

**THE MAHATMA GANDHI UNIVERSITY**

**Bachelor in Computer Applications (Honours)**

**SYLLABUS**

**MGU-BCA (Honours)**

**(2024 Admission Onwards)**



**Faculty: Technology and Applied Sciences**

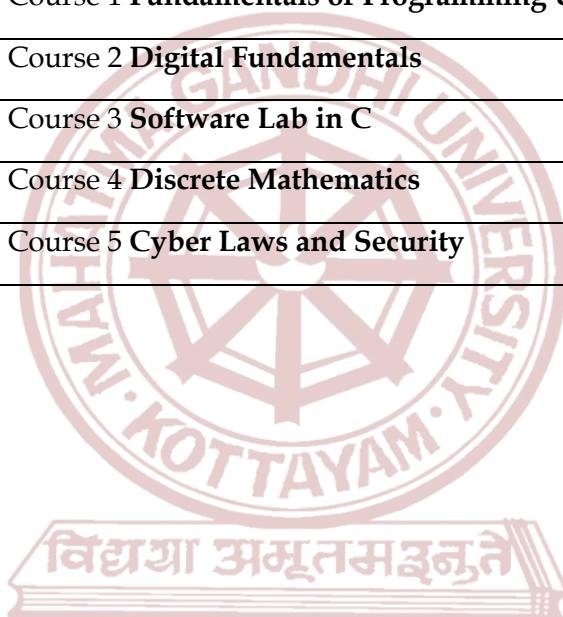
**Expert Committee: Computer Application (UG)**

**Programme: Bachelor in Computer Applications (Honours)**

**Mahatma Gandhi University  
Priyadarshini Hills  
Kottayam – 686560, Kerala, India**

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## MGU-BCA (HONOURS)

## Syllabus

| External Experts   |  |
|--|--|
| 1  | <b>Prof. (Dr.) Bindu V R</b> , Professor and Head, School of Computer Sciences, Mahatma Gandhi University, Kottayam  |
| 2  | <b>Prof. (Dr.) Sabu M K</b> , Professor, Department of Computer Applications, Cochin University of Science and Technology, Kochi                             |
| Members of the Expert Committee in Computer Application (UG) |  |
| 1  | <b>Dr. Rajimol A</b> , Associate Professor, Department of Computer Applications, Marian College Kuttikkanam (Autonomous), Kuttikkanam (Chairperson UG Board) |
| 2  | <b>Dr. Ajitha R S</b> , Assistant Professor, Department of Computer Applications, NSS College, Rajakumari  |
| 3  | <b>Mr. Bineesh Jose</b> , Assistant Professor, Department of Computer Applications, Pavanatma College, Murickassery  |
| 4  | <b>Dr. Reji K Kollinal</b> , Assistant Professor, Department of Computer Applications, BPC College, Piravom  |
| 5  | <b>Ms. Simi M</b> , Associate Professor, Department of Computer Applications, SAS SNDP Yogam College, Konni  |
| 6  | <b>Ms. Ambili M S</b> , Assistant Professor, Department of Computer Science, Sree Sankara Vidyapeetom College, Valayanchirangara                             |
| 7  | <b>Ms. Bindhu Prabha</b> , Associate Professor, Department of Computer Applications, SAS SNDP Yogam College, Konni   |
| 8  | <b>Dr. Leena C Sekhar</b> , Associate Professor, Department of Computer Applications, MES College, Marampally  |
| 9  | <b>Dr. Juby George</b> , Assistant Professor, Department of Computer Applications, Marian College, Kuttikkanam   |
| 10   | <b>Dr. Sowmya M R</b> , Assistant Professor, Department of Computer Science, Sree Sankara College, Kalady  |
| 11   | <b>Mr. Biju Kumar S P</b> , Assistant Professor, Department of Computer Applications, NSS College Rajakumari, Idukki (Dist)                                  |

## First Semester

| Course Code  | Title of the Course                 | Type of<br>the<br>Course | Credit | Hours<br>/ week | Hour<br>Distribution<br>/week |   |   |   |
|--------------|-------------------------------------|--------------------------|--------|-----------------|-------------------------------|---|---|---|
|              |                                     |                          |        |                 | L                             | T | P | O |
| MG1DSCBCA100 | Fundamentals of Programming using C | DSC                      | 4      | 4               | 4                             | 0 | 0 | 0 |
| MG1DSCBCA101 | Digital Fundamentals                | DSC                      | 4      | 4               | 4                             | 0 | 0 | 0 |
| MG1DSCBCA102 | Software lab in C                   | DSC                      | 2      | 4               | 0                             | 0 | 4 | 0 |
| MG1DSCBCA103 | Discrete Mathematics                | DSC                      | 4      | 4               | 4                             | 0 | 0 | 0 |
| MG1MDCBCA100 | Cyber Laws and Online Safety        | MDC                      | 3      | 3               | 3                             | 0 | 0 | 0 |
|              | AEC- ENGLISH                        | AEC 1                    | 3      | 3               | 3                             | 0 | 0 | 0 |
|              | AEC-OL                              | AEC 2                    | 3      | 3               | 3                             | 0 | 0 | 0 |



## **MGU-BCA (HONOURS)**

# Syllabus

|   |   |                |          |           |        |             |
|---|---|----------------|----------|-----------|--------|-------------|
|  | <h1 style="text-align: center;">Mahatma Gandhi University</h1> <h2 style="text-align: center;">Kottayam</h2>  |                |          |           |        |             |
| <b>Programme</b>  | <b>BCA (Honours)</b>  |                |          |           |        |             |
| <b>Course Name</b>  | <b>Fundamentals of Programming Using C</b>  |                |          |           |        |             |
| <b>Type of Course</b>   | <b>DSC</b>  |                |          |           |        |             |
| <b>Course Code</b>  | <b>MG1DSCBCA100</b>   |                |          |           |        |             |
| <b>Course Level</b>   | <b>100</b>  |                |          |           |        |             |
| <b>Course Summary</b>   | This course covers fundamental concepts in computer programming, including algorithms, flowcharts, programming languages, control flow structures, arrays, and functions, emphasizing practical implementation through a series of hands-on exercises. Students will gain proficiency in solving problems using the C programming language. |                |          |           |        |             |
| <b>Semester</b>   | 1   | <b>Credits</b> |          |           | 4      |             |
| <b>Course Details</b>   | Learning Approach   | Lecture        | Tutorial | Practical | Others | Total Hours |
|   |   | 4              | 0        | 0         | 0      |             |
| <b>Pre-requisites, if any</b>   | विद्या अमृतम् इन्हें  |                |          |           |        |             |

### COURSE OUTCOMES (CO)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Demonstrate basic programming concepts.  | U                  | 1     |
| 2      | Understand C Programming Basics such as Datatypes and Variables, Different types of operators. | U                  | 2     |
| 3      | Devise C programs using the concept of Decision statements and loop control statements.        | An                 | 2     |
| 4      | Apply logic to use arrays and functions in C Programming Language.                             | A                  | 1     |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units | Course description   | Hrs | CO No. |
|--------|-------|--|-----|--------|
| 1      | 1.1   | Problem Solving Life Cycle – Understanding the Problem Statement, Analysing the problem,<br>Planning Program design using Hierarchy charts, Top-down approach, Bottom-up approach.<br>Understanding basic Problem-Solving Tools: Algorithms: Definition & its attributes, Flowchart: Definition & its attributes, symbols, Statements: Input-Output, Decision-Making &Looping, Module representation | 6   | 1      |
|        | 1.2   | <b>Introduction to Programming:</b> Computer program. Classification of computer languages: machine, assembly and high-level languages, Language translators (Assembler, Compiler, Interpreter), Linker, Testing and debugging,  | 4   | 1      |
|        | 1.3   | Types of errors- Syntax errors, Logical errors and Runtime errors.   | 2   | 1      |
| 2      | 2.1   | C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables,   | 2   | 2      |
|        | 2.2   | Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions-   | 5   | 2      |
|        | 2.3   | Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators,  | 3   | 2      |
|        | 2.4   | Assignment operators and expressions, Logical Operators, Bitwise operators.  | 4   | 2      |
| 3      | 3.1   | Input and Output in C - Formatted functions, unformatted functions, commonly used library functions,   | 5   | 3      |
|        | 3.2   | Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if.   | 6   | 3      |
|        | 3.3   | Loop control- for loops, nested for loops, while loops, do while loop.   | 6   | 3      |
| 4      | 4.1   | Array, initialization, array terminology, characteristics of an array, one dimensional array and operations,   | 5   | 4      |

|  |     |   |   |   |
|--|-----|---|---|---|
|  | 4.2 | Two dimensional arrays and operations. Strings and standard functions, Introduction to pointers.<br><br>Basics of a function, function definition, return statement,  | 6 | 4 |
|  | 4.3 | Types of functions, call by value and reference. Recursion<br>- Rules for recursive function, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, typedef, enumerated data types, Union. | 6 | 4 |

|                                       |   |
|---------------------------------------|---|
| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b><br><br><ul style="list-style-type: none"> <li>• Use of ICT tools in conjunction with traditional classroom teaching methods</li> <li>• Interactive sessions</li> <li>• Class discussions</li> </ul>  |
| <b>Assessment Types</b>               | <b>MODE OF ASSESSMENT</b><br><br><b>A. Continuous Comprehensive Assessment (CCA)</b><br><br><b>CCA for Theory: 30 Marks</b> <ol style="list-style-type: none"> <li>1. Written tests</li> <li>2. Assignments</li> <li>3. Quiz</li> </ol>   |
|                                       | <b>B. Semester End Examination</b><br><br><b>ESE for Theory: Written Test (70 Marks, 2 Hrs)</b> <p>Part A: Very Short Answer Questions (Answer all) - (10*2=20 Marks)</p> <p>Part B: Short Answer Questions (5 out of 7 Questions) - (5*6=30 Marks)</p> <p>Part C: Essay Questions (2 out of 3 Questions) - (2*10=20 Marks)</p> |

## **REFERENCES**

1. Balagurusamy, E. (2019), “Programming in ANSI C” (8th ed.), Tata McGraw Hill.
2. Hanly J. R. and Koffman E. B. (2007), “Problem Solving and Program Design in C” (7th ed.), Pearson Education.

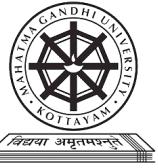
## **SUGGESTED READINGS**

1. Gottfried, B. S. (2018). “Programming with C” (4th ed.). Schaum’s Outline Series, TMH.
2. Pradeep K. Sinha and Priti Sinha (2004), “Computer Fundamentals -Concepts, Systems & Applications”, 8th Edition, BPB Publications.



## **MGU-BCA (HONOURS)**

# *Syllabus*

|   |   |         |          |           |        |                    |
|---|---|---------|----------|-----------|--------|--------------------|
|  | <h1>Mahatma Gandhi University</h1> <h2>Kottayam</h2>  |         |          |           |        |                    |
| <b>Programme</b>  | BCA (Honours)   |         |          |           |        |                    |
| <b>Course Name</b>  | Digital Fundamentals  |         |          |           |        |                    |
| <b>Type of Course</b>   | DSC   |         |          |           |        |                    |
| <b>Course Code</b>  | MG1DSCBCA101  |         |          |           |        |                    |
| <b>Course Level</b>   | 100   |         |          |           |        |                    |
| <b>Course Summary</b>   | This course covers the fundamentals of digital electronics, including number systems, Boolean algebra, logic gates, combinational logic circuits, and sequential logic circuits. Students gain a comprehensive understanding of digital logic design principles and their applications through theoretical concepts and practical examples. |         |          |           |        |                    |
| <b>Semester</b>   | 1   | Credits |          |           | 4      | <b>Total Hours</b> |
| <b>Course Details</b>   | Learning Approach   | Lecture | Tutorial | Practical | Others |                    |
|   |   | 4       | 0        | 0         | 0      | 60                 |
| <b>Pre-requisites, if any</b>   |   |         |          |           |        |                    |

### COURSE OUTCOMES (CO)

### MGU-BCA (HONOURS)

| CO No. | Expected Course Outcome<br><i>Syllabus</i>  | Learning Domains * | PO No |
|--------|---|--------------------|-------|
| 1      | Demonstrate comprehension of number systems.  | U,A                | 2     |
| 2      | Analyse working of logic gates, solve expressions using laws of Boolean algebra.                  | An,A               | 1,2   |
| 3      | Illustrate the combinational logic circuits using multiplexers, demultiplexers and other circuits | U,An               | 1,3   |
| 4      | Design sequential circuits using flip flops and registers   | An,A               | 1,2   |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units | Course description  | Hrs | CO No. |
|--------|-------|---|-----|--------|
| 1      | 1.1   | Number Systems, Introduction – Base or radix, Non-positional and Positional number system, Popular number systems (Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, 1's Complement, 2's complement. | 8   | 1      |
|        | 1.2   | BCD numbers- concept and 8421 additions   | 2   | 1      |
| 2      | 2.1   | Logic gates- AND, OR, NOT, NAND, NOR, XOR and XNOR. Truth tables and graphical representation.  | 5   | 2      |
|        | 2.2   | Basic laws of Boolean Algebra, Simplification of Expressions, DeMorgan's theorems,  | 5   | 2      |
|        | 2.3   | Dual expressions, Canonical expressions. Minterms and Maxterms, SOP and POS expressions   | 4   |        |
|        | 2.4   | Simplification of expressions using K-MAP (up to 4 variables)   | 5   | 2      |
|        | 2.5   | Representation of simplified expressions using NAND/NOR Gates, Don't care conditions  | 4   | 2      |
| 3      | 3.1   | Combinational Logic Circuits: Adders-Half adder, Full adder   | 7   | 3      |
|        | 3.2   | Encoders, Decoders (Diagram and working principle)  | 5   | 3      |
|        | 3.3   | Multiplexers, Demultiplexers (Diagram and working principle)  | 5   | 3      |
| 4      | 4.1   | Sequential Logic Circuits: Flip flops- RS, JK, T, D, Triggering of flip flops, Concept of Registers   | 10  | 4      |

|                                |  |
|--------------------------------|--|
| Teaching and Learning Approach | <b>Classroom Procedure (Mode of transaction)</b> <ul style="list-style-type: none"> <li>• ICT enabled Lectures</li> <li>• Interactive sessions</li> <li>• Class discussions</li> </ul> |
| Assessment Types               | <b>MODE OF ASSESSMENT</b><br><b>A. Continuous Comprehensive Assessment (CCA)</b>   |

|  |  |
|--|--|
|  | <p><b>CCA for Theory: 30 Marks</b></p> <ol style="list-style-type: none"> <li>1. Written tests</li> <li>2. Quiz</li> <li>3. Assignments</li> </ol>   |
|  | <p><b>B. Semester End Examination</b></p> <p><b>ESE for Theory: 70 Marks; Written Test (2 Hrs)</b></p> <p>Part A: Very Short Answer Questions (Answer all) -<br/>(<math>10 \times 2 = 20</math> Marks)</p> <p>Part B: Short Answer Questions (5 out of 7 Questions) -<br/>(<math>5 \times 6 = 30</math> Marks)</p> <p>Part C: Essay Questions (2 out of 3 Questions) - (<math>2 \times 10 = 20</math> Marks)</p> |

## REFERENCES

1. M Morris Mano. Digital Logic and Computer Design (4th Edition). Prentice Hall.
2. A. Anand Kumar (2018). Fundamentals of Digital Circuits (4th Edition). PHI Learning Pvt. Ltd.

## SUGGESTED READINGS

1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition, TATA McGraw Hill Edition
2. Thomas L Floyd- Digital Fundamentals, Ninth edition, PEARSON Prentice Hall.
3. Malvino & Leach- Digital Principles and Applications, Sixth Edition, Tata McGraw Hill, 2006



## MGU-BCA (HONOURS)

# Syllabus

|   |  |                |          |           |          |                    |
|---|--|----------------|----------|-----------|----------|--------------------|
|  | <h1 style="text-align: center;">Mahatma Gandhi University</h1> <h2 style="text-align: center;">Kottayam</h2>   |                |          |           |          |                    |
| <b>Programme</b>  | <b>BCA (Honours)</b>   |                |          |           |          |                    |
| <b>Course Name</b>  | <b>Software Lab in C</b>   |                |          |           |          |                    |
| <b>Type of Course</b>   | <b>DSC</b>   |                |          |           |          |                    |
| <b>Course Code</b>  | <b>MG1DSCBCA102</b>  |                |          |           |          |                    |
| <b>Course Level</b>   | <b>100</b>   |                |          |           |          |                    |
| <b>Course Summary</b>   | This course covers problem solving using C Programming, Practical Implementation of Problems using different types of C statements such as control flow structures, loop control structures, arrays, and functions. Students will gain proficiency in solving problems using the C programming language. |                |          |           |          |                    |
| <b>Semester</b>   | First  | <b>Credits</b> |          |           | <b>2</b> | <b>Total Hours</b> |
| <b>Course Details</b>   | Learning Approach  | Lecture        | Tutorial | Practical | Others   |                    |
|   |  | 0              | 0        | 4         | 0        | 60                 |
| <b>Pre-requisites, if any</b>   | विद्या अमृतमङ्गते  |                |          |           |          |                    |

## MGU-BCA (HONOURS)

| CO No.   | Expected Course Outcome   | Learning Domains * | PO No |
|--|---|--------------------|-------|
| 1  | Develop programs to solve various problems using different types of C statements such as control flow structures, loop control structures, arrays, and functions. | A                  | 1     |
| <i>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)</i> |   |                    |       |

## COURSE CONTENT

### Content for Lab Sessions (Units)

| Module | Units | Course description  | Hrs | CO No. |
|--------|-------|---|-----|--------|
| 1      | 1.1   | Programs to understand the use of Datatypes and variables.  | 3   | 1      |
|        | 1.2   | Programs to use different Operators and Type Conversions  | 5   | 1      |
| 2      | 2.1   | Programs to Apply Input and Output in C, understand Library functions                             | 7   | 1      |
|        | 2.2   | Program to implement Control structures in C  | 10  | 1      |
|        | 2.3   | Programs to Implement Loop Control Structures in C  | 10  | 1      |
| 3      | 3.1   | Programs to Implement Arrays: One-dimensional and Two-dimensional Arrays                          | 10  | 1      |
| 4      | 4.1   | Program to implement problems using Functions, Recursion and different parameter Passing Methods. | 15  | 1      |

|                                |  |
|--------------------------------|--|
| Teaching and Learning Approach | <b>Classroom Procedure (Mode of transaction)</b><br><b>MGU-BCA (HONOURS)</b><br><ul style="list-style-type: none"> <li>• Practical Lab Sessions</li> <li>• Discussions</li> </ul>  |
| Assessment Types               | <b>MODE OF ASSESSMENT</b><br><b>A. Continuous Comprehensive Assessment (CCA)</b><br><b>CCA for Practical: 30 Marks</b> <ol style="list-style-type: none"> <li>1. Written tests</li> <li>2. Lab Assessment</li> <li>3. Viva</li> <li>4. Record</li> </ol> |
|                                | <b>B. Semester End Examination</b><br><b>ESE for Practical: 70 Marks (2.5 Hrs)</b>   |

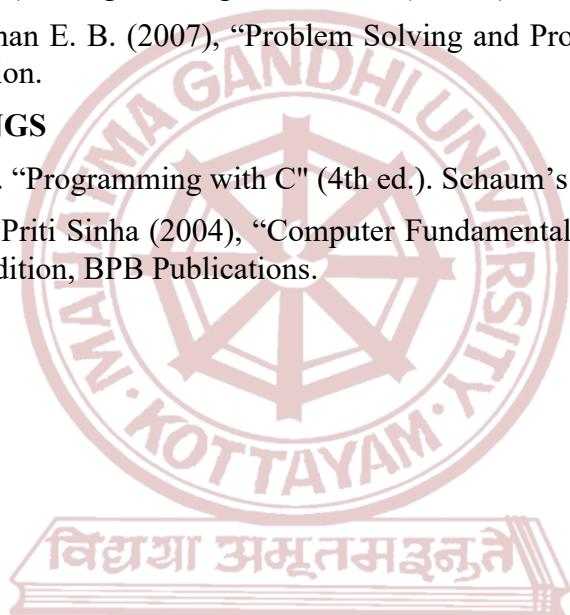
|  |                                       |
|--|---------------------------------------|
|  | <b>Lab Examination Test: 70 Marks</b> |
|  | 1. First Program: 20 Marks            |
|  | 2. Second Program: 30 Marks           |
|  | 3. Viva Voce: 10 Marks                |
|  | 4. Record: 10 Marks                   |

## REFERENCES

1. Balagurusamy, E. (2019), "Programming in ANSI C" (8th ed.), Tata McGraw Hill.
2. Hanly J. R. and Koffman E. B. (2007), "Problem Solving and Program Design in C" (7th ed.), Pearson Education.

## SUGGESTED READINGS

1. Gottfried, B. S. (2018). "Programming with C" (4th ed.). Schaum's Outline Series, TMH.
2. Pradeep K. Sinha and Priti Sinha (2004), "Computer Fundamentals -Concepts, Systems & Applications", 8th Edition, BPB Publications.



## MGU-BCA (HONOURS)

# Syllabus

|   |   |         |          |           |        |                    |
|---|---|---------|----------|-----------|--------|--------------------|
|  | <b>Mahatma Gandhi University</b><br><b>Kottayam</b>   |         |          |           |        |                    |
| <b>Programme</b>  | BCA (Honours)   |         |          |           |        |                    |
| <b>Course Name</b>  | Discrete Mathematics  |         |          |           |        |                    |
| <b>Type of Course</b>   | DSC   |         |          |           |        |                    |
| <b>Course Code</b>  | MG1DSCBCA103  |         |          |           |        |                    |
| <b>Course Level</b>   | 100   |         |          |           |        |                    |
| <b>Course Summary</b>   | This course introduces basic concepts of Set Theory, Logic, Relations, functions and Matrices. The Basic ideas of Sets and Propositional Logic are further expanded. Mathematical Significance of Relations and functions are explained. Various mathematical manipulations involved in Matrices are properly illustrated. Students acquire skills in applying concepts in Propositional Logic and Relations in different branches of computer science. |         |          |           |        |                    |
| <b>Semester</b>   | 1   | Credits |          |           | 4      | <b>Total Hours</b> |
| <b>Course Details</b>   | Learning Approach   | Lecture | Tutorial | Practical | Others |                    |
|   |   | 4       | 0        | 0         | 0      | 60                 |
| <b>Pre-requisites, if any</b>   | Nil   |         |          |           |        |                    |

### MGU-BCA (HONOURS)

#### COURSE OUTCOMES (CO)

| CO No. | Expected Course Outcome<br><i>Syllabus</i>   | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Understand Concepts of Set Theory  | U                  | 1     |
| 2      | Evaluate problems on Set theory.   | E                  | 2     |
| 3      | Understand Propositional Logic.  | U                  | 2     |
| 4      | Identify and Apply Propositional Logic.  | A                  | 3     |
| 5      | Evaluate problems using Truth tables and Logical operators.  | E                  | 3     |
| 6      | Understand And Analyse different types and properties of Relations, functions and Equivalence Relations. | An                 | 2     |
| 7      | Understand concepts of Matrix and Matrix Operators.  | U                  | 2     |

|  |  |   |   |
|--|--|---|---|
| 8  | Evaluate the Inverse of a Matrix and solution of a system of Non homogeneous Equations | E | 2 |
| <b>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)</b> |  |   |   |

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units            | Course description  | Hrs | CO No. |
|--------|------------------|---|-----|--------|
| 1      | Logic and Proofs |   |     |        |
|        | 1.1              | Propositional Logic (1.1 of Text 1)   | 5   | 3      |
|        | 1.2              | Propositional Equivalences (1.2 of Text 1)  | 5   | 4      |
|        | 1.3              | Rules of Inferences for Propositional Logic<br>(Relevant portions of 1.5 of Text 1)   | 5   | 5      |
| 2      | Set Theory       |   |     |        |
|        | 2.1              | Sets (2. 1 of Text 1)   | 4   | 1      |
|        | 2.2              | Set operations. (2. 2 of Text 1)  | 4   | 2      |
|        | 2.3              | Functions ( 2. 3 of Text 1)   | 4   | 6      |
| 3      | Relations        |   |     |        |
|        | 3. 1             | Relations and their Properties ( 7. 1 of Text 1)  | 6   | 6      |
|        | 3. 2             | Representing relations (7.3 of Text 1)  | 6   | 6      |
|        | 3. 3             | Equivalence relations (7.5 of Text 1)   | 5   | 6      |
| 4      | Matrices         |   |     |        |
|        | 4. 1             | Definition and different types of Matrices,<br>Symmetric and Skew Symmetric Matrices<br>(2.5 of Text 2)                               | 3   | 7      |
|        | 4. 2             | Matrix operations, Determinant, Matrix inverse<br>(2.6 , Relevant portions of 2.7 of Text 2)  | 8   | 7 & 8  |
|        | 4.3              | Solution of a system of Non homogeneous<br>equations by Matrix method and Cramer's rule<br>(Relevant portions of 2.7, 2.10 of Text 2) | 5   | 8      |

| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b><br>Brainstorming lectures, Explicit teaching, Active Cooperative learning |  |                |                |                 |              |
|---------------------------------------|--|--|----------------|----------------|-----------------|--------------|
| <b>Assessment Types</b>               | <b>MODE OF ASSESSMENT</b>  |  |                |                |                 |              |
|                                       | A  | <b>Continuous Comprehensive Assessment (CCA) (30 marks)</b>                |                |                |                 |              |
|                                       |  | 1. Quiz / MCQ<br>2. Assignment<br>3. Tests<br>4. Tutorial                  |                |                |                 |              |
|                                       |  | <b>End Semester Evaluation (ESE) 70 marks</b>                              |                |                |                 |              |
|                                       |  | <b>Question Pattern</b><br><b>[Maximum Time 2 Hours, Maximum Marks 70]</b> |                |                |                 |              |
|                                       | <b>B</b>   | <b>Module</b>  | <b>Part A</b>  | <b>Part B</b>  | <b>Part C</b>   | <b>Total</b> |
|                                       |  |  | <b>2 Marks</b> | <b>6 Marks</b> | <b>10 Marks</b> |              |
|                                       |  | I  | 2              | 2              | 2               | 6            |
|                                       |  | II   | 2              | 2              | 1               | 5            |
|                                       |  | III  | 2              | 2              | 1               | 5            |
|                                       |  | IV   | 2              | 2              | 2               | 6            |
|                                       |  | Total no of questions  | 8              | 8              | 6               | 22           |
|                                       |  | Number of questions to be answered   | 5              | 5              | 3               | 13           |
|                                       |  | Total Marks  | 10             | 30             | 30              | 70           |

## REFERENCES

1. Kenneth. H. Rosen - Discrete Mathematics and its applications, 6th edition
2. B.S Grewal - Higher Engineering Mathematics, 40th Edition, Khanna Publications

## SUGGESTED READINGS

1. Erwin Kreyszig - Advanced Engineering Mathematics, Wiley, India.
2. S.S Sastry - Engineering Mathematics Volume 1, 4th edition PHI.



# Mahatma Gandhi University

## Kottayam

|                               |  |         |          |           |             |
|-------------------------------|--|---------|----------|-----------|-------------|
| <b>Programme</b>              | BCA (Honours)  |         |          |           |             |
| <b>Course Name</b>            | Cyber Laws and Security  |         |          |           |             |
| <b>Type of Course</b>         | MDC  |         |          |           |             |
| <b>Course Code</b>            | MG1MDCBCA100   |         |          |           |             |
| <b>Course Level</b>           | 100  |         |          |           |             |
| <b>Course Summary</b>         | This comprehensive course on Cyber Laws and Security is designed to provide participants with a thorough understanding of cyber laws, including the IT Act, data protection, and regulations related to cybercrimes, cyberbullying, and harassment, along with internet security practices. It also provides a foundational understanding of cryptography, cyber forensics, and ethical hacking principles to enhance knowledge in securing digital information and systems. |         |          |           |             |
| <b>Semester</b>               | 1  | Credits |          |           | Total Hours |
| <b>Course Details</b>         | Learning Approach  | Lecture | Tutorial | Practical | Others      |
|                               |  | 3       | 0        | 0         | 0           |
| <b>Pre-requisites, if any</b> | विद्यार्थी अमूल्यनुसार   |         |          |           |             |

### COURSE OUTCOMES (CO)

### MGU-BCA (HONOURS)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Describe cyber laws, IT Act, data protection and various cybercrimes.                    | U                  | 1     |
| 2      | Analyze and apply security measures during online transactions and financial activities. | An                 | 1     |
| 3      | Illustrate basic cryptographic techniques and importance of cyber forensic.              | U                  | 2     |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transaction (Units)

| Module | Units | Course description  | Hrs | CO No. |
|--------|-------|---|-----|--------|
| 1      |       | Cyber Laws, IT Act and Cyber Crimes   |     |        |
|        | 1.1   | Introduction to Cyber laws: Definition and Scope, Key legal concepts in cyberspace.                                     | 2   | 1      |
|        | 1.2   | IT Act: Overview of the IT Act 2000, Offenses and penalties under the IT Act, Amendments and evolving landscape.        | 4   | 1      |
|        | 1.3   | Data Protection and Privacy Laws : Principles of Data Protection, Privacy laws and regulations.                         | 3   | 1      |
|        | 1.4   | Cyber Crimes: Types of Cybercrimes, Hacking and unauthorized access, Identity theft and cyber fraud.                    | 4   | 1      |
|        | 1.5   | Cyber Bullying and Harassment: Definition and Forms of Cyber Bullying, Legal Perspective on Cyberbullying.              | 4   | 1      |
| 2      | 1.6   | Harassment Laws and social media, Reporting and preventing cyberbullying.   | 3   | 1      |
|        |       | Online Security   |     |        |
|        | 2.1   | Introduction to Internet Security: Overview of Internet Security, Importance of Online Safety.                          | 2   | 2      |
|        | 2.2   | Passwords and Authentication: Importance of Strong Password, Multi Factor Authentication (MFA).                         | 2   | 2      |
|        | 2.3   | Secure Browsing Practices: Recognizing and Avoiding phishing Attacks, Identifying Secure Websites (HTTPS).              | 3   | 2      |
|        | 2.4   | Social Media Security: Privacy settings on Social media platforms, Secure sharing information.                          | 2   | 2      |
| 3      | 2.5   | Online Transaction and Financial Security: Secure online shopping, Banking and Financial Security, Payment Card safety. | 2   | 2      |
|        |       | Introduction to Cryptography and Cyber Forensics  |     |        |
| 3      | 3.1   | Security Concepts: Introduction, The need for security, Principles of security, Types of Security attacks               | 3   | 3      |

|     |   |   |   |
|-----|---|---|---|
| 3.2 | Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques,  | 4 | 3 |
| 3.3 | Encryption and decryption, symmetric and asymmetric key cryptography  | 3 | 3 |
| 3.4 | Introduction to Cyber forensics - Definition and importance of cyber forensics, Types of cybercrime -hacking, phishing, identity theft, etc., The role of forensics in investigating cybercrime. Introduction to Ethical Hacking. | 4 | 3 |

|                                       |  |
|---------------------------------------|--|
| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b><br><br>Lectures, Discussions, Case Analysis   |
| <b>Assessment Types</b>               | <b>MODE OF ASSESSMENT</b><br><b>A. Continuous Comprehensive Assessment (CCA)</b><br><b>CCA for Theory: 25 Marks</b> <ol style="list-style-type: none"> <li>1. Written test</li> <li>2. Assignments</li> <li>3. MCQ</li> </ol><br><b>B. Semester End Examination</b><br><b>ESE for Theory: 50 Marks (1.5 Hrs)</b><br><b>MGU-BCA (HONOURS)</b><br><b>Written Test (50 Marks)</b> <p>Part A: Very Short Answer Questions (Answer all) -<br/>(10*2=20 Marks)</p> <p>Part B: Short Answer Questions (6 out of 8 Questions) -<br/>(6*5=30 Marks)</p> |
|                                       |  |

## **REFERENCES:**

1. Vakul Sharma, "Information Technology Law and Practice", 3<sup>rd</sup> ed. 2011, Universal Law Pub., New Delhi.
2. Adv. Prashant Mali, "Cyber Law & Cyber Crimes", Snow White Publications Pvt. Ltd, 2<sup>nd</sup> ed. 2015.
3. Michael Cross , "Social Media Security: Leveraging Social Networking While Mitigating Risk", Elsevier, 2014.
4. William Stallings & Lawrie Brown " Computer Security – Principles and Practice" 3rd ed., Pearson Pub., 2017.
5. William Stallings, Cryptography and Network Security Principles and Practice, 4/e,Pearson Ed.
6. Cyber Forensics - Concepts and Approaches, Ravi Kumar & B Jain,2006, icfai university press

## **SUGGESTED READINGS:**

1. "Cyber Law in India" by Pavan Duggal
2. "Cyber Security: A Practitioner's Guide" by Eric Cole
3. "Principles of Intellectual Property" by Stephen M McJohn
4. "The Indian Cyber Law" by Sandeep Agrawal



## **MGU-BCA (HONOURS)**

# **Syllabus**

**THE MAHATMA GANDHI UNIVERSITY**

**Bachelor in Computer Applications (Honours)**

**SYLLABUS**

**MGU-BCA (Honours)**

**(2024 Admission Onwards)**



**Faculty: Technology and Applied Sciences**

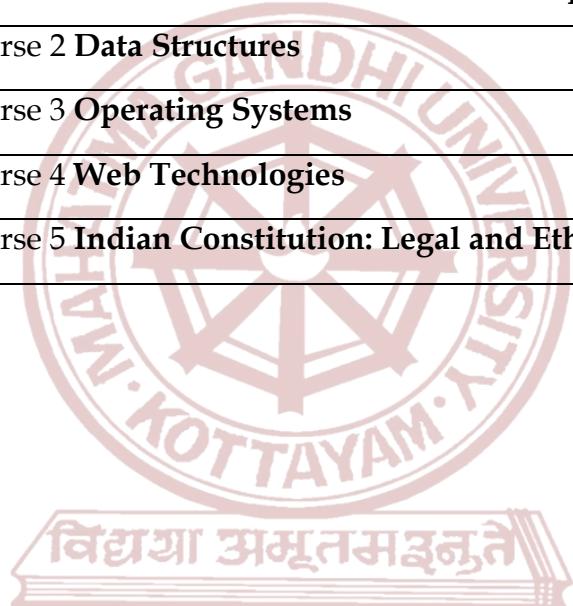
**Expert Committee: Computer Application (UG)**

**Programme: Bachelor in Computer Applications (Honours)**

**Mahatma Gandhi University  
Priyadarshini Hills  
Kottayam – 686560, Kerala, India**

## CONTENTS

| Sl.No | Title   |
|-------|---|
| 1     | External Experts & Expert Committee   |
| 2     | Scheme of <b>Second Semester BCA (Honours)</b>  |
| 3     | Semester 2 Course 1 <b>Mathematics Foundations to Computer Science</b>                |
| 4     | Semester 2 Course 2 <b>Data Structures</b>  |
| 5     | Semester 2 Course 3 <b>Operating Systems</b>  |
| 6     | Semester 2 Course 4 <b>Web Technologies</b>   |
| 7     | Semester 2 Course 5 <b>Indian Constitution: Legal and Ethical Perspectives for IT</b> |

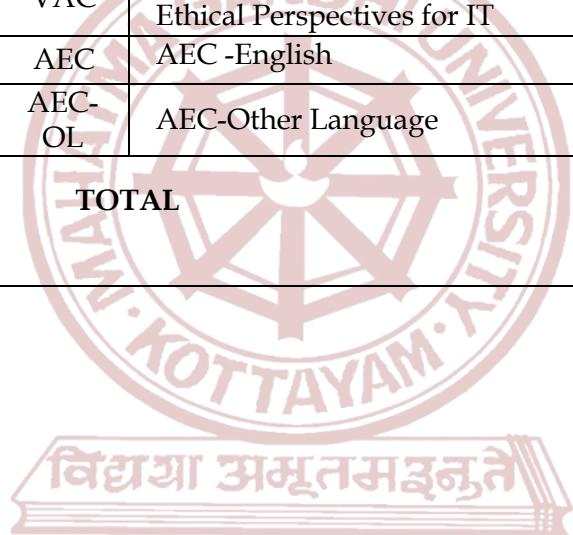


## MGU-BCA (HONOURS)

# Syllabus

| External Experts   |  |
|--|--|
| 1  | <b>Prof. (Dr.) Bindu V R</b> , Professor and Head, School of Computer Sciences, Mahatma Gandhi University, Kottayam  |
| 2  | <b>Prof. (Dr.) Sabu M K</b> , Professor, Department of Computer Applications, Cochin University of Science and Technology, Kochi                             |
| Members of the Expert Committee in Computer Application (UG) |  |
| 1  | <b>Dr. Rajimol A</b> , Associate Professor, Department of Computer Applications, Marian College Kuttikkanam (Autonomous), Kuttikkanam (Chairperson UG Board) |
| 2  | <b>Dr. Ajitha R S</b> , Assistant Professor, Department of Computer Applications, NSS College, Rajakumari  |
| 3  | <b>Mr. Bineesh Jose</b> , Assistant Professor, Department of Computer Applications, Pavanatma College, Murickassery  |
| 4  | <b>Dr. Reji K Kollinal</b> , Assistant Professor, Department of Computer Applications, BPC College, Piravom  |
| 5  | <b>Ms. Simi M</b> , Associate Professor, Department of Computer Applications, SAS SNDP Yogam College, Konni  |
| 6  | <b>Ms. Ambili M S</b> , Assistant Professor, Department of Computer Science, Sree Sankara Vidyapeetom College, Valayanchirangara                             |
| 7  | <b>Ms. Bindhu Prabha</b> , Associate Professor, Department of Computer Applications, SAS SNDP Yogam College, Konni   |
| 8  | <b>Dr. Leena C Sekhar</b> , Associate Professor, Department of Computer Applications, MES College, Marampally  |
| 9  | <b>Dr. Juby George</b> , Assistant Professor, Department of Computer Applications, Marian College, Kuttikkanam   |
| 10   | <b>Dr. Sowmya M R</b> , Assistant Professor, Department of Computer Science, Sree Sankara College, Kalady  |
| 11   | <b>Mr. Biju Kumar S P</b> , Assistant Professor, Department of Computer Applications, NSS College Rajakumari, Idukki (Dist)                                  |

| Second Semester |              |                |  |                   |   |           |           |
|-----------------|--------------|----------------|--|-------------------|---|-----------|-----------|
| Sl.<br>No.      | Course Code  | Course<br>Type | Course Title   | Hours per<br>week |   |           | Credit    |
|                 |              |                |  | L                 | T | P         |           |
| 1               | MG2CCRBCA100 | CC             | Mathematics Foundations to Computer Science                | 4                 | 0 | 0         | 4         |
| 2               | MG2CCRBCA101 | CC             | Data Structures  | 4                 | 0 | 2         | 5         |
| 3               | MG2CCRBCA102 | CC             | Operating Systems  | 4                 | 0 | 0         | 4         |
| 4               | MG2SECBCA100 | SEC            | Web Technologies   | 1                 | 0 | 2         | 2         |
| 5               | MG2VACBCA100 | VAC            | Indian Constitution: Legal and Ethical Perspectives for IT | 2                 | 0 | 0         | 2         |
| 6               |              | AEC            | AEC -English   | 3                 | 0 | 0         | 3         |
| 7               |              | AEC-OL         | AEC-Other Language   | 3                 | 0 | 0         | 3         |
| <b>TOTAL</b>    |              |                |  | 21                | 0 | 4         |           |
|                 |              |                |  |                   |   | <b>25</b> | <b>23</b> |



## MGU-BCA (HONOURS)

# Syllabus

|  |   |                |          |           |                    |
|--|---|----------------|----------|-----------|--------------------|
| <br>विद्या अमृतम् | <h1 style="text-align: center;">Mahatma Gandhi University</h1> <h2 style="text-align: center;">Kottayam</h2>  |                |          |           |                    |
| <b>Programme</b>   | <b>BCA (Honours)</b>  |                |          |           |                    |
| <b>Course Name</b>   | <b>Mathematics Foundation to Computer Science</b>   |                |          |           |                    |
| <b>Type of Course</b>  | <b>Core Course</b>  |                |          |           |                    |
| <b>Course Code</b>   | MG2CCRBCA100  |                |          |           |                    |
| <b>Course Level</b>  | NA  |                |          |           |                    |
| <b>Course Summary</b>  | This course will introduce graph theory and mathematical techniques that form the foundation of advanced computational methods focusing on numerical methods and optimization. It enables students to comprehend and apply various problem-solving strategies to address both theoretical and practical challenges in computer science. |                |          |           |                    |
| <b>Semester</b>  | 2   | <b>Credits</b> |          | 4         | <b>Total Hours</b> |
| <b>Course Details</b>  | <b>Learning Approach</b><br>Lecture   | Lecture        | Tutorial | Practical |                    |
|  |   | 4              | 0        | 0         | 0                  |
| <b>Pre-requisites, if any</b>  | NIL   |                |          |           |                    |

## COURSE OUTCOMES (CO) GU-BCA (HONOURS)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Apply Concepts of Graph Theory to solve real-life problems.  | A                  | 1     |
| 2      | Apply numerical methods to approximate solutions to mathematical problems.   | A                  | 1,2   |
| 3      | Understand the concepts of Linear programming and Operations Research, and Apply them using graphical and simplex methods. | A                  | 1,2   |
| 4      | Formulate and solve transportation problems  | C                  | 1,2   |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units | Course description   | Hrs | CO No. |
|--------|-------|--|-----|--------|
| 1      |       | <b>Elementary Graph Theory</b>   |     |        |
|        | 1.1   | Basic terminologies of graphs, connected and disconnected graphs, subgraphs, paths and cycles, complete graphs, digraphs, weighted graphs, Planar graphs.<br><br>(Section 3.1 of REF. 1)               | 4   | 1      |
|        | 1.2   | Basic concepts of Euler graphs. Characterisation of Euler graphs.<br><br>(Section 3.1 of REF. 1)   | 4   | 1      |
| 2      | 1.3   | Basic concepts of Trees and Spanning trees. Properties of trees.<br><br>(Section 3.2 of REF. 1)  | 5   | 1      |
|        |       | <b>Numerical Methods</b>   |     |        |
|        | 2.1   | Roots of Nonlinear equations: Bisection method and Newton-Raphson methods.<br><br>(Section 6.1, 6.6, 6.8 of REF. 2)<br><br><i>Only formula and problem-solving for all the topics mentioned above.</i> | 6   | 2      |
| 2      | 2.2   | Numerical Interpolation: Newton's Forward and Backward Interpolation Formula.<br><br>(Section 9.1, 9.7 of REF. 2)<br><br><i>Only formula and problem-solving for all the topics mentioned above.</i>   | 5   | 2      |
|        | 2.3   | Numerical Integration: Trapezoidal rule and Simpson's 1/3 rule.<br><br>(Section 12.1- 12.4 of REF. 2)<br><br><i>Only formula and problem-solving for all the topics mentioned above.</i>               | 6   | 2      |
|        |       | <b>Linear Programming Problem</b>  |     |        |
| 3      | 3.1   | Linear programming: Introduction, Formulation of LPP.<br><br>(REF. 3)  | 5   | 3      |
|        | 3.2   | Graphical method for solving LPP with two variables, Special cases in graphical methods.   | 5   | 3      |

|   |                       |   |   |   |
|---|-----------------------|---|---|---|
|   |                       | (REF. 3)  |   |   |
|   | 3.3                   | Simplex method, Artificial variable techniques, Big M method.<br>(REF. 3)   | 6 | 3 |
| 4 | <b>Transportation</b> |   |   |   |
|   | 4.1                   | Transportation problem: Definition, Linear form, North-west corner method, Least cost method, Vogel's approximation method for finding a feasible solution.<br>(REF. 3) | 4 | 4 |
|   | 4.2                   | MODI method for finding the optimum solution. Degeneracy<br>(REF. 3)  | 6 | 4 |
|   | 4.3                   | Unbalanced Transportation Problem, Maximisation in transportation problem.<br>(REF. 3)  | 4 | 4 |

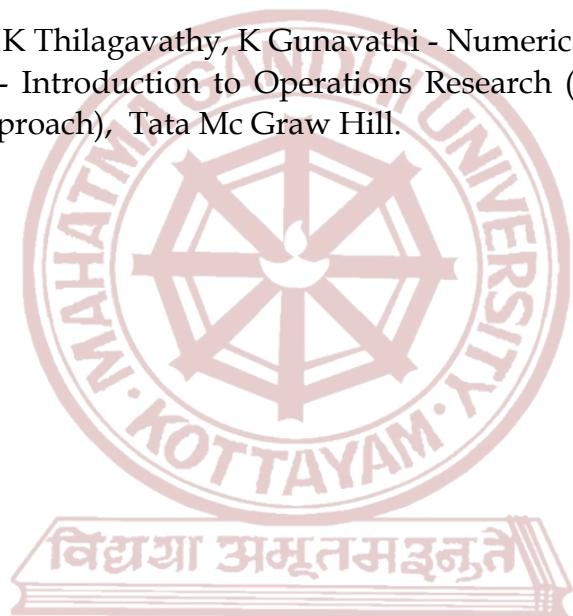
|                                       |  |
|---------------------------------------|--|
| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b> <ul style="list-style-type: none"> <li>• Brainstorming lectures</li> <li>• Explicit teaching</li> <li>• Active Cooperative learning</li> </ul>  |
| <b>Assessment Types</b>               | <p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p><b>CCA for Theory: 30 Marks</b></p> <ul style="list-style-type: none"> <li>• Quiz / MCQ</li> <li>• Assignment</li> <li>• Tests</li> </ul> <p><b>B. Semester End Examination</b></p> <p><b>ESE for Theory: Written Test (70 Marks, 2 Hrs)</b></p> <p>Part A: Answer any 5 questions out of 8. Each question carries 2 marks.<br/>(<math>5 \times 2 = 10</math> marks)</p> <p>Part B: Answer any 5 questions out of 8. Each question carries 6 marks.<br/>(<math>5 \times 6 = 30</math> marks).</p> <p>Part C: Answer any 2 questions out of 4. Each question carries 15 marks.<br/>(<math>2 \times 15 = 30</math> marks)</p> |

## REFERENCES

1. Robert J McEliece, Robert B Ash, Carol Ash - Introduction to Discrete Mathematics, McGraw Hill.
2. E Balagurusamy - Numerical Methods, Tata McGraw Hill.
3. V K Kapoor - Operations Research- Concepts, Problems & Solutions, Sultan Chand & Sons

## SUGGESTED READINGS

1. Narsingh Deo - Graph Theory with applications to Engineering and Computer Science.
2. P Kandasamy, K Thilagavathy, K Gunavathi - Numerical Methods.
3. Belly E Gillet - Introduction to Operations Research (A Computer Oriented Arithmetic Approach), Tata Mc Graw Hill.



## MGU-BCA (HONOURS)

# Syllabus

|  |   |         |          |           |        |
|--|---|---------|----------|-----------|--------|
| <br>Mahatma Gandhi University<br>Kottayam |   |         |          |           |        |
| Programme  | BCA (Honours)   |         |          |           |        |
| Course Name  | Data Structures   |         |          |           |        |
| Type of Course   | Core Course   |         |          |           |        |
| Course Code  | MG2CCRBCA101  |         |          |           |        |
| Course Level   | NA  |         |          |           |        |
| Course Summary   | <p>This course module offers a comprehensive introduction to data structures and its applications. It covers foundational topics such as algorithms, arrays, stacks, queues, recursion, and linked lists. It also covers advanced concepts like hashing, graphs, and tree structures, including AVL trees.</p>                    |         |          |           |        |
| Semester   | 2   | Credits |          |           | 5      |
| Course Details   | Learning Approach   | Lecture | Tutorial | Practical | Others |
|  |   | 4       | 0        | 1         | 0      |
| Pre-requisites, if any   | <ol style="list-style-type: none"> <li><b>Programming Fundamentals:</b> Understanding the basic syntax and semantics of the C programming language.</li> <li><b>Problem-Solving Skills:</b> Ability to break down a problem into smaller steps, devise a step-by-step solution and be familiar with simple algorithms.</li> </ol> |         |          |           |        |

#### COURSE OUTCOMES (CO)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Understand the fundamental concepts of Data Structures, the Representation of single and two-dimensional arrays and the implementation of various operations on them | An                 | 1     |
| 2      | Analyse the representation of stacks and queues using arrays, operations on them and application of these data structures in problem-solving.                        | An                 | 1,2   |
| 3      | Demonstrate the ability to implement and manipulate various types of linked lists (singly, doubly, and circular)   | An                 | 1,2   |
| 4      | Illustrate the basic concepts of Graphs and Trees and the operations on Binary search trees.   | An                 | 1,2   |

|  |  |   |   |
|--|--|---|---|
| 5  | Implement Data Structures using C programming language | A | 2 |
| <b>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)</b> |  |   |   |

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units | Course description  | Hrs | CO No. |
|--------|-------|---|-----|--------|
| 1      | 1.1   | Introduction and Overview: Definition, Classification and Operations of Data Structures. Algorithms: Complexity, Time-Space Trade off.  | 2   | 1      |
|        | 1.2   | Arrays: Definition and Classification of Arrays, Representation of Linear Arrays in Memory, Operations on Linear Arrays: Traversing, Inserting, Deleting, Searching, Sorting and Merging. | 4   | 1      |
|        | 1.3   | Searching: Linear Search and Binary Search, Comparison of Methods.  | 3   | 1      |
|        | 1.4   | Sorting: Bubble Sort, Selection Sort, and Insertion Sort.   | 4   | 1      |
|        | 1.5   | Two-Dimensional Arrays, Representation of Two-Dimensional Arrays in Memory, Matrices  | 2   | 1      |
| 2      | 2.1   | Stacks: Definition, Representation of Stacks using Arrays, Operations on Stacks using Arrays  | 3   | 2      |
|        | 2.2   | Application of Stacks: Arithmetic Expressions, Polish Notation, Conversion of Infix Expression to Postfix Expression, Evaluation of Postfix Expression.                                   | 5   | 2      |
|        | 2.3   | Queues: Definition, Representation of Queues using arrays, Types of Queue: Simple Queue, Circular Queue, Double-Ended Queue, Priority Queue,  | 4   | 2      |
|        | 2.4   | Operations on Simple Queues and Circular Queues using Array, Applications of Queues.  | 5   | 2      |
| 3      | 3.1   | Linked Lists: Definition, Comparison with Arrays, Representation, Types of Linked lists   | 3   | 3      |
|        | 3.2   | Traversing, Inserting, Deleting and Searching in Singly Linked List. Doubly Linked List and Circular Linked List. Applications of Linked Lists.   | 7   | 3      |
|        | 3.3   | Introduction to Hashing, Hash Tables  | 2   | 3      |
|        | 3.4   | Recursion: Definition, Runtime Stack, Applications of Recursion: Factorial of Number, Fibonacci Series  | 5   | 3      |
| 4      | 4.1   | Graphs: Definition, Terminology.  | 2   | 4      |

|   |     |  |    |   |
|---|-----|--|----|---|
|   | 4.2 | Trees: Definition, Terminology, Binary Trees, Traversal of Binary Tree, Binary Search Tree, Inserting and Searching in Binary Search Tree  | 5  | 4 |
|   | 4.3 | Height Balanced Trees: AVL Trees- Introduction   | 4  | 4 |
| 5 | 5.1 | <p style="text-align: center;">(Practical Session)</p> <p>Lab Programs:</p> <ol style="list-style-type: none"> <li>1. Write a program for insertion and deletion operations in an array.</li> <li>2. Write a program to search for an element in an array using Linear Search and Binary Search.</li> <li>3. Write a program to sort an array using Bubble Sort, Selection Sort and Insertion Sort.</li> <li>4. Write a program to merge two arrays.</li> <li>5. Write a program to add and subtract two matrices.</li> <li>6. Write a program to multiply two matrices.</li> <li>7. Write a program to insert an element into a Singly Linked List:             <ol style="list-style-type: none"> <li>(a) At the beginning</li> <li>(b) At the end</li> <li>(c) At a specified position</li> </ol> </li> <li>8. Write a program to delete an element from a Singly Linked List:             <ol style="list-style-type: none"> <li>(a) At the beginning</li> <li>(b) At the end</li> <li>(c) A specified element</li> </ol> </li> <li>9. Write a program to perform the following operations in a Doubly Linked List:             <ol style="list-style-type: none"> <li>(a) Create</li> <li>(b) Search for an element</li> </ol> </li> <li>10. Write a program to perform the following operations in a Circular Linked List:             <ol style="list-style-type: none"> <li>(a) Create</li> <li>(b) Search an element</li> </ol> </li> <li>11. Write a program to implement stack operations using an array.</li> <li>12. Write a program to evaluate a postfix expression using a stack.</li> <li>13. Write a program to perform the following using recursion:             <ol style="list-style-type: none"> <li>(a) Find the factorial of a number</li> <li>(b) Generate Fibonacci Series</li> </ol> </li> <li>14. Write a program to implement simple queue operations using an array.</li> <li>15. Write a program to implement circular queue operations using an array.</li> </ol> | 30 | 5 |

|  |  |  |  |
|--|--|--|--|
|  | <p>16. Write a program to perform the following operations on a binary search tree.</p> <ul style="list-style-type: none"> <li>(a) Preorder Traversal</li> <li>(b) Inorder Traversal</li> <li>(c) Postorder Traversal</li> </ul> <p>17. Write a program to perform an insertion operation in a binary search tree.</p> |  |  |
|--|--|--|--|

|                                       |   |
|---------------------------------------|---|
| <b>Teaching and Learning Approach</b> | <p><b>Classroom Procedure (Mode of transaction)</b></p> <ul style="list-style-type: none"> <li>• ICT enabled Lectures</li> <li>• Interactive sessions</li> <li>• Class discussions</li> </ul>   |
| <b>Assessment Types</b>               | <p><b>MODE OF ASSESSMENT</b></p> <p><b>B. Continuous Comprehensive Assessment (CCA)</b></p> <p><b>CCA for Theory: 30 Marks</b></p> <ul style="list-style-type: none"> <li>• Written tests</li> <li>• Quiz</li> <li>• Assignments</li> </ul> <p><b>CCA for Practical: 15 Marks</b></p> <ul style="list-style-type: none"> <li>• Practical assignments</li> <li>• Lab Record</li> <li>• Observation of practical skills</li> <li>• Viva</li> </ul>  |
|                                       | <p><b>C. Semester End Examination</b></p> <p><b>ESE for Theory: Written Test (70 Marks, 2 Hrs)</b></p> <p>Part A: Very Short Answer Questions (Answer all) - <math>(5*2=10</math> Marks)</p> <p>Part B: Short answer Questions (5 out of 7 Questions) - <math>(5*6=30</math> Marks)</p> <p>Part C: Essay Questions (2 out of 3 Questions) - <math>(2*15=30</math> Marks)</p> <p><b>ESE for Practical: 35 Marks (1.5 Hrs)</b></p> <ul style="list-style-type: none"> <li>• Logic - 10 Marks</li> <li>• Successful Compilation - 5 Marks</li> <li>• Output - 5 Marks</li> <li>• Viva - 10 Marks</li> <li>• Record - 5 Mark</li> </ul> |

## REFERENCES

1. G.S Baluja (2004). Data Structures Through C (A Practical Approach) (2nd Edition). Danapati Rai & Co.

2. Ellis Horowitz and Sartaj Sahni. Fundamentals of Data Structures (2nd Edition). Galgotia Publications.

#### SUGGESTED READINGS

1. Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill.
2. Yedidyah Lanngsam, Moshe Augstein, Aaron M Tenenbaum- Data structures using C and C++, Second Edition, Prentice Hall.



#### MGU-BCA (HONOURS)

# Syllabus

|   |  |                |          |           |        |
|---|--|----------------|----------|-----------|--------|
|  | <h1 style="text-align: center;">Mahatma Gandhi University</h1> <h2 style="text-align: center;">Kottayam</h2>   |                |          |           |        |
| <b>Programme</b>  | <b>BCA (Honours)</b>   |                |          |           |        |
| <b>Course Name</b>  | <b>Operating Systems</b>   |                |          |           |        |
| <b>Type of Course</b>   | <b>Core Course</b>   |                |          |           |        |
| <b>Course Code</b>  | <b>MG2CCRBCA102</b>  |                |          |           |        |
| <b>Course Level</b>   | <b>NA</b>  |                |          |           |        |
| <b>Course Summary</b>   | This course provides a comprehensive understanding of operating systems (OS), focusing on their design, functionality, and core components. Students will explore fundamental concepts, including process management, scheduling, synchronization, memory management, and strategies to handle deadlocks and virtual memory. |                |          |           |        |
| <b>Semester</b>   | 2  | <b>Credits</b> |          |           | 4      |
| <b>Course Details</b>   | <b>Learning Approach</b>   | Lecture        | Tutorial | Practical | Others |
|   |  | 4              | 0        | 0         | 0      |
| <b>Pre-requisites, if any</b>   |  |                |          |           |        |

### COURSE OUTCOMES (CO)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Describe the structure, types, services of operating system.                   | U                  | 1     |
| 2      | Analyse the performance of various process scheduling algorithms.              | An                 | 2     |
| 3      | Appraise various techniques for process synchronization and deadlock handling. | An                 | 2     |
| 4      | Analyse the method employed for memory management in computer systems.         | An                 | 2     |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transactions (Units)

| Module | Units | Course description   | Hrs | CO No. |
|--------|-------|--|-----|--------|
| 1      | 1.1   | Operating Systems Overview: Definition. Functions, Structure- Simple, Layered, Microkernels, Modules.  | 6   | 1      |
|        | 1.2   | Operating systems Operation-Dual-Mode operation and Timer. Operating System services, User Operating System Interface, System Calls, Types of system calls.  | 6   | 1      |
| 2      | 2.1   | Process Management: Process Definition, Process states, Process State transitions, Process Scheduling, Process Control Block, Threads, Concept of multithreads.                                    | 5   | 2      |
|        | 2.2   | Process Scheduling: Definition, Scheduling Criteria, CPU scheduling- Preemptive and Non-preemptive. Scheduling algorithms (FCFS, SJF and RR), Performance evaluation of the scheduling Algorithms. | 9   | 2      |
| 3      | 3.1   | Process Synchronization: Introduction, Inter-process Communication, Race Conditions.<br>Critical Section Problem, Mutual Exclusion, Semaphores, Monitors.  | 8   | 3      |
|        | 3.2   | Deadlocks: System model, deadlock characterization, deadlock prevention, avoidance,<br>Banker's algorithm, Deadlock detection, and recovery from deadlocks.  | 10  | 3      |
| 4      | 4.1   | <b>Memory Management:</b> Logical and Physical address map, Swapping, Contiguous Memory allocation- Internal and External fragmentation and Compaction, Paging, Segmentation.                      | 8   | 4      |
|        | 4.2   | <b>Virtual Memory:</b> Demand paging, Page Replacement algorithms- FIFO, LRU, Optimal. Allocation of frames, thrashing.  | 8   | 4      |

|                                       |   |
|---------------------------------------|---|
| <b>Teaching and Learning Approach</b> | <p><b>Classroom Procedure (Mode of transaction)</b></p> <ul style="list-style-type: none"> <li>• Use of ICT tools in conjunction with traditional classroom teaching methods</li> <li>• Interactive sessions</li> <li>• Class discussions</li> </ul>  |
| <b>Assessment Types</b>               | <p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p><b>CCA for Theory: 30 Marks</b></p> <ul style="list-style-type: none"> <li>• Written tests</li> <li>• Assignments</li> <li>• Quiz</li> <li>• Seminar</li> </ul>  |
|                                       | <p><b>B. Semester End Examination</b></p> <p><b>ESE for Theory: Written Test (70 Marks, 2 Hrs)</b></p> <p>Part A: Very Short Answer Questions (Answer all) - (5*2=10 Marks)</p> <p>Part B: Short answer Questions (5 out of 7 Questions) - (5*6=30 Marks)</p> <p>Part C: Essay Questions (2 out of 3 Questions) - (2*15=30 Marks)</p> |

## REFERENCES

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition. Wiley India Private Limited, New Delhi.
2. William Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.

## SUGGESTED READINGS

## Syllabus

1. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice Hall India.



# Mahatma Gandhi University

## Kottayam

|                               |   |                |          |           |                    |    |
|-------------------------------|---|----------------|----------|-----------|--------------------|----|
| <b>Programme</b>              | BCA (Honours)   |                |          |           |                    |    |
| <b>Course Name</b>            | Web Technologies  |                |          |           |                    |    |
| <b>Type of Course</b>         | SEC   |                |          |           |                    |    |
| <b>Course Code</b>            | MG2SECBCA100  |                |          |           |                    |    |
| <b>Course Level</b>           | NA  |                |          |           |                    |    |
| <b>Course Summary</b>         | This course introduces the fundamental concepts of web development, focusing on HTML, CSS, and JavaScript to build interactive and responsive web pages. Students will also explore server management, web hosting, and modern techniques like AJAX to enhance web application performance. |                |          |           |                    |    |
| <b>Semester</b>               | 2   | <b>Credits</b> |          | 2         | <b>Total Hours</b> |    |
| <b>Course Details</b>         | Learning Approach   | Lecture        | Tutorial | Practical | Others             |    |
|                               |   | 1              | 0        | 1         | 0                  | 45 |
| <b>Pre-requisites, if any</b> | विद्यार्थी अमृतमद्वनुते   |                |          |           |                    |    |

### COURSE OUTCOMES (CO)

### MGU BCA (HONOURS)

| CO No. | Expected Course Outcome  | Learning Domains * | PO No |
|--------|--|--------------------|-------|
| 1      | Apply HTML and CSS to design and develop interactive web pages, incorporating forms, tables, multimedia, and navigation components.  | A                  | 1     |
| 2      | Implement JavaScript for dynamic web page behavior, including DOM manipulation, form validation, and event handling, while integrating AJAX for asynchronous web applications. | A                  | 2     |
| 3      | Design and develop fully functional, responsive, and interactive web applications using HTML, CSS, JavaScript and AJAX   | A                  | 2     |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transactions (Units)

| <b>Module</b> | <b>Units</b> | <b>Course description</b>  | <b>Hrs</b> | <b>CO No.</b> |
|---------------|--------------|--|------------|---------------|
| 1             | 1.1          | Introduction to HTML, history of HTML, Objective, basic Structures of HTML, Header Tags, body tags, Paragraph tags.  | 2          | 1             |
|               | 1.2          | Tags for FORM Creation, TABLE, FORM, TEXTAREA, SELECT, IMG, IFRA<br>ME FIELDSET, ANCHOR.   | 2          | 1             |
|               | 1.3          | Lists in HTML, Introduction to DIV tag, NAVBAR Design.<br>Introduction to CSS, types, Selectors, and Responsiveness of a web page.   | 2          | 1             |
|               | 1.4          | Introduction to www, Protocols and Programs, Applications and development tools, web browsers, DNS, Web hosting Provider, Setting up of Windows/Linux/Unix web servers, Web hosting in cloud, Types of Web Hosting.  | 2          | 1             |
| 2             | 2.1          | Introduction to JavaScript: Functions and Events, Document Object model traversing using JavaScript. Output System in JavaScript i.e. Alert, throughput, Input box, Console. Variables and Arrays in JavaScript. Date and String handling in JavaScript.   | 3          | 2             |
|               | 2.2          | Manipulating CSS through JavaScript: Form Validation like Required validator, length validator, Pattern validator. Advanced JavaScript, Combining HTML, CSS and JavaScript events and buttons, controlling your browser.   | 2          | 2             |
|               | 2.3          | Introduction to AJAX, Purpose, advantages and disadvantages, AJAX based Web applications and alternatives of AJAX.   | 2          | 2             |
| 3             | 3.1          | <b>Practical Session</b><br>1. Create your class time table using table tag.<br>2. Design a Webpage for your college containing description of courses, department, faculties, library etc. using list tags, href tags, and anchor tags.<br>3. Create web page using Frame with rows and columns where we will have header frame, left frame, right frame, | 30         | 3             |

|  |   |  |
|--|---|--|
|  | <p>and status bar frame. On clicking in the left frame, information should be displayed in right frame.</p> <p>4. Create Your Resume using HTML, use text, link, size, color and lists.</p> <p>5. Create a Web Page of a super market using (internal CSS)</p> <p>6. Use Inline CSS to format your resume that you have created.</p> <p>7. Use External CSS to format your time table created.</p> <p>8. Use all the CSS (inline, internal and external) to format college web page that you have created.</p> <p>9. Write a HTML Program to create your college website using for mobile device.</p> <p>10. Write an HTML/JavaScript page to create login page with validations.</p> <p>11. Develop a Simple calculator for addition, subtraction, multiplication and division operation using JavaScript.</p> <p>12. Use Regular Expressions for validations in Login Page using JavaScript.</p> <p>13. Write a Program to retrieve date from a text file and displaying it using AJAX.</p> |  |
|--|---|--|

|                                       |  |
|---------------------------------------|--|
| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b> <ul style="list-style-type: none"> <li>• ICT enabled Lectures</li> <li>• Interactive sessions</li> <li>• Class discussions</li> </ul>   |
| <b>Assessment Types</b>               | <b>MODE OF ASSESSMENT</b> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p><b>CCA for Theory: 15 Marks</b></p> <ul style="list-style-type: none"> <li>• Written tests</li> <li>• Quiz</li> <li>• Assignments</li> </ul> <p><b>CCA for Practical: 15 Marks</b></p> <ul style="list-style-type: none"> <li>• Lab Involvement</li> <li>• Creativity</li> <li>• Lab Record</li> </ul> |

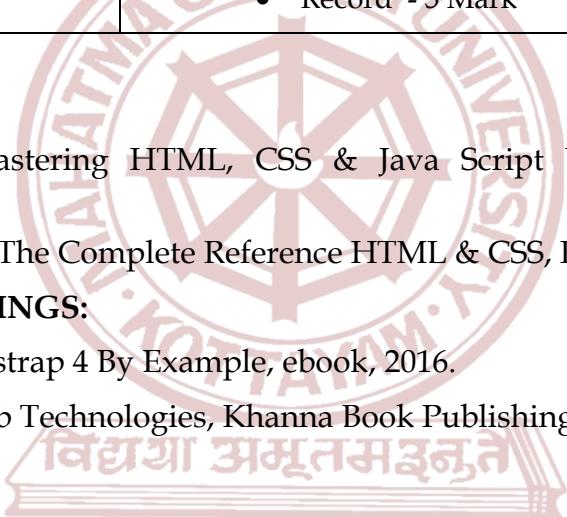
|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>• Viva</li> </ul>  |
|  | <p><b>B. Semester End Examination</b></p> <p><b>ESE for Theory: Written Test( 35 Marks, 1 Hr)</b></p> <p>Part A: Short Answer Questions (4 out of 6 Questions) -<br/>(4*5=20 Marks)</p> <p>Part B: Essay Question (1 out of 2 Questions) - (1*15=15 Marks)</p> <p><b>ESE for Practical: 35 Marks (1.5 Hrs)</b></p> <ul style="list-style-type: none"> <li>• Design &amp; Development - 20 Marks</li> <li>• Viva- 10 Marks</li> <li>• Record - 5 Mark</li> </ul> |

#### REFERENCES:

1. Laura Lemay, Mastering HTML, CSS & Java Script Web Publishing, BPB Publications, 2016
2. Thomas A. Powell, The Complete Reference HTML & CSS, Fifth Edition, 2017

#### SUGGESTED READINGS:

1. Silvio Moreto, Bootstrap 4 By Example, ebook, 2016.
2. Tanweer Alam, Web Technologies, Khanna Book Publishing, 2011.



## MGU-BCA (HONOURS)

# Syllabus



# Mahatma Gandhi University

## Kottayam

|                               |  |         |          |           |        |             |
|-------------------------------|--|---------|----------|-----------|--------|-------------|
| <b>Programme</b>              | BCA (Honours)  |         |          |           |        |             |
| <b>Course Name</b>            | Indian Constitution: Legal and Ethical Perspectives for IT   |         |          |           |        |             |
| <b>Type of Course</b>         | VAC  |         |          |           |        |             |
| <b>Course Code</b>            | MG2VACBCA100   |         |          |           |        |             |
| <b>Course Level</b>           | NA   |         |          |           |        |             |
| <b>Course Summary</b>         | This course provides an interdisciplinary exploration of the Indian Constitution and its intersection with Information Technology (IT). Spanning three modules, the course examines the foundational principles of the Constitution, emphasizing their relevance in the digital era. Students will delve into governance frameworks, IT laws, and cybersecurity, gaining insights into e-Governance and digital transparency. The course also addresses the ethical implications of emerging technologies, highlighting constitutional perspectives on privacy, data protection, and accountability. |         |          |           |        |             |
| <b>Semester</b>               | 2  | Credits |          |           | 2      | Total Hours |
| <b>Course Details</b>         | Learning Approach  | Lecture | Tutorial | Practical | Others |             |
|                               |  | 2       | 0        | 0         | 0      | 30          |
| <b>Pre-requisites, if any</b> | NIL <b>MGU-BCA (HONOURS)</b>   |         |          |           |        |             |

### COURSE OUTCOMES (CO)

| CO No. | Expected Course Outcome  | Learning Domains* | PO No |
|--------|--|-------------------|-------|
| 1      | Understand the fundamental principles of the Indian Constitution   | U                 | 6     |
| 2      | Explain the legal framework governing IT and cybersecurity in India, and evaluate the role of e-Governance in promoting transparency and accountability. | An                | 1     |
| 3      | Analyze the ethical and constitutional implications of emerging technologies.  | An                | 7     |

\*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

## COURSE CONTENT

### Content for Classroom transaction (Units)

| Module | Units   | Course description  | Hrs | CO No. |
|--------|---|---|-----|--------|
| 1      | <b>Foundations of the Indian Constitution</b>       |   |     |        |
|        | 1.1   | <b>Introduction to the Indian Constitution:</b> Historical background and evolution of the Constitution, Salient features and the Preamble  | 2   | 1      |
|        | 1.2   | <b>Fundamental Rights and Duties:</b> Fundamental Rights (Articles 12-35), including Right to Privacy in the digital age, Fundamental Duties in the context of digital citizenship and cyber ethics | 2   | 1      |
|        | 1.3   | <b>Directive Principles of State Policy:</b> Overview and their impact on governance, Relevance to IT policies and development  | 3   | 1      |
| 2      | <b>Governance, IT Laws, and Cybersecurity</b>       |   |     |        |
|        | 2.1   | <b>Separation of Powers and IT in Governance:</b> Legislature, Executive, and Judiciary roles in IT policy-making, e-Governance initiatives and digital transformation                              | 2   | 2      |
|        | 2.2   | <b>Legal Framework for IT and Cybersecurity:</b> Overview of the IT Act, 2000 and its amendments, Cybercrime laws, digital signatures, and electronic records                                       | 2   | 2      |
|        | 2.3   | <b>Right to Information Act and Digital Transparency:</b> Promoting transparency through RTI, Role of IT in ensuring public accountability and access to information                                | 3   | 2      |
| 3      | <b>Ethics, Emerging Trends, and IT Applications</b> |   |     |        |
|        | 3.1   | <b>Digital Ethics and Accountability:</b> Cyber ethics, misinformation, and online behaviour, Combating challenges like cyberbullying and the digital divide  | 3   | 3      |
|        | 3.2   | <b>Constitutional Perspective on Emerging Technologies:</b> Legal and ethical implications of AI, blockchain, and IoT, Data sovereignty and balancing innovation with privacy                       | 2   | 3      |

|     |  |   |   |
|-----|--|---|---|
| 3.3 | <b>IT for Governance and Policy Implementation:</b> Role of IT in improving public service delivery, Case studies on successful digital governance initiatives in India. | 3 | 3 |
| 3.4 | <b>Future Directions and Challenges:</b> Technological advancements and constitutional implications, Evolving role of the judiciary in IT disputes and digital rights    | 2 | 3 |

|                                       |   |
|---------------------------------------|---|
| <b>Teaching and Learning Approach</b> | <b>Classroom Procedure (Mode of transaction)</b><br>Lectures, Discussions, Case Analysis  |
| <b>Assessment Types</b>               | <p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p><b>CCA for Theory: 15 Marks</b></p> <ul style="list-style-type: none"> <li>• Written test</li> <li>• Assignments</li> <li>• MCQ</li> </ul> <p><b>B. Semester End Examination</b></p> <p><b>ESE for Theory: Written Test (35 Marks, 1 Hr)</b><br/>Part A: Short Answer Questions (7 out of 10 Questions) - (7*5=35 Marks)</p> |

#### REFERENCES:

1. "Introduction to the Constitution of India" by D.D. Basu (Module 1)
2. "Cyber Law in India" by Farooq Ahmad, 6<sup>th</sup> Edition, New Era Law Publications. (Module 2)
3. "Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing" by Herman T. Tavani (Module 3)

#### SUGGESTED READINGS:

1. "The Constitution of India: A Contextual Analysis" by Arun K. Thiruvengadam
2. "Legal Dimensions of Cyber Space" by S.K. Verma and Raman Mittal
3. "Information Technology Law and Practice" by Vakul Sharma
4. "Artificial Intelligence and Law" by Thomas E. Arnold and Michael D. Kirby
5. "E-Governance: Concepts and Case Studies" by C.S.R. Prabhu.
6. The Constitution of India by B.L. Fadia Sahitya Bhawan; New edition (2017).