

**GOVERNMENT DEGREE COLLEGE
RAZOLE
EAST GODAVARI DISTRICT**



**DEPARTMENT OF MATHEMATICS
CERTIFICATE COURSE
FOR
2019-20
“LATTICE THEORY &
BOOLEAN ALGEBRA”**

GOVERNMENT DEGREE COLLEGE RAZOLE

EAST GODAVARI DISTRICT

DEPARTMENT OF MATHEMATICS

MINUTES OF THE DEPARTMENT

A staff meeting has been conducted in the department on 02-12-2019 and resolved the following issues

- To introduce “certificate course “ for the II year students during the year 2019-20.
- To conduct classes for 30 working hours on the syllabus presented.
- To approve the syllabus and model paper.
- To conduct external examination for 50 marks as objective questions.



(VSV KRISHNA MURTY)



Principal
Govt. Degree College
NAAC 'B' & 'C'
RAZOLE - E.G.D.

**GOVERNMENT DEGREE COLLEGE,
RAZOLE,
EAST GODAVARI DISTRICT**

DEPARTMENT OF MATHEMATICS

NOTICE

Razole
20-01-2020

To,
The Principal
Government Degree College
Razole

Sir,

Sub: Government Degree College, Razole – Department of Mathematics - Introduction
of Certificate course in “**Lattice Theory & Boolean Algebra**” during 2019-20 -
Proposal submitted for permission – Regarding.

I humbly submit that the Department of Mathematics proposes to conduct a Certificate course in “**Lattice Theory & Boolean Algebra**” during 2019-20 keeping in view of the need of the students . A resolution has been taken in the Departmental Minutes book to that effect .

Hence, I request you to permit us to conduct the said course for the benefit of our students.

Thanking you sir

Yours faithfully,



(Lecturer in Mathematics)

GOVERNMENT DEGREE COLLEGE, RAZOLE

EAST GODAVARI DISTRICT

DEPARTMENT OF MATHEMATICS

CERTIFICATE COURSE

IN

LATTICE THEORY & BOOLEAN ALGEBRA

DURING 2019-20

OUTCOMES OF THE COURSE:

At the end of the course, the student is expected to acquire the following outcomes

- He is able to learn the types of relations especially equivalence relations, POSET
- He is able to learn the properties of lattices and sub-lattices
- He understands the meaning of direct products and homomorphisms.
- He learns about Boolean functions and their representation


(Lecturer in Mathematics)


Principal
Govt. Degree College
NAAC 'B' Grade
RAZOLE - E.G.D.

GOVERNMENT DEGREE COLLEGE, RAZOLE
DEPARTMENT OF MATHEMATICS
CERTIFICATE COURSE
IN
LATTICETHEORY & BOOLEAN ALGEBRA
2019-20
SYLLABUS

Hours : 30

UNIT I
LATTICES:

Relation, Equivalence relation, Partially ordered relation, POSET, Totally ordered set ,Lattice,
Properties of Lattices, Lattices as algebraic system, sub lattices, Direct product, lattice
homomorphism, some special lattices, Hasse Diagrams

Unit II BOOLEAN ALGEBRA

Definition , Examples, sub algebra, Direct products, Homomorphism, Boolean Functions,
Representation of Boolean functions, minimization of Boolean functions, Design examples
using Boolean algebra, sequential circuits, Finite state machines, Equivalence of finite state
machines

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Suggested Readings

1. A Text Book of Discrete Mathematics & Its Applications by Kenneth H Rosen
2. A Text Book of Discrete Mathematics by J.P. Tremblay & R. Manohar

Pattern of Examination:

Theory (50marks)

The students have to write the theory examination in the form of objective type questions for (50) marks of 2 hours duration.


Principal
Govt. Degree College
NAAC 'B' Grade
RAZOLE - E.G.D.L.

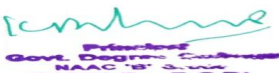


GOVERNMENT DEGREE COLLEGE ,RAZOLE, EGDT
DEPAREMENT OF MATHEMATICS
CERTIFICATE COURSE DURING 2019-20
TITEL: LATTICE THEORY &BOOLEAN ALGEBRA
(21ST JANUARY 2020 TO 27TH FEBRUARY 2020)
WORK DONE STATEMENT

Name of the Lecturer : VSV KRISHNA MURTY

S.NO	DATE	BATCH TIME	TOPIC	Name of the Lecturer taught
		(4.00 to 5.00 PM)		
1	21/01/2020	1Hr	Relations	VSV KRISHNA MURTY
2	22/01/2020	1Hr	Equivalence relation	VSV KRISHNA MURTY
3	23/01/2020	1Hr	Partially ordered relation	VSV KRISHNA MURTY
4	24/01/2020	1Hr	POSET	VSV KRISHNA MURTY
5	25/01/2020	1Hr	Totally ordered set	VSV KRISHNA MURTY
6	27/01/2020	1Hr	Lattice	VSV KRISHNA MURTY
7	28/01/2020	1Hr	Properties of Lattices	VSV KRISHNA MURTY
8	30/01/2020	1Hr	Lattices as algebraic system	VSV KRISHNA MURTY
9	31/01/2020	1Hr	sub lattices	VSV KRISHNA MURTY
10	1/2/2020	1Hr	Direct product	VSV KRISHNA MURTY
11	3/2/2020	1Hr	lattice homomorphism	VSV KRISHNA MURTY
12	4/2/2020	1Hr	some special lattices	VSV KRISHNA MURTY
13	5/2/2020	1Hr	Distributive Lattices, Hasse Diagram	VSV KRISHNA MURTY
14	6/2/2020	1Hr	Boolean Algebra	VSV KRISHNA MURTY
15	7/2/2020	1Hr	Examples	VSV KRISHNA MURTY
16	10/2/2020	1Hr	sub algebra	VSV KRISHNA MURTY
17	11/2/2020	1Hr	Direct products	VSV KRISHNA MURTY
18	12/2/2020	1Hr	Homomorphism	VSV KRISHNA MURTY
19	13/2/2020	1Hr	Boolean Functions	VSV KRISHNA MURTY
20	14/2/2020	1Hr	Representation of Boolean functions	VSV KRISHNA MURTY
21	15/2/2020	1Hr	minimization of Boolean functions	VSV KRISHNA MURTY
22	17/2/2020	1Hr	Design examples using Boolean algebra	VSV KRISHNA MURTY
23	18/2/2020	1Hr	sequential circuits	VSV KRISHNA MURTY
24	19/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
25	20/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
26	22/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
27	24/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
28	25/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
29	26/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY
30	27/2/2020	1Hr	Finite state machines	VSV KRISHNA MURTY


 Signature of the Lecturer(s)


 Govt. Degree College
 NAAC 'B' Grade
 RAZOLE - E.G.D.T.

GOVERNMENT DEGREE COLLEGE, RAZOLE, EGD.
CERTIFICATE COURSE IN
LATTICE THEORY & BOOLEAN ALGEBRA - 2019-20
ATTENDANCE PARTICULARS

DURATION OF THE COURSE: 21ST Jan 2020 to 27th Feb 2020

			21/01/2020	22/01/2020	23/01/2020	24/01/2020	25/01/2020	27/01/2020	28/01/2020	30/01/2020	31/01/2020	1/2/2020	3/2/2020	4/2/2020	5/2/2020	6/2/2020	7/2/2020	10/2/2020	11/2/2020	12/2/2020	13/02/2020	14/02/2020	15/02/2020	17/02/2020	18/02/2020	19/02/2020	20/02/2020	22/02/2020	24/02/2020	25/02/2020	26/02/2020	27/02/2020
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S.NO	NAME OF THE STUDENT	REGD.NO.																														
1	A.Bhargavi Srilekha	181077101001	P	P	P	A	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P
2	Angara Krishna Veni	181077101002	P	A	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P
3	B. Vandana	181077101004	P	P	P	A	P	P	P	P	P	A	P	A	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P
4	Ch. Devika Priyadarshini	181077101005	P	P	A	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P	P
5	Donda Prasanthi	181077101007	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P
6	G.Devi Prasuna	181077101008	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	A	P	P
7	K.Kesava Arun	181077101009	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P
8	K.Sadhoku	181077101010	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P
9	K. Bhanoji Rao	181077101011	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P
10	K.Priyanka	181077101012	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P
11	M.Venkatesh	181077101013	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P
12	M. Amani	181077101014	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P
13	N. Asha	181077101015	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P
14	N. Dana Kumar	181077101016	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P
15	P.V.T. Kishore	181077101017	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P
16	P. B.S. Teja	181077101018	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P


 President
 Govt. Degree College
 NAAC 'B' Grade
 RAZOLE - E.G.D.


 (VSV KRISHNA MURTY)

Q. N O	GOVERNMENT DEGREE COLLEGE RAZOLE DEPARTMENT OF MATHEMATICS CERTIFICATE COURSE FOR 2019-20 LATTICE THEORY & BOOLEAN ALGEBRA		Ans
	Time: 2 Hrs	Max marks : 50	
1)	A relation R reflexive if A) aRa B) aRb C) aRc for all $a, b, c \in P$		A
2)	A Relation R is called as anti-symmetric if aRb and bRa then..... A) $a = b$ B) $a \neq b$ C) Both A and B D) None of these		A
3)	Partial ordered relation on non-empty set P is (A) Reflexive (B) Anti-Symmetric (C) Transitive (D) All above		D
4)	Let X be a non-empty set and $(X, \subseteq)$ be a poset of all subsets of X. If $A, B \in P(X)$ then $\inf(A, B)$ is (A) A (B) B (C) $A \cup B$ (D) $A \cap B$		D
5)	The poset $P = \{1, 2, 3, 4, 5, 6, 12\}$ of factors of 12 under divisibility then the greatest element of P is (A) 1 (B) 2 (C) 12 (D) 6		C
6)	The poset $P = \{1, 2, 3, 4, 5, 6, 12\}$ of factors of 12 under divisibility then the greatest element of P is (A) 1 (B) 2 (C) 12 (D) 6		A
7)	The poset $P = \{2, 3, 4, 5, 6\}$ of non-trivial factors of 12 under divisibility then the greatest element of P is (A) 1 (B) 2 (C) 12 (D) 6		D
8)	The poset $P = \{2, 3, 4, 5, 6\}$ of non-trivial factors of 12 under divisibility then the greatest element of P is (A) 1 (B) 2 (C) 12 (D) 6		A
9)	The Cartesian product of two sets A and B is denoted as $A \times B$ and is defined as (A) $A \times B = \{(a, b) : a \in A, b \in B\}$ (B) $A \times B = \{(a, a) : a \in A, b \in B\}$ (C) $A \times B = \{(b, b) : a \in A, b \in B\}$ (D) $A \times B = \{(b, a) : a \in A, b \in B\}$		A
10)	The Cartesian product of two sets $A = \{a, b\}$ and $B = \{1, 2\}$ is denoted as $A \times B$ and is defined as (A) $A \times B = \{(a, 1), (a, 2), (b, 1), (b, 2)\}$ (B) $A \times B = \{(1, a), (2, b), (1, a), (b, 2)\}$ (C) $A \times B = \{(a, 1), (a, 2)\}$ (D) $A \times B = \{(b, 1), (b, 2)\}$		A
11)	The Cartesian product of two sets $A = \{a, b\}$ and $B = \{x\}$ is denoted as $A \times B$ and is defined as (A) $A \times B = \{(a, x), (a, 2), (b, 1), (b, 2)\}$ (B) $A \times B = \{(1, a), (2, b), (1, a), (b, 2)\}$ (C) $A \times B = \{(a, x), (b, x)\}$ (D) $A \times B = \{(b, 1), (b, 2)\}$		C
12)	The set N of natural numbers under the usual $\leq$ satisfies which of the following properties (A) Reflexivity (B) Anti-Symmetry (C) Transitivity (D) All above		D
13)	If $a \leq b \leq c$ in a poset then a and b are called as A) Non comparable B) Comparable C) Rational D) None of these		B
14)	A lattice L is called a _____ lattice if every non-empty subset of L has its Sup and Inf in L (A) complete (B) semilattice (C) sublattice (D) none of these		A
15)	If $a \leq b$ and if $a \neq b$ in a Poset then A) $a < b$ B) $a > b$ C) $a = b$ D) None of these		A
16)	The set of natural number under divisibility forms A) Non Poset B) Poset C) Both A and B D) None of these		B
17)	If P is a Poset in which every element are comparable then P is called as A) Totally ordered set B) Non totally ordered set C) Infinite set D) None of these		A
18)	True or False : In a Poset P $a < a$ holds for all $a \in P$ A) True B) False		B
19)	Greatest element, if exists in a Poset, will be A) Unique B) Not unique C) Does not exist D) None of these		A
20)	Least element, if exists in a Poset, will be A) Unique B) Not unique C) Does not exist D) None of these		A
21)	An element a in a Poset P is called as maximal element if $a < x$ for no $x \in P$ A) True B) False		A
22)	If S is a non-empty finite subset of a poset P Then S has A) Maximal element B) Minimal element C) Both A and B D) None of these		C

23)	A mapping $f: P \rightarrow Q$ is an..... iff f is isotone and f^{-1} is isotone A) Isomorphisms B) Not Isomorphism C) Both A and B D) None of these	A
24)	If ρ is a relation on a set X and converse of ρ is denoted by $\bar{\rho}$, then $a\bar{\rho}b$ if and only if..... A) $b\rho a$ B) $\bar{b}\rho a$ C) $b\bar{\rho}a$ D) None of these	A
25)	If a Poset X is isomorphic to its dual X^* , then X is called as..... A) Dual B) Self Dual C) Dual of dual D) None of these	B
26)	An element a in a Poset P is called as lower bound of S if..... A) $a \geq x$ B) $a \leq x$ C) $a \neq x$ D) None of these	B
27)	True or False : The Poset $\{2,3,4,6\}$ under divisibility is not lattice A) True B) False	A
28)	Let X be a non-empty set. Then $P(X)$ the power set of X under $\subseteq$ satisfies which of the following properties (A) Reflexivity (B) Anti-Symmetry (C) Transitivity (D) All above	D
29)	Let N be the set of natural number under divisibility, then a A) $\gcd(a,b)$, B) $\text{lcm}(a,b)$, $\text{lcm } a, b$ C) Both A and B D) none of these	A
30)	Let L be the set of all subgroup of group G , and if L forms a Lattice under $\cap$ and if $H, K \in L$ then $H \cap K = \dots$ A) $H \cup K$ B) $H \cap K$ C) $\{H \cup K\}$ D) None of these	B
31)	Any two elements of a every poset (A) must be comparable (B) must be non-comparable (C) may or may not be comparable (D) None of these	C
32)	In the poset of natural numbers N under divisibility, the numbers 2 and 3 are (A) comparable elements (B) not comparable elements (C) may or may not be comparable (D) None of these	B
33)	If P is a poset in which every two members are comparable, then it is called as ____ (A) totally ordered set (B) toset (C) chain (D) All above	D
34)	A poset $(L, \leq)$ is a lattice iff every non empty finite subset of L has... A) Sup B) Inf C) Sup and Inf D) None of these	C
35)	Let L be a lattice and if $a, b, c \in L$, then $a \wedge (a \vee b)$ a) b B) a C) c D) None of these	B
36)	Let L be a lattice and $0 \in L$ then $0 \wedge a$ A) a B) 0 C) 1 D) None of these	B
37)	True or False : In a lattice L the modular inequality $a \wedge (b \vee c) \geq b \wedge (a \vee c)$ A) True B) False	A
38)	If the greatest element exists, then it is comparable with _____ elements of the poset. (A) Two (B) all (C) three (D) some	B
39)	Let P be a poset. If there exists an element $a \in P$ such that $x \leq a$ for all $x \in P$ then a is called _____ of P . (A) least element (B) greatest element (C) zero element (D) minimal element	B
40)	Let P be a poset. If there exists an element $b \in P$ such that $b \leq x$ for all $x \in P$ then b is called _____ of P . (A) least element (B) greatest element (C) unity element (D) maximal element	A
41)	In a lattice L , if $a \geq b$, then $a \wedge b$ A) b B) a (C) ab (D) None of these	A
42)	True or False : Dual of a lattice is a lattice. A) True B) False	A
43)	True or False : Product of two lattices is again a lattice A) False B) True	B
44)	True or False: A finite lattice has both least and greatest elements. A) True B) False	A
45)	A finite lattice has ----- (A) least elements (B) greatest elements (C) both least and greatest elements (D) none of these	C
46)	A poset $(P, \leq)$ is called a _____ if for all $a, b \in P$, $\text{Sup } \{a, b\}$ exists. (A) meet semilattice (B) semilattice (C) join semilattice (D) none of these	C
47)	A poset $(P, \leq)$ is called a _____ if for all $a, b \in P$, $\text{Inf } \{a, b\}$ exists. (A) meet semilattice (B) semilattice (C) join semilattice (D) none of these	A
48)	A poset $(P, \leq)$ is called a _____ if for all $a, b \in P$, $\text{Inf } \{a, b\}$ and $\text{Sup } \{a, b\}$ exists. (A) meet semilattice (B) semilattice (C) join semilattice (D) none of these	B
49)	A chain has ----- (A) least elements (B) greatest elements (C) both least and greatest elements (D) none of these	C
50)	In a lattice L , if $a \geq b$, then $a \vee b =$ A) b B) a C) ab D) None of these	B

GOVERNMENT DEGREE COLLEGE, RAZOLE
EAST GODAVADI DISTRICT

DEPARTMENT OF MATHEMATICS

CERTIFICATE COURSE ON LATTICE THEORY & BOOLEAN ALGEBRA
FOR THE YEAR 2019-20

MARKS OBTAINED IN THE EXAMINATION

S.NO	NAME OF THE STUDENT	GROUP	REGD .NO.	MAX. MARKS 50
1	A.Bhargavi Srilekha	II BSC (MPC)	181077101001	38
2	Angara Krishna Veni	II BSC (MPC)	181077101002	45
3	B. Vandana	II BSC (MPC)	181077101004	32
4	Ch. Devika Priyadarshini	II BSC (MPC)	181077101005	30
5	Donda Prasanthi	II BSC (MPC)	181077101007	38
6	G.Devi Prasuna	II BSC (MPC)	181077101008	34
7	K.Kesava Arun	II BSC (MPC)	181077101009	26
8	K.Sadhoku	II BSC (MPC)	181077101010	25
9	K. Bhanoji Rao	II BSC (MPC)	181077101011	27
10	K.Priyanka	II BSC (MPC)	181077101012	38
11	M.Venkatesh	II BSC (MPC)	181077101013	26
12	M. Amani	II BSC (MPC)	181077101014	32
13	N. Asha	II BSC (MPC)	181077101015	28
14	N. Dana Kumar	II BSC (MPC)	181077101016	24
15	P.V.T. Kishore	II BSC (MPC)	181077101017	27
16	P. B.S. Teja	II BSC (MPC)	181077101018	39


(VSV KRISHNA MURTY)


Principal
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NAAC 'B' Grade
RAZOLE - E.G.Dt.

GOVERNMENT DEGREE COLLEGE, RAZOLE
EAST GODAVARI DISTRICT -533242
DEPARTMENT OF MATHEMATICS

Razole
28-02-2020

To,
The Principal
Government Degree College
Razole

Sir,

Sub: Government Degree College, Razole - Department of Mathematics - Certificate
course in **Lattice Theory & Boolean Algebra**-2019-20- Submission of Work done
statements and related documents -- Regarding.

I humbly submit that the Department of Mathematics has organized a
Certificate course from 21-01-2020 to 27-02-2020 under the title "**Lattice Theory &
Boolean Algebra**" during 2019-20. The statement showing the work done together with
the details of number of hours and the name of the faculty taught are submitted
herewith.

Thanking you sir

Yours faithfully,



(VSV KRISHNA MURTHY)