Faculty of Science

Bachelor of Science (B.Sc.)
SUBJECT: Mathematics

B.Sc. V Semester
Paper-Core – Elements of Discrete Mathematics

## Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO1	Comprehend Indian Logic and its influence on Modern Logic Analyse and Apply Relations and Lattices to Real World	U, An, Ap
CO2	Correlate Boolean Algebra to Switching Circuit and Generate Applications in Real Life. Analyse and Evaluate a Minimal Boolean Function	U, An, Ap
CO3	Deduce the Practicality of Graph Theory and implement the techniques in Real Life perspective.	U, An, Ap
CO4	Understand and Apply Trees and Matrix Representation of Graphs	U, An, Ap

Credit and Marking Scheme

Theory	Credits	Marks		Total Marks
		Internal	External	
	6	40	60	100
Total	6	100		

Evaluation Scheme

Theory	Marks	
	Internal	External
	3 Internal Exams of 20 Marks each during the Semester (Best 2 will be taken)	1 External Exams (At the End of Semester)
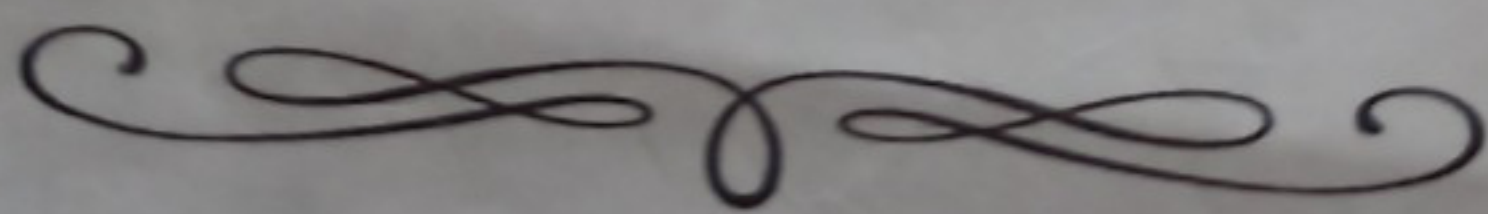
ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

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Content of the Course
Theory

No. of Lectures Hours per Week: 6 Hours. per Week

Total No. of Lectures: 90 Hours.   **Maximum Marks:** 60

Unit	Topics	No. of Lectures
I	**1.1 Indian Logic**	
	1.1.1 Origins	
	1.1.2 The schools Vaisheshika	
	1.1.3 Catuskoti	
	1.1.4 Nyaya	
	1.1.5 Jain Logic	
	1.1.6 Buddhist Logic	
	1.1.7 Navya-Nyaya	
	1.1.8 Influence of Indian Logic on Modern Logic	
	1.1.9 Boolean Logic and Indian Thoughts	
	1.2 Relations	34
	1.2.1 Binary, Inverse, Composite and Equivalence relation	
	1.2.2 Equivalence classes and its properties	
	1.2.3 Partition of a set	
	1.2.4 Partial order relation	
	1.2.5 Partially ordered and totally ordered sets	
	1.2.6 Hasse diagram	
	1.3 Lattices	
	1.3.1 Definition and examples	
	1.3.2 Dual, bounded, distributive and complemented lattices	
II	**2.1 Boolean Algebra**	34
	2.1.1 Definition and properties	
	2.1.2 Switching circuits and its applications	
	2.1.3 Logic gates and circuits	
	2.2 Boolean Functions	
	2.2.1 Disjunctive and conjunctive normal forms	
	2.2.2 Bool's expansion theorem	
	2.3 Minimize the Boolean function using Karnaugh Map	
III	**3. Graphs:**	28
	3.1 Definition and types of graphs	
	3.2 Subgraphs	
	3.3 Walk, path and circuit	
	3.4 Connected and disconnected graph	
	3.5 Euler graph	

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	3.6 Hamiltonian path and circuit 3.7 Dijkstra's Algorithm for shortest paths in weighted graph	
IV	4. **Tree:** 4.1 Trees and properties 4.2 Rooted, Binary and Spanning tree 4.3 Rank and nullity of a graph 4.4 Kruskal's and Prim's Algorithm 4.5 Cut- set and Its Properties 4.6 Fundamental Circuits and Cut- set 4.7 Planar graphs 4.8 Kuratowski's two graph 4.9 Matrix representation of graph 4.9.1 Incidence 4.9.2 Adjacency 4.9.3 Circuit 4.9.3 Cut – Set 4.9.4 Path	24

References

Text Books:

1. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications To Computer Science, McGraw Hill Education, 1st edition, 2017.

2. Satinder Bal Gupta, C. P. Gandhi: Discrete Structures, Laxmi Publication, 2010.

3. C. L. Liu: Elements of Discrete Mathematics, Mac Graw Hill Education, 4th edition, 2017.

4. Narsingh Deo: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall India Learning Private Limited, 1997.

5. मध्यप्रदेश हिंदी ग्रन्थ अकादमी की पुस्तके।

Reference Books:

1. Seymour Lipschutz and Mark Lipson: Discrete Mathematics (Schaums Outline), Mac Graw Hill Education, 3rd edition, 2017.

2. Edgar G. Goodaire and Michael M. Parmenter.

3. Discrete Mathematics with Graph Theory, Pearson Education Pt. Ltd., Indian Reprint 2003