

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College affiliated to Barkatullah University, Bhopal)

(NAAC Accredited 'A' Grade)



SYLLABUS

UG

SESSION- 2023-24

CLASS: B.Sc. III YEAR

SUBJECT: Mathematics

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College Affiliated to Barkatullah University Bhopal)

Department of Higher Education, Govt. of M.P.

Under Graduate Syllabus (Annual Pattern)

As recommended by Central Board of Studies and approved by the Governor of M. P.

wef 2023-2024

(Session 2023-24)

(NEP-2020)

Class/कक्षा	:	B.Sc. Third Year/ बी.एससी. तृतीय वर्ष
Subject/विषय	:	Mathematics / गणित
Title of Paper/ प्रश्नपत्र का शीर्षक	:	Elements of Discrete Mathematics (Theory)/ विविक्त गणित के तत्व (सैद्धांतिक)
Course Type/कोर्स टाइप	:	Discipline Specific Elective (DSE) Group-A
Paper/प्रश्नपत्र	:	II
Max Marks:अधिकतम अंक	:	70 + 30 Regular Students/ नियमित विद्यार्थी
Min. Marks: न्यूनतम अंक	:	35
Credit Value	:	06 (Theory)

Course

The course will enable the students to:

Learning outcomes

1. Apply the Boolean algebra in 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..

Contents

Unit- 1	<p>1.1. Indian logic</p> <p>1.1.1. Origins</p> <p>1.1.2. The schools Vaisheshika</p> <p>1.1.3. Catuskoti</p> <p>1.1.4. Nyaya</p> <p>1.1.5. Jain logic</p> <p>1.1.6. Buddhist logic</p> <p>1.1.7. Navya-Nyaya</p> <p>1.1.8. Influence or Indian logic on modern logic</p> <p>1.1.9. Boolean Logic and Indian Thoughts</p> <p>1.2. Relations:</p> <p>1.2.1. Binary, Inverse, Composite and Equivalence relation</p> <p>1.2.2. Equivalence classes and its properties</p> <p>1.2.3. Partition of a set</p> <p>1.2.4. Partial order relation</p> <p>1.2.5. Partially ordered and Totally ordered sets</p> <p>1.2.6. Hasse diagram</p> <p>1.3. Lattices</p> <p>1.3.1. Definition and examples</p> <p>1.3.2. Dual, bounded, distributive and complemented lattices</p>
ईकाई - 1	<p>1.1. भारतीय तर्क</p> <p>1.1.1. मूल</p> <p>1.1.2. स्कूल वैशेषिक</p> <p>1.1.3. कैटुस्कोटी</p> <p>1.1.4. न्याय</p> <p>1.1.5. जैन तर्क</p> <p>1.1.6. बौद्ध तर्क</p> <p>1.1.7. नव्या-न्याय</p>

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

	<p>1.1.8. आधुनिक तर्क पर भारतीय तर्क का प्रभाव 1.1.9. बूलियन तर्क और भारतीय विचार</p> <p>1.2. संबंध:</p> <p>1.2.1. द्विचर, प्रतिलोम, संयोजित और मुल्यता संबंध 1.2.2. तुल्यता वर्ग एवं इसके गुणधर्म 1.2.3. समुच्चय का विभाजन 1.2.4. अंशतः क्रम संबंध 1.2.5. अंशतः क्रमित और पूर्णतः क्रमित समुच्चय 1.2.6. हेस आरेख</p> <p>1.3. जालक</p> <p>1.3.1. परिभाषा एवं उदाहरण 1.3.2. द्वैत, परिबद्ध, वितरणीय और पूरक जालक</p>
Unit-2	<p>2.1. Boolean Algebra:</p> <p>2.1.1. Definition and properties 2.1.2. Switching circuits and its applications 2.1.3. Logic gates and circuits</p> <p>2.2. Boolean functions</p> <p>2.2.1. Disjunctive and conjunctive normal forms 2.2.2. Bool's expansion theorem</p> <p>2.3. Minimize the Boolean function using Karnaugh-Map.</p>
ईकाई -2	<p>2.1. बूलियन बीजबणित:</p> <p>2.1.1. परिभाषा एवं उसके गुणधर्म 2.1.2. स्विचन परिपथ एवं उसके अनुप्रयोग 2.1.3. तर्क द्वार एवं परिपथ</p> <p>2.2. बूलियन फलन</p> <p>2.2.1. वियोजनीय एवं संयोजनीय प्रसामान्य रूप 2.2.2. बूल का विस्तार प्रमेय 2.3. कारनाफ-मैप का उपयोग कर बूलियन फलन को न्यूनतम करना</p>
Unit-3	<p>3.1. Graphs:</p> <p>3.1.1. Definition and types of graphs 3.1.2. Subgraphs 3.1.3. Walk, path and circuit 3.1.4. Connected and disconnected graphs 3.1.5. Euler graph 3.1.6. Hamiltonian path and circuit 3.1.7. Dijkstra's Algorithm for shortest paths in weighted graph</p>
ईकाई -3	<p>3.1. आरेख:</p> <p>3.1.1. परिभाषा और आरेख के प्रकार 3.1.2. उपआरेख 3.1.3. गमन, पथ एवं परिपथ 3.1.4. सम्बंध एवं असम्बंध आलेख 3.1.5. आयलर आलेख 3.1.6. हैमिलटोनियन पथ एवं परिपथ 3.1.7. भारित आलेख में लघुत्तम पथ हेतु डिज्कस्ट्रा का एल्गोरिथ्म</p>
Unit-4	<p>4.1. Tree:</p> <p>4.1.1. Trees and its properties 4.1.2. Rooted, Binary and Spanning tree 4.1.3. Rank and nullity of a graph 4.1.4. Kruskal's and Prim's Algorithm 4.1.5. Cut-set and its properties 4.1.6. Fundamental Circuit and Cut-Set 4.1.7. Planar graphs 4.1.8. Kuratowski's two graphs</p> <p>4.1.1. Matrix representation of graphs</p> <p>4.1.1.1. Incidence</p>

Shaly

Shaly

Shaly

	4.1.1.2. Adjacency 4.1.1.3. Circuit 4.1.1.4. Cut-Set 4.1.1.5. Path
ईकाई -4	4.1. वृक्ष: 4.1.1. वृक्ष एवं उसके गुणधर्म 4.1.2. नियत, द्विचर और जनक वृक्ष 4.1.3. आलेख की जाति एवं शून्यता 4.1.4. क्रुस्कल एवं प्राइम की एल्गोरिथ्म 4.1.5. कट-सेट एवं इसके गुणधर्म 4.1.6. आधारभूत परिपथ एवं कट-सेट 4.1.7. प्लानर आलेख 4.1.8. कुराटोव्हास्की के द्विआलेख 4.1.9. आलेख का आव्यूह निरूपण 4.1.9.1. आपतन 4.1.9.2. आसन्नता 4.1.9.3. परिपथ 4.1.9.4. कट-सेट 4.1.9.5. पथ
	Keywords/Tags: Relation. Hasse diagram, Lattices, Boolean algebra, Boolean function, Graph and Sub-graph, Path and circuit, Tree, Spanning tree. Cut-set. Matrix representation of graph
	सारबिन्दु बिंदु (की वर्ड)/टैग: – संबंध, हेस आरेख, जालक, बूलीयन, बीजगणित, बूलीयन फलन, आरेख एवं उपआरेख, पथ एवं परिपथ, वृक्ष, जनक, वृक्ष, कट-सेट, आलेख का आव्यूह निरूपण।

Suggested Reading: 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. Satinder Bal Gupta. C.P. Gandhi: Discrete Structures. I. axmi Publication, 2010.
5. मध्यप्रदेश हिन्दी ग्रंथ अकादमी पुस्तकें।

Reference Books:

1. Seymour Lipchitz and Mark Lipson: Discrete Mathematics (Schamus Outline). McGraw Hill Education, 3rd edition, 2017.
2. Edgar G. Goodaire and Michael M. Parmenter Discrete Mathematic with Graph, Theory. Pearson Education Pl. Ltd. Indian Reprin Limited 2003

Suggested Digital Platforms Web links:

<https://www.eshiksha.mp.gov.in/inpdhe>

Suggested Equivalent online courses:

<https://nptel.ac.in/courses/I11106056/>

https://ugcmoocs.inflibnet.ac.in/index.php/courses/v_ug/311

Shah

Shah

Shah

Scheme of Marks: Suggested Continuous Evaluation Methods:

Maximum Marks: 100		
Continuous Comprehensive Evaluation 30 marks (CCE): Term End Exam Theory 70 marks		
Internal Assessment : Continuous Comprehensive Evaluation (CCE): 30 Marks	There shall be 4 internal assessment of 10 marks each, out of which the 3 best scores are to be taken into account.	10+10+10= 30
External Assessment: Term End Exam (Theory) 70 (Time : 03:00 Hrs.)	Section (A) 10 Marks (a) Objective questions – 5 (b) Very Short Answer type question – 5 Section (B) 24 Marks: Short Answers Type Questions 1 question from each unit 4 to be attempted out of 7 given questions Section (C) 36 Marks: Long answer type questions 4 to be attempted out of 7 given questions	10 questions 01 marks each - 10 4 questions 06 marks each - 24 4 questions 09 marks each - 36
		Total 70

Phet

Dish

Shaly