# GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

"*In Pursuit of Global Competitiveness*"

(An Autonomous Institute of Government of Maharashtra)

**Department:  Information Technology**

| Program Educational Objective(s) | |
|---|---|
| After  graduation and few years of graduation, the (Information Technology) graduates would | |
| PEO I | Interpret, design and analyze data for effective problem solving |
| PEO II | Pursue advanced studies to adapt to current trends |
| PEO III | Attain professional careers and provide services in societal and environmental context for sustainable development |
| PEO IV | Work successfully with effective communication skills, professionalism, team work and ethical attitude |

**Program Outcome(s)**

The program enables students to achieve by the time of graduation:

1. An ability to apply principles and methodologies of mathematics, science, and engineering fundamentals

2. An ability to identify, study research literature, formulate the computing requirements appropriate to its solution

3. An ability to design solutions for engineering problems and design systems or processes that meet specified needs with appropriate considerations

4. An ability to conduct investigations of complex problems including design of experiments, analysis and interpretation of data to provide valid conclusions

5. An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations

6. An understanding of professional engineering practice with concern to societal, health, safety and legal responsibilities

7. Recognize the impact of IT solutions in an environmental and societal context and demonstrate knowledge of and need for sustainable development

8. Understand and commit to professional ethics and responsibilities and norms of engineering practice

9. An ability to function effectively as an individual and as a member or leader in a team to accomplish a common goal

10. Communicate effectively to comprehend and write effective reports, design documentation and make effective presentations

11. An ability to engage in independent and life-long learning to enhance their careers for continuing professional development

12. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

**Mapping of PEOs and POs**

| Programme Educational Objective(s) | Program Outcome(s) | |
|---|---|---|
| **PEO I** | Interpret, design and analyze data for effective problem solving | 1,2,3 |
| **PEO II** | Pursue advanced studies to adapt to current trends | 3,4,5,6,7,9 |
| **PEO III** | Attain professional careers and provide services in societal and environmental context for sustainable development | 4,5,6,7,8,9,10,11,12 |
| **PEO IV** | Work successfully with effective communication skills, professionalism, team work and ethical attitude | 6,8,10,11,12 |

# Second Year Engineering (IT) Choice Based Credit System
## Semester- III

| SR. NO. | Subject Code | Subject | Contact Period (Hrs.) | | | Credits | Continuous Evaluation in terms of Marks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TH | T | PR | | Class Test I | Class Test II | TA | ESE | TW | TOTAL (100) |
| 1 | EVS | EVS | 4 | 0 | - | 4 | 15 | 15 | 10 | 60 | - | 100 |
| 2 | Math | MATH-III | 4 | 0 | - | 4 | 15 | 15 | 10 | 60 | - | 100 |
| 3 | IT2031 | Digital Electronics and Microprocessor | 3 | 0 | - | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 4 | IT2032 | Data Structures | 3 | 0 | - | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 5 | IT2033 | Computer Graphics | 3 | 0 | - | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 6 | IT2034 | Lab: Digital Electronics and Microprocessor | - | - | 2 | 1 | - | - | - | 25 | 50 | 75 |
| 7 | IT2035 | Lab: Data Structures | - | - | 2 | 1 | - | - | - | 25 | 25 | 50 |
| 8 | IT2036 | Lab: Computer Graphics | - | - | 2 | 1 | - | - | - | 25 | 25 | 50 |
| 9 | IT2037 | Lab: Software Development lab-I | - | - | 4 | 2 | - | - | - | 25 | 50 | 75 |
| | | **Total** | **17** | **0** | **10** | **22** | **75** | **75** | **50** | **400** | **150** | **750** |

**Second Year Engineering (IT) Choice Based Credit System**
**Semester- IV**

| SR. NO. | Subject Code | Subject | Contact Period (Hrs.) | | | Credits | Continuous Evaluation in terms of Marks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TH | T | PR | | Class Test I | Class Test II | TA | ESE | TW | TOTAL (100) |
| 1 | IT2001 | Professional Ethics and Cyber Laws | 3 | 0 | 0 | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 2 | IT2021 | Object Oriented Programming | 3 | 0 | 0 | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 3 | IT2038 | Discrete Mathematics & Structure | 3 | 1 | 0 | 4 | 15 | 15 | 10 | 60 | - | 100 |
| 4 | IT2039 | Database Management System | 3 | 0 | 0 | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 5 | IT2040 | Data Communication Networking | 3 | 0 | 0 | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 6 | OEIT2001 | **OPEN ELECTIVE** | 3 | - | - | 3 | 15 | 15 | 10 | 60 | - | 100 |
| 7 | OEIT2002 | | | | | | | | | | | |
| 8 | IT2022 | Lab: Object Oriented Programming | - | - | 2 | 1 | - | - | - | 25 | 25 | 50 |
| 9 | IT2041 | Lab: Database Management System | - | - | 2 | 1 | - | - | - | 25 | 25 | 50 |
| 10 | IT2042 | Lab: Software Development lab-II | - | - | 2 | 1 | - | - | - | 25 | 25 | 50 |
| | | **Total** | **18** | **1** | **6** | **22** | **90** | **90** | **60** | **435** | **75** | **750** |

**OPEN ELECTIVE**

1. Basics of Data Structure
2. Basics of Computer System

| IT2031:Digital Electronics & Microprocessor | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 3Hrs/Week**<br>**Credits :03** | **Examination Scheme**<br>**Test-1**            : 15 Marks<br>**Test-2**            :15 Marks<br>**Teachers Assessment**    : 10 Marks<br>**End Semester Exam**     : 60 Marks |

**Prerequisites: MA1001: Maths**

**Course description**: This course introduces binary arithmetic, fundamentals of digital circuits, and their applications. Also fundamental concepts of 8086 microprocessor, architecture , instruction set and assembly Language Programming of 8086.

**Course Objectives:**

1. To train the students on fundamentals of digital electronics.
2. To train the students for minimization of digital circuit.
3. To study combinational and sequential Logic Design (Multiplexer, Demultiplexer, Counters, Registers).
4. To learn architecture, instruction set, interrupt structure of 8086 microprocessor.
5. To learn assembly language programming of 8086.

**Course Outcomes**
After completing the course, students will able to:

| CO1 | Perform binary arithmetic , explain logic gates, universal gates, K-map. |
|---|---|
| CO2 | Differentiate between Combinational and Sequential Logic Design. |
| CO3 | Discuss Registers, Counters |
| CO4 | Present the fundamental concepts of 8086 microprocessor, their architecture, instruction set, and interrupt structure. |
| CO5 | Use assembly language programming of 8086. |

**Detailed Syllabus:**

| Unit 1 | **Binary arithmetic, Logic Gates, Boolean algebra:** |
|---|---|
| | Binary arithmetic, 2's complement arithmetic, Gray code, Excess three codes, error detecting and correcting codes. Basic gates, Universal gates and their truth tables, De-Morgan's theorem. |
| | **Combinational circuit design** |
| | K-Map minimization , don't care condition, Binary half and full adders and subtractors, BCD to Seven Segment decoder, binary to gray and gray to binary conversion. Quine-McClusky minimization technique. Multiplexers, cascading of multiplexers, Demultiplexers, cascading of Demultiplexers, Binary and BCD Adders. |
| Unit 2 | **Flip-Flops, Sequential Logic Design** |
| | Flip-flops **-** One bit memory cell, Clocked SRFF, JKFF, D- Type, T-type FF, Application of Flip-flops. Introduction to registers, shift registers, universal registers, application of shift registers as ring counters, twisted ring counter. |
| Unit 3 | **Counters :** Ripple or Asynchronous Counters, Modulus of Counters, Introduction to general purpose 54/74 series, Asynchronous IC's, Cascading of ripple counter IC's, Synchronous counters, up/down counters. |
| Unit 4 | **Introduction to Microprocessor:** Introduction to 16 bit microprocessor, Architecture and Pin diagram of 8086, Programmers model of 8086 (Registers), Segmentation, logical to physical address translation, even and odd memory banks, Read write cycle timing diagrams. |
| Unit 5 | **Addressing modes & Instruction Set:** Addressing modes, Instruction set of 8086 in detail, Instruction Formats, Stacks, Assembler, Linker, Debugger (Turbo debugger), Directives, Procedures (Near & Far), Macros, Loop constructs, 8086 Programming examples. |
| | **8086 Interrupts:** 8086 Interrupt Structure, Interrupt Vector Table (IVT), ISR. |

**Text and Reference Books**

1. R. P Jain, "Modern Digital Electronics", Tata Mcgraw Hill.
2. R. P. Jain & Thomas L. Floyd,"Digital Fundamentals", Pearson
3. D. P. Leach, A. P. Malvino, G. Saha ; Digital Principles & applications Inc.
4. Douglas Hall, "Microprocessors & Interfacing", McGraw Hill, Revised 2$^{nd}$ Edition, 2006 ISBN 0-07-100462-9
5. Ray,K.Bhurchandi, "Advanced Microprocessors and peripherals: Arch, Programming &Interfacing",Tata McGraw Hill,2004 ISBN 0-07-463841-6

**Reference Books:**

1. D. P. Leach, A. P. Malvino, G. Saha ; Digital Principles & applications Inc.
2. John Uffenbeck," The 8086/88 Family: Design, Programming & Interfacing", PHI
3.Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
4. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC"

**Reference websites:**

https://www.tutorialspoint.com/computer_logical_organization/overview.htm
https://www.tutorialspoint.com/videos/digital_electronics/index.htm
https://www.tutorialspoint.com/microprocessor

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | | | | | | | | |
| CO2 | | 2 | 2 | 3 | | | | | | | | |
| CO3 | | 1 | | | | | | | | | | |
| CO4 | 1 | | | | | | | | | | | |
| CO5 | | | 2 | 2 | | | | | | | | |

**1 – High    2 – Medium    3 - Low**

**Teacher's Assessment:**  Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1)      Simulation

2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Case Study

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test-1 | Test-2 | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 10 | 00 | 00 | 12 |
| K2 | Understand | 05 | 10 | 05 | 24 |
| K3 | Apply | 00 | 05 | 05 | 24 |
| K4 | Analyze | 00 | 00 | 00 | 00 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 | K2 | K3 |
|---|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 | CO5 |
| Class Test 1 (15 Marks) | 10 | 05 | 00 | 00 | 00 |
| Class Test 2 (15 Marks) | 00 | 00 | 05 | 10 | 00 |
| Teachers Assessment (10 Marks) | 00 | 02 | 02 | 03 | 03 |
| ESE Assessment (60 Marks) | 12 | 12 | 12 | 12 | 12 |

**Special Instructions if any: Nil**

**Designed by:**
1.Prof.K.R.Sarode
2.Prof Bharat Chaudhari.

| IT2032:Data Structure | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 03 Hrs/Week**<br>**Credits:03** | **Examination Scheme**<br>Test  I                              : 15 Marks<br>Test  II                             : 15 Marks<br>Teachers Assessment      : 10 Marks<br>End Semester Exam        : 60 Marks |

**Prerequisites: CS1001: Basics of CS & IT**

**Course description**:

This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping you understand the reasons for choosing structures or algorithms. Topics covered include managing complexity, abstraction, analysis, vectors, lists, queues, trees, heaps, hash tables maps, and graphs.

**Course Objectives:**

1. To train the students on fundamentals that one must learn of data structures
2. To train the students for a strong foundation for programming using data structures

**Course Outcomes**

After completing the course, students will able to:

| CO1 | Interpret and compute asymptotic notations of algorithms to analyze the consumption of resources (time/space). |
|---|---|
| CO2 | Describe and explain data structure: arrays, records, strings, linked list, stacks and queues. |
| CO3 | Compare the searching algorithms and sorting algorithms. |
| CO4 | Identify and model graph algorithms like DFS, BFS, shortest path, spanning tree. |

**Detailed Syllabus:**

| Unit 1 | **Sorting & searching**<br>Different sorting tech, classification on the basis of big-O notation, tech such as straight selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques, Sequential searching, index Sequential searching binary searching. |
|---|---|
| Unit 2 | **Introduction to data structure, The Stacks& Queues**<br>The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Using Multidimensional Arrays, Definition and Examples, Primitive Operation, The stack as an ADT, The queue and its sequential representation, The queue as an ADT, Basic Definition and examples: Infix, Postfix, and Prefix, Program to evaluate a Postfix expression, Limitations of the program, Circular Queue, priority queue |
| Unit 3 | **Linear Data Structure & their representation :**<br>Definition, concept, operation on linked lists, Circular linked lists<br>Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating , Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list |
| Unit 4 | Definition, Basic terminology, operation on binary trees, linked storage representation for binary search trees, Basic operation on binary search tree such as creating a binary search tree, searching, modifying an element, inserting & deleting the element, destroy a binary search tree, tree traversals ,in-order, pre-order, post-order , tree application for expression evaluation & for solving sparse Matrices, Huffman code algorithm, height balanced trees2-3 tree, B trees, B+ trees, AVL trees |
| Unit 5 | **Graph:**<br>Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path, spanning tree |

**Text Books**
1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C and C++ " , Pearson Pub.

2. G.S. Baluja, "Principles of Data Structures using C and C++",

**Reference Books**
1. Yashavant P Kanetkar, "Data Structures through C", BPB Pub. ( Book with CD)
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",
3. Robert L Kruse, "Data Structures and Program Design", PHI

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 2 | | | | | | | | |
| CO2 | | | 2 | 1 | 3 | | | | | | | |
| CO3 | | | 2 | 1 | 3 | | | | | | | |
| CO4 | 3 | 2 | 1 | | | | | | | | | |
| | | | | | | | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:** Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Mini projects

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test -I | Test-II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 05 | 00 | 15 |
| K2 | Understand | 05 | 05 | 05 | 20 |
| K3 | Apply | 05 | 05 | 05 | 10 |
| K4 | Analyze | 00 | 00 | 00 | 15 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 | K4 |
|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 |
| Class Test I (15 Marks) | 05 | 05 | 05 | 00 |
| Class Test II (15 Marks) | 05 | 05 | 05 | 00 |
| Teachers Assessment (10 Marks) | 05 | 05 | 00 | 00 |
| ESE Assessment (60 Marks) | 10 | 20 | 15 | 15 |

**Designed By:**

1.Prof. S.B. Nemade

2. Prof. Kiran Sonkamble

| IT2033:  Computer Graphics | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 03 Hrs/Week**<br>**Credits:03** | **Examination Scheme**<br>Test  I            : 15 Marks:<br> Test II           : 15 Marks<br>Teachers Assessment    : 10 Marks<br>End Semester Exam     : 60 Marks |

**Prerequisites: CS1001: BCOMP & IT, MA1001: Maths**

**Course description**: This course gives description about computer graphics applications. Subject overviews about different line drawing algorithms. It introduces 2D and 3D transformations for graphics programming.

**Course Objectives:**

1.  To introduce basic concepts of Computer graphics.

2.  To study line drawing algorithms.

3.  To understand line clipping and polygon clipping.

4.  To study animation techniques.

**Course Outcomes**
After completing the course, students will be able to:

| | |
|---|---|
| CO1 | Remember the basic concepts of graphics with line drawing algorithms. |
| CO2 | Identify transformation methods. |

| CO3 | Apply clipping and segmenation techniques. |
|-----|---------------------------------------------|
| CO4 | Examine use of color models, shading and animation. |
| CO5 | Analyze the curve generation and use of graphics tools. |

**Detailed Syllabus:**

| Unit 1 | **Basics of Computer Graphics**<br>**Introduction of computer graphics,** Raster scan & Random scan displays**,** Display Files, Plotting Primitives: Scan conversions, lines, line segments, vectors, pixels and frame buffers, vector generation.<br>Line drawing Algorithms: DDA, Bresenham.<br>Circle drawing Algorithms:  DDA, Bresenham.<br>Character Generation: Stroke Principle, Starburst Principle, Bit map method, Introduction to aliasing and anti-aliasing**.**<br>Polygon and its types, inside test, polygon filling methods: Seed fill, Scan Line, Flood fill and Boundary fill. |
|--------|-------------|
| Unit 2 | **Graphical Transformations**<br>**2-D transformations,homogeneous coordinates and matrix representation of 2-D transformations,other 2-D transformations: reflection and shear,**<br>**3D transformations:** Translation, scaling, rotation, rotation about X, Y, Z and arbitrary axis reflection about XY, YZ, XZ and arbitrary plane.<br>Projections: Types Parallel - Oblique: Cavalier, Cabinet and orthographic :Isometric, Dimetric, Trimetric and Perspective - Vanishing Points as 1 point, 2 point and 3 point. |
| Unit 3 | **Windowing ,Clipping and Segments**<br>Introduction, Segment table, Segment creation, closing, deleting and renaming, Visibility Concept of window and viewport, viewing transformations,<br>Line Clipping: Cohen Sutherland Method.<br>Polygon Clipping : Sutherland Hodgman method for clipping convex and concave polygons |

| Unit 4 | **Shading and Animation**<br>Color Models – RGB, YIQ, CMY, HSV,<br>Shading: Halftoning, Gouraud and Phong Shading<br>Computer Animation: Animation sequences, functions & Languages, Key-frame Systems, Motion Specifications, Introduction to OpenGL ES. |
|---|---|
| Unit 5 | **Curves and Fractals**<br>Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, BSplines and corners, Bezier curves, Fractals, fractal lines and surfaces .<br>Interactive Graphics & usage of the tools of computer graphics – 3D Studio and Maya or Blender. |

**Text Books:**
**1.** S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6.
**2.** D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 – 4**.**
**3.** J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9
**4.** D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4
**Reference Books:**
**1.** D. Rogers, J. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2002, ISBN 0 – 07 – 048677 – 8**.**
**2.** Zhigang Xiang, Roy Plastock, "Computer Graphics", Schaum's Series outlines
**3**. F.S. Hill JR, "Computer Graphics Using Open GL", Pearson Education
**4**. Foley, "Computer Graphics: Principles & Practice in C", 2e, ISBN 9788131705056, Pearson Edu.
**5**. Mario Zechner, Robert Green, "Beginning Android 4 Games Development", Apress, ISBN: 978- 81-322-0575-3

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 3 | | | | | | | | |
| CO2 | 2 | 2 | | 1 | | | | | | | | |
| CO3 | 2 | 2 | | | 2 | | | | | | | |
| CO4 | 2 | 2 | | | 1 | | 3 | | | | | |
| CO5 | 2 | | | | 1 | | | | | 3 | | |

**1 – High   2 – Medium   3 - Low**

**Teacher's Assessment:** Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test I | Test II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 00 | 05 | 15 |
| K2 | Understand | 00 | 05 | 05 | 15 |
| K3 | Apply | 05 | 05 | 00 | 15 |
| K4 | Analyze | 00 | 05 | 00 | 15 |
| K5 | Evaluate | 05 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 | K4 | K5 |
|---|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 | CO5 |
| Class Test I (15 Marks) | 05 | 00 | 05 | 00 | 05 |
| Class Test II (15 Marks) | 00 | 05 | 05 | 05 | 00 |
| Teachers Assessment (10 Marks) | 05 | 05 | 00 | 00 | 00 |
| ESE Assessment (60 Marks) | 15 | 15 | 15 | 15 | 00 |

**Special Instructions if any: Nil**

**Designed by**
1. S.M.Chavan
2. D.S.Tandle

## IT2034 :Digital Electronics & Microprocessor lab

| Teaching Scheme | Examination Scheme | |
|---|---|---|
| Practical: 2Hrs/Week | Term Work | : 50 Marks |
| Credits :01 | Practical Examination & Viva | : 25 Marks |

**Course Outcomes Expected:** After successful completion of the course, students will be able to:

| CO1 | Implement functions with logic gates. |
|---|---|
| CO2 | Demonstrate the concepts half and full adder and subtractors , analyze the code conversion circuit of gray to binary and binary to gray, |
| CO3 | Illustrate the concepts of various multiplexer, de-multiplexer. |
| CO4 | Demonstrate arithmetic operators by using MASM |
| CO5 | Implement logical and string operations |

## Suggestive List of Practical's:

| Sr. No. | Details |
|---|---|
| **Level:  Basic (all)** | |
| 1 | To study the logic gates & verify the truth table. . |
| 2 | To study & verify the truth table for half adder, full adder, half subtractor, full subtractor. |
| 3 | To implement BCD adder. |
| 4 | Arithmetic operations –Addition and Subtraction, Multiplication and Division , BCD – arithmetic operation |
| 5 | Logic operations –converting packed BCD to unpacked BCD, BCD to ASCII conversion |
| **Level: Moderate (any three)** | |
| 6 | To study & verify the code conversion circuits Binary to Gray Code, Gray to binary. |

| | |
|---|---|
| 7 | To study multiplexer/demultiplexer circuit and verify their truth table. |
| 8 | To study registers and verify their summary table. |
| 9 | String operations-Move/exchange Block, Reverse string, , Length of the string, String comparison. |
| 10 | To find smallest/largest number within an array. |
| **Level: Complex (any two)** | |
| 11 | To implement up/down counter, mod counter |
| 12 | To implement bidirectional shift registers. |
| 13 | To sort array in ascending /descending order. |
| 14 | To implement string concatenation, string palindrome |

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | 3 | | | | | | | | | |
| CO2 | 2 | 2 | 2 | | | | | | | | | |
| CO3 | | | 2 | 2 | | | | | | | | |
| CO4 | 1 | 2 | | | | | | | | | | |
| CO5 | 1 | 3 | | | | | | | | | | |

**1 – High      2– Medium      3 – Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S2 | S3 | S4 |
|---|---|---|---|---|---|
| | CO1 | CO2 | CO3 | CO4 | CO5 |
| Term Work (50 Marks) | 15 | 10 | 10 | 05 | 10 |
| Practical Examination & Viva Voce (25 Marks) | 05 | 05 | 05 | 05 | 05 |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 15 | 05 |
| S2 | Manipulation | 20 | 10 |
| S3 | Precision | 05 | 05 |
| S4 | Articulation | 10 | 05 |
| S5 | Naturalization | 00 | 00 |
| Total | | 50 | 25 |

| | | |
|---|---|---|
| Preparation (S1) | 15 | 05 |
| Conduct of Experiment (S2) | 15 | 06 |
| Observation and Analysis of Results (S3) | 05 | 05 |
| Record (S2) | 05 | 04 |
| Mini-Project / Presentation/ Viva-Voce (S4) | 10 | 05 |
| Total | 50 | 25 |

**Designed by:**
  1.Prof.K.R.Sarode
  2.Prof Bharat Chaudhari.

| IT2035: Data Structure Lab | |
|---|---|
| **Teaching Scheme**<br>**Practical: 02Hrs/Week**<br>**Credits:01** | **Examination Scheme**<br>**Term Work   : 25 Marks**<br>**Practical Examination**<br>**& Viva Voce: : 25 Marks** |

**Laboratory Course Outcomes**

As an outcome of completing the Laboratory course, students will able to:

| CO1 | To implements the algorithms including various operations on queues, stacks, linked list, trees, graphs, sorting, searching on real time application. |
|---|---|
| CO2 | Design and implement abstract data types with static or dynamic representation. |
| CO3 | Analyze, evaluate and Design appropriate data types and algorithms for solving particular problems |

**List of Experiments**

| Sr. No. | Details |
|---|---|
| | **Level : Easy** |
| 1 | Program for Bubble Sort and Bucket Sort. |
| 2 | Program for Merge Sort and Heap Sort. |
| 3 | Program for Insertion Sort and Quick sort. |
| 4 | Program for Binary Search to search an element in the given sequence |
| | **Level : Moderate** |
| 5 | Program to implement two stacks in the one array. |
| 6 | Program for implementing Stack and Queue. |
| 7 | Program for implementing Singly Linked List and Doubly Linked List. |
| 8 | Program for implementing Circular Queue using Linked List. |
| 9 | Program for Creation of Binary Tree and operations on it. |
| | **Level : Complex** |

| 10 | Program for Creation of Binary Threaded Tree. |
|---|---|
| 11 | Program for Depth First search and Breadth First search. |

**Note: Experiment will be implement using turbo c/ gcc compiler**

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 2 | | | | | | | | |
| CO2 | | 2 | 1 | | 1 | | | | | | | |
| CO3 | | | | | 1 | 3 | 2 | 3 | | | | |

**1 – High     2 – Medium     3 – Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S3 |
|---|---|---|---|
| | CO1 | CO2 | CO3 |
| Term Work (25 Marks) | 08 | 10 | 07 |
| Practical Examination & Viva Voce (25 Marks) | 10 | 07 | 08 |

**Recommended Assessment pattern**

| Assessment Pattern  Level No. | Skill  Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 08 | 10 |
| S2 | Manipulation | 10 | 07 |
| S3 | Precision | 07 | 08 |
| S4 | Articulation | 00 | 00 |

| | | | |
|---|---|---|---|
| S5 | Naturalization | 00 | 00 |
| **Total** | | 25 | 25 |

| | | |
|---|---|---|
| Preparation (S1) | 08 | 10 |
| Conduct of Experiment (S2) | 05 | 04 |
| Observation and Analysis of Results (S3) | 04 | 04 |
| Record (S2) | 05 | 03 |
| Mini-Project / Presentation/ Viva-Voce (S3) | 03 | 04 |
| Total | **25** | **25** |

**Designed By:**

1.Prof. S.B. Nemade

2. Prof. Kiran Sonkamble

| IT2036 : Lab- Computer Graphics | |
|---|---|
| **Teaching Scheme** <br> **Practical: 02 Hrs/Week** <br> **Credits:01** | **Examination Scheme** <br> **Term Work**           **: 25 Marks** <br> **Practical Examination** <br> **& Viva Voce:**         **: 25 Marks** |

**Prerequisites: CS1001: BCOMP & IT, MA1001: Maths**

**Course Objectives:**
1. To learn basic concepts of Computer Graphics.
2. To study the various algorithms for generating graphical figures.
3. To summarize mathematics behind the graphical transformations
4. To understand various methods regarding projections, animation, shading.

**Laboratory Course Outcomes**

As an outcome of completing the Laboratory course, students will able to:

| CO1 | Identify functions of graphics editor with graphics packages. |
|---|---|
| CO2 | Apply and implement line drawing and circle drawing algorithms to draw specific shape given in the problem. |
| CO3 | Identify geometrical transformations for given input shape. |
| CO4 | Formulate various polygon filling methods for given input polygon. |
| CO5 | Analyze Fractals clipping algorithms, animation on the given object and apply any graphics tool. |

**List of Experiments**

| Sr. No. | Details |
|---|---|
| | **Level : Easy** |
| 1. | Implement a program to draw and color all the basic shapes in graphics editor. |
| 2. | Implement a program for DDA Line drawing Algorithm with any pattern. |
| 3. | Execute a program for Bresenham's Line drawing Algorithm with any pattern. |
| 4. | Simulate a program for Bresenham's circle drawing Algorithm with 4X4 chessboard rotated 45° with the horizontal axis. |
| | **Level : Moderate** |
| 5. | Develope a program for one pattern (or use above chessboard) by polygon filling. |
| 6. | Execute a program for seedfill algorithm by polygon filling. |
| 7. | Implement a program for 2 D transformation by using specific pattern. |
| 8. | Implement a program for other transformations like Reflection and Shear. |
| | **Level : Complex** |
| 9. | Implement Cohen Sutherland Hodgman algorithm to clip any given polygon. |
| 10. | Generate fractal patterns by using Koch curves. |
| 11. | Execute animation assignments like National Flag hoisting. |
| 12. | Usage of the computer graphics tools. (Maya/Blender). |

**Special Instructions if any:** All the assignments should be conducted preferably using OpenGL/ Linux platform/ C/C++.

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 1 | | | | | | | | | | |
| CO2 | | 1 | | | 1 | | | | | | | |
| CO3 | | | 1 | | | | | | | | | |
| CO4 | | 1 | | | | | | | | | | |
| CO5 | | | | 2 | 1 | | | | | | | |

**1 – High      2 – Medium      3 – Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S2 | S3 | S3 |
|---|---|---|---|---|---|
| | CO1 | CO2 | CO3 | CO4 | CO5 |
| Term Work (25 Marks) | 05 | 05 | 05 | 05 | 05 |
| Practical Examination & Viva Voce (25 Marks) | 05 | 05 | 05 | 05 | 05 |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 05 | 05 |
| S2 | Manipulation | 10 | 10 |
| S3 | Precision | 10 | 10 |
| S4 | Articulation | 00 | 00 |
| S5 | Naturalization | 00 | 00 |

| Total | 25 | 25 |
| --- | --- | --- |

| | | |
| --- | --- | --- |
| Preparation (S1) | 05 | 05 |
| Conduct of Experiment (S2) | 07 | 07 |
| Observation and Analysis of Results (S3) | 06 | 06 |
| Record (S2) | 03 | 03 |
| Mini-Project / Presentation/ Viva-Voce (S3) | 04 | 04 |
| Total | **25** | **25** |

**Designed by**

1.Prof. S.M.Chavan
2. Prof D.S.Tandale

| IT2037: Software Lab-1 |
|---|

| Teaching Scheme<br>Practical: 4 Hrs/Week<br>Credits :02 | Examination Scheme<br>Term Work            : 50 Marks<br>Practical Examination & Viva  : 25 Marks |
|---|---|

**Total Hours required for this course: 48 Hours.**

| CO1 | **Understand the basic features of object-oriented programming.** |
|---|---|
| CO2 | Design, implement, and test the implementation of friend function and **constructors.** |
| CO3 | Implement the concepts of overloading and overriding methods and contrast them. |
| CO4 | Make use of  object oriented concept like virtual function, inheritance, polymorphism. |
| CO5 | Formulate a software application and propose an object oriented design. |

**Suggestive List of Practical**

| Sr. No. | Details |
|---|---|
| | **Level:  Basic (all)** |
| 1 | Implement program using Structure |
| 2 | Program which shows use class and Objects. |
| 3 | Program for Static Data Members and Member functions. |
| 4 | Program for friend function and inline function. |
| 5 | Write a program to demonstrate different types of constructors |
| 6 | Write a program for overloading various binary operators. |
| 7 | Write a program to implement to implement the Use of "this" Pointer. |
| | **Level: Moderate (any four)** |
| 8 | Program using streams |
| 9 | Write a program for Multilevel and multiple inheritances.. |
| 10 | Write a program for Hierarchical and hybrid inheritance. |
| 11 | Write a program for polymorphism (virtual function). |
| 12 | Program using manipulators. |

| 13 | Program for User Defined Manipulators |
|----|----|
| **Level: Complex (any one from 10,11,12)** | |
| 10 | Implementation of any Data structure using object oriented language. |
| 11 | Program using files (open function method) |
| 12 | Program using files(constructor method) |
| 13 | **Mini Project  in C++** |

**Note: Experiment will be perform in Visual Studio/Turbo C++/ JDK**

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| CO1 | 1 | 3 | | | | | | | | | | |
| CO2 | | | 1 | | | | | | | | | |
| CO3 | | | | | 2 | | | | | | | |
| CO4 | | | | | 3 | | | | | | | |
| CO5 | | | 2 | 3 | 3 | | | | | | | |

**1-High, 2-Medium, 3-Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S3 | S4 | S1 |
|----|----|----|----|----|----|
| | CO1 | CO2 | CO3 | CO4 | CO5 |
| Term Work (50 Marks) | 08 | 08 | 16 | 08 | 10 |
| Practical Examination & Viva Voce (25 Marks) | 04 | 04 | 08 | 05 | 04 |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 18 | 08 |
| S2 | Manipulation | 08 | 04 |
| S3 | Precision | 16 | 08 |
| S4 | Articulation | 08 | 05 |
| S5 | Naturalization | 00 | 00 |
| **Total** | | **50** | **25** |

| | | |
|---|---|---|
| Preparation (S1) | 18 | 08 |
| Conduct of Experiment (S2) | 05 | 03 |
| Observation and Analysis of Results (S3) | 16 | 08 |
| Record (S2) | 03 | 01 |
| Mini-Project / Presentation/ Viva-Voce (S4) | 08 | 05 |
| Total | **50** | **25** |

**Designed By:**
1. Prof. Umesh Bodkhe
2. Pankaj Mohrut

| IT2001: Professional Ethics and Cyber Laws | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 3 Hrs/Week**<br>**Credits: 3** | **Examination Scheme**<br>Test I               : 15 Marks<br>Test II            : 15 Marks<br>Teachers Assessment  : 10 Marks<br>End Semester Exam   : 60 Marks |

- To make students familiar with the fundamental concepts of computer ethics
- To know the linkage between computer, professional, philosophical ethics and decision making
- To develop the concepts in computer forensics
- To introduce the linkage between technology, law and ethics

**Course Outcomes:**

After completion of this course students will be able to:

| | |
|---|---|
| **CO1** | To makes students familiar with the fundamental concepts of computer ethics. |
| **CO2** | To know the linkage between computer, professional philosophical ethics and decisions making. |
| **CO3** | Identify the cyber threats |
| **CO4** | Illustrate tools and methods used in Cyber crime |
| **CO5** | Make use of information and data to serve as digital evidence |

| | |
|---|---|
| **Unit 1** | An Overview of Ethics.Ethics for IT Professionals and IT Users.Foundations of Information Ethics. Ethical Issues Involving Computer Security: Hacking,Hacktivism, and Counterhacking.Identify some of the basic content in the field of Computers, Information Systems, Ethics, Society and Human Values. |
| **Unit 2** | Ethical Decision Making: Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics. Crime incident Handling Basics: Hacking, cyber activism, Tracking hackers, clues to cyber crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations |

| | Information Technology Act 2000 <br> Scope, jurisdiction, offense and contraventions, powers of police, adjudication |
|---|---|
| **Unit 3** | Introduction: Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes Cyberoffenses How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector |
| **Unit 4** | Constitutional & Human Rights Issues in Cyberspace, Freedom of Speech and Expression in Cyberspace,Right to Access Cyberspace Access to Internet, Right to Privacy, Right to Data Protection,Cyber Crimes & Legal Framework,Cyber Crimes against Individuals, Institution and State, Hacking , Digital Forgery, Cyber Stalking/Harassment,Cyber Pornography,Identity Theft & Fraud,Cyber terrorism, Different offences under IT Act 2000. |
| **Unit 5** | Cyber Law -Need for Cyber Law,International Perspectives,Cyber Jurisprudence at International and Indian Level,Dispute Resolution in Cyberspace,Cyber Torts:Cyber Defamation,Different Types of Civil Wrongs under the IT Act 2000, Intellectual Property Issues in Cyber Space:Interface with Copyright Law,Interface with Patent Law,Trademarks & Domain Names Related issues. Concept of Jurisdiction Indian Context of Jurisdiction and IT Act.2000,International Law and Jurisdictional Issues in Cyberspace. |

**TEXT AND REFERENCE BOOKS**
**Text Books:**
1.Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi
2. Deborah G Johnson, " *Computer Ethics*", Pearson Education Pub., ISBN : 81-7758-593-2.
3. Earnest A. Kallman, J.P Grillo, "*Ethical Decision making and IT: An Introduction with Cases",*
McGraw Hill Pub.
4. .Cyber Law & Cyber Crimes By Advocate Prashant Mali; Snow White Publications, Mumbai
**Reference Books:**
1.Michael E. Whitman, Herbert J. Mattord, "*Principles of Information Security",* 2nd Edition,,
CengageLearning Pub.
2.Nina Godbole, "Information Systems Security", Wiley India, New Delhi

3.Kennetch J. Knapp, "Cyber Security & Global Information Assurance", Information Science Publishing.
4.Randy Weaver, Dawn Weaver, "*Network Infrastructure Security*", Cengage Learning Publication.
5 Guide to Cyber Laws by Rodney D. Ryder; Wadhwa and Company, Nagpur

**Websites:**

Http://www.garykessler.net.library/forensicsurl.html

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | | | 3 | | | | | | | |
| CO2 | | 3 | 2 | | | | | 1 | | | | |
| CO3 | | | | 2 | | | 2 | 3 | | | | |
| CO4 | | 3 | | 1 | 1 | | | | | | | |
| CO5 | | | | 2 | | 2 | | | | | | |

**1 – High   2 – Medium   3 – Low**

**Teacher's Assessment:** Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1)   Power point presentation of case studies
2)   Question & answer

**Recommended Assessment Pattern**

| Assessment Pattern Level No. | Knowledge Level | Test I | Test II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| | | | | | |

| K1 | Remember | 07 | 08 | 00 | 20 |
|---|---|---|---|---|---|
| K2 | Understand | 08 | 07 | 05 | 20 |
| K3 | Apply | 00 | 00 | 05 | 20 |
| K4 | Analyze | 00 | 00 | 00 | 00 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 |
|---|---|---|---|
| | CO1,CO2 | CO3,CO4 | CO5 |
| Class Test  I  (15 Marks) | 07 | 08 | 00 |
| Class Test II (15 Marks) | 08 | 07 | 00 |
| Teachers Assessment (20 Marks) | 00 | 05 | 05 |
| ESE Assessment (60 Marks) | 20 | 20 | 20 |

**Designed By:**

1.Prof. Sangita Nemade

2. Prof. Pankaj Mohrut

| IT2021: Object Oriented Programming | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 3Hrs/Week**<br>**Credits :03** | **Examination Scheme**<br>**Test I** : **15 Marks**<br>**Test II** : **15 Marks**<br>**Teachers Assessment** : **10 Marks**<br> **End Semester Exam** : **60 Marks** |

**Total Hours required for this course: 30 Hours.**

**Prerequisites: CS1001: BCOMP & IT, IT2037: S/W LAB I**

**Course Description:** Object Oriented Programming is designed to create sophisticated programs to solve real-time problems using object oriented approach. The course emphasizes to improve the logical thinking of the students.

**Course Educational Objectives:**
- To enable the students to understand the core principles of the Object Oriented Language.
- To understand the concept of Multi-threading.
- To understand the concept of Exception Handling.
- Introduce the students to database connectivity.
- Introduce the students to Java EE.

Course Outcomes:
 After completion of this course students will be able to:

| CO1 | Illustrate Object oriented principals using Object Oriented programming language's.K1 |
|---|---|
| CO2 | Develop programs using Inheritance, Interfaces. Multithreading.K2 |
| CO3 | Develop programs using Exception handling.K2 |
| CO4 | Develop application using database .K2 |
| CO5 | Illustrate the basics of Java Enterprise Edition.K3 |
| Unit 1 | Abstract Data types: Evolution of OOP,Features of OOP, Syntax and Semantics of OO Programming language in  C++, Java, C# |
| Unit 2 | Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, |

| | Java threads, C# threads |
|---|---|
| **Unit 3** | Exception handling: Exceptions, exception Propagation, Exception handler in C++ ,Java and C#, Packages ,Namespace |
| **Unit 4** | Database connectivity: JDBC and Database Programming: Introduction to JDBC, JDBC Drivers, creating DSN, The java.sql package, PreparedStatement class, CallableStatement object, Scrollable Resultset, Updatable Resultset Database Connectivity using c#:Connecting to Database and Connection Pooling |
| **Unit 5** | Introduction to Java  Enterprise Edition: Need for J2EE, Advantages of J2EE, Types of Enterprise Architecture,  Architecture of J2EE, J2EE Components, J2EE Containers, J2EE Technologies |

**TEXT AND REFERENCE BOOKS**

**Text Books:**

1.Bjarne Stroustrup," The C++ Programming Language",4th Edition, Addison-Wesley ISBN ISBN:978-0321563842.

2.Herbert Schildt, *"The Complete Reference Java2",* 7th Edition, TMH Publications.
3.E Balguruswamy, *"Programming with Java - A Primer"*
4. Herbert Schildt, "C# 4.0 *The Complete Reference", 1st* Edition, TMH Publications, ISBN:9780070703681.
**Reference Books:**

1.E Balguruswamy, *"Object Oriented Programming with C++"*4th Edition, TMH Publications

1.Cay S. Horstmann, Gary Cornell*, "Core Java Volume II"* - Pearson Education.
2.Steven Holzner, *"Java 2 Black Book"*, Dreamtech Pub.

3.Ian Griffiths, Matthew Adams, Jesse Liberty"Programming C# 4.0"- O'Reilly Media
**Reference websites:**

1.www.java.sun.com/docs/books/tutorial

2.https://www.tutorialspoint.com/csharp

3.https://www.tutorialspoint.com/cplusplus

4. http://docs.oracle.com/javaee/6/tutorial/doc/

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | | | | 3 | | | | | | | |
| CO2 | | | 1 | | 3 | | | | | | | |
| CO3 | | | 2 | 3 | | | | | | | | |
| CO4 | | | 2 | 2 | | | | | | | | |
| CO5 | | | 1 | 3 | | | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:**  Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1) Power point presentation of case studies
2) Application development
3) Question & answer
4) Mini projects

**Recommended Assessment Pattern**

| Assessment Pattern Level No. | Knowledge Level | Test-I | Test-II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 05 | 00 | 20 |
| K2 | Understand | 05 | 05 | 05 | 20 |
| K3 | Apply | 05 | 05 | 05 | 20 |
| K4 | Analyze | 00 | 00 | 00 | 00 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 |
|---|---|---|---|
| | CO1,CO2 | CO3,CO4 | CO5 |
| Class Test I (15 Marks) | 05 | 05 | 05 |
| Class Test II (15 Marks) | 05 | 05 | 05 |
| Teachers Assessment (10 Marks) | 00 | 05 | 05 |
| ESE Assessment (60 Marks) | 20 | 20 | 20 |

**Special Instructions if any: Nil**

**Designed by:1.** Prof.S.S.Laddha

2. Prof Pankaj Mohrut

| IT2038: Discrete Mathematical and Structures | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 03 Hrs/Week**<br>**Tutorial:01 Hrs/Week**<br>**Credits:04** | **Examination Scheme**<br>**Test-I** : 15 Marks<br>**Test-II** : 15 Marks<br>**Teachers Assessment** : 10 Marks<br>**End Semester Exam** : 60 Marks |

**Course Description:** Discrete Mathematics deals with objects that are discrete. It is the fundamental mathematics for digital computer and all fields of computer science. Topics covered in the course include proof techniques, logic and sets, functions, relations, graph tree and algebraic techniques, probability and recurrences.

**Course Objective**:

1. To make students familiar with correct mathematical terminologies and notations
2. To understand sets, functions, relations, graphs and trees used in computer algorithms
3. To familiarize logical reasoning to solve a variety of problems.
4. To impart formal proof techniques

**Course Outcomes:** After successful completion of the course, students will be able to:

| CO1 | Describe basics of sets, relations, functions and recursion |
|---|---|
| CO2 | Use logical reasoning to solve the problems |
| CO3 | Explain and apply permutations and combinations |
| CO4 | Practice problems based on graphs and trees |

| CO 5 | Apply the concepts to various applications to find effective solution |
|------|----------------------------------------------------------------------|
|      |                                                                      |

**Detailed Syllabus**:

| Unit 1 | Sets, Combinations of sets, Finite and Infinite sets, Uncountably infinite sets, Mathematical Induction, Principle of inclusion and exclusion, Multisets, Propositions, Logical Connectives, Conditionals and Biconditionals, Logical equivalences, Euclidean Algorithm | 6 Hrs |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Unit 2 | Relations, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattices, Chains and Anti chains, Functions, Recursive functions, Pigeon hole principle., Recurrence relation, Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions, Total solutions, solutions by the method of generating functions | 6 Hrs |
| Unit 3 | Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations. Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information | 6 Hrs |
| Unit 4 | Graphs & Trees Basic terminology, multi graphs and weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, Factors of a graph, planar graph graphcoloring. Trees, rooted trees, path length in rooted trees, binary search trees, spanning trees and cut sets | 6 Hrs |
| Unit 5 | Algebraic Systems: Algebraic Systems, Groups, Semi Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal | 6 Hrs |

| | | |
|---|---|---|
| | Subgroups, Rings, Integral domain and Fields. | |

**Text Books and Reference Books:**

**Text Books:**

1. C. L. Liu, D. P.Mohapatra, "Elements of Discrete Mathematics", 3$^{rd}$ Edition, Tata McGraw Hill, 2008, ISBN 978-0-07-066913-0
2. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001, ISBN 81-7808-279-9
3. G.Shanker Rao, "Discrete Mathematics and Structure", 1st Edition, New Age International publisher, 2003, ISBN 81-224-1424-9

**Reference Books:**

1. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
2. J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", McGraw-Hill, 2002, ISBN 0-07-065142-6
3. Kenneth H. Rosen: Discrete Mathematics and Its Applications, 5th Edition, Tata McGraw-Hill, 2003, ISBN 0-07-053047-5

**Mapping of Course outcome with Program Outcomes:**

| Course outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | 2 | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | 1 | | 2 | 3 | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | 3 | | | | | | | | | | |

**1-High      2-Medium      3-Low**

**Teacher's Assessment:** Teacher Assessment of 10 Mark is based on one of the/or combination of few of following.

1. Simulation
2. Problem solving
3. Question and Answer/ Numerical solution
4. Power point presentation/ Quizzes

**Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test 1 | Test 2 | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 04 | 03 | 00 | 20 |
| K2 | Understand | 06 | 05 | 05 | 20 |
| K3 | Apply | 05 | 07 | 05 | 20 |
| K4 | Analyze | 00 | 00 | 00 | 00 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K2 | K3 | K3 |
|---|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 | C05 |
| Class Test I (15 Marks) | 04 | 03 | 03 | 03 | 02 |
| Class Test II (15 Marks) | 03 | 02 | 03 | 03 | 04 |
| Teachers Assessment (10 Marks) | 00 | 03 | 02 | 04 | 01 |
| ESE Assessment (60 Marks) | 20 | 10 | 10 | 10 | 10 |

**Designed by:**
1. Prof. C. M. Gaikwad
2. Prof. K. V.Sonkamble

| IT2039 Data Base Management System | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 03 Hrs/Week**<br>**Credits:03** | **Examination Scheme**<br>Test I           : 15 Marks<br>Test II          : 15 Marks<br>Teachers Assessment    : 10 Marks<br>End Semester Exam    : 60 Marks |

**Prerequisites: EM-III**

**Course Description:** Database Management System. In short, a DBMS is a database program. Technically speaking, it is a software system that uses a standard method of cataloging, retrieving, and running queries on data. The DBMS manages incoming data, organizes it, and provides ways for the data to be modified or extracted by users or other programs.Some DBMS examples include MySQL, PL/SQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBASE and FoxPro. Since there are so many database management systems available, it is important for there to be a way for them to communicate with each other

**Course Educational Objectives:**
1. To recognize the different issues involved in the design and implementation of a database   system.
2. Realize and successfully apply logical database design principles, including E-R diagrams and database normalization.
3. To identify and use data manipulation language to query, update, and manage a database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

**Course Outcomes**
After completing the course, students will able to:

| CO1 | Analyze the basic concepts and architecture associated with DBMS |
|---|---|
| CO2 | Convert entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data |
| CO3 | Apply normalization steps in database design and removal of data anomalies |
| CO4 | Develop team spirit and professional attitude towards the development of database |

| | applications |
|---|---|
| CO5 | Learn and implement the principles and concepts of information integrity, security and confidentiality |

**Detailed Syllabus:**

| UNIT-1 | **Introduction:** What is Database? Necessity of database? DBMS, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System Architecture, Data Models, Schemes and Instances, Data Independence, Database Languages and Interfaces, Database System Environment, Classification of Database Management Systems. Database users and administration |
|---|---|
| UNIT-2 | **ER Models, Relational Models:**<br><br>Different types of integrity constraints-Primary Key, Unique , Foreign key, Check, Not Null, Super key, Candidate Key, **E-R model**- Entity, Entity set, Strong and Weak entity ,Entity-Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Attributes- Simple, Derived, Composite, Multi valued, Identifier, Relationship, Associative entity, Cardinality constraints, Degree of relationship. E-R diagram naming conventions and design issues. Examples, Extended E_R Features.<br><br>**Relational Models:** the Relational Data Model, the Relational Algebra: Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra operations. ER-to-Relational Mapping |
| UNIT-3 | **Structured Query Language:**<br><br>Background, Structure of SQL Queries, Data Definition language-Create, alter, Describe, Drop, Truncate clause, create table using Integrity constraints Select clause, Set Operations, Functions-single row functions-general, conversion, date, character, Multiple row functions -Aggregate Functions, Group by clause, Having clause, Nested Sub queries, Complex Queries, Views, Modification of the Data-DML-Insert, Update, Delete, Different types of joins, Introduction to PL/SQL-Cursor, triggers, Procedures. |

| UNIT-4 | **Database Designing:** |
|---|---|
| | **Relational Database Design**: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Functional Dependencies, Decomposition using Multi-valued Dependencies, More Normal Forms up to BCNF. |
| UNIT-5 | **Query Processing  and Transaction Processing:** |
| | Overview of Query Processing, Measures of Query Cost, Transaction Concept, Transaction State, Implementation of Atomicity and Durability. <br> **Introduction to NoSQL**: CAP Theorem and BASE Properties, Types of NoSQL Database. <br> Concurrent Executions, Serializability, Recoverability, Implementation of Isolation. Transaction support in SQL Concurrency control techniques, concurrency control based on timestamp based protocol, validation based protocol, deadlock handling, Database Recovery Techniques based on Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage, Authorization and transaction control SQL clauses |

**Text Books**

1. Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 5th Edition, ISBN :  0-07-120413X, Tata McGraw-Hill.
2. Elmasri and Navathe : Fundamentals of Data base Systems ( 5th Ed.), Addison-Wesley, 1999.
3. Christof Strauch, "NoSQL Databases"

**Reference Books**
1. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
2. Hector Garcia- Molina, Jeffrey D. Ullman and Jennifer Widom-"Database System Implementation" Pearson Education-2003

**Mapping of Course outcome with Program Outcomes:**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | | 2 | | | | | | | |
| CO2 | 2 | 3 | 1 | 3 | | | | | | | | |
| CO3 | 1 | 2 | 2 | | 1 | | | | | | | |
| CO4 | | | 2 | | | | | | 1 | | 1 | 2 |
| CO5 | 3 | 2 | 2 | 3 | 2 | | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:**  Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1) Application development
2) Power point presentation of case studies.
3) Question & answer
4) Mini projects

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test 1 | Test 2 | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 00 | 00 | 05 |
| K2 | Understand | 10 | 05 | 02 | 15 |
| K3 | Apply | 00 | 10 | 03 | 15 |
| K4 | Analyze | 00 | 00 | 00 | 10 |
| K5 | Evaluate | 00 | 00 | 05 | 06 |
| K6 | Create | 00 | 00 | 00 | 09 |
| **Total Marks 100** | | **15** | **15** | **10** | **60** |

**Assessment table**

| Assessment Tool | K1 | K2 | K2 | K5 | K3 | K4 | K6 | Total |
|---|---|---|---|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 | CO5 | CO1 | CO4 | |
| Class Test 1 (15 Marks) | 05 | 10 | 00 | 00 | 00 | 00 | 00 | **15** |
| Class Test 2 (15 Marks) | 00 | 00 | 05 | 00 | 10 | 00 | 00 | **15** |
| Teachers Assessment (10 Marks) | 00 | 00 | 02 | 05 | 03 | 00 | 00 | **10** |
| ESE Assessment (60 Marks) | 05 | 09 | 06 | 06 | 15 | 10 | 09 | **60** |
| **Total** | **10** | **19** | **13** | **11** | **28** | **10** | **09** | **100** |

**Special Instructions if any: Nil**

**Designed by**

1. V.P. Gaikwad
2. S.S. Magare

| IT2040:    Data Communication and Networking | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 3 Hrs/Week**<br>**Credits :03** | **Examination Scheme**<br>Test-I                    : 15 Marks<br>Test-II                   :15 Marks<br>Teachers Assessment     : 10 Marks<br>End Semester Exam       : 60 Marks |

**Total Hours required for this course: 30 Hours.**

Prerequisites: NIL

**Course Description:** After completing this course, students will understand fundamentals of Data communication and Networking. First and second unit introduces Network models and it also explores the telecommunication aspects of the physical layer in the Internet model. Third unit is devoted to switching and error detection and correction. The forth and fifth unit explores the data link layer and Medium Access Control sub-layer of the to data link control

**Course Educational Objectives:**
1. To explore Data communication, Networking , Protocols and Standards and Networking Models
2. To discuss issues related to physical layer and transmission medium.
3. To discuss services provided by data link layer.
4. To make the students understand error detection and correction.

**Course Outcomes:**
After completion of this course students will be able to:

| CO1 | Understand Data communication components and  network structures. |
|---|---|
| CO2 | Compare ISO-OSI model and TCP/IP model with their functionalities. |
| CO3 | Identify and solve issues related to physical layer. |
| CO4 | Make use of error correction/ detection techniques. |

| CO5 | Classify Multiple Access Protocols and be familiar with IEEE standards. |
|---|---|

| Unit 1 | **Introduction:**Data Communication, Networks, Internet, Protocols and Standards, Network Models: OSI, TCP/IP analog and digital data, analog signal, digital signal, transmission impairments, data rate limits, performance. |
|---|---|
| Unit 2 | **Bandwidth Utilization and Transmission Media:**<br>Signal Conversion: digital-to-digital, analog-to-digital, analog-to-analog, digital-to-analog conversion, multiplexing, spread spectrum, guided media and unguided media |
| Unit 3 | **Switching and Error Detection - Correction**<br>Switching: circuit switched networks, datagram networks, virtual circuit networks, Types of errors, detection vs correction, block coding, linear block codes, cyclic codes, checksum, hamming code |
| Unit 4 | **Data Link Control Medium Access**<br>Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC and PPP. |
| Unit 5 | **Medium Access, Ethernet and LAN**<br>Random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization, IEEE standards, different Ethernets, connecting devices, backbone networks, VLAN. |

**TEXT BOOKS:**
- B. A. Forouzan, "Data Communications and Networking",5th Edition, Tata McGraw-Hill, 2013, ISBN-10: 1-25-906475-1
- Alberto Leon Garcia and Indra Widjaja, "Communication Networks, Fundamental Concepts and Key Architectures", 2nd Edition, Tata McGraw-Hill. 2004, ISBN-10: 007246352X

**REFERENCE BOOKS:**
- William Stallings, "Data and computer Communication",7th Edition, Pearson Education, ISBN-81-297-0206-1

- A S Tanenbaum, "Computer Networks", 4th Edition, Pearson Education, ISBN 9788177581652
- S. Keshav , "Engineering Approach to Computer Networks", Pearson Education, 1997, ISBN-13: 9780201634426
- J.F. Kurose and K. W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet" , 2nd Edition, Pearson, 2003, ISBN-13: 97802019769911

**WEB REFERENCES:**
- **http://nptel.ac.in/courses/106108098/**
- **http://nptel.ac.in/courses/106105082/**
- **www.mhhe.com/engcs/compsci/forouzan/**
- **https://accessengineeringlibrary.com/**

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | | | | | |
| CO2 | | 2 | | | | | | | | | | |
| CO3 | | 3 | 2 | | | | | | | | | |
| CO4 | | | 3 | | 2 | | | | | | | |
| CO5 | | | | | 3 | | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:** Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution

5) Study of Industry processes and its presentation

**Recommended Assessment Pattern:**

| Assessment Pattern Level No. | Knowledge Level | Test I | Test II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 00 | 05 | 00 | 20 |
| K2 | Understand | 05 | 05 | 05 | 10 |
| K3 | Apply | 05 | 05 | 05 | 10 |
| K4 | Analyze | 05 | 00 | 00 | 10 |
| K5 | Evaluate | 00 | 00 | 00 | 10 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table:**

| Assessment Tool | K1 | K2 | K3 | K4 | K5 |
|---|---|---|---|---|---|
| | CO1,CO3 | CO1 | CO4 | CO3,CO5 | CO5 |
| Class Test I (15 Marks) | 05 | 05 | 05 | 00 | 00 |
| Class Test II (15 Marks) | 00 | 05 | 05 | 05 | 00 |
| Teachers Assessment (10 Marks) | 00 | 05 | 05 | 00 | 00 |
| ESE Assessment (60 Marks) | 20 | 10 | 10 | 10 | 10 |

**Special Instructions if any: Nil**

**Designed by: 1.** Prof. A.N.Ghule

2.Prof. Umesh Bodkhe

| | OEIT2001: Basics Data Structure | |
|---|---|---|
| **Teaching Scheme** <br> **Lectures: 03 Hrs/Week** <br> **Tutorial:00 Hrs/Week** <br> **Credits:03** | **Examination Scheme** <br> Test I <br> Test II <br> Teachers Assessment <br> End Semester Exam | : 15Marks <br> : 15Marks <br> : 10 Marks <br> : 60 Marks |

**Prerequisites: CS1001: Basics COMP & IT**

**Course description**:

This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping you understand the reasons for choosing structures or algorithms. Topics covered include managing complexity, abstraction, analysis, vectors, lists, queues, trees, heaps, hash tables maps, and graphs.

**Course objectives:**

- To acquaint student with: Algorithm analysis and its complexity.
- Data structure design methodologies and its implementation.
- Motivate students to use critical thinking skill to implement algorithms and data structures.

**Course Outcomes**

After completing the course, students will able to:

| CO1 | Interpret and compute asymptotic notations of algorithms to analyze the consumption of resources (time/space). |
|---|---|
| CO2 | Describe and explain data structure: arrays, records, Pointer, stacks and queues. |
| CO3 | Compare the searching algorithms and sorting algorithms. |

| CO4 | Identify and model binary tree and file structure . |
|-----|-----------------------------------------------------|

**Unit 1: Introduction to Data Structure :**Algorithms, performance analysis- time complexity and space complexity. Basic terminology, Elementary Data Organization, Definition of Data structure and Abstract data type, Classification of Data structures.

**Unit 2: Arrays :**Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C++, Character string operation, Array as Parameters. **Pointer:** Pointers Definition and declaration, Initialization; Indirection operator, address of operator; pointer arithmetic; dynamic memory allocation; arrays and pointers; function and pointers.

**Unit 3: Stacks and Queue:**Array Representation and Implementation of stack, Operations on Stacks: Push, Pop, Traverse. Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack, Applications in recursion**,**Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.    **Introduction of Link list**

**Unit 4: Searching, Hashing and Sorting** :Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation, Selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

**Unit 5: Binary Search Trees and File Structures**:Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.**,** Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

**Text Books**
1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C

and   C++ " , Pearson Pub.
2.  G.S. Baluja, "Principles of Data Structures using C and C++",

**Reference Books**
1.  Yashavant P Kanetkar, "Data Structures through C", BPB Pub. ( Book with CD)
2.  Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",
3.  Robert L Kruse, "Data Structures and Program Design", PHI

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 2 | | | | | | | | |
| CO2 | | | 2 | 1 | 3 | | | | | | | |
| CO3 | | | 2 | 1 | 3 | | | | | | | |
| CO4 | 3 | 2 | 1 | | | | | | | | | |
| | | | | | | | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:** Teachers Assessment of 10 marks is based on one of the / or combination of few of following
6)  Simulation
7)  Application development
8)  Power point presentation of case studies
9)  Question & answer / Numerical solution
**10)**  Mini projects

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Knowledge Level | Test I | Test II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 05 | 00 | 15 |
| K2 | Understand | 05 | 05 | 05 | 20 |
| K3 | Apply | 05 | 05 | 05 | 10 |
| K4 | Analyze | 00 | 00 | 00 | 15 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| Total Marks 100 | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 | K4 | K5 |
|---|---|---|---|---|---|
| | C01 | C02 | C03 | CO4 | C01 |
| Class Test I (15 Marks) | 05 | 05 | 05 | 00 | 00 |
| Class Test II (15 Marks) | 05 | 05 | 05 | 00 | 00 |
| Teachers Assessment (10 Marks) | 00 | 05 | 05 | 00 | 00 |
| ESE Assessment (60 Marks) | 15 | 20 | 10 | 15 | 00 |

Designed by

1. V. P. Gaikwad

2. K.V.Sonkamble

| OEIT2002: Basics of Cyber Security | |
|---|---|
| **Teaching Scheme**<br>**Lectures: 3 Hrs/Week**<br>**Credits: 03** | **Examination Scheme**<br>**Test I** : 15 Marks<br>**Test II** : 15 Marks<br>**Teachers Assessment** : 10 Marks<br>**End Semester Exam** : 60 Marks |

**Course Educational Objectives:**
- To make students familiar with the fundamental concepts of cyber security.
- To Identify the cyber threats
- To develop the concepts in computer forensics
- To make use of information and data to serve as digital evidence

**Course Outcomes:**

After completion of this course students will be able to:

| CO1 | To makes students familiar with the fundamental concepts of cyber security |
|---|---|
| CO2 | To understand the different types of attacks |
| CO3 | Identify the cyber threats |
| CO4 | Illustrate tools and methods used in Cyber crime |
| CO5 | Make use of information and data to serve as digital evidence |

| Unit 1 | Introduction to cyber security. Defination,Computer Security,Necessity of Security,What to Secure?,Benefits of Computer Security Awareness,Losses due to Security Attacks,Different Elements in Computer Security, Cyber security strategies, Policies To Mitigate Cyber Risk. Introduction to Cybercrime,Cybercrime definition andoriginsof theworld,Cybercrime and information security,Classificationsof cybercrime,CybercrimeandtheIndian ITA2000, A global Perspective on cybercrimes. |
|---|---|
| Unit 2 | How criminal plan the attacks,Social Engg, Cyber stalking, Cybercafe and Cybercrimes, Botnets, Attack vector, Cloud computing,Proliferation of Mobile and Wireless Devices, Trends in Mobility,Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attackson Mobile/Cell Phones, Mobile Devices: Security |

| | |
|---|---|
| | Implications for Organizations, Organizational Measures for Handling Mobile, Devices Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptop |
| **Unit 3** | Tools and methods used in cybercrime: Software Vulnerabilities: Phishing, password cracking, keyloggers and spywares, Viruses, Worms, and other Malware , steganography, DoS and DDoS attacks, SQL injection, Buffer overflow, Attacks on wireless network, Identity theft. |
| **Unit 4** | Cybercrimes and Cybersecurity: The Legal Perspectives, Introduction Cybercrime and the Legal , Landscape around the World,Why Do We Need Cyberlaws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the, Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment,Cyberlaw, Technology and Students: Indian Scenario. |
| **Unit 5** | Understanding Computer Forensics:Introduction,Historical Background of Cyberforensics, Digital Forensics Science,The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-Mail , Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics. |

**TEXT AND REFERENCE BOOKS**
**Text Books:**
1.Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi
2. . James Graham, Richard Howard, Ryan Olsan, "Cyber Security Essentials"
CRC Press.
**Reference Books:**
1.Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, "Cyber Security Policy
Guidebook" Wiley Publications
2.Albert J. Marcella, Jr. Doug Menendez"CYBER FORENSICS: A Field Manual
for Collecting, Examining, and Preserving Evidence of Computer Crimes", Auerbach Publications

3.Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012

**Website:**
1. http://nptel.ac.in/courses/106106129
2. https://www.tutorialspoint.com/information_security_cyber_law/cyber_security_strategies.htm

**Mapping of Course outcome with Program Outcomes**

**Mapping of Course outcome with PO's-Information Technology Department**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | | | 3 | | | | | | | |
| CO2 | | 3 | | 2 | | | | | | | | |
| CO3 | | | | 2 | 3 | | | | | | | |
| CO4 | | 3 | | 1 | 1 | | | | | | | |
| CO5 | | | | 2 | | 1 | | | | | | |

**1 – High    2 – Medium    3 – Low**

**Teacher's Assessment:**  Teachers Assessment of 10 marks is based on one of the / or combination of few of following
1)    Power point presentation of case studies
2)    Question & answer

**Recommended Assessment Pattern**

| Assessment Pattern Level No. | Knowledge Level | Test I | Test II | Teachers Assessment/ Assignment | End Semester Examination |
|---|---|---|---|---|---|
| K1 | Remember | 05 | 05 | 00 | 20 |
| K2 | Understand | 05 | 05 | 05 | 20 |
| K3 | Apply | 05 | 05 | 05 | 20 |
| K4 | Analyze | 00 | 00 | 00 | 00 |
| K5 | Evaluate | 00 | 00 | 00 | 00 |
| K6 | Create | 00 | 00 | 00 | 00 |
| **Total Marks 100** | | 15 | 15 | 10 | 60 |

**Assessment table**

| Assessment Tool | K1 | K2 | K3 |
|---|---|---|---|
| | CO1,CO2 | CO3,CO4 | CO5 |
| Class Test I (15 Marks) | 05 | 05 | 05 |
| Class Test II (15 Marks) | 05 | 05 | 05 |
| Teachers Assessment (10 Marks) | 00 | 05 | 05 |
| ESE Assessment (60 Marks) | 20 | 20 | 20 |

Designed by

1. S.B. Nemade

2. P.A.Mohrut

| IT2022: Lab Object Oriented Programming |
|---|

| Teaching Scheme<br>Practical: 2Hrs/Week<br>Credits :01 | Examination Scheme<br>Term Work  :  25 Marks<br>Practical Examination & Viva: 25 Marks |
|---|---|

| CO1 | Familiarize with Object Oriented programming Syntax , Semantics, compiling, debugging, linking and executing a program using the development environment |
|---|---|
| CO2 | Use and apply Multithreading using OO programming languages |
| CO3 | Use and apply Exception Handling using OO programming languages |
| CO4 | Develop database applications to access and query a database |
| CO5 | Illustrate the basics of Java Enterprise Edition |

**Suggestive List of Practical**

| Sr. No. | Details |
|---|---|
| | **Level:  Basic (all)** |
| 1 | Install JDK,set the variables and write program to print message on the output screen |
| 2 | Install C#,set the variables and write program to print message on the output screen |
| 3 | Program to implement the concept of OOP's using C++ |
| 4 | Program to implement the concept of OOP's using C# |
| 5 | Program to implement the concept of OOP's using Java |
| 6 | Program to implement the concept of database connectivity using Java |
| 7 | Program to implement the concept of database connectivity using C# |
| | **Level: Moderate (any four)** |
| 8 | Program to implement the concept of Virtual function in C++. |
| 9 | Program to implement the concept of Multithreading using java. |
| 10 | Program to implement the concept of Exception Handling using java. |

| 11 | Program to implement the concept of Multithreading using c#. |
|---|---|
| 12 | Program to implement the concept of Exception Handling using c#. |
| 13 | Program to implement the 2-tier architecture using J2EE. |
| **Level: Complex (any one)** | |
| 10 | Mini Project in C++ |
| 11 | Mini Project in Java |
| 12 | Mini Project in C# |

**Note: Experiment will be perform in Visual Studio/ JDK/ Turboc++**
**Expected to solve all problems of simple level any four from Moderate and any one from complex level**

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | | | | 3 | | | | | | | |
| CO2 | | | 1 | | 3 | | | | | | | |
| CO3 | | | 2 | 3 | | | | | | | | |
| CO4 | | | 2 | | 2 | | | | | | | |
| CO5 | | | 1 | 3 | 2 | | | | | | | |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 04 | 04 |
| S2 | Manipulation | 07 | 07 |
| S3 | Precision | 07 | 07 |
| S4 | Articulation | 07 | 07 |
| S5 | Naturalization | 00 | 00 |

| Total | 25 | 25 |
|---|---|---|

| | | |
|---|---|---|
| Preparation (S1) | 04 | 04 |
| Conduct of Experiment (S2) | 04 | 04 |
| Observation and Analysis of Results (S3) | 07 | 07 |
| Record (S2) | 03 | 03 |
| Mini-Project / Presentation/ Viva-Voce (S4) | 07 | 07 |
| Total | **25** | **25** |

Designed By:

1. S.S. Ladha
2. Pankaj Mohrut

| IT2041  Lab-Database  Management  System | |
|---|---|
| **Teaching Scheme**<br>**Practical: 02 Hrs/Week**<br>**Credits:  01** | **Examination Scheme**<br>**Term Work**              **: 25 Marks**<br>**Practical Examination**<br>**& Viva Voce:**             **: 25 Marks** |

**Laboratory Course Outcomes**

As an outcome of completing the Laboratory course, students will able to:

| | |
|------|---|
| CO1 | Formulate and test SQL queries using SELECT FROM, WHERE, ORDER BY blocks |
| CO2 | Recognize the need for logical operation, set operators, UNION, DISTINCT, LIKE, and use them appropriately. |
| CO3 | Formulate and test queries using aggregate functions in SQL |
| CO4 | Formulate and test of cursor and procedure in PL/SQL. |

**List of Experiments**

| Sr. No. | Details |
|---------|---------|
| | **Level:  Basic (all)** |
| 1 | To Study different types of Oracle Data types |
| 2 | To Study different types of DDL commands. |
| 3 | To study different types of DML commands. |
| 4 | To study different integrity constraints |
| | **Level: Moderate (any three)** |
| 5 | To study different types SQL functions |
| 6 | To study subqueries. |
| 7 | To study views. |
| 8 | To study different types of joins |
| | **Level: Complex (any two)** |
| 9 | Study of Open Source Databases : MySQL |
| 10 | Design at least 10 SQL queries for suitable database application using SQL DML |

| | statements: Insert, Select, Update, Delete with operators, functions, and set operator |
|---|---|
| 11 | To study cursor and procedure in PL/SQL |
| 12 | To study trigger in PL/SQL |
| 13 | Mini Project |

**Note: Experiment will be perform in Oracle 11g**

**Mapping of Course outcome with Program Outcomes**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | | | | | | | | | |
| CO2 | | | | 2 | 2 | | | 3 | | | | |
| CO3 | | 2 | 2 | 3 | | | | | | | | |
| CO4 | | | | 1 | 2 | | | 3 | | 2 | | |

**1 – High     2 – Medium     3 - Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S3 | S4 | S2 |
|---|---|---|---|---|---|
| | CO1 | CO2 | CO3 | CO4 | CO1 |
| Term Work (25 Marks) | 05 | 05 | 05 | 05 | 05 |
| Practical Examination & Viva Voce (25 Marks) | 03 | 05 | 05 | 07 | 05 |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill  Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 05 | 03 |
| S2 | Manipulation | 10 | 10 |

| S3 | Precision | 05 | 05 |
|---|---|---|---|
| S4 | Articulation | 05 | 07 |
| 55 | Naturalization | 00 | 00 |
| **Total** | | 25 | 25 |

| | | | |
|---|---|---|---|
| Preparation (S1) | | 04 | 04 |
| Conduct of Experiment (S2) | | 05 | 07 |
| Observation and Analysis of Results (S3) | | 05 | 05 |
| Record (S2) | | 04 | 04 |
| Mini-Project / Presentation/ Viva-Voce (S4) | | 07 | 05 |
| Total | | **25** | **25** |

**Designed by**

1. V.P.Gaikwad
2. S.S.Magare

| IT2042: Lab Software Lab II (ASP.NET ) | |
|---|---|
| **Teaching Scheme** <br> **Practical: 2Hrs/Week** <br> **Credits :01** | **Examination Scheme** <br> **Term Work  : 25 Marks** <br> **Practical Examination** <br> **& Viva Voce              : 25 Marks** |

**Laboratory Course Outcomes**
As an outcome of completing the Laboratory course, students will able to:

| CO1 | Demonstrate secure web applications using ASP.Net |
|---|---|
| CO2 | Ability to handle XML file and Database. |
| CO3 | Create a simple website to demonstrate the use of  rich controls for creating online |

| | registration form |
|---|---|
| CO4 | Ability to create Advance programs using ASP.net which is required in IT industry |
| CO5 | Ability to develop Web services |

**List of Practical**

| Sr. No. | Details |
|---|---|
| | **Level: Easy** |
| 1 | To Study the ASP.Net Introduction. Create a webform that allow users to upload files to the web server. |
| 2 | Create online registration form using rich controls |
| 3 | Design logon Web form and validate it |
| | **Level: Moderate** |
| 4 | Develop a web page to insert, delete & modify information stored in the database. |
| 5 | Create a feedback form having various choices and count obtained percentage of each choice |
| 6 | Develop a web application to read an XML document containing subject, mark scored, and year of passing into a Dataset. |
| | **Level: Complex** |
| 7 | Develop a webpage that displays data in graphical form, using the "Chart Helper". |
| 8 | To create advertisements using adRotator |
| 9 | Create a program using web service |
| 10 | Create a web form for Online test. |
| 11 | Mini Project |

**Note: Experiment will be perform in asp.net**

**Mapping of Course outcome with Program Outcomes**

**1 –**                                                                                                          **High**

**2 –**

| Course Outcome | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 2 | | | | | | | | | | |
| CO2 | | | | 2 | 1 | | | | | | | |
| CO3 | | | 2 | | | | | | | | | |
| CO4 | | | | | 3 | | 1 | | | | | |
| CO5 | | | | | | | 1 | | | | | |

**Medium    3 – Low**

**Assessment Table**

| Assessment Tool | S1 | S2 | S3 | S4 | S3 |
|---|---|---|---|---|---|
| | CO1 | CO2 | CO3 | CO4 | CO5 |
| Term Work (25 Marks) | 04 | 04 | 08 | 06 | 03 |
| Practical Examination & Viva Voce (25 Marks) | 05 | 10 | 05 | 05 | 00 |

**Recommended Assessment pattern**

| Assessment Pattern Level No. | Skill Level | Term Work | Practical Examination & viva voce |
|---|---|---|---|
| S1 | Imitation | 04 | 05 |
| S2 | Manipulation | 04 | 10 |
| S3 | Precision | 11 | 05 |
| S4 | Articulation | 06 | 05 |
| S5 | Naturalization | 00 | 00 |
| **Total** | | 25 | 25 |

| Preparation (S1) | 04 | 05 |
|---|---|---|

| | | |
|---|---|---|
| Conduct of Experiment (S2) | 03 | 07 |
| Observation and Analysis of Results (S3) | 11 | 05 |
| Record (S2) | 01 | 03 |
| Mini-Project / Presentation/ Viva-Voce (S4) | 06 | 05 |
| Total | **25** | **25** |

**Designed by**

1. Deepa S. Tandale

2. Sujata S. Magare