research using data analytics, guiding students in creating integrated marketing campaigns. Additionally, the course emphasizes applying data-driven decision-making to optimize marketing efforts and achieve strategic business goals.

Course Content

Unit 1: Introduction **6 LHs**

Definition and importance of marketing; Marketing process; Societal marketing; Meaning and components of the marketing mix for products and services; Evolution of marketing: From traditional to digital; The role of marketing in the digital age for IT professionals, Article: "The Role of Technology in Modern Marketing."

Unit 2: Understanding Marketing environment and Consumer Behavior 7 LHs

Concept and types of marketing environment; Basics of consumer behavior and psychology; Factors influencing consumer behavior in digital contexts; Data analytics for understanding customer preferences and behavior; Reactive and proactive marketing; Factors influencing business buyer behavior; Marketing environment in Nepal. Case study: Analyzing consumer data to drive marketing decisions, Excerpt from "Influence: The Psychology of Persuasion" by Robert B. Cialdini.

Unit 3: Digital Marketing Landscape 4 LHs

Overview of digital marketing channels: SEO, SEM, social media, email, and content marketing; Understanding digital marketing funnels and customer journeys; The role of technology and automation in digital marketing, Article: "Understanding the Digital Marketing Funnel."

Unit 4: Content Marketing and Storytelling 4 LHs

Principles of content marketing and creating valuable content; Building a brand narrative through storytelling; Tools and platforms for content distribution; Case study: Successful content marketing campaigns in the tech industry, Excerpts from "Building a Story Brand" by Donald Miller.

Unit 5: Social Media Marketing Strategies 4 LHs

Overview of major social media platforms (Facebook, Instagram, Twitter, LinkedIn, TikTok); Creating and managing social media campaigns; Measuring social media ROI and analytics; Case study: Viral social media campaigns, Articles on social media analytics and ROI.

Unit 6: Search Engine Optimization and Marketing (SEM) 7 LHs

Basics of SEO and SEM; Keywords, backlinks, and on-page vs. off-page SEO; PPC advertising and Google Ads; Tools and software for SEO/SEM optimization; Fundamentals of email marketing; Building effective email lists and campaigns; Marketing automation tools and platforms (e.g., Mailchimp, HubSpot). Understanding mobile marketing strategies; The role of mobile apps in marketing; SMS marketing, push notifications, and location-based marketing; Case studies: Mobile marketing successes and challenges, Excerpts from "Contagious: How to Build Word of Mouth in the Digital Age" by Jonah Berger, Articles on mobile marketing trends.

Unit 7: Data-Driven Marketing and Analytics 4 LHs

Introduction to data-driven marketing; Key metrics and analytics tools (Google Analytics, social media insights); Using data to optimize marketing campaigns; Case study: Data analytics in marketing decision-making.

Unit 8 : Segmentation, Targeting and Positioning Strategies 6 LHs

Concept, process, requirements of market segmentation. Bases for segmenting consumer and organizational markets. Segment evaluation, and selection. Concept and types of positioning; product positioning process; Concept and levels of the product.; New product development process. Branding and Packaging.

Unit 9 : Integrating Marketing Strategies 3 LHS

Developing an integrated marketing communications plan; Aligning digital and traditional marketing strategies; Case study: Integrated marketing campaigns in the tech sector.

Recommended Books and Materials:

- "Marketing 4.0: Moving from Traditional to Digital" by Philip Kotler, Hermawan Kartajaya, and Iwan Setiawan.

- "Digital Marketing: Strategy, Implementation, and Practice" by Dave Chaffey and Fiona Ellis-Chadwick.
- "Data-Driven Marketing: The 15 Metrics Everyone in Marketing Should Know" by Mark Jeffery.
- "Building a StoryBrand: Clarify Your Message So Customers Will Listen" by Donald Miller.

Programming in C++

Course Title: Programming with C++ **Full Marks:** 60 + 40
Course No: BIT152 **Pass Marks:** 30 + 20
Nature of Course: Theory + Lab **Credit Hrs:** 3
Semester: II

Course Description:
This course focuses on providing an in depth knowledge about object oriented programming and its implementation using C++

Course Objectives:
This course emphasizes on fundamental concepts of object oriented programming, formation of classes, constructors, inheritance, polymorphism, exception handling, file handling and templates.

Course Contents:

Unit 1: Introduction (3 Hrs.)
Development and Properties of C++, Object-Oriented Programming, Developing a C++ Program, A Beginner's C++ Program, Structure of Simple C++ Programs

Unit 2: Defining Classes (3 Hrs.)
The Class Concept, Defining Classes, Defining Methods, Defining Objects, Using Objects, Pointers to Objects, Structs, Unions

Unit 3: Methods, Member Objects and Static Members (4 Hrs.)
Constructors, Constructor Calls, Destructors, Inline Methods, Access Methods, const Objects and Methods, Standard Methods, this Pointer, Passing Objects as Arguments, Returning Objects, Member Objects, Member Initializers, Constant Member Objects, Static Data Members, Accessing Static Data Members, Enumeration

Unit 4: Overloading Operators (5 Hrs.)
Generals, Operator Functions, Operator Functions, Using Overloaded Operators, Global Operator Functions, Friend Functions, Friend Classes, Overloading Subscript Operators, Overloading Shift-Operators for I/O

Unit 5: Type Conversion for Classes and class hierarchies (4 Hrs.)
Conversion Constructors, Conversion Functions, Ambiguities of Type Conversions, Type Conversion in Class Hierarchies, Converting to Base Classes, Type Conversions and Assignments, Converting References and Pointers, Explicit Type Conversions

Unit 6: Dynamic Memory Allocation and Dynamic Members (4 Hrs.)
The Operator new, The Operator delete, Dynamic Storage Allocation for Classes, Dynamic Storage Allocation for Arrays, Members of Varying Length, Classes with a Dynamic Member, Creating and Destroying Objects, Implementing Methods, Copy Constructor, Assignment

Unit 7: Inheritance (7 Hrs.)
Concept of Inheritance, Derived Classes, Member Access, Redefining Members, Constructing and Destroying Derived Classes, Objects of Derived Classes, Protected Members, Multiple Derived Classes, Multiple Indirect Base Classes, Virtual Base Classes, Constructor Calls, Initializing Virtual Base Classes

Unit 8: Polymorphism (6 Hrs.)
Concept of Polymorphism, Virtual Methods, Destroying Dynamically Allocated Objects, Virtual Method Table, Dynamic Casts, Abstract Classes: Pure Virtual Methods, Abstract and Concrete Classes, Pointers and References to Abstract Classes, Virtual Assignment

Unit 9: Exception Handling (3 Hrs.)
Traditional Error Handling, Exception Handling, Exception Handlers, Throwing and Catching Exceptions, Nesting Exception Handling, Defining Your Own Error Classes, Standard Exception Classes

Unit 10: File Handling (3 Hrs.)
Files, File Streams, Creating File Streams, Open Modes, Closing Files, Reading and Writing Blocks, Object Persistence, Opening a File for Random Access, Positioning for Random Access, File State, Exception Handling for Files, Persistence of Polymorphic Objects

Unit 11: Templates (3 Hrs.)
Function and Class Templates, Defining Templates, Template Instantiation, Template Parameters, Template Arguments, Specialization, Default Arguments of Templates, Explicit Instantiation

Laboratory Works:
- The laboratory works should focus on developing programming skills through the implementation of programs with core logics
- There students should carry out project work in a group (max 4 students)

Recommended Books:

- Ulla Kirch-Prinz, Peter Prinz; "A Complete Guide to Programming in C++", Jones and Bartlett Publishers; Sudbury, Massachusetts
- Deitel and Deitel, C++ How to Program, Third Edition, Pearson Publication
- Joyce Farrell, Object-oriented programming using C++, Fourth Edition, Cengage Learning.