GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

# School of Computing Science and Engineering

Program: BCA

Scheme: 2018-2021

## Curriculum

### SEMESTER – I

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | CSJP1001 | Basic Japanese | 2 | 0 | 0 | 2 | 20 | 50 | 100 |
| 2 | SLBC1001 | Basic English | 0 | 0 | 4 | 2 | 20 | 50 | 100 |
| 3 | BCAS1110 | Discrete Mathematics | 3 | 0 | 0 | 4 | 20 | 50 | 100 |
| 4 | BCAS1120 | Digital Computer Fundamentals | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 5 | BCAS1130 | Introduction to Information Technology | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 6 | BCAS1140 | Programming Essentials in C | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 7 | BCAS1141 | Programming Essentials in C Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 8 | BCAS1131 | Information Technology Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| | | **Total** | **14** | **0** | **8** | **19** | | | |

### SEMESTER – II

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | ENVS1001 | Environmental Science | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 2 | SLBC1002 | Professional Communication | 2 | 0 | 2 | 2 | 20 | 50 | 100 |
| 3 | BCAS1008 | Data Structures | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 4 | BCAS1009 | Web Technology | 3 | 0 | 0 | 3 | 20 | 30 | 50 |
| 5 | BCAS1007 | Principle of Management | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 6 | BCAS1010 | Object Oriented Programming with C++ | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 7 | BCAS1011 | Data Structures Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 8 | BCAS1012 | Web Technology Lab | 0 | 0 | 2 | 1 | 20 | 30 | 50 |
| 9 | BCAS1013 | Object Oriented Programming with C++ Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| | | **Total** | **17** | **0** | **8** | **20** | | | |

### SEMESTER – III

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | BCAS2001 | Computer Architecture | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 2 | BCAS2002 | Database Management System | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 3 | BCAS2003 | JAVA Programming | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 4 | BCAS2004 | Introduction to Algorithm Analysis and Design | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 5 | LLL223 | Logical Skill Building | 3 | 0 | 0 | 2 | 20 | 50 | 100 |
| 6 | BCAS2006 | Enterprise Resource Planning | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 7 | BCAS2007 | Computer Networking | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 8 | BCAS2008 | Computer Networking Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 9 | BCAS2009 | Java Programming Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 10 | BCAS2010 | DBMS Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| | | **Total** | **21** | **0** | **6** | **23** | | | |

**SEMESTER – IV**

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | BCAS2015 | Operating System | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 2 | BCAS2016 | Software Engineering | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 3 | BCAS2025 | .Net technology | 3 | 0 | 0 | 3 | 20 | 30 | 50 |
| 4 | BCAS2021 | Linux Administration | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 5 | BCAS2013 | Graph Theory | 3 | 0 | 0 | 3 | 50 | - | 50 |
| 6 | BCA9001 | PE-1 - AI & ML | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 7 | BCA9003 | iOS, Android APP Development Lab | 0 | 0 | 4 | 2 | 50 | - | 50 |
| 8 | BCAS2026 | .Net technology Lab | 0 | 0 | 2 | 1 | 20 | 30 | 50 |
| 9 | BCAS2022 | Linux Administration Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 10 | BCA9002 | PE-1- AI & ML using Python Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 11 | LLL245 | Campus-to-Corporate | 0 | 0 | 4 | 2 | 50 | - | 50 |
| | | **Total** | **18** | **0** | **14** | **25** | | | |

**SEMESTER – V**

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | BCAS3002 | Mobile Application Development | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 2 | BCAS3003 | Computer Graphics | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 3 | BCAS3004 | E-Commerce | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 4 | BCAS3006 | Software Project Management | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 5 | | Elective-II | 3 | 0 | 0 | 3 | 20 | 50 | 100 |
| 6 | BCAS3005 | Computer Graphics Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 7 | BCAS3007 | Mobile Application Development Lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 8 | | Elective II lab | 0 | 0 | 2 | 1 | 50 | - | 50 |
| 9 | BCAS9998 | Project-I | 0 | 0 | 8 | 4 | 50 | - | 50 |
| | | **Total** | **15** | **0** | **14** | **22** | | | |

**SEMESTER – VI**

| S. No. | Course Code | Name of the Course | | | | | Assessment Pattern | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | IA | MTE | ETE |
| 1 | BCAS9999 | Project Work-2 | 0 | 3 | 30 | 15 | 50 | - | 50 |
| | | **Total** | **0** | **3** | **30** | **15** | | | |

# Detailed Syllabus

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Basic Japanese** | | | | |
| **Course Code** | **CSJP1001** | | | | |
| **Prerequisite** | NIL | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

1. This course attempts to give the students working knowledge of Japanese Language with emphasis on communicative competence.
2. This course will impart all the four skill viz. reading, writing, listening and speaking.
3. Basic Japanese sentences will be introduced and practiced.
4. Sufficient vocabulary will be given to the students to converse in a given situation such as, in a Coffee House, at the airport, in a restaurant and in the marketplace.
5. This course aims to give our students an interdisciplinary approach in order to compete with the globalized world.
6. This course will expose the students to a new culture and promote respect for the 'others' and inculcate tolerance.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Interpret simple sentences, and read short sentences and,paragraphs.(K3) |
| **CO2** | Apply simples sentences to discuss about their family members, friends etc.(K3) |
| **CO3** | Develop an understanding of Japanese society and culture.(K4) |
| **CO4** | Assess all the four skills viz. reading,writing,listening and speaking.. (K5) |

**Text Book (s):**

1. Shokyuu Nihongo, Japanese Language Center for International Students, Tokyo University of Foreign Studies, Japan.
2. Minna-no Nihongo-1, 3A Corporation, Japan.
3. Nihongo Shoho, Japan Foundation, Japan.
4. Nihongo Kana nyuumon, Japan Foundation, Japan.

**Reference Book (s):**

1. Random House Japanese-English Dictionary
2. Japanese for Busy people, Video CD, AJALT, Japan.

**Course Content:**

| **Unit-1 Introduction** | **6 Hours** |
|---|---|
| Introduction to Japanese sound structure, Vowels and Consonants, short and long vowels, pronunciation of two/three syllable words, and longer words<br>Introduction to Hiragana and Katakana ,<br>Greetings, Set phrases | |

| **Unit-2** | **6 Hours** |
|---|---|
| Basic sentence structure (SOV)<br>Demonstrative pronoun, Kore, Sore, Are and Dore (This, That, That over there, which). Kono, sono, Ano and Dono (this, that, that over there, which) Kochira, Sochira, Achira and Dochira (this way....) Koko, Soko, Asoko and Doko (Here, There….location) | |
| **Unit-3** | **6 Hours** |
| Numerals in Japanese, counting in Japanese Adjectives- I and Na<br>Be-verbs (arimasu, imasu)<br>Telling time in Japanese<br>Names of months, dates,<br>Audio/ video clips<br>Class test | |
| **Unit-4** | **6 Hours** |
| Desiderative sentences<br>Request sentences<br>Class room instructions in Japanese<br>Other useful expressions<br>Transitive and intransitive verbs | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **SLBC1001** | | | | |
| **Course Code** | **Basic English** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 0 | 0 | 4 | 2 | |

**Course Objectives:**

1. To expose students to communication challenges (verbal as well as non-verbal) in the professional environment
2. To define & interpret verbal and non-verbal messages
3. To express and present themselves effectively in business situations
4. To familiarize students with contemporary writing practices in the business environment

**Course Outcomes**

| | |
|---|---|
| **CO1** | To understand importance & various concepts of effective business communication |
| **CO2** | To enable students to understand significance and interpretation of Nonverbal communication |
| **CO3** | To understand & execute the concept, principles and various situations in Group Discussion & how to handle them. |
| **CO4** | To prepare the students for job interviews. |
| **CO5** | To familiarize students with contemporary writing practices in the business environment |

**Text Book (s)**

Meenakshi Raman, Prakash Singh, Business Communication, Oxford University Press

**Course Content:**

| |
|---|
| **Unit-1 : Professional Communication:** |
| Purpose, Process & Classification of Communication, Barriers of Communication, 7Cs of Communication |
| **Unit-2 : Non-Verbal Communication:** |
| Role of Non-Verbal Communication, Classification of Non-Verbal Communication, Guidelines for developing Non-Verbal Communication. |
| **Unit-3 : Written Communication:** |
| Structure & Layout of Business letters, Type of Letters: Sales, Order, Complaint, Enquiry, Memo, Circular, Notice, etc. |
| **Unit-4 : Spoken:** |
| Introduction to Pronunciation, Group Discussion, Mock Interviews |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Discrete Maths | | | | |
|---|---|---|---|---|---|
| Course Code | BCAS1110 | | | | |
| Prerequisite | | | | | |
| Corequisite | | | | | |
| Antirequisite | | | | | |
| | | L | T | P | C |
| | | 3 | 0 | 0 | 4 |

**Course Objectives:**

**The objective of this course is to:**

1. Teach the relevance of inference and algebraic theory to Computer Science Engineering problems.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Explain at high levels concepts and implement basic operations in discrete mathematics. |
| **CO2** | Perform combinatorial analysis to solve counting problems. |
| **CO3** | Develop mathematical models from computation theory to programming languages through combinatorics. |
| **CO4** | Use mathematical reasoning to comprehend and construct mathematical arguments, graphs. |
| **CO5** | Develop techniques for counting, permutations and combinations. |

**Text Book (s)**


1. Seymour lipschutz, Marc Lars Lipson, Theory and Problems of Discrete Mathematics Third Edition, Schaum's Outline Series McGRAW-HILL.
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Structures, PHI
3. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill


**Reference Book (s)**


1. Swapan Kumar Sarkar, A Textbook of Discrete Mathematics, S.Chand Publication
2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill
3. J.L. Mott, A. Kandelad T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, PHI, 2nd Edition, 1999.
4. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill


**Course Content:**

| **Unit-1: MATHEMATICAL LOGIC:** | **10 Hours** |
|---|---|
| Introduction, Propositions, Connectives, Truth tables, Tautologies and Contradictions, Equivalences implications, Normal forms, Methods of proof rules of inference for quantified propositions, Mathematical induction. | |
| **Unit-2: COMBINATORICS** | **6 Hours** |

| | |
|---|---|
| Basics of counting, Combinations of permutations, Enumeration of combination and permutation, Pigeonhole principle, Inclusion, Exclusion principle, Ordered and unordered portions. | |
| **Unit-3: RECURRENCE RELATIONS:** | **8 Hours** |
| Generating function of sequences, Calculating coefficients of generating functions, Recurrence relations, solving recurrence relations by substitutious and generating functions, Method of characteristic roots, Solution of homogenous recurrence relations | |
| **Unit-4: GRAPH THEORY:** | **8 Hours** |
| Basic concepts of graph theory, Diagraph, Paths, Reachability connectedness, Matrix representation of graphs, Subgraphs, Isomorphisms trees, Properties, Directed tress, Binary trees. | |
| **Unit-5: BOOLEAN ALGEBRA:** | **8 Hours** |
| Post, Hasse diagrams, Lattices, Types of Lattices, Boolean Algebra, Basic theorems, Applications. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Digital Computer Fundamentals | | | |
|---|---|---|---|---|
| Course Code | BCAS1120 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

The purpose of this course is to provide digital computer fundamentals. The main goal of the course is to introduce students to the number system conversion from one base to another, to solve equations using Karnaugh map and Tabulation method, design circuits for binary adder, code converter, multiplexer, arithmetic circuits and accumulator.

**Course Outcomes**

| | |
|---|---|
| CO1 | Develop an understanding of the number system |
| CO2 | Design the logic gates And solve K-maps Problems. |
| CO3 | Understand the logics of Adder, Multiplexer and encoder-decoder. |
| CO4 | Understand the Flip-flops and application of flip-flops |
| CO5 | Understand Registers and Memory classification. |

**Text Books**

1. M. Morris Mano – Digital Logic and Computer Design, 3rd Ed, PHI – 1994.

**Reference Books**

**1** A.P. Malvino and D.P. Leach – Digital Principles and Applications – Fourth Edition – Tata McGraw Hill Edition – 1999.

**Course Content:**

| **Unit-1 :** | **8 Hours** |
|---|---|
| Introduction – Converting Numbers from One Base to Another – Complements – Binary Codes – Integrated Circuits – Boolean Algebra – Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms. | |
| **Unit-2 :** | **8 Hours** |
| Logic Gates – Karnaugh Map Up to 3 Variables – Don't Care Condition – Sum of Products and Products of Sum Simplification. | |
| **Unit-3 :** | **8 Hours** |
| Adder – Subtractor – Code Converter – Multilevel NAND and NOR Circuits – Binary Parallel Adder – Decimal Adder – Binary Multiplier-Binary Divider-Decoders – Encoder – Multiplexers-Demultiplexer. | |
| **Unit-4 :** | **8 Hours** |
| Flip Flops – Triggering of Flip Flops – Design of Counters –Ripple Counters. | |
| **Unit-5 :** | **8 Hours** |

| |
|---|
| Registers – Shift Registers –Memory Devices – Introduction,Classificationof Memories ,Basic Memory Structure ,RAM,ROM,PLA. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **INTRODUCTION TO INFORMATION TECHNOLOGY** | | | | |
| **Course Code** | **BCAS1130** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 3 | 0 | 0 | 3 | |

**Course Objectives:**

The purpose of this course is to provide basic concepts of Information Technology, database management systems, spreadsheets, word processing, Networking and Multimedia.

**Course Outcomes**

| | |
|---|---|
| CO1 | Understand the basics of Information System and GPS |
| CO2 | Understand about Computer System, CPU, Microprocessor and I/O. |
| CO3 | Learn about the I/O Devices and storage Media. |
| CO4 | Understand about the Software, word processing, spreadsheets and database Application. |
| CO5 | Understand the Network Application, Tools of multimedia. |

**Text Book (s)**

1. D.P. Curtin, K. Foley, K. Sen and C. Morin, Information Technology – The Breaking Wave, TMH Edition – 1999.

**Reference Book (s)**


**1** Sawyer, Williams and Hutchinson, Using Information Technology – Brief Version, McGraw Hill International Edition – 2003.

**2** Fundamentals of Information Technology, Alexis Leon & Mathews Leon–Vikas Publishing House Pvt. Ltd. – 1999.


**Course Content:**

| **Unit-1 : Introduction** | **8 Hours** |
|---|---|
| IT an Introduction – Information Systems – Software and Data – IT in Business, Industry, Home, at Play, Education, Training, Entertainment, Arts, Science, Engineering and Maths – Computers in Hiding – Global Positioning System (GPS). | |
| **Unit-2 : Technology** | **8 Hours** |
| Types of Computers – Anatomy of a Computer – Foundations of Modern Information Technology – The Central Processing Unit – How Microprocessors and Memory Chips are Made – Memory – Buses for Input and Output – Communication With Peripherals. | |
| **Unit-3 : Devices** | **8 Hours** |

| | |
|---|---|
| I/O Devices – Inputting Text and Graphics – State of the Art – Input and Output – Pointing Devices – Foundations of Modern Output – Display Screens – Printers – Foundations of Modern Storage – Storage Media – Increasing Data Storage Capacity – Backing up your Data – The Smart Card. | |
| **Unit-4 : Interfaces** | **8 Hours** |
| Software – User Interfaces – Application Programs – Operating Systems – Document – Centric Computing – Major Software Issues – Network Computing – Word Processing and Desktop Publishing – Spreadsheet and Database Applications. | |
| **Unit-5 : Networks** | **8 Hours** |
| Network Applications – Foundation of Modem Networks – Local Area Networks – Wide Area Networks – Links Between Networks – Networks: Dial–up Access – High Bandwidth Personal Connections – Multimedia – Tools of Multimedia – Delivering Multimedia – Multimedia on Web. | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Programming Essentials in C | | | | |
|---|---|---|---|---|---|
| Course Code | BCAS1140 | | | | |
| Prerequisite | | | | | |
| Corequisite | | | | | |
| Antirequisite | | | | | |
| | | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

The objective of this course is to introduce the students to the concepts of C programming with emphasis on the following topics Functions, Arrays, Pointers, Structures, Files. This course fully covers the basics of programming in C language and demonstrates fundamental programming techniques, customs and vocabulary including the most common library functions and the usage of the pre-processor.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the working and architecture of 'C' |
| **CO2** | Understand when and how to take decisions, to compare and iterate, to simplify the problems. |
| **CO3** | Students should be able to implement syntax and logics for development according to user account, implement algorithmic solutions in a programming language. |
| **CO4** | Solve problems of limited scope by writing programs using the concepts taught. |
| **CO5** | To allow the student to write their own programs using standard language infrastructure regardless of the hardware or software platform. |

**Text Books**

1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004.

**Reference Books**

1. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999
2. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988
3. Infosys Foundation program, Volume 1

**Course Content:**

| **Unit-1 : Introduction** | **8 Hours** |
|---|---|
| Identifiers - Keywords- Data Types - Access Modifiers - Data Type Conversions - Operators - Conditional Controls - Loop Controls- Input / Output Operations - Character Test Functions. | |
| **Unit-2 : Arrays** | **8 Hours** |
| Arrays - One Dimensional Arrays - Two Dimensional Arrays - Multi Dimensional Arrays - Handling of Character Strings - String - Handling Functions - Table of Strings - enum - Typedef. | |
| **Unit-3 : Functions** | **8 Hours** |
| User Defined Functions - Need for User Defined Functions - Category of Functions - Nesting of Functions - Recursion - Functions with Arrays - Storage Classes - Macros and Preprocessors. | |
| **Unit-4 : Structures** | **8 Hours** |
| Structures - Array of Structures - Arrays within Structures - Structures within Structures - Structures and Functions - Unions - Size of Structures. | |

| | |
|---|---|
| **Unit-5 : Pointers** | **8 Hours** |
| Pointers - Pointer Variables - Passing Pointers to Functions - Pointers and One Dimensional Array - Dynamic Memory Allocation - Pointers and Multi Dimensional Arrays - Arrays of Pointers - Pointers to Structures – Data files - Opening and Closing a Data file - Creating a Data file - Processing a Data file - Unformated Data file. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | |
|---|---|---|---|---|
| **Name of The Course** | **Environment Science** | | | |
| **Course Code** | **ENVS 1001** | | | |
| **Prerequisite** | | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**

1. Introduce the fundamentals and abstract concepts of environment studies.
2. Learn how concepts of social issues and the environment studies are useful in realistic problem solving.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Students will understand the need for eco-balance |
| **CO2** | Also, Knowledge on the method of pollution prevention |
| **CO3** | Understand the knowledge of Environmental Pollution |
| **CO4** | Demonstrate Social Issues and the Environment |
| **CO5** | Students able to understand Human Population and the Environment |

**Text Book (s)**

1. Kurian Joseph & R. Nagendran, "Essentials of Environmental Studies", 1st Edition , Pearson Education, 2004.

**Reference Book (s)**

1. Keerthinarayana & Daniel Yesudian,"Environmental Science and Engineering",1st Edition, Hi-Tech publications, 2004.
2. Erach Bharucha, "A Text Book for Environmental Studies", Text Book of University Grants Commission, 2004.
3.Metcalf & Eddy,"Wastewater Engineering: Treatment and Reuse", New Delhi, TMH

**Course Content:**

| **Unit-1 : Environment & Natural Resources** | **8 Hours** |
|---|---|
| Definition, scope, importance, need for public, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, land slides, soil erosion, desertification & case studies. | |
| **Unit-2 : Ecology & Bio-Diversity** | **8 Hours** |
| Concept of ecosystem, structure & function of an ecosystem, producers, consumers and decomposers, energy flow, ecological succession, food chains, food webs and ecological pyramids. Bio diversity: Definition, genetic, species and ecosystem diversity, bio-geographical classification of India, | |

| | |
|---|---|
| hotspots, threats related to habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of bio-diversity. | |
| **Unit-3 : Environmental Pollution** | **8 Hours** |
| Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid `waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides. | |
| **Unit-4 : Social Issues and the Environment** | **8 Hours** |
| Urban problems related to energy & sustainable development, water conservation, rain water harvesting, watershed management, problems related to rehabilitation – case studies, Wasteland reclamation, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. | |
| **Unit-5 : Human Population and the Environment** | **8 Hours** |
| Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology – Visit to local polluted site / Case Studies. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Professional Communication | | | | |
|---|---|---|---|---|---|
| Course Code | SLBC1002 | | | | |
| Prerequisite | | | | | |
| Corequisite | | | | | |
| Antirequisite | | | | | |
| | | L | T | P | C |
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

**The objective of this course is to:**

1. Make students understand that both oral & written communications are equally important.
2. The students should be comfortable with both verbal & written communication.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Students understand the value of business communication, written & presentation skills in professional life. |
| **CO2** | Students should be well equipped with business & written communication with effective presentation skills. |
| **CO3** | Students understand the Forms of Technical Communication |
| **CO4** | Students able to understand presentation strategies |
| **CO5** | Understand the fundamentals of human relations |

**Text Book (s)**

1 Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .
2 Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.

**Reference Book (s)**

1 Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi.
2 Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
3 How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
4 Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5 Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
6 Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

**Course Content:**

| **Unit-1 : Basics of Technical Communication** | **8 Hours** |
|---|---|
| Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication. | |
| **Unit-2 : Constituents of Technical Written Communication** | **8 Hours** |
| Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: | |

| | |
|---|---|
| Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps. | |
| **Unit-3 : Forms of Technical Communication** | **8 Hours** |
| Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes. Official Letters: D.O. Letters; Govt. Letters, Letters to Authorities etc. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing. | |
| **Unit-4 : Presentation Strategies** | **8 Hours** |
| Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time-Dimension. | |
| **Unit-5 : Fundamentals of Human Relations:** | **8 Hours** |
| Intra-personal, Interpersonal and Group Relationships, Transactional Analysis Implications for Managers in Organizational Context. Formal Written Communication: Official Letters, Report, Writing: Categories Formats, Memorandums and Circulars, Agenda and Minutes, Resume, Drafting Advertisements. Enquires and Replies, Quotations, Voluntary Offers, Placing of Order, Cancellation of Order, Complains and Adjustments. Formal Verbal Communication: Group Discussion, Interview, Extempore, Business Negotiation, Public Speaking, Meeting, Toasting, Counselling, Business Presentation. Negotional Skills. Social Skills for Managers: Update of Etiquettes a Manager should observe in Various Formal and Informal Situations; The Knowledge of Body Language. | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Data Structures | | | |
|---|---|---|---|---|
| Course Code | BCAS1008 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**

1. Introduce the fundamentals and abstract concepts of Data Structures.
2. Introduce searching, sorting techniques
3. Learn how concepts of data structures are useful in problem solving.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Use and implement appropriate data structure for the required problems using a programming language such asC/C++. |
| **CO2** | Analyze step by step and develop algorithms to solve real world problems. |
| **CO3** | Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs. |
| **CO4** | Understand various searching & sorting techniques. |
| **CO5** | Use and implement appropriate data structure for the required problems using a programming language such asC/C++. |

**Text Book (s)**

1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.
2. Data Structure and algorithm using C :By R.S.Salaria-Khanna Publication.
3. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publication

**Reference Book (s)**

1 Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein “Data Structures Using C and C++” , PHI
2 Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill
3 R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education
4 Lipschutz, “Data Structures” Schaum’s Outline Series, TMH
**5** G A V Pai, “Data Structures and Algorithms”, TMH

**Course Content:**

| **Unit-1 : Introduction to Data Structure** | **8 Hours** |
|---|---|
| Introduction, Basic Terminology : Data and information, ADT, Data Organization and types of Data Structure. | |
| **Unit-2 : Arrays** | **8 Hours** |
| Representation of Linear Arrays, Types of Arrays : 1D,2D & M-D Concept, Sorting & Searching Algorithms-Bubble,Selection,Merge, Quicksort, linear and binary search. Type of Memory Allocations | |

| **Unit-3 : Linked List** | **8 Hours** |
|---|---|
| Concept of Linked List, Representation of linked List in memory, Memory Allocation, Garbage Collection ,Overflow and Underflow, Traversing a linked list, Searching a linked list, Insertion & Deletion in Linked List, More types of linked list: Header Linked List , Two way List and Circular linked list. | |
| **Unit-4 : Stacks, Queues , Recursion** | **8 Hours** |
| Concepts of Stack, Operation on Stack, Array Representation of Stack, Arithmetic Expression POLISH Notation, Concepts of Queue, Operation on Queue, Representation of queues, Other types of queue: Priority Queues, Deque and Circular queue. Recursion : factorial number, Fibonacci series and Tower of Honai | |
| **Unit-5 : Introduction of Trees and Graph** | **8 Hours** |
| Introduction of Trees – Binary Trees –Binary Search Trees. Types of Graph | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | |
|---|---|---|---|---|
| **Name of The Course** | **Web Technology** | | | |
| **Course Code** | **BCAS1009** | | | |
| **Prerequisite** | | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**
The student will gain knowledge behind the concepts of Web Designing as a whole and the technologies that constitute its development. By building sample applications, the student will get experience and be ready for large-scale projects.

**Course Outcomes**

| | |
|---|---|
| **CO1** | The student will gain programming skills both in basic and advanced levels. |
| **CO2** | Demonstrate the knowledge and able to apply the design principles, techniques and technologies to the development of creative websites. |
| **CO3** | Demonstrate the concept of VBScript |
| **CO4** | Applications of ASP |
| **CO5** | Understand the concept of database system and file system |

**Text Book (s)**

Web Design: A Complete Introduction by Nigel Chapman and Jenny Chapman. John Wiley & Sons, 2006

**Reference Book (s)**


1 HTML 4.0, No Experience required – E. Stephen Macj, J. Platt (bpb)
2 Completer Reference HTML - Thomas A. Powell (TMH)
3 Dynamic HTML in action - Michele Petrovisjy (TMH)
4 Unleashed HTML - (Techmedia SAMS)


**Course Content:**

| **Unit-1 : Introduction and HTML** | **8 Hours** |
|---|---|
| Basic web designing: Introduction to web browser, architecture of web browser, web page, static & dynamic web pages, home page, web-site, Web-servers & clients, www. Introduction to HTML: History, structure of HTML document, creating & executing HTML. Tags of HTML, Creating Lists & Links, Creating Bookmarks, Image tags, Tables and Frames tags. Forms and CSS: Understanding Form, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. Creating CSS, applying CSS to HTML documents. Use of <META> Tag. | |
| **Unit-2 : JavaScript** | **8 Hours** |
| JavaScript: Introduction: Scripting Language, The Use of JavaScript, Using Javascript in an HTML document, <SCRIPT> Tag. Overview of Javascript Programming: Variable, Scope of variables, | |

| | |
|---|---|
| number & string, Operators Statements: if-else, for, while, break, continue, for-in, new, return. Arrays, JavaScript Functions & Objects, Document Object Model (DOM), Hierarchy of objects. Properties & Methods of Objects, Event Handling & Form Validation. | |
| **Unit-3 : VBScript** | **8 Hours** |
| Introduction, VBScript Statements and loops, Arrays, VBScript objects, VBScript layout statements, error handling, adding objects, Forms, Controls & managing transactions, VBScript event programming, Procedures & Functions | |
| **Unit-4 : ASP** | **8 Hours** |
| Introduction, Variables, Data types of ASP, Statements, Request & Response Objects: Response Object - buffering page, page caching, Request Object – QueryString collection, form collection, server-variables collection, working with HTML forms, retrieving form data suing text boxes, textareas, buttons, checkboxes, select lists. Form validation, Session & Application Object. | |
| **Unit-5 : Database and File system** | **8 Hours** |
| ASP with Databases: Connection and data sources, creating connections with OLEDB and ODBC, connecting to SQL server with OLEDB and ODBC, connection to MS-Access, Executing SQL statements. Working with Record set, File System Object(FSO), Folder object. | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | |
|---|---|---|---|---|
| **Name of The Course** | **Principle of Management** | | | |
| **Course Code** | **BCAS1007** | | | |
| **Prerequisite** | | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**

1. provide a basis of understanding to the students with reference to working of business organization through the process of management

**Course Outcomes**

**At the end of the course student will be able to:**

| | |
|---|---|
| **CO1** | Student will understand the basic principles of management - will acquaint himself with management process, functions and principles. |
| **CO2** | Student will also get the idea about new developments in management |
| **CO3** | Understand functions of management- part-I |
| **CO4** | Understand functions of management- part-II |
| **CO5** | Understand strategic management and recent trends in management |

**Text Book (s)**

1. Essential of Management - Horold Koontz and Iteinz Weibrich -McGrawhills International

**Reference Book (s)**

1. Management Theory & Practice - J.N.Chandan.
2. Essential of Business Administration - K.Aswathapa Himalaya Publishing House
3. Principles & practice of management- Dr. L.M.Parasad, Sultan Chand & Sons-New Delhi
4. Business Organization & Management - Dr. Y.K. Bhushan.
5. Management: Concept and Strategies by J. S. Chandan, Vikas Publishing.
6. Principles of Management by Tripathi, Reddy Tata McGraw Hill

**Course Content:**

| | |
|---|---|
| **Unit-1 : Nature of Management** | **8 Hours** |
| Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization | |
| **Unit-2 : Evolution of Management Thought** | **8 Hours** |
| Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Various approaches to management (i.e. Schools of management thought)Indian Management Thought | |
| **Unit-3 : Functions of Management- Part-I** | **8 Hours** |

| |
|---|
| Planning - Meaning - Need & Importance, types levels - advantages & limitations. Forecasting - Need & Techniques Decision making - Types - Process of rational decision making & techniques of decision making Organizing - Elements of organizing & processes Types of organizations, Delegation of authority - Need, difficulties in delegation - Decentralization Staffing - Meaning & Importance Direction - Nature - Principles Communication - Types & Importance Motivation - Importance - theories Leadership - Meaning - styles, qualities & functions of leaders . |

| **Unit-4 : Functions of Management- Part-II** | **8 Hours** |
|---|---|
| Controlling-Need, Nature, importance, Process & Techniques, Coordination - Need – Importance | |

| **Unit-5 : Strategic Management and Recent Trends in Management** | **8 Hours** |
|---|---|
| Strategic Management :Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India<br>Recent Trends in Management: Social Responsibility of Management – environment friendly management, Management of Change, Management of Crisis , Total Quality Management Stress Management, International Management | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Object Oriented Programming With C++** | | | | |
| **Course Code** | **BCAS1010** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

1. Introduce the fundamentals and abstract concepts of object oriented programming.
2. Introduce basic features of object oriented programming such as data hiding, operator overloading, inheritance are given emphasis
3. Learn how concepts of object oriented are useful in problem solving using C++.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Use and implement appropriate technique for the required problems using C++. |
| **CO2** | Analyze step by step and develop programs to solve real world problems. |
| **CO3** | Implementing various problems, which involve object orientation using C++. |
| **CO4** | Demonstrate the concept of class in C++. |
| **CO5** | Understand the concept of I/O streams in C++. |

**Text Book (s)**


1. Herbert Schildt, C++ - The Complete Reference, Third Edition -Tata McGraw Hill - 1999.
2. Bruce Eckel, Thinking in C++, Second Edition, Volume One, Pearson Education Asia, 2000.


**Reference Book (s)**


1. Object Oriented Programming in C++ by Robert Lafore Techmedia Publication.
2. The complete reference C – by Herbert shieldt Tata McGraw Hill Publication.
3. Object Oriented Programming in C++ Saurav Sahay Oxford University Press.
4. Object Oriented Programming in C++ R Rajaram New Age International Publishers 2nd.
5. OOPS C++ Big C++ Cay Horstmann Wiley Publication.


**Course Content:**

| **Unit-1 : Introduction: Basic Terminology** | **8 Hours** |
|---|---|
| Introduction to OOP- Overview of C++ - Classes - Structures - Union - Friend Functions - Friend Classes - Inline Functions - Constructors - Destructors - Static Members - Scope Resolution Operator. | |
| **Unit-2 : POINTERS** | **8 Hours** |
| Array of Objects - Pointer to Object - This Pointer - References - Dynamic Memory Allocation - Function Overloading - Default Arguments - Overloading Constructors. | |
| **Unit-3 : OPERATORS** | **8 Hours** |
| Operator Overloading - Member Operator Function - Friend Operator Function - Inheritance - Types of Inheritance - Protected Members - Virtual Base Class - Polymorphism - Virtual Functions - Pure Virtual Functions. | |

| **Unit-4 : CLASS** | **8 Hours** |
|---|---|
| Class Templates and Generic Classes - Function Templates and Generic Functions - Overloading a Function Template - Exception Handling - Namespaces. | |
| **Unit-5 : I/O STREAMS** | **8 Hours** |
| I/O Streams - Formations I/O with ios Class Functions and Manipulators - Overloading - File I/O. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | COMPUTER ARCHITECTURE | | | |
|---|---|---|---|---|
| Course Code | BCAS2001 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

To introduce students to the different functional units of a computer system and to describe the various concepts of the same.

**Course Outcomes**

| | |
|---|---|
| **CO1** | understand the concepts of arithmetic operations on integer & decimal data, the input-output process and memory management. |
| **CO2** | Be familiar with the Von Neumann architecture |
| **CO3** | Be familiar with the cost-performance issues and design trade-offs in designing and constructing a computer processor including memory |
| **CO4** | Be familiar with the basic knowledge the design of digital logic circuits and apply to computer organization |
| **CO5** | understand the concepts of arithmetic operations on integer & decimal data, the input-output process and memory management. |

**Text Book (s)**

1 M. M. Mano – Computer System Architecture – 3rd Edition – PHI – 1994.

**Reference Book (s)**

1. Subrata Ghoshal-Computer Architecture and Organization-First Impression-Pearson-2011
2. J. P. Hayes – Computer Architecture and Organization – McGraw–Hill – 1988 3rd Edition.

**Course Content:**

| **Unit-1 : Register Transfer and Microoperations** | **9 Hours** |
|---|---|
| Register Transfer Language-Register Transfer-Bus and Memory Transfers-Arithmetic Microoperations-Logic Microoperations-Shift Microoperations-Arithmetic Logic Shift Unit-Basic Computer organization and design-Instruction Codes-Computer Registers-Computer Instructions-Timing and Control- Instruction Cycle- Memory Reference Instructions-Input Output and Interrupt-Complete Computer Description-Design of Basic Computer-Design of Accumulator Logic | |
| **Unit-2 : Central Processing Unit** | **8 Hours** |
| Introduction-General Register Organization-Stack organization, Instruction Format, Addressing Modes-Data Transfer and Manipulation-Program Control. | |
| **Unit-3 : Computer Arithmetic** | **8 Hours** |
| Computer Arithmetic – Addition and Subtraction – Multiplication and Division Algorithms – Floating-Point and decimal Arithmetic operations | |
| **Unit-4 : Input–Output Organization** | **7 Hours** |

| | |
|---|---|
| Input–Output Organization – Peripheral devices – I/O Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory – Access I/O Processor | |
| **Unit-5 : Memory Organization** | **8 Hours** |
| Memory Hierarchy – Associative Memory- Cache Memory -Virtual Memory. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Database Management System** | | | | |
| **Course Code** | **BCAS2002** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**

1. Explain data management and the use of various techniques in the manipulation of data subject to various constraints.
2. Describe the entity relationship diagram and to explain the basic concepts of database recovery, concurrency control, security and integrity.

**Course Outcomes**

| | |
|---|---|
| CO1 | Identify data relationships and to design relational database tables adopting the normalization rules. |
| CO2 | Students able to understand E-R Modeling. |
| CO3 | Be familiar with the concept of Normalization. |
| CO4 | Understand the concept of Data Models. |
| CO5 | Be familiar with the concept of Back Up & Recovery. |

**Text Book (s)**

1. Henry F. Korth and Abraham Silberschatz: Database system concepts, McGraw Hill International Publication, 1988 (Chapters 1 to 6 and 9 to 13), 2nd Edition,1991.

**Reference Book (s)**

1. Jeffrey D Ullman: Principles of data Base systems, Galgotia Publishers, 2nd Edition 1994.
2. C.J. Date, An Introduction to database Systems, Third Ed., Narosa 3rd Edition 1995.

**Course Content:**

| | |
|---|---|
| **Unit-1 : Introduction: Basic Terminology** | **8 Hours** |
| Introduction: Purpose of Database systems - overall system structure – Data Model | |
| **Unit-2 : E-R Modeling** | **8 Hours** |
| Entity relationship model: entities and entity sets relationships - mappings constraints - primary keys - E.R diagram. | |
| **Unit-3 : Normalization** | **8 Hours** |
| Relational database design: pitfalls – Normal Forms - 1 NF, 2NF 3NF and BCNF | |
| **Unit-4 : Data Models** | **8 Hours** |
| Basic concepts of Hierarchical data model – Tree structure diagram, Network Data Model-Data Structure diagram. | |

| | |
|---|---|
| **Unit-5 : Back Up & Recovery** | **8 Hours** |
| Basic concepts of database recovery -concurrency control - Database security and integrity | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | JAVA Programming | | | | |
|---|---|---|---|---|---|
| Course Code | BCAS2003 | | | | |
| Prerequisite | | | | | |
| Corequisite | | | | | |
| Antirequisite | | | | | |
| | | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**
Introduce students Core Java Concepts and to teach students the basic concepts of Java programming. This course covers preliminaries, I/O streaming and file handling and teach students how to program applets in Java, networking and allow the students to implement effectively.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Implement and use efficiently the java programs, can develop applets, able to access database with JDBC, work with networking protocols using java with attractive GUI . |
| **CO2** | **Understand the concept of Control Statements in JAVA** |
| **CO3** | **Be familiar with string's in JAVA** |
| **CO4** | **Understand Exception Handling in JAVA** |
| **CO5** | **Understand IO Package in JAVA** |

**Text Book (s)**

1. R. Naughton and H. Schildt – Java2 (The Complete Reference) – Fifth Edition – TMH – 2004.

**Reference Book (s)**

1. K. Arnold and J. Gosling – The Java Programming Language – 3rd Edition., Pearson Edu,2005
2. David Flanagan – Java in a Nutshell: A Desktop Quick Reference for Java Programmers– O'Reilly & Associates, Inc. 1999
3. Bruce Eckel –Thinking in Java – Prentice Hall, 2nd Ed 2002.

**Course Content:**

| **Unit-1 : Introduction** | **8 Hours** |
|---|---|
| Introduction - Object oriented fundamentals, History-Java and the Internet-Java Applets and Applications, Features of Java, Java Virtual Machine (JMV), Byte-Code ,JAVA buzzwords, JAVA Environments, Command Line Arguments, Java program structure, Reserved keywords, Identifiers, Literals, Operators, Separators, Variables, Declaring a variable, Scope and lifetime of variables, Data types, Type conversion, casting | |
| **Unit-2 : Control Statements** | **8 Hours** |
| Control Statements, Arrays- One-Dimensional Arrays, Two-dimension Array, Vectors, Operators-Arithmetic, Boolean logical, Relational and Bitwise operators-Operator Precedence. Class :Fundamentals ,The General Form of a Class ,A Simple Declaring Objects, Assigning Object Reference Variables, Methods: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing ,Returning Objects, Recursion Introducing Access Control, Overriding | |

| | |
|---|---|
| Methods, Final Variables and Methods, Final class, Finalizer Methods, Abstract Methods and Class, Visibility Control, Constructors | |
| **Unit-3 : String** | **8 Hours** |
| String : Strings, String Constructors, String length, String Literals, String Concatenation, data types-String conversion. Inheritance : basic ,Types of Inheritance, Member Access, Creating a Multilevel Hierarchy, When Constructors Are Called Method Overriding, Why Overridden Methods?, Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding . Using final to Prevent Inheritance, Packages and Interfaces. | |
| **Unit-4 : Exception Handling** | **8 Hours** |
| Exception Handling: Exceptions Exception hierarchy, Try, Catch, Finally, Throw. | |
| **Unit-5 : IO Package** | **8 Hours** |
| Java.io Package-I/O Basics-Reading console Input-Writing console output Print Writer class-Reading and Writing files-Java I/O classes, Byte Stream Classes, Character Stream. | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | |
|---|---|---|---|---|
| **Name of The Course** | **INTRODUCTION TO ALGORITHM ANALYSIS & DESIGN** | | | |
| **Course Code** | **BCAS2004** | | | |
| **Prerequisite** | Fundamentals of programming & Data structures | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

To introduce students, the concepts of algorithm analysis for find out the space and time complexity of different algorithms. Different design techniques such as greedy method, divide and conquer, backtracking, dynamic programming, branch and bound are to be studied for finding the solution to the different problems. It also provides an insight into the basic concepts of NP and NP-hard problems and their relevance in research.

**Course Outcomes**

| | |
|---|---|
| **CO1** | On completion of this subject the student shall be able to find out the efficiency of algorithms for different problems. |
| **CO2** | Students able to understand data structure concepts |
| **CO3** | Understand advance design and analysis techniques |
| **CO4** | Understand the concept of Graph Algorithms |

**Text Book (s)**

T. Cormen, C.E. Leiserson, R.L. Rivest & C. Stein – Introduction to Algorithms – PHI – 2nd Edition, 2005.

**Reference Book (s)**

1. Knuth E. Donald, Art of Computer Programming Sorting and Searching Vol3, Second Edition, Pearson Education.
2. Brassard Bratley, “Fundamental of Algorithms”, PHI
3. A V Aho etal, “The Design and analysis of Algorithms”, Pearson Education
4. Adam Drozdek, “Data Structures and Algorithms in C++”, Thomson Asia

**Course Content:**

| | | |
|---|---|---|
| **Unit I** | **Introduction to Algorithms** | **8 Hours** |
| **Introduction to Algorithms & Analysis**- Design of Algorithms, Growth of function, Complexity of Algorithms, Asymptotic Notations, Recurrences. | | |
| **Sorting:** Insertion Sort, Quick Sort, Merge Sort | | |
| **Unit II** | **Advance Data Structure** | **8 Hours** |
| Advanced Data Structure: Binary Search Trees,Red Black Trees | | |
| **Unit III** | **Advance Design and Analysis Techniques** | **8 Hours** |
| Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm | | |
| **Unit IV** | **Graph Algorithms** | **8 Hours** |
| Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal’s Algorithms, Prim’s Algorithms, Single Source Shortest Path | | |

| Unit V | Special Topics in AAD | 8 Hours |
|---|---|---|
| String Matching, Introduction of NP-Hard and NP-Completeness , Matrix Operations | | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Enterprise Resource Planning and Management | | | |
|---|---|---|---|---|
| **Course Code** | **BCAS2006** | | | |
| **Prerequisite** | | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

The objective of this course is to:

1. To know what is ERP.
2. To learn different ERP technologies

**Course Outcomes**

| | |
|---|---|
| **CO1** | Learn about mobile technology. |
| **CO2** | Understand enterprise modelling and integration technologies |
| **CO3** | Understand ERP And related technologies |
| **CO4** | Students able to understand ERP Implementation |
| **CO5** | Understand ERP System technologies. |

**Text Book (s)**

1. ERP : Demystified – Alexis Leon (Tata McGraw Hill)
2. ERP – Ravi Shankar and S. Jaiswal (Galgotia)

**Reference Book (s)**

1. Lee C.Y.& William (1997), “Mobile Cellular Telecommunication”, McGraw Hill Inter Edition.

**Course Content:**

| **Unit-1 :** ERP : An Overview | **8 Hours** |
|---|---|
| What is ERP - Reasons for Growth Of ERP - Problem areas in ERP implementations-The future of ERP - Characteristics and features of ERP - Benefits of ERP. | |
| **Unit-2 :** Enterprise Modelling and Integration for ERP | **8 Hours** |
| Enterprise-An overview - What is enterprise - Integrated Management Information - The role of enterprise - Business modelling - Integrated Data Model - Role of Common/Shared -Enterprise Database - Linkages of the Enterprise - Establishing Customer-Enterprise Link Establishing Vendor-Enterprise Link - Establishing Links within the Enterprise -Establishing Links with Environment - Scope of Enterprise system - Generic Model of ERP System - Client/Server Architecture and Enterprise wide Computing - Characteristics of client/Server Architecture - Different Components of ERP Client/Server Architecture | |
| **Unit-3 :** ERP And related Technologies | **8 Hours** |
| BPR(Business Process reengineering) – Definition - BPR –The different phases<br>Enterprise Redesign Principles - BPR and IT - Data Warehousing - Data Warehouse Components - Structure and Uses of Data Warehouse - Data Mining - What Is Data Mining<br>Data Mining Process - Advantages and Technologies Used In Data Mining - OLAP<br>Supply Chain Management - Definition - Stevan’s Model - Benefits - ERP Vs SCM<br>CRM | |

| | |
|---|---|
| **Unit-4 :** ERP Implementation | **7 Hours** |
| Evolution - Evolution of ERP - Evolution of Packaged Software Solutions - The Obstacles in ERP implementation - ERP Implementation Lifecycle (Different Phases) - Implementation Methodology - ERP Implementation - The Hidden Costs -In-house Implementation-Pros and Cons - Vendors and role of vendors for ERP - Consultants and role of consultants for ERP. | |
| **Unit-5 :** Technologies In ERP System | **9 Hours** |
| Introduction - Electronic Data Interchange(EDI) - Use of EDI - Evolution of EDI<br>Benefits of the EDI - EDI Standards - EDI Services - EDI Components - EDI Administration<br>IDoc Application - EDI Integration - ALE Integration - Internet Integration - OCR Integration | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Computer Networking | | | |
|---|---|---|---|---|
| Course Code | BCAS2007 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

**The objective of this course is to:**

1. Teach fundamental concepts of networks.
2. Give hands on training of network installation and configuration.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand basic of networking from the user's, developer's and administrator's perspective. |
| **CO2** | Students able to Physical Layer and Data Link Layer |
| **CO3** | Understand the concept of Network Layer |
| **CO4** | Demonstration of Transport and Application Layer |
| **CO5** | Students able to known network administration |

**Text Book (s)**


1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4 thEd. 2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", Tata MCGraw Hill,
3. William stallings, "Data and computer communications", Pearson education Asia, ,


**Reference Book (s)**


1. MCSE: Networking Essentials Study Guide -- Tata McGrawHill Publication
2. MCSE: Windows 2000 N/W Infrastructure design - Tata McGraw Hill Publication


**Course Content:**

| **Unit-1 : Basic Concepts, Network Reference Models** | **8 Hours** |
|---|---|
| Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks (LAN,WAN,PAN). Network Topologies ( Bus, Star, Ring, Star Bus, Star Ring and Physical Mesh) , OSI and TCP/IP Models: Layers and their functions, comparison of models. | |
| **Unit-2 : Physical Layer and Data Link Layer** | **8 Hours** |
| Transmission Media: Guided and Unguided. CSMA, Ethernet, FDDI, Token Ring ,Wireless LAN. DLL: Basic functions of DLL, Circuit switching, packet switching and message switching. Flow control, error control. MAC. | |
| **Unit-3 : Network Layer** | **8 Hours** |
| Hub, Repeaters, bridges, gateways, routers, design issues of network layer, Routing algorithms,. Network Layer Protocols: IPv4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol, ARP – RARP –DHCP – ICMP. | |

| **Unit-4 : Transport and Application Layer** | **8 Hours** |
|---|---|
| Transport layer: Process- to- Process delivery, Data traffic, Congestion control: Open loop, closed loop. Flow control and error Control. UDP – TCP. Application Layer: Client- Server model, DNS. DNS in internet E-mail, SMTP, FTP, HTTP, World Wide Web. | |
| **Unit-5 : Network Administration** | **8 Hours** |
| Analyzing the technical support structure( Network manager support, End-user Support), Analyzing the current Network Management, Managing Network Connections, Installing and configuring Network adapters, Installing and Configuring TCP/IP Protocol, Managing network bindings, Sharing files and Printers, Building Internet and Intranet Infrastructure, IP address scheme, assigning IP addresses. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Operating System** | | | | |
| **Course Code** | **BCAS2015** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 3 | 0 | 0 | 3 | |

**Course Objectives:**

1. Provide the fundamental principles of modern operating systems that explores design aspects of modern operating systems.
2. Solve problems using the above concepts.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions |
| **CO2** | Understand how the operating system abstractions can be implemented |
| **CO3** | Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software |
| **CO4** | Understand basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection |
| **CO5** | Understand the storage management concepts |

**Text Book (s)**

**1.** Operating System Concepts (7th Ed) by Silberschatz and Galvin, Wiley, 2000

**Reference Book (s)**

1. Operating Systems (5th Ed) – Internals and Design Principles By WilliamStallings, Prentice Hall,
2. Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India, 1992.
3. Operating Systems (3rd edition) by Gary Nutt, Nabendu Chaki, SarmishthaNeogy, Pearson
4. Operating Systems Design & Implementation Andrew S. Tanenbam, AlbertS. Woodhull Pearson
5. Operating Systems Achyut S. Godbole Tata Mc Graw Hill
6. Operating Systems D.M.Dhardhere Tata Mc Graw Hill

**Course Content:**

| **Unit I:** | **8 Hours** |
|---|---|
| Operating System and Function, Evolution of Operating System, System Software, OS services and Components: Multitasking , Multiprogramming, Multiprocessing, Time Sharing, Buffering, Spooling, Distributed OS | |

| **Unit II:** | **8 Hours** |
|---|---|
| Concept of process and threads: Process states, Process management, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling. | |
| **Unit III:** | **8 Hours** |
| Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection | |
| **Unit IV:** | **8 Hours** |
| Memory partitioning: Swapping, Paging, Segmentation Virtual memory: Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts<br>Page replacement algorithms, Allocation algorithms, Example OS : Linux | |
| **Unit V:** | **8 Hours** |
| I/O Devices and The Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Protection, File Sharing, Implementation Issues. | |
| | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| **20** | **30** | **50** | **100** |

| **Name of The Course** | **SOFTWARE ENGINEERING** | | | |
|---|---|---|---|---|
| **Course Code** | **BCAS2016** | | | |
| **Prerequisite** | Computer Programming Computer science | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

1. Large scale software development poses special challenges.
2. This course targets to expose the students to the challenges of large scale software development and would expose the students as to how to overcome those.

3. Starting with basic life cycle model concepts, it would discuss requirements specification, design, and testing issues.
4. The concepts will be illustrated with appropriate examples.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand basic concepts and applications of Software Engineering. |
| **CO2** | Work with software requirement engineering process. |
| **CO3** | Understand the concepts of software design. |
| **CO4** | Develops the basic concepts of Coding and Testing concepts. |
| **CO5** | Understand the principles of software maintenance. |

**Text Book (s):**

1) Roger S Pressman," Software Engineering – A Practitioner's Approach", McGraw Hill, USA, 2007.
2) Sommerville I, "Software Engineering", Pearson Education India, New Delhi, 2006.

**Reference Book (s):**

1) Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2) K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3) Pankaj Jalote, Software Engineering, Wiley

**Course Content:**

| **Unit-1 Introduction** | **8 Hours** |
|---|---|
| **Introduction to Software Engineering**, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Selection of Software Process models. | |
| **Unit-2 Requirement Engineering Process** | **8 Hours** |
| **Requirement Engineering Process**: Elicitation, Analysis, Documentation, Analyzing a problem, creating software specification document, review for correctness, consistency, and completeness, Management of User Needs, Feasibility Study, Characteristics and components SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model | |
| **Unit-3 Software Design** | **8 Hours** |
| **Software Design**: Refining the software Specification; Software design, fundamental design concept for data, Abstraction, Modularity, Software architecture, Cohesion and Coupling, Architectural design and procedural design, Data flow oriented design, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design, creating design document: Review of conformance for software requirements and quality. | |
| **Unit-4 Coding & Testing** | **8 Hours** |
| **Coding**: Relationship between design and implementation, Implementation issues and programming support environment; Coding the procedural design, Good coding style and review of correctness and readability, Structured Programming, need for structured programming, Coding standards, Coding style, Maintainability of programs, Code documentation – Code efficiency<br>**Testing** : Software testing, Testing Objectives, Levels of testing– Unit Testing, Integration Testing, System testing, Acceptance Testing, Verification Vs Validation, Testing for Functionality and | |

| | |
|---|---|
| Testing for Performance, Top-Down and Bottom-Up Testing , Incremental Vs Non incremental testing, Structural Testing (White Box Testing), Functional Testing (Black Box Testing). | |
| **Unit-5 Maintenance** | **8 Hours** |
| **Maintenance**: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Function Point (FP) Based Measures, Cyclomatic Complexity Measures, Software Risk Analysis and Management. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **.NET Technology** | | | | |
| **Course Code** | **BCAS2025** | | | | |
| **Prerequisite** | Programming language C | | | | |
| **Corequisite** | None | | | | |
| **Antirequisite** | None | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

To design and implement of .NET technology concepts.

**Course Outcomes**

| | |
|---|---|
| **CO1** | To understand the basis of .NET Framework. |
| **CO2** | Develop applications with c# using .NET Framework. |
| **CO3** | Develop applications with Visual Basic using .NET Framework.. |
| **CO4** | Develop active server pages using .NET Framework. |
| **CO5** | Read and write data from/to files in ADO.Net . |

**Text Book (s)**

1. Introduction to C# Joes 2 Pros (C# Exam Prep 70-536) by Peter Bako.

**Reference Book (s)**


1.Jeffrey R.Shapiro"The Complete Reference Visual Basic.NET"TataMcgraw Hill(2002 Edition)
2. Pro ASP.NET 4 in C# 2010,MacDonald and Freeman
3. Visual Studio 2010 and .Net 4 Six-in-One(Wrox Programmer to Programmer)


**Course Content:**

| **Unit-1 Introduction** | **8 Hours** |
|---|---|
| Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions, Defining classes and class members. Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler. Namespaces Collections, Comparisons and Conversions, Delegates and Events.. | |
| **Unit-2** | **8 Hours** |
| Getting Started with .Net Framework, Exploring Visual Studio .NET, Inside a C# Program, Data Types, Statements, Arrays, Using Strings, Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events, Namespaces, Generics, Collections and Data Structures, Exception Handling, Threading, Using Streams and Files, Reflection, Assemblies, versioning, Windows Forms, Controls, Data binding to Conrols, Advanced Database Programming using ADO.net, Using GDI +,Networking,.net Remoting, Manipulating XML. | |
| **Unit-3** Creating Applications | **8 Hours** |
| Creating Applications with Visual Basic.NET, Variables, Constants, and Calculations, Making Decisions and Working with Strings, Lists, Loops, Validation, Sub Procedures and Functions, Multiple Forms, Standard Modules, and Menus, Arrays, Timers, Form Controls, File Handling, Exception Handling, Working with Databases, Advanced Database Programming using ADO.net, | |

| | |
|---|---|
| Classes, Generics, Collections, Inheritance, Custom Controls, Packaging & deployment, Using Crystal Reports | |
| **Unit-4** | **8 Hours** |
| Building a Web Application, Examples Using Standard Controls, Using HTML Controls, Validating Form Input Controls using Validation Controls, Understanding Applications and State, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages, Binding to Databases using Controls, Data Management with ADO.net, Creating a Site Navigation Hierarchy, Navigation Controls , Membership and Role Management, Login Controls, Securing Applications, Caching For Performance, Working with XML, Using Crystal Reports in Web Forms. | |
| **Unit-5** | **8 Hours** |
| Databases: Introduction, Using SQL to work with database, retrieving and manipulating data with SQL, working with ADO.NET, ADO.NET architecture, ASP.NET data control, data source control, deploying the web site. Crystal reports. LINQ: Operators, implementations, LINQ to objects, XML, ADO.NET, Query Syntax. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| Name of The Course | Linux administration | | | |
|---|---|---|---|---|
| Course Code | BCAS2021 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- Design and implement common system automation tasks using shell scripts

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the history of Linux and its environment. Comparing Linux and UNIX operating syste. Demonstrating the installation of Linux based operating system (Fedora and Ubuntu) on computer system. |
| **CO2** | Explain and appraise the philosophy behind Open Source Software and GNU Public License. Differentiating between Windows based OS and Linux based OS. |
| **CO3** | Understanding and Practicing basic Linux commands - ls, cp, cat, mv, rm, chmod, ping, who, who –b, who-m. Analysing security and System Integrity. Managing Processes and users on Linux system. Managing networking using NFS and NIS. |
| **CO4** | Understanding boot process and analysing LILO and GRUB boot methods. Analysing dual boot using Linux and Windows based operating system. Explain different aspects of Linux file system and comparing different file system on a Linux distribution. |
| **CO5** | Understanding and practicing vi editor and shell. Understanding and practicing shell programming constructs. Creating and executing shell scripts. |

**Text Book (s):**

1. Richard Petersen, The Complete Reference – Linux, McGraw-Hill.
2. LINUX kernel development by Robert Love.
3. YashwantKanetkar, UNIX & Shell programming – BPB
4. Wale Soyinka, “Linux Administration: A Beginner’s Guide”, McGraw Hill Companies

**Reference Book (s):**

1. M.G.Venkateshmurthy, Introduction to UNIX & Shell Programming, Pearson Education
2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, O’ Reilly

**Course Content:**

| **Unit I: History and Installation of Linux** | **7 Hours** |
|---|---|
| History, Hardware and Environmental Considerations, Server Design, Methods of Installation, Installing Fedora, Installing Ubuntu Server. Dual-Booting Issues, Comparison between UNIX and LINUX. | |
| **Unit II:Introduction to Linux: Basic Terminology** | **7 Hours** |
| Linux – The Operating System, Open Source Software, Features of Linux, GNU, GNU Public License, Advantages of Open Source Software, Difference between Windows and Linux. | |
| **Unit III: Linux Commands** | **10 Hours** |

| |
|---|
| General-Purpose commands, File oriented commands, directory orientedcommands, Communication-orientedcommands, processorientedcommands. Commands like: ls, cp, cat, mv, rm, chmod, ping, Who, who –b, who-m etc. Security and system Integrity, Starting and Stopping the System, System Activity and Process Management, Users, Miscellaneous. |

| **Unit IV: Boot Methods and Linux file system** | **7 Hours** |
|---|---|

**Boot Methods:** The Boot Process, LILO, GRUB, Dual-Booting Linux and Windows XP/Vista, BootTime Kernel Options.

**Introduction to Linux file system:** Architecture, aspects/features of file system, different types of file systems.

| **Unit V: Shell Programming** | **9 Hours** |
|---|---|

vieditor, features of different shells,I/Oinshell, controlstructures,loops, subprograms.Shell scripts: Creating&executingshell scriptsinLinux, shell variables, purpose of shell scripts.

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **GRAPH THEORY** | | | | |
| **Course Code** | **BCAS2013** | | | | |
| **Prerequisite** | Basic Mathematics | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 3 | 0 | 0 | 3 | |

**Course Objectives:**

The main objective of this course is to introduce graphs as a powerful modelling tool that can be used to solve practical problems in various fields. To achieve this goal, the course introduces the main concepts of graph theory, graph representations and the basic classes of graphs. Several famous graph problems and associated algorithms are also covered. At the end of this course, the student should be able to apply the abstract concepts of graph theory in modelling and solving non-trivial problems in different fields of study.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the basic concepts and applications of Graph theory. |
| **CO2** | Work with trees and finding minimum spanning tree of a graph. |
| **CO3** | Understand the concepts of graph traversal and matching. |
| **CO4** | Develops the basic concepts of matrix represeantation of a graph. |
| **CO5** | Understand the principles of planarity and coloring of graphs. |

**Text Book (s):**

1. Deo, N, Graph theory with applications to Engineering and Computer Science, PHI

**Reference Book (s):**


1. S. R. Jena and S. Patro, “Design and Analysis of Algorithms, Laxmi Publications, New Delhi.
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, TMH
3. Robin J. Wilson, Introduction to Graph Theory, Pearson Education
4. Harary, F, Graph Theory, Narosa
5. Bondy and Murthy: Graph theory and application. Addison Wesley.


**Course Content:**

| **Unit-1 Introduction** | **8 Hours** |
|---|---|
| Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, Euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem. . | |
| **Unit-2 Trees** | **8 Hours** |
| Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms | |
| **Unit-3 Traversability and Matching** | **8 Hours** |
| Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows Planer graphs, combinatorial and geometric dual. | |
| **Unit-4 Matrix Representation of a Graph** | **8 Hours** |
| Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix. Coloring, covering and partitioning of a graph. | |

| | |
|---|---|
| **Unit-5 Planarity and Coloring** | **8 Hours** |
| Chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem Discussion of Graph theoretic algorithm wherever required. Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | |
|---|---|---|---|---|
| **Name of The Course** | **Artificial Intelligence and Machine Learning using Python** | | | |
| **Course Code** | **BCA9001** | | | |
| **Prerequisite** | Discrete Maths and Probability Theory | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives:** Presentation of artificial intelligence as a coherent body of ideas and methods to acquaint the student with the basic programs in the field and their underlying theory. Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods and learning.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand different types of AI agents and implement them using different search algorithms. |
| **CO2** | Apply the knowledge and reasoning ability in logical agents and planning in real world. |
| **CO3** | Understand representation and manipulation of complex information, knowledge and uncertainty. |
| **CO4** | Analyze different Classification Techniques. |
| **CO5** | Understand the Machine Learning and its application. |

**Text Book (s)**

**1. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill**

**Reference Book (s)**

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
3. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

**Course Content:**

| **Unit-1: Introduction to AI** | **8 Hours** |
|---|---|
| Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents, Computer vision, Natural Language Possessing. | |
| **Unit-2 : Searching** | **8 Hours** |
| Searching for solutions, Uniformed search strategies, Informed search strategies, Hill Climbing, Best First Search, A* Algorithm, Constraint Satisfaction, Search for games, Min-Max and Alpha Beta Pruning. | |

| | |
|---|---|
| | |
| **Unit-3 : Knowledge Representation** | **8 Hours** |
| Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Clauses and Resolution. | |
| **Unit-4 : Learning** | **8 Hours** |
| Semantic Nets, Markov Model ,Hidden Markov Models (HMM), Bayesian Networks. | |
| **Unit-5 : Machine Learning** | **8 Hours** |
| Introduction to Machine Learning, Supervised and unsupervised learning, Decision trees, Naive Bayes models, EM algorithm, Reinforcement learning. | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Mobile Application Development** | | | | |
| **Course Code** | **BCAS3002** | | | | |
| **Prerequisite** | Object-oriented design principles, C/ C++/ Java/Java-script, etc | | | | |
| **Corequisite** | None | | | | |
| **Antirequisite** | None | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

1. Introduce the fundamentals and abstract concepts of mobile application.
2. Provide students with the tools and knowledge necessary to create applications that can run on mobile devices.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the technical challenges posed by current mobile devices and wireless communications; be able to evaluate and select appropriate solutions. |
| **CO2** | Select and evaluate suitable software tools and APIs for the development of a particular mobile application and understand their strengths, scope and limitations. |
| **CO3** | Use an appropriate application development to design, write and test small interactive programs for mobile devices. |
| **CO4** | Identify the important issues of developing mobile computing systems and applications. |
| **CO5** | Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools. |

**Text Book (s)**

1. Pogue, iPhone: The Missing Manual (4th ed.) , Pogue Press, 2010. ISBN: 978-1449393656

**Reference Book (s)**

1. Guy Hart-Davis, How to Do Everything iPod, iPhone & iTunes (5th ed.), McGraw-Hill Osborne Media, 2009. ISBN: 978-0071630245
2. W. Frank Ableson; Robi Sen; Chris King; C. Enrique Ortiz, Android in Action (3rd ed.), Manning Publications, 2012. ISBN: 978-1-61729-050-3

**Course Content:**

| | |
|---|---|
| **Unit I: Mobile Application Development Overview** | **9 Hours** |
| **Mobile (Cellular) Telephony:** mobile devices/radio communications, 1G/2G/3G/4G, carriers device and carrier dependence and independence, **Categories of Mobile Apps:** phone-related, Internet/Web-based, games, GPS-based, standalone utilities, integration utilities, Platform Overview, Mobile Devices Profiles, Mobile Software, Options for development, Common UI Elements. | |
| **Unit II: Architecture, interfaces** | **8 Hours** |
| Software architecture, application models, user interfaces, **Data storage:** ordinary UNIX File System files, SQ Lite Databases, object persistence. **Networking:** Internet, Bluetooth, Near-Field Communication (NFC). **On-board instruments:** accelerometers, compass, GPS, etc. **Specific devices:** Apple iOS (iPhone/ iPad/ iPod Touch), Android devices. | |
| **Unit III: Platforms and Develop environments** | **8 Hours** |

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|---|---|
| Operating platforms: Apple iOS, Google Android, windows iPhone7 Development environments: Xcode /Cocoa Frameworks/Objective-C/ iOS simulator, Eclipse (w. Android Development Tools)/Android Application Framework/Java/Android device emulator. | |
| **Unit IV: Introduction to Android Programming** | **7 Hours** |
| Installing Android Development Tools , Core Java Concepts, Introduction of android Framework, Android Development Tools, Creating Android Application and Activities, All controls, View Groups(Gallery,Gridview..etc). | |
| **Unit V: Android Application Development** | **8 Hours** |
| Working with Menus, Intent, 2DGraphics, 2D animation, Audio, Video, Preferences(with all controls), Using File System (from Internal and External), Accessing Sdcard, Database and Content Provider Maps, Geo-coding and Location Based Services, Parsing: Dom Parsing, Json Parsing, Sax Parsing, Pull Parsing. | |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Computer Graphics** | | | | |
| **Course Code** | **BCAS3003** | | | | |
| **Prerequisite** | Object-oriented design principles, C/ C++/ Java/Java-script, etc | | | | |
| **Corequisite** | None | | | | |
| **Antirequisite** | None | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To enlighten the working principles of display devices, and concepts of resolution.
- To understand the fundamental data-structures and algorithms used for output primitives.
- To design graphics programmes using mathematical and theoretical foundations.
- To hypothesize 3D models of objects.
- To organize steps and plan for generation of animations.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Apply mathematics, physics and computer programming to computer graphics applications and write programmes for various output primitives. |
| **CO2** | Summarize and critically review the routines in computer graphics packages like Paint Brush. |
| **CO3** | Compare various object representation systems in Graphics systems. |
| **CO4** | Be immediately ready to contribute in a significant way to the computer graphics industry. |
| **CO5** | Demonstrate the knowledge, technical skills and personal discipline to be successful in a specialized, computer-based graphics field. |

**Text Book (s)**

1. D. Hearn, P. Baker, "Computer *Graphics - C Version"*, 2nd Edition, Pearson Education, 1997

**Reference Book (s)**

1. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.
2. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill.
3. Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004.

**Course Content:**

| | |
|---|---|
| **Unit I: Overview of Graphics Systems** | **9 Hours** |
| Video display devices, Raster-Scan System, Random-Scan, Systems. Random-Scan Systems Graphics monitors and work stations. Input devices: Hard copy devices. Graphics software | |
| **Unit II: Output primitives** | **8 Hours** |
| Line drawing algorithms circle generation algorithms. Ellipse Generating, Algorithm. Pixel Addressing. Filled-Area Primitives. Fill Area Function, Cell Array, Character, Generation. | |
| **Unit III: Attributes of Output Primitives** | **8 Hours** |
| Line Attributes, Curve Attributes, Color and Gray-Scale levels. Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions. Two-dimensional geometric transformations: Basic transformations. | |
| **Unit IV: Transformation** | **7 Hours** |
| Homogenous coordinates, composite transformations, other transformations. Affine transformations, transformation functions, Roster methods for transformations. | |
| **Unit V: Two-dimensional viewing** | **8 Hours** |

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|---|
| The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping Polygon clipping: Sutherland-Hodgman polygon clipping, Weiler Amerton polygon clipping. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **E-Commerce** | | | | |
| **Course Code** | **BCAS3004** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | | | | | |
| **Antirequisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

To provide students with a good understanding in planning, design, development, deployment and management of e-commerce systems and applications.

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the basic concepts and technologies used in the field of MIS and e-commerce. |
| **CO2** | Policy and regulatory issues in E-commerce. |
| **CO3** | Implement information systems and e- commerce website. |
| **CO4** | Handle security threats in electronic commerce. |
| **CO5** | Use the basic concepts and technologies used in mobile Commerce |

**Text Book (s):**

1. Ravi Kalakota and Andrew B Whinston, Frontiers of Electronic Commerce, Add. Wesley, 2004

**Reference Book (s):**

1. Pete Loshin, Paul H Murphy, Electronic Commerce, II Edition, Jaico Publishers, 1996.
2. David Whiteley, E-Commerce: Strategy, Technologies and Applications, McGraw Hill, 2000.
3. Daniel Minoli & Emma Minoli – Web Commerce Technology – Tata McGraw Hill, 2002.

**Course Content:**

| **Unit I: Introduction** | **8 Hours** |
|---|---|
| Infrastructure of Electronic Commerce – Networks – Packet Switched Networks – TCP/IP – Internet Protocol – Domain Name Services – Web Service Protocols – Internet Applications – Utility Programs – Markup Languages – Web Clients and Servers – Internets and Extranets – Virtual Private Network. | |
| **Unit II: Core Technology** | **8 Hours** |
| Electronic Commerce Models – Shopping Cart Technology – Data Mining – Intelligent Agents – Internet Marketing – XML and E-Commerce. | |
| **Unit III: Electronic Payment System** | **8 Hours** |
| Real World Payment Systems – Electronic Fund Transfer – Digital Payment – Internet Payment Systems – Micro Payments – Credit Card Transactions | |
| **Unit IV: Security and Threats** | **8 Hours** |
| Threats to Network Security – Public Key Cryptography – Network Security Solutions –Firewalls. | |
| **Unit III: Inter/Intra Organizational Electronic Commerce** | **8 Hours** |

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| EDI – EDI Application in Business – Legal, Security and Privacy Issues – EDI and Electronic Commerce – Standards – Internal Information Systems |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | **Software Project Management** | | | | |
| **Course Code** | **BCAS3006** | | | | |
| **Prerequisite** | | | | | |
| **Corequisite** | None | | | | |
| **Antirequisite** | None | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

1. Define and highlight importance of software project management.
2. Describe the software project management activities
3. Train software project managers and other individuals involved in software project.
4. Planning and tracking and oversight in the implementation of the software project management process
5. Describe the usefulness of software project management for Big data
6. Discuss software project management play critical role for other projects

**Course Outcomes**

| | |
|---|---|
| **CO1** | Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project. |
| **CO2** | Compare and differentiate organisation structures and project structures. |
| **CO3** | Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools. |
| **CO4** | With increase of data size update project schedule and budget considering Big data concept. |
| **CO5** | Develop strategies to calculate risk factors involved in IT projects. |

**Text Book (s)**

1. Clifford F. Gray, Erik W. Larson, "Project Management: The Managerial Process with MS", Mc Graw Hill

**Reference Book (s)**

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. 2. Royce, Software Project Management, Pearson Education
3. 3. Kieron Conway, Software Project Management, Dreamtech Press
4. 4. S. A. Kelkar, Software Project Management, PHI Publication.

**Course Content:**

| | |
|---|---|
| **Unit I: Introduction To Software Project Management** | **9 Hours** |
| Project Definition – Contract Management – Activities Covered By SoftwareProjectManagement – Overview Of Project Planning – Stepwise Project Planning | |
| **Unit II: Project Evaluation** | |
| Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. | |
| **Unit III: ACTIVITY PLANNING** | **8 Hours** |
| Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control. | |
| **Unit IV: MONITORING AND CONTROL** | **7 Hours** |

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|---|---|
| Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring –Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance. | |
| **Unit V: Managing People And Organizing Teams** | **8 Hours** |
| Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies | |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Mid Term Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 20 | 30 | 50 | 100 |