Revised Syllabus (**Effective from the session 2020-21**)
Gurukula Kangri Vishwavidyalaya, Haridwar
Faculty of Engineering & Technology
Computer Science & Engineering

BEM-C302
ENGINEERING MATHEMATICS – III

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 4**
3 1 0

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Laplace Transform: Laplace transform of elementary functions, shifting theorems, transform of derivatives, Differentiation and Integration of transforms, Heaviside unit step and Dirac Delta functions, Convolution theorem, Solution of ordinary linear differential equations used in Mechanics, Electric circuits and bending of beams.

UNIT II

Fourier Transform: Definition of Fourier transform, Fourier sine and cosine transforms. Fourier integral formula, Parseval's identity, Applications of Fourier transform in solving heat equations.

UNIT III

Z transform: Definition, Linearity property, Z transform of elementary functions, Shifting theorems, Initial and final value theorem, Convolution theorem, Inversion of Z transforms, Solution of difference equations by Z transforms.

UNIT IV

Functions of Complex Variable: Limit and Continuity of functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Unit V

Errors and Roots of Equations: Absolute, relative, round-off and truncation errors. Significant digits. Algebraic and Transcendental Equations, Numerical solution, Method of bisection, Newton-Raphson method, Direct iterative method, convergence.

Text Books / References

1. Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
2. Gerald, C.F., Wheatley P.O., Applied Numerical Analysis, Pearson, 2007.
3. Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000.
4. Jain R. K., Iyenger S.R.K., Advanced Engineering Mathematics, Narosa , 2002.
5. Jain R. K., Iyenger S.R.K., Jain M.K., Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 2012.



BCE-C305/BCE-C405
DATA STRUCTURE - I

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 3**
3 0 0

NOTE: The question paper shall consist of three sections (Sec.-A, Sec.-B and Sec.-C). Sec.-A shall contain 10 objective type questions of one mark each and student shall be required to attempt all questions. Sec.-B shall contain 10 short answer type questions of four marks each and student shall be required to attempt any five questions. Sec.-C shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction to Algorithm Design and Data Structure: Design & analysis of algorithm, Top-down and Bottom-up approaches to algorithm design, Analysis of Algorithm, Frequency count, Complexity measures in terms of time and space.
Arrays, Stacks and Queues: Representation of Array (Single & Multi-Dimensional Arrays), Address Calculation using column & row major Ordering, Array and linked representation and implementation of queues. Applications of Arrays, Stacks & Queues; Conversion from Infix to Postfix & Prefix and Evaluation of Prefix expressions using Stack**,** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque and Priority Queue

UNIT II

Linked List: Representation and Implementation of Singly Linked List, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to/from Linked List, Insertion and Deletion Algorithms, doubly linked List, Linked List in Array, Polynomial representation and addition, generalized linked list, Uses and Application

UNIT III

Trees: Basic terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked representation of Binary trees, Traversing Binary trees.
Binary Search Tree: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of search algorithm, Path Length, AVL Tree, Balancing in AVL Trees, B-trees, uses and applications.

UNIT IV

Graphs: Introduction, Definition, Directed and undirected graph, Degree, incidence, adjacent vertices, path, cycle, connected and unconnected graph, complete graph, connectedness, weighted graph, subgraph, spanning trees.
Graph Representation: Adjacency matrix, adjacency list, Incidence matrix. Traversal of graph: Depth first search, Breadth first search. Shortest path problem, Dijkstra's algorithm. Minimum spanning tree, Kruskal's algorithm, prim's algorithm.



UNIT V

Searching: Sequential Search, Binary Search, Comparison and implementation.
Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two-way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.
Hashing: Hash table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Uses and applications.

Text Books / References

1. Horowitz and Sahani, Fundamentals of Data Structure, Galgotia.
2. R.Kruse etal, Data Structures and Program Design in C, Pearson Education.
3. A M Tenenbaum etal, Data Structure using C & C++, PHI.
4. Lipschutz, Data Structure, TMH.
5. K. Loudon, Mastering Algorithms with C, Sheoff Publisher & Distributors.
6. Bruno R Preiss, Data Structures and Algorithms with Object Oriented Design Pattern in C++, John Wiley & Sons, Inc.
7. Yashwant Kanetkar, Pointers in C, BPB



BCE-C306
COMPUTER ARCHITECTURE AND ORGANIZATION

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 3**
3 0 0

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UNIT I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro-operation, Arithmetic Logic Shift Unit, Arithmetic Algorithms (addition, subtraction, Booth's Multiplication), IEEE standard for Floating point numbers.

UNIT II

Control Design: Hardwired & Micro Programmed Control Unit, Fundamental Concepts (Register Transfers, performing of arithmetic or logical operations, fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction.

UNIT III

Processor Design: Processor Organization: General register organization, Stack organization, addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).

UNIT IV

Input-Output Organization: I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

UNIT V

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

Text Books / References

1. M. Mano, Computer System Architecture, PHI
2. Vravice, Zaky & Hamacher, Computer Organization, TMH Publication
3. Tannenbaum, Structured Computer Organization, PHI
4. Stallings, Computer Organization, PHI
5. John P.Hayes, Computer Organization, McGraw Hill



BET-C306
DIGITAL SYSTEM DESIGN

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 3**
3 1 0

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UNIT I

Number System: Representation of negative numbers, 9's and 1's complement, 10's and 2's complement, arithmetic using 2's complement. BCD Code, Gray Code, Excess-3 Code, Introduction to Boolean algebra, Truth table verification of various gates, Realization of Switching functions with gates.

K- Map: Representation up to 4 variables, simplification and realization of various functions using gates, Tabular Method, Combinational logic and design procedure.

UNIT II

Combinational logic Circuits: Arithmetic circuits, Half and Full adder, Subtractors, BCD adders, Code Conversion, 4-bit Magnitude Comparator (IC -7485), Cascading of IC 7485, Decoder, Multiplexer, Demultiplexers, Encoders. Parallel Binary adder, IC 7483, 4-bit Binary parallel adder/subtractor,

UNIT III

Sequential Logic Circuits: Flip Flops, S-R latch, gated latches, Edge triggered Flip Flops, Master-slave Flip Flops, Conversion of flip flops, Analysis of clocked sequential circuits, Design of synchronous circuits, State transition diagram, state reduction and assignment.

UNIT IV

Counters: Design of Asynchronous and Synchronous Counters, two bits & four bits up & down counters and their design, Shift registers, Serial & Parallel data transfer, Shift left/Right register, Shift Register applications.

UNIT V

Logic Families: Diode switching, Transistors as a switching element, MOS as a digital circuit element, concept of transfer characteristics, input characteristics and output characteristics of logic gates, fan in, fan out, noise margin, Logic families: TTL, IIL, ECL, NMOS, & CMOS, Open collector outputs.

Text Books / References

1. M.Morris Mano, Digital Design, PHI
2. R.P.Jain, Modern Digital electronics, TMH
3. A.Anand Kumar, Fundamentals of Digital Circuits, PHI
4. Lee S.C, Modern Switching Theory and Digital design, PHI
5. Greenfield J.D., Practical Digital design using ICs, John Wiley.



BCE-C307
PYTHON PROGRAMMING

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 3**
3 1 0

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UNIT I

Introduction to Python – Installation, Python Interpreter, Usage and Customization, Editor setup - Variables, Expressions and Statements – Conditionals – Functions.

UNIT II

Variables, Expressions and Statement – Assignment Statements, Variables Name, Expressions & Statements, Order of Operations & String Operations.

UNIT III

Functions – Function Calls, Math Functions, Adding New Function, Definition & Uses, Parameters & Arguments.

UNIT IV

Conditional & Recursions – Boolean Expressions, Logical Operators, Conditional Execution, Chained Conditional Executions, Recursion.

UNIT V

Strings, Lists, Dictionaries, Tuples – Introduction to Strings, Lists, Dictionaries and Tuples Case Studies.

Text Books / References

1. The Python Tutorial available at http://docs.python.org/3.3/tutorial/
2. How to Think Like a Computer Scientist: Learning with Python (3nd edition) by: Peter Wentworth Jeffrey Elkner, Allen B. Downey, and Chris Meyers. Free Online Version: http://openbookproject.net/thinkcs/python/english3e/
3. Python Documentation available at http://www.python.org/doc/
4. A Byte of Python by Swarooph CH available at http://swaroopch.com/notes/python/



BCE-C355/BCE-C454

DATA STRUCTURE - I LAB

MM: 50 **Sessional: 15**
Time: 3 hrs **ESE: 35**
L T P **Credits 1**
0 0 2

Write Program in C

1. Array implementation of Stack.
2. Array implementation of Queue.
3. Array implementation of Circular Queue.
4. Implementation of Linked List.
5. Implementation of Circular Linked List
6. Implementation of Doubly Linked List
7. Implementation of Stack using list.
8. Implementation of Queue using list.
9. Implementation of Binary Search Tree.
10. Insertion and Deletion in BST.
11. Implementation of Searching and Sorting Algorithms.
12. Implementation of a hash function.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.



BET-C355
DIGITAL SYSTEM DESIGN LAB

MM: 50 **Sessional: 15**
Time: 3 hrs **ESE: 35**
L T P **Credits 1**
0 0 2

LIST OF EXPERIMENTS:

1. To verify the truth tables of various types of gates using IC 7400.
2. To verify the truth tables of Multiplexer & also implement a function using Multiplexer.
3. To design & verify the truth table of half & full adder.
4. To design & verify the truth table SR flip-flop using NOR/NAND gates.
5. To design & verify the truth table JK flip-flop using NOR/NAND gates.
6. To design & study Counters.
7. To design & study Shift registers.
8. To verify the truth tables of de Multiplexer.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.



Gurukula Kangri Vishwavidyalaya, Haridwar
Faculty of Engineering & Technology
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BCE-C354
PYTHON PROGRAMMING LAB

MM: 50 **Sessional: 15**
Time: 3 hrs **ESE: 35**
L T P **Credits 1**
0 0 2

LIST OF EXPERIMENTS

1. Installation of spyder on any other IDE.
2. Working with IPE
3. Programs for variables
4. Programs for lists
5. Programs for tuples
6. Programs for dictionaries
7. Programs for functions
8. Programs for Boolean operators
9. Programs for logical operators
10. Programs for string operations
11. A small project



BCE-C356
PRESENTATION

MM: 50	**Sessional: 15**
Time: 3 hrs	**ESE: 35**
L T P	**Credits 1**
3 1 0	

Note:

1. A presentation on the topic of the internship or project or course completed in the summer vacations is to be submitted by the student and a presentation is to be given of duration at least 5 minutes.
2. The certificate along with a short report on the work accomplished during the training or the course studied is also to be submitted in the department in two copies with only spiral bind format.