## Computer Science (कम्प्यूटर विज्ञान)

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| नोटः 1. A student of computer science, who opts for mathematics as a subject, can not opt. UGMM-13 in any of his/her years. 
2. प्रथम चयनित विषय का विषय केंद्रित पौरात्निक पाद्यक्रम (8 क्रेडिट का) प्रथम वर्ष में, द्वितीय चयनित विषय का विषय केंद्रित पौरात्निक पाद्यक्रम (8 क्रेडिट का) द्वितीय वर्ष में तथा उसी प्रकार तृतीय विषय का विषय केंद्रित पौरात्निक पाद्यक्रम (8 क्रेडिट का) तृतीय वर्ष में अध्ययन करना होगा। |
3. कौशल विकास कार्यक्रमों के अन्तर्गत चयनित विषयों में सम्बन्धित एक-एक 08 क्रेडिट का पाठ्यक्रम द्वितीय एवं तृतीय वर्ष में पढ़ना अनिवार्य है।
### UGCS-01 COMPUTER FUNDAMENTAL

#### BLOCK-1 HARDWARE CONCEPTS
- **UNIT-1** Introduction and Data Representation
- **UNIT-2** Digital Logic Circuits
- **UNIT-3** Memory Organization
- **UNIT-4** Input/Output Organization

#### BLOCK-2 CPU ORGANIZATION
- **UNIT-5** Instruction Sets
- **UNIT-6** Register Organizations and Micro-operation
- **UNIT-7** ALU and Control Unit Organization
- **UNIT-8** Micro-programmed Control Unit

#### BLOCK-3 MICROPROCESSOR AD ASSEMBLY LANGUAGE PROGRAMMING
- **UNIT-9** Microprocessor Architecture
- **UNIT-10** Introduction to Assembly Language
- **UNIT-11** Assembly Language Programming (part-1)
- **UNIT-12** Assembly Language Programming (part-2)

#### BLOCK-4 PARALLEL ORGANIZATION AND REDUCED INSTRUCTION SET COMPUTERS
- **UNIT-13** Introduction to Parallel Organization
- **UNIT-14** Pipeline and Vector Processing
- **UNIT-15** Dataflow computers and Parallel Algorithms
- **UNIT-16** Reduced Instruction Set Computers Architecture-part-1
- **UNIT-17** Reduced Instruction Set Computers Architecture-part-2

### UGCS-02 PC SOFTWARE APPLICATIONS SKILLS

#### BLOCK-1 PROBLEM SOLVING TECHNIQUES
- **UNIT-1** Classical Problem and Puzzles
- **UNIT-2** The Higher Arithmetic-1
- **UNIT-3** The Higher Arithmetic-2
- **UNIT-4** General Methods

#### BLOCK-2 INTRODUCTION OF MS-EXCEL
- **UNIT-5** Introduction to EXCEL
- **UNIT-6** Formatting and Printing Worksheet
- **UNIT-7** Customising Workphace
- **UNIT-8** Calculation in Worksheet
- **UNIT-9** Chart
- **UNIT-10** Database power of Excel
- **UNIT-11** Focus on analysis
- **UNIT-12** Automating worksheet

#### BLOCK-3 INTERNET AWARENESS
- **UNIT 13** Internets: An Overview
- **UNIT-14** Internet Tools: E mail, FTP & Telnet
- **UNIT-15** Browsers
- **UNIT-16** Visiting Web Sites
# UGCS-03 INTRODUCTION TO SYSTEM SOFTWARE

## BLOCK-1 PROGRAMMING CONCEPTS AND SOFTWARE TOOLS

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<td>UNIT-2</td>
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<td>UNIT-3</td>
<td>Introduction to Compiler</td>
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<td>UNIT-4</td>
<td>Graphic User Interface</td>
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<td>UNIT-5</td>
<td>Introduction to a Text Editor &amp; Debugging System</td>
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## BLOCK-2 FUNAMENTALS OF OPERATIN SYSTEM

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<td>UNIT-7</td>
<td>Process Management</td>
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<td>Memory Management</td>
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## BLOCK-3 UNIX-OPERATING SYSTEM-1

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<td>UNIT-11</td>
<td>UNIX- Getting Started-1</td>
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<td>UNIX- Getting Started-2</td>
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## BLOCK-4 UNIX-OPERATING SYSTEM-2

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<td>UNIT-17</td>
<td>Programming Tools</td>
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<td>UNIT-18</td>
<td>System Administration</td>
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# UGCS-04 ‘C’ PROGRAMMING & DATA STRUCTURES

## BLOCK-1 INTRODUCTION TO THE PROGRAMMING LANGUAGE

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<td>Decision Structures in ‘C’</td>
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<td>Functions</td>
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## BLOCK-3 DATA STRUCTURES

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<td>UNIT-13</td>
<td>Stacks and Queues</td>
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## BLOCK-4 TREES AND FILE ORGANIZATION

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UGCS-05  DATA STRUCTURES THROUGH C AND PASCAL

BLOCK-1  PROGRAMMING IN PASCAL
UNIT-1  Problem Solving and Pascal
UNIT-2  Control Structures in Pascal
UNIT-3  Arrays and Records
UNIT-4  Subprograms : Functions and Procedures
UNIT-5  Pointers, Files and Sets

BLOCK-2  INTRODUCTION TO THE PROGRAMMING LANGUAGE
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UNIT-7  Data Types in ‘C’
UNIT-8  Operators and Expression in C
UNIT-9  Decision Structures in ‘C’
UNIT-10 Control Structures-1

Block-3
UNIT-11 Control Structures-2
UNIT-12 Pointers and Arrays
UNIT-13 Functions
UNIT-14 Functions
UNIT-15 Files and Structs, Unions and Bit-fields

Block-4  DATA STRUCTURES
UNIT-16 Lists
UNIT-17 Stacks and Queues
UNIT-18 Graphs

BLOCK-5  TREES AND FILE ORGANIZATION
UNIT-19 Trees
UNIT-20 AVL-Tree and B-Tree
UNIT-21 Files

BLOCK-6
UNIT-22 Searching Techniques
UNIT-23 Sorting Techniques
UNIT-22 Sorting Techniques

UGCS-06  INTRODUCTION TO DATABASE MANAGEMENT SYSTEM

Block-1
INTRODUCTORY CONCEPTS OF DATABASE MANAGEMENT SYSTEMS
UNIT-1  Basic Concepts
UNIT-2  Database Models and Its Implementations
UNIT-3  File Organization for Conventional DBMS
UNIT-4  Management Considerations
UNIT-5  Enterprises Wide Information System of the Times of India Group (A Case Study)

BLOCK-2  RDBMS AND DDBMS
UNIT-6  Relation Model
UNIT-7  Normalization
UNIT-8  Structural Query Language
UNIT-9  Distributed Database

BLOCK-3  EMERGING TRENDS IN DATABASE MANAGEMENT SYSTEMS
UNIT-10  Introduction to Object Oriented Database Management System
UNIT-11  Introduction to Client/Server Database
UNIT-12  Introduction to Knowledge Database
UGCS-07  ELEMENTS OF SYSTEM ANALYSIS AND DESIGN

BLOCK-1  SYSTEM ANALYSIS
UNIT-1  Overview of System Analysis and Design
UNIT-2  Project Selection
UNIT-3  Feasibility Study
UNIT-4  System Requirement Specification and Analysis

BLOCK-2  SYSTEM DESIGN
UNIT-5  Structured System design
UNIT-6  Input Design and Control
UNIT-7  Output System Design
UNIT-8  File and Database Design

BLOCK-3  SYSTEM DEVELOPMENT AND IMPLEMENTATION
UNIT-9  System Development
UNIT-10  System Control and Quantity Assurance
UNIT-11  Documentation
UNIT-12  System Implementation

BLOCK-4  MANAGEMENT INFORMATION SYSTEM
UNIT-13  Introduction to MIS
UNIT-14  The Technology Component
UNIT-15  The Organization Impact of MIS
UNIT-16  Building Management Information System

BLOCK-5  CASE STUDIES
UNIT-17  Case (A) Information System Planning
UNIT-18  Case (B) Preparing for System Analysis
UNIT-19  Case (C) System Analysis Completions
UNIT-20  Case (D) System design Proposal
UNIT-21  Case (E) Evaluation and Selection of Systems
UNIT-22  Case (F) Implementation Plan and Activites

BLOCK-6  SAD: EMERGING TRENDS
UNIT-23  The Analyst as a Professional
UNIT-24  Human Computer Interaction
UNIT-25  Introduction to Multimedia

UGCS-08  DISCRETE MATHEMATICS

BLOCK-1  ELEMENTRY LOGIC
UNIT-1  Propositional Calculus
UNIT-2  Methods of Proof
UNIT-3  Boolean Algebra and Circuits

BLOCK-2  BASIC COMBENATORIES
UNIT-4  Combinatory- An Introduction
UNIT-5  Partitions and Distribution
UNIT-6  More about Counting

BLOCK-3  RECURRENCE
UNIT-7  Recurrence Relation
UNIT-8  Generating Function
UNIT-9  Solving Recurrence

BLOCK-4  GRAPH THEORY
UNIT-10  Basic properties of graph
UNIT-11  Special graph
UNIT-12  Eulerian and Hamiltonian Graph
UNIT-13  Graph Colouring and Planar Graphs
UGCS-9
COMPUTER NETWORKS

BLOCK-1 AN INTRODUCTION TO COMPUTER NETWORKS
UNIT-1 Network Classification and Reference Models.
UNIT-2 Data Transmission and multiplexing.
UNIT-3 Network, Transport and Application Layers

BLOCK-2 NETWORK DEVICES AND TECHNOLOGY
UNIT-4 Network Devices – Repeaters, Bridge, Switches, Hubs
UNIT-5 Network devices- Routers, gateways modems
UNIT-6 ISDN
UNIT-7 ATM

UGCS-10
TCP/IP PROGRAMMING
UNIT-1 Introduction to TCP/IP
UNIT-2 Internet Protocol
UNIT-3 Transmission Control Protocol

UGCS-11
C++ AND OBJECT ORIENTED PROGRAMMING

BLOCK-1
UNIT-1 What is Object Oriented Programming?
UNIT-2 Object Oriented Programming System
UNIT-3 Advanced Concept
UNIT-4 Introduction to Object Oriented Languages.
UNIT-5 An Introduction to UML

BLOCK-2
UNIT-6 Overview of C++
UNIT-7 Classes and Objects
UNIT-8 Operator Overloading
UNIT-9 Inheritance- Extending Classes
UNIT-10 Streams and Templates
UGCS-16(N)/ UGSTAT-01

Statistical Methods

BLOCK – I . Data Collection and Its Representation

Unit-I- Data Collection and Tabulation :
  Meanings, Definitions and Applications of Statistics, Measurements and Scale,
  Measurements of qualitative data, Methods of data collection, Types of data.

Unit-II-Representation of Data- I (Diagrammatical representation):
  Frequency distribution, Tabulation of data, Diagrammatical Representation of
  data, Bar diagram, Multiple bar diagram, Divided bar diagram, Percentage bar diagram,
  Pie chart, Pictogram, leaf chart,

Unit-II- Representation of Data- I (Graphical representation):
  Graphical representation of frequency distribution, Histogram, Frequency
  polygon, Frequency curve, Ogive.

BLOCK – II . Measures of Central Tendency and Dispersion

Unit-I- Measures of Central Tendency :
  Types of measures of central tendency, Arithmetic mean, Fundamental
  Theorems on
  Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Percentiles,
  Deciles, and Quartiles.

Unit-II- Measures of Dispersion :
  Types of measures of Dispersion, Range, Mean Deviation, Variance and
  Standard deviation, Effect of change of origin and scale, Relationship between measures
  of central tendency and measures of dispersion, Coefficient of variation.

BLOCK – II . Moments, Skewness and Kurtosis

Unit-I- Moments, Raw Moments and Central Moments :
  Definition of moments, raw moments for ungrouped data, raw moments for
  grouped data, Central moments, Factorial moments, Interrelationship between various
  moments, effect of change of origin and scale on moments, Charlier’s checks,
  Sheppard”s correction for moments.

Unit-II- Skewness and Kurtosis :
  Definition of skewness, Measures of skewness, Pearson’s coefficient, Bowley’s
  coefficients, Kurtosis, Measures of Kurtosis, effect of change of origin and scale.
**UGCS-17(N)/ UGSTAT-07(O) Operation Research**

**BLOCK – I. ** *Formulation of Linear Programming Problems*

**Unit-I-** *Introduction to Operation Research:*

Introduction, Phases of OR Problem, Operation Research Modeling Approach, Defining the Problem & Gathering Data, Formulating a Mathematical Models, Deriving Solution from the Model Introduction to Linear Programming, Formulation of a Linear Programming Problem with examples.

**Unit-II-** *Graphical Method to Solve LPP:*

Introduction, Graphical Solution to Linear Programming Problem.

**BLOCK – II. ** *Simplex Method of Solving LPP*

**Unit-I-** *Simplex Method:*

Introduction, Principle of Simplex Method, Simplex Method with Several Decision Variables, Two Phase & M-Method, Multiple, Unbounded Solution & Infeasible Problems, Sensitivity Analysis.

**Unit-II-** *Duality Problem in LPP:*

Introduction, Dual Linear Programming Problem, Formulation of a Dual Problem with example.

**BLOCK – III. ** *Transportation Problem & Assignment Problem*

**Unit-I-** *Representation of Transportation Problem (Non-Generated & Balanced Cases only) & Assignment Problem as Linear Programming Problem:*

Introduction of T.P. & A.P., Transportation Problem as LPP, Non-Degenerate Transportation Problem, Balanced Transportation Problem, Assignment Problem & LPP, Balanced Assignment Problem.

**Unit-II-** *Different Methods of Finding Initial Feasible Solution of a Transportation Problem (T.P., MODI Method of Finding Optimal Solution of a T.P.) :*

Introduction, Basic Feasible Solution of a Transportation Problem, Modified Distribution Method (MODI), Vogel’s Approximation Method (VAM), Maximization in a Transportation Problem.

**Unit-III-** *Solution of Assignment Problem With using Hungarian Method :*

Introduction, Solution of an Assignment Problem, Hungarian Method, Maximization in an Assignment Problem.

**BLOCK – IV. ** *Theory of Games*

**Unit-I-** *Basic Concepts of Game Theory :*


**Unit-II-** *Dominance Rule, Equivalence of Rectangular Games with Linear Programming :*

Introduction, Rectangular Games without Saddle Point, Dominance Property of reducing the Size of the Game, Solution Methods of Games without Saddle Point, Equivalence of Rectangular Games with Linear Programming.