Part A Introduction				
Program: Certificate Course		**Class:** BCAI Year	**Year:** 2021	**Session:** 2021-2022
1	Course Code	S1-BCAC2G		
2	Course Title	Discrete Mathematics		
3	Course Type	Elective		
4	Pre-requisite (if any)	Open for All		
5	Course Learning Outcomes (CLO)	The course will enable the students: 1.Apply the Boolean algebra, switching circuits and their applications. 2. Minimize the Boolean Function using Karnaugh Map. 3. Understand the lattices and their types. 4. Graphs, their types and its applications in study of shortest path algorithms. 5. Test whether two given graphs are isomorphic. 6. Understand the Eulerian and Hamiltonian graphs. 7. Represent graphs using adjacency and incidence matrices. 8. Understand the discrete numeric functions, generating functions and Recurrence Relations.		
6	Credit Value	**Theory:** 6Credit		
7	Total Marks	Max. Marks: 25 + 75	Min. Passing Marks: 33	

Part B - Content of the Course		
Total No. of Lectures (in hours per week): 3 hours per week **Total Lectures:** 90 hours		
Unit	Topics	No. of Lectures
I	**Relations:** Binary, Inverse, Composite and Equivalence relation, Equivalence classes and its properties, Partition of a set, Partial order relation, Partially ordered and Totally ordered sets, Hasse diagram. **Lattices:** Definition and examples, Dual, bounded, distributive and complemented lattices.	18
II	**Boolean Algebra:** Definition and properties, Switching circuits and its applications, Logic gates and circuits. **Boolean functions:** Disjunctive and conjunctive normal forms, Bool's expansion theorem, Minimize the Boolean function using Karnaugh Map.	18
III	**Graphs:** Definition and types of graphs, Subgraphs, Walk, path and circuit, Connected and disconnected graphs, Euler graph, Hamiltonian path and circuit, Dijkstra's Algorithm for shortest paths in weighted graph.	18

IV	**Trees:** Definition and its properties, Rooted, Binary and Spanning tree Rank and nullity of agraph, Kruskal's and Prim's Algorithm, Cut-set and its properties, Fundamental Circuit and Cut-Set, Planar graphs. **Matrix representation of graphs:** Incidence, Adjacency, Circuit, Cut-Set, Path.	18
V	**Discrete numeric and generating functions:** Operations on numeric functions, Asymptotic behavior of numeric functions, Generating functions. **Recurrence relations and recursive algorithms:**Recurrence relations, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Solution by the method of generating functions.	18

Keywords/Tags:
Relation, Hasse diagram, Lattices, Boolean Algebra, Boolean function, Graph and Subgraph, Path and circuit, Tree, Spanning tree, Cut-set, Matrix representation of graph, Discrete numeric function, Generating function, Recurrence relation, Recursive algorithm.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

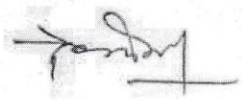
Text Books:

1. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures With Applications To Computer Science, McGraw Hill Education, 1st edition, 2017.
2. C. L. Liu: Elements of Discrete Mathematics, McGraw Hill Education, 4th edition, 2017.
3. Narsingh Deo: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall India Learning Private Limited, 1979.
4. मध्य प्रदेश हिन्दी ग्रंथ अकादमी से प्रकाशित विषय से संबंधित पुस्तकें।

Reference Books:

1. Seymour Lipschutz and Mark Lipson: Discrete Mathematics (Schaums Outline), McGraw Hill Education, 3rd edition, 2017.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, Pearson Education Pt.Ltd., Indian Reprint 2003.

Suggested Digital Platforms Web links:
https://www.highereducation.mp.gov.in/?page=xhzIQmpZwkylQo2b%2Fy5G7w%3D%3D

Suggested Equivalent online courses:
https://nptel.ac.in/courses/111106086/
https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/311

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: **100** Continuous Comprehensive Evaluation (CCE): **25**Marks University Exam (UE): **75**Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10 **Total Marks: 25**
External Assessment: University Exam (UE) Time: 02.00 Hours	Section (A): Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 **Total Marks: 75**