# **DEPARTMENT OF MATHEMATICS** COURSE CURRICULUM & MARKING SCHEME

# B.Sc. III, IV, V, VI Semester MATHEMATICS

# (Based on Choice Based Credit System)

**SESSION : 2024-25** 



ESTD: 1958

# GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg) NAAC Accredited Grade A<sup>+</sup>, College with CPE - Phase III (UGC), STAR COLLEGE (DBT) Phone : 0788-2212030 Website - www.govtsciencecollegedurg.ac.in, Email – <u>autonomousdurg2013@gmail.com</u>

## DEPARTMENT OF MATHEMATICS GOVT. V.Y. T. PG. AUTONOMOUS COLLEGE, DURG

#### SYLLABUS for B.Sc. Semester – III

The syllabus with the paper combinations and Marking Scheme for the session 2024-2025.

			Marks Al	Credit	
Title	Paper No.	Title of the Paper	Theory	Practical / Project	
Core Course (DSC)	BMT101	Abstract Algebra	100	50	4(3 + 1)
Discipline Specific Elective (DSE)		Advanced Calculus	100		14 14
Skill Enhancement	BMTSE01	Introduction to Logic	25	25	2(1+1)
Course (SEC) (Anyone)	BMTSE02	Vector Calculus	25	25	2(1+1)

The syllabus for **B.Sc. Semester - III** is hereby approved by the members of Board of Studies for the session 2024-25.

In case any change or modification is prescribed by Central Board of Studies or Higher Education Dept., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.

#### Name & Signature:

**Faculty members:** Chairperson / H.O.D - Dr. Padmavati -07-24 Dr. M.A. Siddiqui -Subject Expert - Dr. Madhu Shrivastava Subject Expert - Dr. Shabnam Khan Dr. Rakesh Tiwari - 1713 Subject Expert - Dr. S. K. Bhatt 🌖 Dr. (Smt.) Prachi Singh **Representative Members** 1. Dr. Anil Kashyap -2. Shri A. K. Pandey -3. Dr. Mayur Puri Goswami -

DCC

-						DSC
Par	t A: Int	troduction				_
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		Class: B.Sc.	Semester – III	Session:2024-2025		
1	~	e Code				
2		e Title		ABSTRACT ALGEI	BRA	
3				Discipline Specific Cours		
4						
5	Cred	it Value	3C		Learning and Observ	ation
6	_	l Marks	Maximum Ma		Minimum Passing Ma	
		content of the	Course		1	
				g/ Learning Periods = 45 Period	s (45 Hours)	
Un	nit			cs (COURSE CONTENTS)	14	No. of Periods
	I	Definition and	s Elementary Pro l examples of gro o, The Dihedral gr	operties ups, Elementary Properties of group oups. Modulo, its properties and exam	s, Symmetric group, nples.	09
	II	Subgroups Subgroups an Product of two		ubgroups, Centralizer, Normalizer,	Center of a group,	09
III Cyclic Groups and Lagrang Cyclic groups, Properties of Cosets, Factor groups, Lagra		, Properties of C	yelic groups, Normal subgroups, Co	osets, Properties of	09	
IV Permutation Groups, Cycle notation for permutations, Properties of Permutations, Even and odd Permutations, alternating groups				Permutations, Even	09	
	V	Group isomor	norphisms, Prope	erties of homomorphisms, Kernel theorem, Properties of isomorphisms groups.	of homomorphism, s, First, Second and	09

Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati Subject Expert - Dr. Madhu Shrivastava	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mmm/6-07-09	<u>n</u>
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui -
Subject Expert - Dr. S. K. Bhatt	TO Aud
Representative Members	Dr. Rakesh Tiwari
1. Dr. Anil Kashyap -	P
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh -
3. Dr. Mayur Puri Goswami -	
Colo	

Part C - Learning				
	Text Books, Reference	Books, Othe	r Resources	
References:				
	ph. A. (2013). Contemporary Abstract	t Algebra (8 <sup>th</sup> e	ed.). Cengage Lea	arning India Private Limited
Delhi. Fourt	1 Impression, 2015.			
2. P.B. Bhattac	harya, S.K. Jain, S.R. Nagpaul : B	asic Abstract	Algebra,Cambri	dge University press.
3. I.N. Hersteir	: Topics in Algebra, Wiley Eastern Lt	td.		
4. Quazi Zamee	eruddin and Surjeet Singh : Modern A	lgebra.		
5. A.R. Vasisht	ha, A.K.Vasishtha: Modern Algebra,	Krishna's Edu	icational Publishe	er.
Online Resources:	: ( e- Resources/ e- Books/ e- Lea	rning Porta	ls):	
1. <u>https://onli</u>	necourses.nptel.ac.in	2. <u>http</u>	s://swayam.gov.i	n
2		4 144		
3. <u>https://epqp</u>	<u>o.inflibnet.aci.in</u>	4. <u>http</u>	s://www.mooc.or	2
	ent and Evaluation			
Suggested Contin Maximum Mark	nuous Evaluation Methods:	100 Marks		
	prehensive Evaluation (CCE):	20 Marks		
Semester End Ex		80 Marks		
				D ( CT () I
Internal Assessment:	Internal Test – 20 Marks Assignment/ Seminar – one of 20	) Marks		Best of Test and Assignment shall be
Continuous	Assignment Semmar one of 20	o manto		considered against 20
Comprehensive				marks
Evaluation (CCE) Semester End	Pattern -FOUR Question A, B,	C D from es	ch unit Questi	on A and B are
Exam (SEE)	compulsory. Question C and D h		-	
	Question-A & B (Compulsory):	Very short a	nswer type ques	stion (2 each) $04 \ge 5 = 20$ Mark
	Question-C: Short answer type q	uestions		01775 20 Mark
				$05 \ge 5 = 25$ Mark
	Question-D: Long answer type q	uestions		07 x 5 = 35 Mark
				Total = $80$ Mark
Name & Signature of	of Members of Board of Studies:			
Chairnerson / H.(	D.D - Dr. Padmavati	ju	Faculty mem	bers:
	02 61	n		01
Subject Expert - D	r. Madhu Shriyastava Muc	6-07-24	Dr. M.A. Side	liqui –
Subject Expert - D	r. Shabnam Khan			
Subject Expert - Dr. S. K. Bhatt Rome Bry Dr. Rakesh Tiwari - Tom				
- mejoor Enpert D			Lon	
Representative M	01110013		KIN	
<b>Representative M</b> 1. Dr. Anil Kas	shvap -		D (0 ) D	
Representative M 1. Dr. Anil Kas 2. Shri A. K. F	N		Dr. (Smt.) Pra	ichi Singh –

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#### GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

# FOUR YEAR UNDERGRADUATE PROGRAM DEPARTMENT OF MATHEMATICS COURSE CURRICULUM 2024-25

DSC

_		: Introduction				0	
Program: Bachelor's in			Class: B.Sc. Semester - III Session:2024-2025				
science (Certificate		`					
		/Diploma /					
_		gree/Honors)					
1	-	ourse Code					
2	-	ourse Title			Lab Course	(0.00)	
3	Co	ourse Type		Dis	scipline Specific Cours	se (DSC)	
4 Course Learning Outcome (CLO)			<ul> <li>coding technic</li> <li>Develop skills functions and</li> <li>Understand th</li> </ul>	cy in plotting jues. in graphical their derivative e impact of page	and analyzing various m representation and interpr ves. arameters on function beh cical applications.	navior and graphical	
5	(	Credit Value	1C		1 credit =15 Hours -	- Learning and Observation	
6	1	Fotal Marks	Maximum M	arks :50		Minimum Passing Marks:20	
	S.No. 1 Plotting all symm		List of Experiments netry of dihedral groups.				
	2	Finding order of	subgroup of cycli	c group of fi	inite order.		
	3	Finding number	of elements of gro	oup of finite	order.	10. Y	
-	4	Subgroup of Syn	nmetric Group S <sub>n</sub>	and Alterna	ting Group An.	and the second	
	5	Plotting graph of	f Homomorphism,	, Isomorphis	m and Automorphism of	of Group.	
	6	Describing group	o and its subgroup	os of order 1	5, 21, 30, 45 and 60.		
	7 Finding cosets and factor group of Q/Z.						
Non		2 Signature of Me	mbers of Board	of Studies.			
				Re Cha	Eacult	y members:	
Cł	lair	person / H.O.D -	Dr. Padmavati	No Ente	Facun	y members.	

Chairperson / H.O.D - Dr. Padmavali	Faculty members.
Subject Expert - Dr. Madhu Shrivastava Multi 6-07-24	Dr. M.A. Siddiqui – 📈
Subject Expert - Dr. Shabnam Khan	i de
Subject Expert - Dr. S. K. Bhatt Store 6.7.1	Dr. Rakesh Tiwari - Brus
Representative Members	Dr. Rakesh Hwall
1. Dr. Anil Kashyap -	PA
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh
<ol> <li>Shri A. K. Pandey -</li> <li>Dr. Mayur Puri Goswami - NPO Shlar</li> </ol>	21

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Part C - Learnin	g Resource
	Text Books, Reference Books, Other Resources
<b>Books Recomm</b>	nended
1. Gallian Learning	n, Joseph. A. (2013). Contemporary Abstract Algebra (8th ed.). Cengage
India I 1. Algebra	Private Limited, Delhi. Fourth Impression, 2015. a 2 <sup>nd</sup> adition by Michel Artin .
	Part D: Assessment and Evaluation
Suggested Conti	inuous Evaluation Methods:
Maximum Mar	JU WIAI KS
(Will include In	ternal assessment, Lab records and End Semester Viva/Voce and performance)
Semester End Exam (SEE)	Laboratory performance: As per Dept. (LOCF)

O Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Muit=/6-07-24	Dr. M.A. Siddiqui – 💋
Subject Expert - Dr. Shabnam Khan	q
Subject Expert - Dr. S. K. Bhatt Stall 6.7.24	Dr. Rakesh Tiwari – Tokur
Representative Members	Ph
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami -	

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DSE

Par	rt A: I	ntroduction					
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		(Certificate iploma /	Class: B.Sc. Sen	nester – I	Session:2024-202	5	
1		se Code				_	
2		se Title	Advan	ced Calculu	15	_	
3	Cour	se Type	Discipline Spo				
4		se Learning	This Course will enable the stude	ents to:			
Outcome (CLO)			<ul> <li>Calculate the limit and examine the continuity and understand the concepts of limit, continuity and differentiability of functions of more than one variable with geometrical interpretation.</li> <li>To Understand the concepts of mean value theorems with their applications.</li> <li>To understand the concept of maxima and minima for functions of two and</li> </ul>				
			<ul><li>three variables with their uses a</li><li>Understand conceptual variation</li></ul>	nd techniques.			
			<ul> <li>several variables in calculus.</li> <li>Understand the concept of integ and their evaluation technique v</li> </ul>	ration of func	tions of two and thre	e variables	
5	Cree	dit Value	4C 1 credit	=15 Hours – I	Learning and Obser	vation	
6		al Marks	Maximum Marks :100		Minimum Passing M		
Pa	rt B: (	Content of the					
	-	Total	no. of Teaching/ Learning Periods =	-A6 Periods	(66 Hours)	1.00	
Un	lit		Topics (COURSE CONTENTS)			No. of Periods	
æ	I	of function of	tinuity of function of two and three variables. Mean value theorems f two variables- First mean value theorem and taylor's theorem.				
]	n	theorem, Your	tion and differentiability of function of two variables. Schwartz's ng's theorem, Implicit function theorem. Fourier series, Fourier piece wise monotonic function.				
I	II	Jacobians, M	axima, Minima and saddle points of function of two variables.				
I	V	Partial Differe	ntiation and Euler's theorem on homo range's multipliers method. Envelop	geneous func	tions, Change of	<del>-09</del> -12 <del>09</del> -12	
	V	Beta and Gan	uma function. Double and triple int ler of integration.	egrals. Diric	hlet's integrals.	<del>09</del> -12	
ame	e & Sig	mature of Mem	pers of Board of Studies:			ξ.	
		on / H.O.D - D pert - Dr. Madh	1 2 6 1	Faculty m	embers:		
		pert - Dr. Shabr	1 10 1 -	Dr. M.A. S	Siddiqui –	,	
		pert - Dr. S. K. ative Members	Shatt flore 6.704	Dr. Rakesl	n Tiwari – TIY	M	
ī. 2,		Anil Kashyap - A. K. Pandey -		Dr. (Smt.)	Prachi Singh –		
3. Dr. Mayur Puri Goswami - ang ang				1			

#### Part C - Learning Resource Text Books, Reference Books, Other Resources **References:** 1. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd. 2. Mathematical Analysis, S.C. malik and S. Arora, New age international, Delhi 3. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India. 4. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag. 5. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. 6. Principles of Mathematical analysis, W.Rudin, McGraw Hill Publication 7. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic 8. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage. Online Resources: ( e- Resources/ e- Books/ e- Learning Portals) 1. https://onlinecourses.nptel.ac.in 2. https://swayam.gov.in 3. https://epqp.inflibnet.aci.in 4. https://www.mooc.org Part D: Assessment and Evaluation **Suggested Continuous Evaluation Methods:** Maximum Marks: **100 Marks** Continuous Comprehensive Evaluation (CCE): 20 Marks Semester End Exam (SEE): 80 Marks

Internal	Internal Test – 20 Marks	Best of Test and
Assessment:	Assignment/ Seminar - one of 20 Marks	Assignment shall be
Continuous		considered against 20
Comprehensive		marks
Evaluation (CCE)		
Semester End Exam (SEE)	<ul> <li>Pattern -FOUR Question A, B, C, D from each unit. Quest compulsory. Question C and D have internal choice.</li> <li>Question-A &amp; B (Compulsory): Very short answer type que</li> </ul>	
	Question-C: Short answer type questions	
		$05 \ge 5 = 25$ Mark
	Question-D: Long answer type questions	
5		07  x  5 = 35  Marks
		Total $= 80$ Mark

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mithe/6-07-24	Dr. M.A. Siddiqui – 📈
Subject Expert - Dr. Shabnam Khan	DI. M.A. Siddiqui -
Subject Expert - Dr. S. K. Bhatt Span 6721	Dr. Rakesh Tiwari - Takui
Representative Members	
1. Dr. Anil Kashyap -	
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami - Mersula	, i i

SEC

Par	rt A: In	troduction				
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		(Certificate oloma /	Class: B.SC.	Semester – III/V	Session:2024-2025	
1	+.:	se Code				
2	Cours	se Title		Introduction to I	Logic	
3	Cours	ве Туре		Skill Enhancement Cou	urse (SEC)	
4 Course Learning Outcome (CLO)		0	<ul> <li>This Course will enable the students to:</li> <li>Remember results of Prepositions, truth table, negation, conjunction and disjunction and equivalence relation.</li> <li>Understand Logical equivalence, Predicates and Quantifiers.</li> </ul>			
5	5 Credit Value 2C 1 credit =15 Hours – Learning an				– Learning and Observation	
6 Total Marks		l Marks			Minimum Passing Marks:10	
Pa	rt B: C	<b>Content</b> of the	Course		* * *	
		Total	no. of Teachin	g/ Learning Periods = 30 Perio	ods (30 Hours)	
Unit			Topi	cs (COURSE CONTENTS)	No. of Periods	
I		and Disjuncti converse, com precedence of Logical equiv	on, implications tra positive and f logical operato	th table, negation, conjunction , bi-conditional propositions, inverse propositions and rs. Propositional equivalence: tes and quantifiers: Introduction s and Negations.	30	

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	a
Subject Expert - Dr. S. K. Bhatt Sport 6724	Dr. Rakesh Tiwari – Takur
Representative Members	01
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami - Mosilia	•
Car	

Part C - Learning	Resource			
	Text Books, Reference Books, Other Resources			
References:				
1. R.P. Grimaldi,	Discrete Mathematics and Combinatorial Mathematics, Pea	rson education, 1998.		
	: (e- Resources/ e- Books/ e- Learning Portals)	· · · · · · · · · · · · · · · · · · ·		
		*		
	necourses.nptel.ac.in 2. https://swayam.go	v.in		
	<u>b.inflibnet.aci.in</u> 4. <u>https://www.mood</u>	o.org		
Part D: Assessme	ent and Evaluation	0.04		
Suggested Continuous Evaluation Methods:				
Maximum Marks: 25 Marks				
<b>Continuous Com</b>	prehensive Evaluation (CCE): 5 Marks			
Semester End Ex	xam (SEE): 20 Marks			
Internal	. S			
Assessment:		Marks obtained in		
Continuous	Assignment 05 Marks	Assignment shall be		
Comprehensive		considered against 05		
Evaluation(CCE)		marks		
Semester End				
<b>Exam (SEE)</b> Pattern - Attempt any five questions out of given ten questions.				

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Whit/6-07-24	Dr. M.A. Siddiqui – 🥂
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt Solar 6.723	Dr. Rakesh Tiwari - TRui
Representative Members	N: 3
1. Dr. Anil Kashyap -	Dr. (Smt.) Brachi Singh
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh -
3. Dr. Mayur Puri Goswami - Mostan	,

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Part	t A: Int	troduction				
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		Class: B.SC.	Semester – III / V	Session:2024-2025		
1						
2		e Title		Vector Calcu	lus	
3	Cours	е Туре		Skill Enhancement Cou	the second se	-
4		e Learning	This Course	will enable the students to:		
-	Outco	me (CLO)	<ul> <li>Remember scalar and vector product of three vectors and Reciproca vector.</li> <li>Understand Vector differentiation, Gradient, divergence and curl.</li> <li>Apply Vector integration in various types of calculation.</li> </ul>			
5	Cred	it Value	2C	1 credit =15 Hours	– Learning and Observat	ion
6	Tota	l Marks	Maximum Mar	ks: 25	Minimum Passing Marks:	:10
Pa	rt B: C	ontent of the	Course			
		Total	no. of Teaching	g/ Learning Periods = 30 Perio		
Un	it		Topic	s (COURSE CONTENTS)		No. of eriods
	IScalar and vector product of three vectors. Product of four vectors.30Reciprocal vector. Examples and Applications. Vector differentiation, Gradient, divergence and curl. Vector integration. Examples and Applications.30					30
		Drampies a	na rippileatio.		12	

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint 16-07-20	Dr. M.A. Siddiqui – 🕢
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt Shar 6.7124	Dr. Rakesh Tiwari – Tohun
Representative Members	P.
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami -	·

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Textbooks,	Reference Books, Other	Resources	
Reference		ũ.	
<ol> <li>Murray R. Spiegel, Vector Analys</li> <li>Erwin Kreyszig, Advanced Engine</li> <li>Shanti Narayan, A Text book of V</li> <li>Online Resources: (e- Resources/ e- Book</li> </ol>	eering Mathematics, Joh ector Calculus, S.Chand	n Wiley and S & Co. New De	ons, 1999.
1. https://onlinecourses.nptel.ac.in	2. <u>http</u>	s://swayam.gov.i	in
3. https://epqp.inflibnet.aci.in	4. <u>https</u>	s://www.mooc.o	rg
Part D: Assessment and Evaluation			
Suggested Continuous Evaluation Me	thods:		
Maximum Marks:	25 Marks		*1 25
Continuous Comprehensive Evaluation	on (CCE): 5 Marks		
Semester End Exam (SEE):	20 Marks		9
Internal Assessment:	Assignment 05 Marks		Marks obtained in
Continuous Comprehensive Evaluation CCE)			Assignment shall be considered against 05 marks
Semester End Exam (SEE)	Pattern – Attempt any questions.	five questions	out of given ten
ame & Signature of Members of Board o	f Studies:		
C <b>hairperson</b> / <b>H.O.D -</b> Dr. Padmavati	Partinizu	Faculty mem	bers:
Subject Expert - Dr. Madhu Shrivastava	Mil=/6-07-24	Dr. M.A. Side	tiqui
Subject Expert - Dr. Shabnam Khan			TOMAN
Subject Expert - Dr. S. K. Bhatt	01 6. 1.25	Dr. Rakesh Ti	wari -
<ul> <li>Representative Members</li> <li>4. Dr. Anil Kashyap -</li> <li>5. Shri A. K. Pandey -</li> <li>6. Dr. Mayur Puri Goswami - </li> </ul>	, was	Dr. (Smt.) Pra	ichi Singh –
6. Dr. Mayur Puri Goswami -			

# DEPARTMENT OF MATHEMATICS GOVT. V.Y. T. PG. AUTONOMOUS COLLEGE, DURG

#### SYLLABUS for B.Sc. Semester – IV

The syllabus with the paper combinations and Marking Scheme for the session 2024-2025.

			Marks Allotted		Credit
Title	Paper No.	Title of the Paper	Theory	Practical / Project	u - 4
Core Course(DSC)	BMT101	Real Analysis	100	50	4(3 + 1)
Discipline Specific Elective (DSE)		Mechanics	100		
Skill Enhancement Course(SEC)	BMTSE01	Set Theory	25	25	2(1+1)
(Anyone)	BMTSE02	Boolean Algebra	25	25	2(1+1)

The syllabus for **B.Sc. Semester - IV** is hereby approved by the members of Board of Studies for the session 2024-25.

In case any change or modification is prescribed by Central Board of Studies or Higher Education Dept., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.

#### Name & Signature:

Faculty members:
Dr. M.A. Siddiqui
Dr. Rakesh Tiwari - Toru
Dr. (Smt.) Prachi Singh -
e

DSC

		Introduction			
		m: Four Year	Class: B.Sc. Semester – IV	Session:2024-202	5
		iduate Program			5
1		rse Code			
2		rse Title Real Analysis			
3		rse Type Discipline Specific Course (DSC)			
4 Course Learning Outcome (CLO)			<ul> <li>This Course will enable the students to:</li> <li>Understand many properties of the real line an of functions from N to a subset of Real numb</li> <li>Recognize bounded, convergent, divergent, diverge</li></ul>	per. Cauchy and monoton	ic sequences
~			<ul> <li>and to calculate their limit superior, limit inf sequence.</li> <li>Apply the ratio, root, alternating series a convergence and absolute convergence numbers.</li> </ul>	and limit comparise of an infinite ser	on tests fo ies of rea
5 5		dit Value	3C 1 credit =15 Hours –		
_	_	al Marks	Maximum Marks :100	Minimum Passing M	1arks:40
Pa	rt B: (	Content of the (			
	2	Total	no. of Teaching/ Learning Periods = 45 Periods	(45 Hours)	
Un	it	4.	Topics (COURSE CONTENTS)	4	No. of Periods
Real Number System Algebraic and order properties of Absolute value of a real number; Bounded above and bounded below sets, Supremum and infimum of a nonempty subset of Real number.			09		
1	I	The completer numbers in R.	Real Number System less property of R, Archimedean property, Dense Definition and types of intervals, Nested interval Open and closed sets in real number.	eness of rational s, Neighborhood	09
n	Ĩ	Sequences Convergent sec Monotone sequ Weierstrass the	quence, Limit of a sequence, Bounded sequence, hences, Monotone convergence theorem, Subseque forem for sequences, Limit superior and limit infe hy sequence, Cauchy's convergence criterion.	ences Bolzano-	09
-		the second s			
IJ	7	Infinite Series Convergence a condition for convergence of	and divergence of infinite series of real numl convergence, Cauchy criterion for converge positive term series: Integral test, Basic compar- , D'Alembert's ratio test, Cauchy's <i>n</i> -th root test.	nce. Tests for	09

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Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint/6-07-24	Dr. M.A. Siddiqui – 🕢 🦯
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt Store 6.7.74	Dr. Rakesh Tiwari - With
Representative Members	0 11
1. Dr. Anil Kashyap -	Dr. (Smit) Brach Singh
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami -	
hole	

I art C - Lear min	g Resource			
References:	Text Books, R	eference Books,	Other Resource	ces
		IR. (2015). Intro	oduction to Rea	al Analysis (4th ed.). Wiley Ind
Edition. No	ew Delhi.			
Online Resources	: ( e- Resources/ e- Book	s/ e- Learning I	Portals)	
1. https://onli	necourses.nptel.ac.in	. 2.	https://swayan	a.gov.in
3. <u>https://epq</u>	p.inflibnet.aci.in	4.	https://www.m	looc.org
	ent and Evaluation nuous Evaluation Metho			
Semester End Ex	20 	80 Ma	arks	
Internal Assessment: Continuous Comprehensive	Internal Test – 20 Mark Assignment/ Seminar –		S	Best of Test and Assignment shall be considered against 20 marks
Evaluation (CCE)				
Evaluation (CCE) Semester End Exam (SEE)	Pattern -FOUR Question compulsory. Question C	n A, B, C, D fro and D have inte	om each unit. ( ernal choice.	Question A and B are
Semester End	compulsory. Question C	and D have inte	ernal choice.	
Semester End	Pattern -FOUR Question compulsory. Question C Question-A & B (Comp Question-C: Short answ	C and D have into ulsory): Very sh	ernal choice. 10rt answer typ	e question (2 each)
Semester End	compulsory. Question C Question-A & B (Comp	c and D have into ulsory): Very sh er type question	ernal choice. 10rt answer typ s	

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint/6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	DI. M.A. Siddiqui -
Subject Expert - Dr. S. K. Bhatt Spore 6.7.24	Dr. Rakesh Tiwari – Takun
Representative Members	21
1. Dr. Anil Kashyap -	F.
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami - Rosilia	

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#### GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

### FOUR YEAR UNDERGRADUATE PROGRAM DEPARTMENT OF MATHEMATICS COURSE CURRICULUM 2024-25

Par	rt A	: Introduction					
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		nce (Certificate /Diploma /	Class: B.Sc.		Semester - IV	Session:2024-2025	
1	Co	ourse Code					
2	Co	ourse Title			Lab Course		
3	Co	ourse Type		D	iscipline Specific Cours	e (DSC)	
4	10	ourse Learning utcome (CLO)	<ul> <li>Develop sk of various o</li> <li>Gain profic differential</li> <li>Master tech</li> </ul>	ills in solv orders usir iency in p equations miques for	ng practical methods. lotting and analyzing fa of second and third ord	lers. linary differential equations	
5	C	Credit Value	1C		1 credit =15 Hours –	Learning and Observation	
6	T	otal Marks	Maximum Ma	urks :50		Minimum Passing Marks:20	
<b>S.</b> N	lo.			List	of Experiments		
1		Find the sum of	progression ( AP	,GP,HP).			
2		Finding sum of i	finfinite series of Real number.				
3		Finding limit sup	perior and limit inferior of sequence by using software.				
4		Plotting of graph	of piecewise co	ntinuous f	unction.		
5		Plotting of Graph	h of Function which is continuous but not differentiable.				
6		Plotting of graph	of sequence of 1	eal numbe	er which is monotonic b	out not convergent.	
7					l sequence of real numb		
8					and continuity of funct		





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	g Resource	
	Text Book	ks, Reference Books, Other Resources
Books Recom	mended:	
<ol> <li>Belinda I Differen London a</li> <li>C.H. Edw Computi</li> <li>Martha I</li> </ol>	Barners and Glenn R. tial EquationApproach and New York, 2009. vards and D.E. Penny, ing andModeling, Pea	by Robert G. Bartle abd Donald R. Sherbert. Fulford, Mathematical Modeling with Case Studies, A h using Maple and Matlab, 2 <sup>nd</sup> Ed., Taylor and Francis group, Differential Equations and Boundary Value problems arson Education India, 2005. elton, Differential Equations with MATHEMATICA, 3 <sup>rd</sup> Ed.,
	Part	D: Assessment and Evaluation
Suggested Conti	nuous Evaluation M	lethods:
Maximum Marl	<b>KS</b> :	50 Marks
(Will include Int	ternal assessment. La	ab records and End Semester Viva/Voce and performance
<b>、</b>		ab records and End Semester viva/vote and performance
Semester End		ance: As per Dept. (LOCF)
Semester End		
Semester End		
Semester End		
Semester End Exam (SEE)	Laboratory perform:	ance: As per Dept. (LOCF)
Semester End Exam (SEE)		ance: As per Dept. (LOCF)
Semester End Exam (SEE) me & Signature o	Laboratory perform:	ance: As per Dept. (LOCF) of Studies:
Semester End Exam (SEE) me & Signature of Chairperson / H.(	Laboratory performs of Members of Board <b>D.D</b> - Dr. Padmavati	ance: As per Dept. (LOCF)
Semester End Exam (SEE) me & Signature of hairperson / H.O ubject Expert - Dr	Laboratory performs of Members of Board <b>D.D</b> - Dr. Padmavati r. Madhu Shrivastava	ance: As per Dept. (LOCF) of Studies:
Semester End Exam (SEE) me & Signature of hairperson / H.C ubject Expert - Dr	Laboratory performs of Members of Board <b>D.D</b> - Dr. Padmavati	ance: As per Dept. (LOCF) of Studies: Faculty members:
Semester End Exam (SEE) ume & Signature of Chairperson / H.O ubject Expert - Dr	Laboratory performs of Members of Board D.D - Dr. Padmavati r. Madhu Shrivastava r. Shabnam Khan	ance: As per Dept. (LOCF) of Studies: Particular Marine Marine Dr. M.A. Siddiqui –
Semester End Exam (SEE) ume & Signature of Chairperson / H.( ubject Expert - Dr ubject Expert - Dr ubject Expert - Dr	Laboratory performs of Members of Board <b>D.D</b> - Dr. Padmavati r. Madhu Shrivastava r. Shabnam Khan r. S. K. Bhatt	ance: As per Dept. (LOCF) of Studies: Faculty members:
Semester End Exam (SEE) ume & Signature of Chairperson / H.( ubject Expert - Dr ubject Expert - Dr ubject Expert - Dr	Laboratory performs of Members of Board D.D - Dr. Padmavati r. Madhu Shrivastava r. Shabnam Khan r. S. K. Bhatt embers	ance: As per Dept. (LOCF) of Studies: Particular Manual Manual Dr. M.A. Siddiqui – Dr. Rakesh Tiwari A
Semester End Exam (SEE) ume & Signature of Chairperson / H.( ubject Expert - Dr ubject Expert - Dr ubject Expert - Dr ubject Expert - Dr	Laboratory performs of Members of Board <b>D.D</b> - Dr. Padmavati r. Madhu Shrivastava r. Shabnam Khan r. S. K. Bhatt <b>embers</b> hyap -	ance: As per Dept. (LOCF) of Studies: Particular Marine Marine Dr. M.A. Siddiqui –

						DSE
Par	t A: In	troduction				
Program: Four Year			Class: B.SC.	Semester – IV	Session:2024-2025	
Undergraduate Program		uate Program				
1	Cours	e Code				
2	Cours	Course Title MECHANICS				
3	Course Type Discipline Specific Elective (DSE)					
4			<ul> <li>Understand stability.</li> <li>Apply the forces and s</li> <li>Analyse the</li> <li>Calculate pr</li> </ul>	vill enable the students to: the concepts of stability and equil principle of virtual work to solv simple frameworks. e geometric and intrinsic properties rojectile motion parameters, includ	ibrium, and test for de e problems involving s of catenary curves. ing trajectory, maximu	g coplanar um height,
				ht, and horizontal range, with appl		
5		it Value	4C		- Learning and Obser	
6		l Marks	Maximum Mar	·ks :100	Minimum Passing M	larks:40
Par	t B: Co	ontent of the C				
_		Total	no. of Teaching	g/ Learning Periods = 45 Period	s (45 Hours)	
Un	iit		Торі	cs (COURSE CONTENTS)		No. of Periods
			nstable Equilibriu le and unstable equ	<b>im:</b> ailibrium, Test for Determining the I	Nature of Stability.	1g
II Vir Co		Coplanar Force	cement and Virtua es Acting on a Par	I Work, Principle of Virtual Work for ticle and Different Points of a Rigid on Simple Frame Work.		12
]	Catenary:IIIDefinitions, Ir		trinsic Equation of	f the Common Catenary. Cartesian I Properties of the Catenary.	Equation of the	1\$
]	IV       Projectile: Equation of Projectile, Vertex, Axis, Latus-Rectum, Focus and Directrix of the Trajectory, Velocity and Direction of the Projectile at a given time and at the given Height, Greatest Height of Projectile, Time of Flight, Horizontal Range, Maximum Horizontal Range.			19		
	V	Applications: Sag of Telegra Catenary, Proje Inclined Plane.	ph Wires (Tightly ection on an Inclir	Stretched Wire), Approximation to ned Plane, The Range and Time of F f Studies:		(\$

Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mutike 6-07-24	1
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui –
Subject Expert - Dr. S. K. Bhatt 877 6.72	Dr. Rakesh Tiwari - Rous
Representative Members	DI
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh
2. Shri A. K. Pandey -	-+
3. Dr. Mayur Puri Goswami -	
06/01/	

Part C - Learn	ing Resource		
	Text Books, Refe	rence Books, Other Resour	TCPS
References:			
<ol> <li>P.L. Shri</li> <li>A.S. Ran</li> <li>A.S. Ran</li> <li>S.L. Lond</li> </ol>	ma (1962). a text books of statics vastava (1964). Elementary dyna nsey (2009), Statics, Cambridge nsey (2009), Dynamics, Cambrid ey (2006), An Elementary Treat ge an Griffith (1949). Principal of	amics. Ram Narayan Lal, Be University Press Ige University Press ise on the dynamics of some	
Online Resourc	ees: ( e- Resources/ e- Books/ e	e- Learning Portals)	
l. <u>https://o</u> i	nlinecourses.nptel.ac.in	2. https://swayan	n.gov.in
3. <u>https://ep</u>	oqp.inflibnet.aci.in	4. <u>https://www.n</u>	100c.org
10 m			
Part D: Assess	ment and Evaluation		
Suggested Con	tinuous Evaluation Methods:		
Suggested Con Maximum Ma	tinuous Evaluation Methods: rks:	100 Marks	
Suggested Con Maximum Ma	tinuous Evaluation Methods: rks:	100 Marks	
Suggested Con Maximum Ma Continuous Co	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC	100 Marks E): 20 Marks	
Suggested Con Maximum Ma	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC	100 Marks	
Suggested Con Maximum Ma Continuous Co	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC	100 Marks E): 20 Marks	
Suggested Con Maximum Ma Continuous Co	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE):	100 Marks E): 20 Marks	
Suggested Con Maximum Ma Continuous Co Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks	100 Marks E): 20 Marks 80 Marks	Best of Test and
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment:	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE):	100 Marks E): 20 Marks 80 Marks	Assignment shall be
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks	100 Marks E): 20 Marks 80 Marks	Assignment shall be considered against 20
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks	100 Marks E): 20 Marks 80 Marks	Assignment shall be
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks	100 Marks E): 20 Marks 80 Marks	Assignment shall be considered against 20
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A,	100 Marks EE): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Ou	Assignment shall be considered against 20 marks
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o	100 Marks EE): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Ou	Assignment shall be considered against 20 marks
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A, compulsory. Question C and I	100 Marks EE): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice.	Assignment shall be considered against 20 marks estion A and B are
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A,	100 Marks EE): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice.	Assignment shall be considered against 20 marks estion A and B are question (2 each)
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A, compulsory. Question C and I Question-A & B (Compulsory	100 Marks E): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice. y): Very short answer type of	Assignment shall be considered against 20 marks estion A and B are question (2 each)
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A, compulsory. Question C and I Question-A & B (Compulsory Question-C: Short answer type	100 Marks E): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice. V): Very short answer type of e questions	Assignment shall be considered against 20 marks estion A and B are question (2 each) 04 x 5 = 20 Mark
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A, compulsory. Question C and I Question-A & B (Compulsory	100 Marks E): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice. V): Very short answer type of e questions	Assignment shall be considered against 20 marks estion A and B are question (2 each) $04 \ge 5 = 20$ Mark $05 \ge 5 = 25$ Mark
Suggested Con Maximum Ma Continuous Co Semester End Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	tinuous Evaluation Methods: rks: omprehensive Evaluation (CC Exam (SEE): Internal Test – 20 Marks Assignment/ Seminar – one o Pattern -FOUR Question A, compulsory. Question C and I Question-A & B (Compulsory Question-C: Short answer type	100 Marks E): 20 Marks 80 Marks of 20 Marks B, C, D from each unit. Qu D have internal choice. V): Very short answer type of e questions	Assignment shall be considered against 20 marks estion A and B are

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mit /6-07-24	/
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui
Subject Expert - Dr. S. K. Bhatt Same 6.7.24	
Representative Members	Dr. Rakesh Tiwari – Arus
1. Dr. Anil Kashyap -	0 1
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh
3. Dr. Mayur Puri Goswami - Roser Tam	
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Par	t A · T	ntroduction	A			
		Bachelor's in	Class: B.Sc.			Ű.
science (Certificate			Class: D.Sc.	Semester- IV/VI	Session:2024-20	025
/Diploma /		•	5			
Degree/Honors)						
				3		M
1		se Code				
2	1	se Title		Set The		
3		se Type		Skill Enhancement	Course (SEC)	3
4		se Learning		ill enable the students to		
	Outco	ome (CLO)	<ul> <li>Apply Co</li> </ul>	ncepts of sets, subset, set	operations and Veni	n diagram in real
			life proble			52
-	0	11	Evaluate	practical problems on cour	ting principal and p	ower set of a set.
5		lit Value	2C	1 credit =15 Ho	ours - Learning and	Observation
6		al Marks	Maximum Marks:	: 25	Minimum Passing	Marks:10
Pa	rt B: C	Content of the				
		Total	no. of Teaching/	Learning Periods = 30 F	eriods (30 Hours)	*
Unit		- i	Topics (C	COURSE CONTENTS)		No. of Periods
		Set Theory:	Sets, subsets, set o	operations, the low of set	theory and	
		Venn diagran	enn diagrams. Examples of finite and infinite sets. Finite sets and			
		counting prin	ng principle. Empty set, Properties of empty set. Standard set			0
(*)		operations. (	perations. Classes of sets. Power set of a set. Difference and			
]	I	symmetric di	fference of two se	ets. Set identities, General	ized union	30
		and intersecti	ons and applicatio	ons of above topics.		7.0
		Relation: pro	oduct set, composi	tion of relations. Types of	of relations	
	- e - 1	partitions and	l its applications, l	Equivalence Relations with	th example	04 1
		of congruence	e modulo relation.			*

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati 617 129	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Minte/6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	DI. M.A. Siddiqui –
Subject Expert - Dr. S. K. Bhatt Some 6.7.24	Dr. Rakesh Tiwari – Torun
Representative Members	D M
1. Dr. Anil Kashyap -	Dr. (Smt) Drochi Sinch
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami -	н. <b>М</b> і
Colon	

SEC

Part C - Learning Resource					
Text Books, Ref	Ference Books, Other Resources				
Reference					
1. E. Kamke, Theory of sets, Dover Publishers, 1950.					
2. P.R. Halmos, Naive set theory, Springe					
Online Resources: (e- Resources/ e- Books/					
	e Dear ining Fortails)				
<ol> <li><u>https://onlinecourses.nptel.ac.in</u></li> </ol>	2. https://swayam.g	ov in			
3. https://epqp.inflibnet.aci.in	4. https://www.moc				
Part D: Assessment and Evaluation					
Suggested Continuous Evaluation Method	¢'				
Maximum Marks:	25 Marks				
Continuous Comprehensive Evaluation (C		4			
Semester End Exam (SEE):	20 Marks	¢			
Starter Line Line (SEL).	20 14141 KS				
Internal Assessment:		Marks obtained in			
Continuous Comprehensive Evaluation	Assignment 05 Marks	Assignment shall be			
(CCE)	· · · · · · · · · · · · · · · · · · ·	considered against 05			
		marks			
Semester End Exam (SEE)	Pattern -Attempt any five qu	estions out of given ten			
	questions.	-			

Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint 6-07 24	N
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui –
Subject Expert - Dr. S. K. Bhatt STONAL 6.705 Representative Members	Dr. Rakesh Tiwari - DRu
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	AL AND A
3. Dr. Mayur Puri Goswami -	
MADE	
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			COUN	SE COMICOLOM 20		SEC
Par	t A: In	troduction				
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		Class: B.SC.	Semester – IV/VI	Session:2024-2025	8	
1	Cours	e Code				
2					Algebra	
3	Cours	е Туре		Skill Enhanceme		
4 Course Learning Outcome (CLO)			<ul> <li>Remem duality</li> <li>Understalgebra</li> <li>Apply of Evaluat</li> </ul>	principal, maximal and m tand Lattices as ordered ic structures, sub lattices, concepts of Karnaugh dia e problems on Boolean mials, minimal forms of E	sets, partial order sets, Hasse ninimal elements. d sets, complete lattices, la product and Homomorphism grams, switching circuits. algebras and its properties, 300lean polynomials.	attices as Boolean
5	Cred	it Value	2C		Hours – Learning and Observ	ation
6		l Marks	Maximum Mai	·ks: 25	Minimum Passing Mar	ks:10
Pa	rt B: C	Content of the	the second se			
		Tota	l no. of Teachin	g/ Learning Periods = 3	0 Periods (30 Hours)	
Uı	nit			ics (COURSE CONTEN		No. of Periods
ordered sets maximal and lattices as alg Definition, e I Complete la theorems. B minimal for		ordered sets maximal and lattices as alg Definition, e Complete la theorems. B minimal for Karnaugh d	, Partial ordered minimal element gebraic structures xamples and pro- attice, Complem oolean Algebra ms of Boolear	sic properties of ordered ed set, Hasse Diagram, nts. Lattices as ordered set s, sub-lattices, products a operties of modular and nented lattice, Bounded and its properties, Bo polynomials. Quinn-N ing circuits and applica	, duality principle, ts, complete lattices, and Homomorphism. distributive lattices, l lattice and some polcan polynomials, Mccluskey method,	30
Nam	e & Sig	gnature of Me	mbers of Board of	of Studies:		
Chairperson / H.O.D - Dr. PadmavatiFaculty members:Subject Expert - Dr. Madhu ShrivastavaWint / 6 - 0 7 - 24Dr. M.A. Siddiqui -					/	
Sub	ject Exp	pert - Dr. Shabn	am Khan		-71	<i>x</i>
	-	pert - Dr. S. K.	Bhatt State	at Girzy	Dr. Rakesh Tiwari -	M
1	Representative Members         1. Dr. Anil Kashyap -         2. Shri A. K. Pandey -         3. Dr. Mayur Puri Goswami -				R -	
			(has		12	

Turte Bearing	Resource	Deservations		
Defense	Text Books, Reference Books, Othe	er Resources	4	
References:         1. B. A. Davey and H.A. Priestley, Introduction to lattices and order. Cambridge				
	ress, Cambridge, 1990.	orderr odnisno	.0-	
	nd Gunter Pilz, Applied Abstract Algebra, 2nd	Ed Undergrad	uate texts in	
	s, Springer (SIE), Indian reprint, 2004.	rea, ondergrad		
	nents of Discrete Mathematics, Tata McGraw	-Hill Publishing	Company Limited.	
3. C. L. LIU, Eler	nents of Discrete Mathematics, rata McGraw		company Enniced	
Online Resources:	(e- Resources/ e- Books/ e- Learning Porta	ls)		
		https://swayam.g		
	nt and Evaluation			
	uous Evaluation Methods:			
Maximum Marks		÷	2	
	prehensive Evaluation (CCE): 5 Marks am (SEE): 20 Marks		a	
Semester End Ex Internal	am (SEE): 20 Marks		No. 1 . 1 . 1 . 1 .	
Assessment:			Marks obtained in Assignment shall be	
Continuous	Assignment 05 Marks		considered against	
Comprehensive			marks	
Evaluation(CCE)				
Semester End Exam (SEE)	Pattern - Attempt any five questions out of g	iven ten questio	ns.	
	f Members of Board of Studies:			
lame & Signature of				
lame & Signature o		24		
	D.D - Dr. Padmavati	Faculty mem	bers:	
Chairperson / H.C	6		N	
<b>Chairperson</b> / <b>H.O</b> Subject Expert - Dr	Madhu Shrivastava Mit 16-07-24	Faculty mem Dr. M.A. Side	N	
Chairperson / H.C	Madhu Shrivastava Mit 16-07-24	Dr. M.A. Side	diqui – H	
<b>Chairperson</b> / <b>H.C</b> Subject Expert - Dr Subject Expert - Dr	Madhu Shrivastava Mihit 16-07-24		diqui – H	
<b>Chairperson / H.C</b> Subject Expert - Dr Subject Expert - Dr Subject Expert - Dr	Madhu Shrivastava Mint 16-07-24 Shabnam Khan S. K. Bhatt Filther 6-7-24	Dr. M.A. Side	diqui – H	
Chairperson / H.O Subject Expert - Dr Subject Expert - Dr Subject Expert - Dr Representative Me	Madhu Shrivastava Mint 16-07-24 Shabnam Khan S. K. Bhatt Filther 6-7-24	Dr. M.A. Side	diqui - H iwari - Bruú	
Chairperson / H.O Subject Expert - Dr Subject Expert - Dr Subject Expert - Dr Representative Me 1. Dr. Anil J	Madhu Shrivastava Mit 16-07-24 Shabnam Khan S. K. Bhatt Filther G-7-24 embers	Dr. M.A. Side Dr. Rakesh T	diqui - H iwari - Bruú	
Chairperson / H.O Subject Expert - Dr Subject Expert - Dr Subject Expert - Dr Representative Me 1. Dr. Anil 2. Shri A. F	Madhu Shrivastava Mint /6-07-24 Shabnam Khan S. K. Bhatt When G-7-24 embers Kashyap -	Dr. M.A. Side Dr. Rakesh T	diqui - H iwari - Bruú	

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# DEPARTMENT OF MATHEMATICS GOVT. V.Y. T. PG. AUTONOMOUS COLLEGE, DURG

# SYLLABUS for B.Sc. Semester - V

The syllabus with the paper combinations and Marking Scheme for the session 2024-2025.

			Marks Allotted		Credit
Title	Paper No.	Title of the Paper	Theory	Practical / Project	
Core Course (DSC)	BMT101	Metric Space	75	25	4(3 + 1)
Discipline Specific Elective (DSE)		<ul><li>(A)Partial Differential</li><li>Equation</li><li>(B)Numerical Methods</li></ul>	100		4
Skill Enhancement	BMTSE01	Introduction to Logic	25	25	2(1+1)
Course (SEC) (Anyone)	BMTSE02	Vector Calculus	25	25	2(1+1)

The syllabus for **B.Sc. Semester -** V is hereby approved by the members of Board of Studies for the session 2024-25.

In case any change or modification is prescribed by Central Board of Studies or Higher Education Dept., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.

#### Name & Signature:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava	Dr. M.A. Siddiqui – 📈
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt	Dr. Rakesh Tiwari – When
Representative Members	2 des
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh
2. Shri A. K. Pandey -	T
3. Dr. Mayur Puri Goswami -	

DSC

Par	t A: Introduction			
	gram: Bachelor's in	Class: B.Sc. Semester – V Session:2024-202	5	
science (Certificate				
/Diploma /		26		
Degree/Honors)				
1	Course Code			
2	Course Title	se Title Metric Spaces		
3	Course Type	Discipline Specific Course (DSC)		
4	Course Learning	This Course will enable the students to:		
	Outcome (CLO)	• Understand concepts of metric, distance, convergence, co	mpleteness,	
	-	compactness, connectedness, Bolzano-Weierstrass property.	-	
	2.0	• Apply these concepts to key classes of spaces.		
	a.	<ul> <li>Learn to analyze mapping between spaces.</li> </ul>		
		• Identify the continuity of a function defined on metric space		
		• Attain background for advanced courses in real analysis,	functional	
		analysis and topology.		
5	Credit Value	3C 1 credit =15 Hours – Learning and Obse	rvation	
6	Total Marks	Maximum Marks :75 Minimum Passing M	/larks:30	
Pa	rt B: Content of the			
	Total	no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Un	it	<b>Topics (COURSE CONTENTS)</b>	No. of Periods	
Un	it Concepts in	Topics (COURSE CONTENTS) n metric spaces:		
1	it Concepts in Definition and	Topics (COURSE CONTENTS) n metric spaces: d examples of metric spaces, Open spheres and closed spheres,	Periods	
1	it Concepts in Definition and Neighborhoods	<b>Topics (COURSE CONTENTS)</b> <b>n metric spaces:</b> d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points		
1	it Concepts in Definition and Neighborhoods and isolated po	<b>Topics (COURSE CONTENTS)</b> <b>n metric spaces:</b> d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance	Periods	
	it Concepts in Definition and Neighborhoods and isolated po between two set	<b>Topics (COURSE CONTENTS)</b> <b>n metric spaces:</b> d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space.	Periods	
	it Concepts in Definition and Neighborhoods and isolated po between two see Complete M	Topics (COURSE CONTENTS) a metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces:	Periods 09	
	it Concepts in Definition and Neighborhoods and isolated po between two set Complete M Convergent and	Topics (COURSE CONTENTS) a metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection	Periods	
	it Concepts in Definition and Definition and isolated po between two set <b>Complete N</b> Convergent and theorem, Denset	Topics (COURSE CONTENTS) a metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem.	Periods 09	
1	it Concepts in Definition and Neighborhoods and isolated po between two set Complete M Convergent and theorem, Denset Continuous Continuous	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. <b>Functions:</b>	Periods 09 09	
1	it Concepts in Definition and Neighborhoods and isolated po between two set Complete M Convergent and theorem, Denset Continuous Continuous fun	Topics (COURSE CONTENTS) a metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. s Functions: hetions, Extension and Restriction Functions, Uniform Continuous	Periods 09	
1	it Concepts in Definition and Definition and isolated po between two sets and isolated po between two sets Convergent and theorem, Denset Continuous fun Functions, Ison	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. <b>Functions:</b>	Periods 09 09	
1	it Concepts in Definition and Definition and isolated po between two sets and isolated po between two sets Convergent and theorem, Denset Continuous fun Functions, Ison	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. s Functions: netry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle.	Periods 09 09	
1	it Concepts in Definition and Definition and isolated po between two set Complete M Convergent and theorem, Dense Continuous fun Functions, Ison Point, Banach of Compactnee Compact and C	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: actions, Extension and Restriction Functions, Uniform Continuous metry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. SS:	Periods 09 09 09	
1	it Concepts in Definition and Definition and Isolated poly between two sets and isolated poly between two sets Complete M Convergent and theorem, Dense Continuous fun Functions, Ison Point, Banach of Compactnee and finite intersets and fini	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: netry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. SS: s, Sequential compactness, Bolzano-Weierstrass property, Compactness section property, Heine-Borel theorem, Totally bounded sets, Equivalence	Periods 09 09	
1	it Concepts in Definition and Neighborhoods and isolated po between two see Complete M Convergent and theorem, Dense Continuous fun Functions, Ison Point, Banach of Compact space and finite inters of compactness	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: actions, Extension and Restriction Functions, Uniform Continuous metry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. s, Sequential compactness, Bolzano-Weierstrass property, Compactness section property, Heine-Borel theorem, Totally bounded sets, Equivalence and sequential compactness, Continuous functions on compact spaces.	Periods 09 09 09	
I	it Concepts in Definition and Definition and Neighborhoods and isolated po between two set Complete M Convergent and theorem, Dense Continuous fun Functions, Ison Point, Banach or Compact space and finite inters of compactness Connected Connected Connected Connected Connected Connected Context Space and finite inters of compactness Connected Context Space and finite inters of connected Connected Connected Connected Connected Connected Context Space and finite inters of connected Connected Connected Connected Connected Connected Connected Connected Context Space and finite inters of connected Connected Connected Connected Connected Connected Context Space and Connected Connected Connected Context Space and Con	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: ettions, Extension and Restriction Functions, Uniform Continuous metry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. SS: s, Sequential compactness, Bolzano-Weierstrass property, Compactness section property, Heine-Borel theorem, Totally bounded sets, Equivalence and sequential compactness, Continuous functions on compact spaces. Hess:	Periods 09 09 09	
I	it Concepts in Definition and Definition and Neighborhoods and isolated por between two sets of Complete M Convergent and theorem, Dense Continuous functions, Ison Point, Banach of Compact space and finite inters of compactness of	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: actions, Extension and Restriction Functions, Uniform Continuous hetry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. Metric Spaces: s, Sequential compactness, Bolzano-Weierstrass property, Compactness section property, Heine-Borel theorem, Totally bounded sets, Equivalence and sequential compactness, Continuous functions on compact spaces. Metrics: Disconnected and connected sets, Components, Connected subsets of R,	Periods 09 09 09	
I I I	it Concepts in Definition and Definition and Neighborhoods and isolated por between two sets of Complete M Convergent and theorem, Dense Continuous functions, Ison Point, Banach of Compact space and finite inters of compactness of	Topics (COURSE CONTENTS) metric spaces: d examples of metric spaces, Open spheres and closed spheres, s, Open sets, Interior, exterior and boundary points, Closed sets, Limit points ints, Interior and closure of a set, Boundary of a set, Bounded sets, Distance ets, Diameter of a set, Subspace of a metric space. Metric Spaces: d Cauchy sequences, Completeness of metric spaces, Cantor's intersection e sets and separable spaces, Nowhere dense sets, Baire's category theorem. S Functions: ettions, Extension and Restriction Functions, Uniform Continuous metry, Open mapping, Homeomorphism, Contraction mapping, Fixed contraction principle. SS: s, Sequential compactness, Bolzano-Weierstrass property, Compactness section property, Heine-Borel theorem, Totally bounded sets, Equivalence and sequential compactness, Continuous functions on compact spaces. Hess:	Periods 09 09 09 09	

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Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mut/6-07-24	De MA STATE A
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui –
Subject Expert - Dr. S. K. Bhatt Rober 6 7:24	Dr. Rakesh Tiwari - 1 2 Mu
Representative Members	WM T
1. Dr. Anil Kashyap -	O V .
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami -	~

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0		Part C - Learning	g Resource
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õ	1	Chairperson / H.O	. <b>D -</b> Dr Pa
0		Subject Expert - Dr.	
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		Subject Expert - Dr.	
		Representative Me	
0		1. Dr. Anil Kash	iyap -
0		<ol> <li>Shri A. K. Pa</li> <li>Dr. Mayur Pu</li> </ol>	
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	Text Books, Reference Books, Other Resour	rces
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. T. Copso	n (1988). Metric Spaces. Cambridge University Press.	
R. Halmo	os (1974). Naive Set Theory. Springer.	
	Khalil Ahmad (2019). Metric Spaces. Narosa.	
	an (2011). Topology of Metric Spaces (2nd edition). Narosa.	
atish Shira	li & Harikishan L. Vasudeva (2006). Metric Spaces. Springe	r-Verlag.
licheál O'S	Searcoid (2009). Metric Spaces. Springer-Verlag.	
. F. Simmo	ons (2004). Introduction to Topology and Modern Analysis.	McGraw Hill.
lesources	: ( e- Resources/ e- Books/ e- Learning Portals)	
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d Contin m Marks ous Comp End Exa	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks	Best of Test and
d Contin m Marks ous Comp End Exa ent:	uous Evaluation Methods: : 75 Marks orehensive Evaluation (CCE): 15 Marks am (SEE): 60 Marks	Best of Test and Assignment shall be
d Contin m Marks ous Comp End Exa ent: us	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks	Assignment shall be considered against 15
d Contin m Marks ous Comp End Exa ent: us ensive	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks	Assignment shall be
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE)	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks	Assignment shall be considered against 15 marks
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit.	Assignment shall be considered against 15 marks
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks	Assignment shall be considered against 15 marks
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.	Assignment shall be considered against 15 marks Question A and B are
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit.	Assignment shall be considered against 15 marks Question A and B are be question (2 each)
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit.         compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer type	Assignment shall be considered against 15 marks Question A and B are
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         orehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.	Assignment shall be considered against 15 marks Question A and B are be question (2 each) $02 \ge 5 = 10$ Marks
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer type         Question-C: Short answer type questions	Assignment shall be considered against 15 marks Question A and B are be question (2 each)
d Contin m Marks ous Comp End Exa ent: us ensive n (CCE) r End	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit.         compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer type	Assignment shall be considered against 15 marks Question A and B are be question (2 each) $02 \ge 5 = 10$ Marks $03 \ge 5 = 15$ Marks
d Contin m Marks ous Comp End Exa	uous Evaluation Methods:         :       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer type         Question-C: Short answer type questions	Assignment shall be considered against 15 marks Question A and B are be question (2 each) $02 \ge 5 = 10$ Marks

n / H.O.D - Dr. Padmavati	Feaultymomhars
ert - Dr. Madhu Shrivastava Wint/6-07-2 ert - Dr. Shabnam Khan	Faculty members:
ert - Dr. Shabnam Khan	Dr. M.A. Siddiqui –
ert - Dr. S. K. Bhatt frang 6.7.24	Dr. Rakesh Tiwari - Torus
tive Members	DI. Rakesh Hwall - Day
nil Kashyap -	P
A. K. Pandey -	Dr. (Smt.) Prachi Singh –
ayur Puri Goswami - Republic	
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<b>D</b> .	T					DSC	
F	Program: nce (Cer	Bachelor's in tificate /Diploma ee/Honors)	Class: B.Sc.	Semester – V	Session:2024-2025	)	
1		se Code					
2	-	se Title		Project			
3		зе Туре		Discipline Specific Cours	e (DSC)		
4		se Learning	This Course will en:	able the students to:			
<ul> <li>Outcome (CLO)</li> <li>Explore and comprehend the mathematical contributions of ancien mathematicians.</li> <li>Develop contextual understanding of historical and cultural influer their works.</li> <li>Fostering a deeper understanding of their impact on global mathematical</li> </ul>							
5	Cred	lit Value	1C	1 credit =15 Hours -			
6	Tota	l Marks	Maximum Marks: 25		Minimum Passing M		
Pa	rt B: C	Content of the	Course				
		Total	no. of Teaching/ Lea	rning Periods = 15 Periods	(15 Hours)		
Ur	it			OURSE CONTENTS)		No. of Periods	
	<ul> <li>Project Topic:</li> <li>Examine the contributions and life stories of Indian mathematicians such as Baudhayana, Aryabhata, Bhaskara I, Hemachandra, Bhaskaracharya (Bhaskara II) (in special context of Lilavati), Madhava of Sangamagrama, Nilakantha Somayaji, and Srinivasa Ramanujan. Analyze their mathematical achievements in algebra, geometry, calculus, and other areas. exploring how their work has impacted mathematics globally.</li> </ul>		15				

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava	
Subject Expert - Dr. Shabnam Khan 6-07-14	Dr. M.A. Siddiqui – 📈
Subject Expert - Dr. S. K. Bhatt	9
Representative Members	Dr. Rakesh Tiwari – TBrun
1. Dr. Anil Kashyap -	0 1
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh -
3. Dr. Mayur Puri Goswami -	7
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Part	t A: Inti	roduction			Session:2024-2025	
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)		achelor's in Certificate oma /	Class: B.Sc.	Semester – V	Session:2024-2023	
_	Course					
$\frac{1}{2}$	Course			Partial Differential Eq	uations	
3				Discipline Specific Elective	(DSE)	
4	<ul> <li>Course Learning         Outcome (CLO)</li> <li>This Course will enable the students to:         <ul> <li>Apply a range of techniques to solve first &amp; second order partial equations.</li> <li>Model physical phenomena using partial differential equation heat and wave equations.</li> </ul> </li> <li>Understand problems, methods and techniques of calculus of values of va</li></ul>			lifferential equations su iques of calculus of vari	ich as the ations.	
5	Cred	it Value	4C		- Learning and Observation Minimum Passing Ma	rks:40
6		l Marks	Maximum Mark	s :100	Withinfituti rassing the	110.10
	art B: C	Content of the	e Course	Di la Andreio	le (ADHours)	
	Part B: Content of the Course         Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)         Unit         Topics (COURSE CONTENTS)			No. of Periods		
	l	I         First Order Partial Differential Equations I:           Order and degree of Partial differential equations (PDE), Concept of linear and non- linear partial differential equations, Partial differential equations of the first order,		pt of linear and non- ons of the first order,	<del>.09</del> 12	
	II	Lagrange's method.         First Order Partial Differential Equations II:         II       Some special type of equation which can be solved easily by methods other than the general method (Standard Form I,II,III, and IV), Charpit's general method.			<del>()9</del> -)2	
	Second Order Partial Differential Equations with Constant Contractions			<del>09</del> 12		
	and nonhomogeneous equations with constant coefficients: Second Order Partial Differential Equations with Variable Coefficients:				<del>09</del> 13	
	V	Application Monge's mo		eat and wave equations in one a bles.	nd two dimensions by	<del>09</del> .)

Name & Signature of Members of Board of Studies:

Name & Signature of Memoers of Dourd of Charles	Faculty members:
Chairperson / H.O.D - Dr. Padmavati	Faculty members.
The second secon	
Subject Expert - Dr. Shabnam Khap	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shadham Hand 12 (72)	A.
Subject Expert - Dr. S. K. Bhatt	Dr. Rakesh Tiwari - Rus
Representative Members	V ST
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh -
2. Shri A. K. Pandey -	Dr. (Sint.) Placin Singh
3. Dr. Mayur Puri Goswami - MOSNO 1911	
J. Dr. Waydi Fait Courtain (11) 1 [201	
56101	

	Resource Text Books, Refere	ence Books, (	Other Resources	
Reference:				
1 A S Gunta (2	2004). Calculus of Variations	with Applicati	ons. PHI Learning.	
2 Emuin Vroug	via (2011) Advanced Engine	ering Mathem	atics (10th edition).	. Wiley.
3. TynMyint-U	& Lokenath Debnath (2013	3). Linear Pa	rtial Differential Ec	quation for Scientists and
Engineers (A	thedition) Springer India.			
Publishers	gio (2004). An Elementary Tr			
5. S. B. Rao & H	. R. Anuradha (1996). Differe	ential Equation	ns with Applications	s. University Press.
6. Ian N. Snedd	on (2006). Elements of Partia	al Differential	Equations. Dover P	ublications.
Online Resources:	( e- Resources/ e- Books/ e	- Learning P	'ortals)	
1. <u>https://onlin</u>	ecourses.nptel.ac.in	2.	https://swayam.gov	.in
3. <u>https://epqp</u>	.inflibnet.aci.in	4.	https://www.mooc.	org
Part D: Assessme	ent and Evaluation			
Suggested Contin	uous Evaluation Methods			
Maximum Mark		100 M CE): 20 M		
Continuous Com	prehensive Evaluation (CO	CE): 20 M		
Semester End Ex Internal	Internal Test – 20 Marks	00 111		Best of Test and
Assessment:	Assignment/ Seminar – or	ne of 20 Mark	S	Assignment shall be
Continuous	Assignment Comman and the set		considered against 20	
Comprehensive				marks
Evaluation (CCE)	Pattern -FOUR Question	ADCDf	om each unit Oue	stion A and B are
Semester End	compulsory. Question C a	and D have in	ternal choice.	Stion / Cana 2 and
Exam (SEE)				
	Question-A & B (Compu			uestion (2 each) 04 x 5 = 20 Mar
	Question-C: Short answer			$05 \ge 5 = 25$ Mar
	Question-D: Long answer type questions			
	Question = 1 = 100	r type questic		$07 \ge 5 = 35 \text{ Mar}$
	Queenen 2 ·	r type questic		$07 \ge 5 = 35 \text{ Mar}$ Total = 80 Mar
Nome & Signature				
Name & Signature	of Members of Board of Stu			
	of Members of Board of Stu		Faculty me	Total = 80 Mar
Chairperson / H.	of Members of Board of Stu O.D - Dr. Padmavati			Total = 80 Mar
<b>Chairperson / H.</b> Subject Expert - D	of Members of Board of Stu <b>O.D</b> - Dr. Padmavati			Total = 80 Mar
<b>Chairperson / H.</b> Subject Expert - D Subject Expert - D	of Members of Board of Stu O.D - Dr. Padmavati		<b>Faculty me</b> Dr. M.A. S	Total = 80 Mar mbers: iddiqui - K
<b>Chairperson / H.</b> Subject Expert - D Subject Expert - D Subject Expert - D	of Members of Board of Stu O.D - Dr. Padmavati Or. Madhu Shrivastava Or. Shabnam Khan Or. S. K. Bhatt		Faculty me	Total = 80 Mar mbers: iddiqui - K
<b>Chairperson / H.</b> Subject Expert - D Subject Expert - D	of Members of Board of Stu O.D - Dr. Padmavati Or. Madhu Shrivastava Or. Shabnam Khan Or. S. K. Bhatt Iembers		<b>Faculty me</b> Dr. M.A. S Dr. Rakesh	Total = 80 Mar mbers: iddiqui - K

#### **Representative Members**

- 1. Dr. Anil Kashyap -
- 2. Shri A. K. Pandey -
- 3. Dr. Mayur Puri Goswami -

Dr. M.A. Siddiqui -
Dr. Rakesh Tiwari TBrun
Dr. (Smt.) Prachi Singh –

						DSE
		troduction				
	Program: Bachelor's in science (Certificate /Diploma / Degree/Honors) Class: B.Sc. Semester – V Session:2024-2025					
1		se Code				
2		se Title	Numerical Methods			
3		se Type	Discipline Specific Elective (DSE)			
4			This Course will enable the students to:			
	<ul> <li>Course Learning         Outcome (CLO)</li> <li>This Course will enable the students to:         <ul> <li>The aim of this course is to teach the student the application of various num techniques for a variety of problems occurring in daily life.</li> <li>The main outcome will be that students will be able to handle problems an approximated solutions.</li> <li>Obtain numerical solutions of algebraic and transcendental equations.</li> <li>Find numerical solutions of system of linear equations and to check the accur the solutions.</li> <li>Learn about various interpolating and extrapolating methods to find num</li> </ul> </li> </ul>		ns and find accuracy of			
			solutions.	as merpolating and extrapo	inting memous to ime	nameriea
5	Crec	lit Value	4C	1 credit =15 Hours -	- Learning and Observ	ation
6	Tota	l Marks	Maximum Marks :10	0	Minimum Passing M	arks:40
Pa	rt B: C	Content of the	Course			
		Total	no. of Teaching/ Lea	rning Periods = 🚯 Period	ls (15 Hours)	
Ur	nit		Topics (C	OURSE CONTENTS)		No. of Periods
	Fundamentals of Numerical MethodsIRound-off error and computer arithmetic, local and global truncation errors, algorithmsand convergence.		<del>119</del> 12			
	II	Root Finding Bisection method.	od, false position metho	od, fixed point iteration metho	od, Newton's method,	· <del>09</del> 12
	IIIInterpolation and Approximation Lagrange and Newton interpolations, piecewise linear interpolation, cubic spline interpolation, finite difference operators, Gregory Newton forward and backward0"			- <del>09</del>  2		
	IV	Numerical Di First order and derivative. tra	e. trapezoidal rule, Simpson's rule and its error analysis, Bulirsch-Stoer		<del>09</del> 12	
	extrapolation methods, Richardson extrapolation.         Numerical Solutions of Differential Equations         Euler's method, Runge-Kutta methods, higher order one-step method, multi-step methods.         Finite difference method, shooting method.			<del>99</del> 12		
			bers of Board of Stud	ies:		
Sub Sub Sub	oject Ex oject Ex oject Ex	on / H.O.D - I pert - Dr. Madl pert - Dr. Shab pert - Dr. S. K ative Member	nu Shrivastava nam Khan . Bhatt	Dr. M.A	<b>members:</b> A. Siddiqui – <b>A</b> esh Tiwari – <b>D</b>	un
Representative Members       One         1. Dr. Anil Kashyap -       Dr. Rakesh Tiwari -         2. Shri A. K. Pandey -       Dr. (Smt.) Prachi Singh -         3. Dr. Mayur Puri Goswami -       Dr. (Smt.) Prachi Singh -			1			

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	Taxt Dooks Defenses Dealer Other Deserve	
Reference:	Text Books, Reference Books, Other Resource	es
• M.K. Jain, S. R	. K. Iyengar& R. K. Jain (2012). Numerical Methods for	Scientific and
	omputation (6th edition). New Age International Publishe	
• C. F. Gerald &	P. O. Wheatley (2008). Applied Numerical Analysis (7th	n edition), Pearson
Education, Indi		
Brian Bradie (2	006), A Friendly Introduction to Numerical Analysis. Pe	arson.
Robert J. Schill	ing & Sandra L. Harris (1999). Applied Numerical Meth	ods for Engineers Using
	C. Thomson-Brooks/Cole.	
Onnie Resources:	: (e- Resources/ e- Books/ e- Learning Portals)	
1. https://onlin	necourses.nptel.ac.in 2. https://swayam	n.gov.in
2		
3. <u>https://epqp</u>	b.inflibnet.aci.in 4. https://www.m	ooc.org
Part D: Assessme	ent and Evaluation	
	ent and Evaluation	
Suggested Contin	nuous Evaluation Methods:	
Suggested Contin Maximum Mark	nuous Evaluation Methods: s: 100 Marks	
Suggested Contin Maximum Mark Continuous Com	nuous Evaluation Methods: s: 100 Marks aprehensive Evaluation (CCE): 20 Marks	
Suggested Contin Maximum Mark	nuous Evaluation Methods: s: 100 Marks prehensive Evaluation (CCE): 20 Marks	Best of Test and
Suggested Contin Maximum Mark Continuous Com Semester End Ex	nuous Evaluation Methods:s:100 Marksoprehensive Evaluation (CCE):20 Markscam (SEE):80 MarksInternal Test – 20 Marks	Best of Test and Assignment shall be
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal	nuous Evaluation Methods: s: 100 Marks prehensive Evaluation (CCE): 20 Marks kam (SEE): 80 Marks	Assignment shall be
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment:	nuous Evaluation Methods:s:100 Marksoprehensive Evaluation (CCE):20 Markscam (SEE):80 MarksInternal Test – 20 Marks	
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE)	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         xam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks	Assignment shall be considered against 20 marks
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         oprehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. (Compared to the second s	Assignment shall be considered against 20 marks
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE)	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         xam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks	Assignment shall be considered against 20 marks
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         xam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. C compulsory. Question C and D have internal choice.	Assignment shall be considered against 20 marks Question A and B are
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         oprehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. (Compared to the second s	Assignment shall be considered against 20 marks Question A and B are
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. C compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer typ	Assignment shall be considered against 20 marks Question A and B are
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         xam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. C compulsory. Question C and D have internal choice.	Assignment shall be considered against 20 marks Question A and B are e question (2 each) 04 x 5 = 20 Mark
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         oprehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer typ         Question-C: Short answer type questions	Assignment shall be considered against 20 marks Question A and B are e question (2 each) 04 x 5 = 20 Mark
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         prehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. C compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer typ	Assignment shall be considered against 20 marks Question A and B are e question (2 each) $04 \ge 5 = 20$ Mark $05 \ge 5 = 25$ Mark
Suggested Contin Maximum Mark Continuous Com Semester End Ex Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	nuous Evaluation Methods:         s:       100 Marks         oprehensive Evaluation (CCE):       20 Marks         cam (SEE):       80 Marks         Internal Test – 20 Marks       Assignment/ Seminar – one of 20 Marks         Pattern -FOUR Question A, B, C, D from each unit. Compulsory. Question C and D have internal choice.         Question-A & B (Compulsory): Very short answer typ         Question-C: Short answer type questions	Assignment shall be considered against 20 marks Question A and B are

Chairperson / H.O.D - Dr. Padmavati	Faculty members:	
Subject Expert - Dr. Madhu Shrivastava	Dr. M.A. Siddiqui – 📈	
Subject Expert - Dr. Shabnam Khan		
Subject Expert - Dr. S. K. Bhatt	Dr. Rakesh Tiwari – Brun	
Representative Members		
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh	
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh =	
3. Dr. Mayur Puri Goswami -		

SEC

Par	t A: Int	roduction				
sc	rogram: Bachelor's in science (Certificate /Diploma / Degree/Honors) Class: B.SC. Semester – III/V Session:2024-202.					
1	Course	e Code	i i i			
2	Course	e Title			on to Logic	
3	Course	е Туре			ent Course (SEC)	
4	1.4.7	e Learning me (CLO)	<ul> <li>This Course will enable the students to:</li> <li>Remember results of Prepositions, truth table, negation, conjunction and disjunction and equivalence relation.</li> <li>Understand Logical equivalence, Predicates and Quantifiers.</li> </ul>			к.
5	Cred	it Value	2C	1 credit =15	5 Hours – Learning and Obser	
6	Total	Marks	Maximum N	/larks: 25	Minimum Passing Ma	rks:10
Pa	rt B: C	ontent of the	Course			
		Tota	l no. of Teach	ning/ Learning Periods = 3	0 Periods (30 Hours)	
			No. of Periods			
	IIntroduction, propositions, truth table, negation, conjunction and Disjunction, implications, bi-conditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.30			30		

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	617124	Faculty members:
Subject Expert - Dr. Madhu Shrivastava	Mshit/6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan		æ
Subject Expert - Dr. S. K. Bhatt	101- B. 7.24	Dr. Rakesh Tiwari - Tok Mu
Representative Members		0.11
1. Dr. Anil Kashyap -		Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	Not N	
3. Dr. Mayur Puri Goswami -	107124	
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Learnin	Learning Resource					
	Text Books, Reference Books, Other Resources					
fès ices:						
The Grimaldi,	Discrete Mathematics and Com	hinatorial Mathematics Pea	rean education 1009			
ine Resources	s: (e- Resources/ e- Books/ e- Lo	earning Portals)	13011 education, 1998.			
1. https://onli	necourses.nptel.ac.in	2. https://swayam.gc	iv.in			
	p.inflibnet.aci.in	4. https://www.mood				
Part D: Assessm	ent and Evaluation	The second s				
Suggested Conti	nuous Evaluation Methods:	35				
Maximum Marl	KS:	25 Marks				
<b>Continuous</b> Con	nprehensive Evaluation (CCE)		11 K.			
Semester End E	xam (SEE):	20 Marks	*			
Internal						
Assessment:			Marks obtained in			
Continuous	Assignment 05 Marks		Assignment shall be			
Comprehensive	rissignment of Warks					
Evaluation(CCE)			marks			
Semester End	D					
Exam (SEE)	Pattern Attempt only five questions a to C					

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint 6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	Di. W.A. Shuliqui -
Subject Expert - Dr. S. K. Bhatt FOR 6.7.23	Dr. Rakesh Tiwari - Takun
Representative Members	
1. Dr. Anil Kashyap -	D G IND HOUSE P
2. Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3. Dr. Mayur Puri Goswami - ROSING	
	P

SEC

Par	t A: In	troduction				
Program: Bachelor's in science (Certificate /Diploma /			Class: B.SC.	Semester – III / V	Session:2024-20	25
Degree/Honors)						
1		e Code				
2	Cours	e Title		Vector C	Calculus	
3	Cours	е Туре		Skill Enhancemer	t Course (SEC)	
4		e Learning	This Course	will enable the students	to:	
		me (CLO)	<ul> <li>Remember scalar and vector product of three vectors and vector.</li> <li>Understand Vector differentiation, Gradient, divergence and Apply Vector integration in various types of calculation.</li> </ul>		nd curl.	
5	Cred	it Value	2C	1 credit =15	Hours – Learning and O	bservation
6	Tota	l Marks	Maximum Mai	rks: 25	Minimum Passing	Marks:10
Pa	rt B: C	ontent of the	Course			×
		Total	no. of Teaching	g/ Learning Periods = 30	Periods (30 Hours)	
Un			No. of Periods			
	I         Scalar and vector product of three vectors. Product of four vectors.           Reciprocal vector. Examples and Applications. Vector         differentiation, Gradient, divergence and curl. Vector integration.           Examples and Applications.         Examples and Applications.			30		

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint 6-07-2	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt 8002 6.724	Dr. Rakesh Tiwari - TRun
Representative Members	011
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami -	
06010	

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0 0 Part C - Learning Resource  $\cap$  $\cap$ ) $\cap$  $\cap$  $\bigcirc$  $\bigcirc$  $\bigcirc$  $\bigcirc$ 0 Ô  $\bigcirc$ C ((  $\bigcirc$  $\bigcirc$ 0 Na  $\bigcirc$ C  $\bigcirc$ Su 0 Su  $\bigcirc$ Su 0 Re 0 0 0 0

Textbook	s, Reference	Books,	Other Resources	1.	
Reference					
<ol> <li>Murray R. Spiegel, Vector Anal</li> <li>Erwin Kreyszig, Advanced Engin</li> <li>Shanti Narayan, A Text book of</li> <li>Online Resources: (e- Resources/ e- B</li> </ol>	neering Mat Vector Calcu	hematic: $u_{1} > C$	s, John Wiley and	Cong 1000	
1. https://onlinecourses.nptel.ac.in	. <u>https://onlinecourses.nptel.ac.in</u> 2. <u>https://swayam.gov.in</u>				
3. <u>https://epqp.inflibnet.aci.in</u>		4,	https://www.mooc.	org	
Part D: Assessment and Evaluation					
Suggested Continuous Evaluation Me	ethods:		Y		
Maximum Marks: Continuous Comprehensive Evaluati		25 Mar 5 Mar		52 54 55	
Semester End Exam (SEE):		20 Ma		A	
Internal Assessment:	Assignme	nt 05 Ma	arks	Marks obtained in	
Continuous Comprehensive Evaluation				Assignment shall be considered against 05 marks	
Semester End Exam (SEE)	Pattern – A questions.	ttempt	any five questions	out of given ten	
me & Signature of Members of Board o	of Studies:			<pre></pre>	
hairperson / H.O.D - Dr. Padmavati	pt ann	u li	Faculty mem	bers:	
ibject Expert - Dr. Madhu Shrivastava ibject Expert - Dr. Shabnam Khan	pubit	16-07-	Dr. M.A. Sidd	iqui —	
bject Expert - Dr. S. K. Bhatt	hat	6.7.2.	Dr. Rakesh Tiv	wari-IRmu'	
epresentative Members			10	1000	
<ol> <li>Dr. Anil Kashyap -</li> <li>Shri A. K. Pandey -</li> <li>Dr. Mayur Puri Goswami -</li> </ol>	ind	64	Dr. (Smt.) Prac	chi Singh –	

# DEPARTMENT OF MATHEMATICS GOVT. V.Y. T. PG. AUTONOMOUS COLLEGE, DURG

## SYLLABUS for B.Sc. Semester - VI

The syllabus with the paper combinations and Marking Scheme for the session 2024-2025.

			Marks Allotted		Credit
Title	Paper No.	Title of the Paper	Theory	Practical / Project	
Core Course (DSC)	BMT101	Complex Variables and Trigonometry	75	25	4(3 + 1)
Discipline Specific Elective (DSE)		(A)Linear Algebra (B)Integral Transforms	100		
Skill	BMTSE01	Set Theory	25	25	2(1+1)
Enhancement Course (DSC) (Anyone)	BMTSE02	Boolean Algebra	25	25	2(1+1)

The syllabus for **B.Sc. Semester - VI** is hereby approved by the members of Board of Studies for the session 2024-25.

In case any change or modification is prescribed by Central Board of Studies or Higher Education Dept., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.

## Name & Signature:

Faculty members: Chairperson / H.O.D - Dr. Padmavati Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Subject Expert - Dr. Madhu Shrivastava Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt Dr. (Smt.) Prachi Singh -**Representative Members** 1. Dr. Anil Kashyap -2. Shri A. K. Pandey -3. Dr. Mayur Puri Goswami - mesanar

Par	t A: I	ntroduction					DSC
		ogram:	Class: B.Sc.	Som	ester – VI	See. 2024 202	-
1		se Code	01000. 0.00.	Sem	lester - vi	Session:2024-2025	)
2	-	se Title		Complex Variab	les and Tr	iganomotev	
3	Cour	se Type		Discipline Specifi			
4		se Learning	This Course will			JSC)	
		ome (CLO)				here and its proper	tion
	, and its propertie						ties.
ripply these concepts to key classes of spaces.							
			<ul> <li>Identify the</li> </ul>	continuity of a f	function de	efined on complex	spaces.
			<ul> <li>Attain backg</li> </ul>	ground for adva	nced cours	ses in complex ana	lysis.
5		dit Value	3C			Learning and Obser	
6		al Marks	Maximum Marks :10	00		Minimum Passing M	
Pa	rt B: (	Content of the					
_	_	Total	no. of Teaching/ Lea	arning Periods =	45 Periods	s (45 Hours)	
Un	it			OURSE CONTE			No. of
	_	Complex Nun					Periods
		Complex nun	nbers and Their Georemonity of the second se	netrical Represen	itation:		
	I	numbers. Mo	dulus and argumer	ans, deometrical	represent	ation of complex	10
		Equation of st	raight line and circle	Cauchy's inequa	lity and Lac	iu its Properties,	
		Limit, Contin	uity and Differenti	ability of Comp	lev Functio	ange sidentity.	
		Functions:		ability of Comp	ica runcin	his and Analytic	
r	1	Limit, Continu	uity, Differentiability	of functions of a	a Complex	variable Analytic	
1	1	function, Cauc	hy – Riemann equati	Differentiability of functions of a Complex variable. Analytic - Riemann equations, Conjugate function, Laplace's Differential			12
		equations, Ha	rmonic functions, Or	thogonal system	and Constr	uction of Analytic	
		function.		0 7		and the second sec	
		Mobius Trans					
П	II	Jacobian of T	ransformation, Line	ar Transformatio	on, Mobius	Transformation,	10
		Linear Group,	Fixed point of Mobi	us transformation	n, Cross rat	tio, Inverse Point,	10
		Properties of I	Mobius transformatio	on.			
Г	17	Trigonometry		11 1 201			
1	v	De-Moivre s	Theorem and its ap	oplications. Direc	et and invo	erse circular and	07
		hyperbolic fun Trigonometry					
V	,				m :		
, ,	V Logarithm of a complex quantity. Expansion of Trigonometrical functions. Gregory's Series. Summation of series.					06	
Jame	& Sig	nature of Memb	pers of Board of Stud	ines.			
		on / H.O.D - Di		in the			
		pert - Dr. Madhu		5/6-07-24	Faculty n	nembers:	1
Subie	ect Exr	pert - Dr. Shabn		-10-01-24	D. M.A	C'11' · //	
Subje	ect Exr	pert - Dr. S. K. I	Rhait 20 A		Dr. M.A.	Siddiqui –	/
Repr	esenta	tive Members	-010rd	<u> </u>	Dr. Dakas	h Timoni III	in
1.		nil Kashyap -			Dr. Rakes	n riwari –	
2.		A. K. Pandey -	N		Dr (Smt)	Prachi Singh – 🖌	1
3.		layur Puri Gos	wami -	IM			1º
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Part C - Learning		
	Text Books, Reference Books, Other Resou	urces
Reference:		
New-York, 2. Mark J. Ab University I 3. Shanti Naray	chill & J.W. Brown, Complex Variables and Application 1990. Dolowitz & A.S. Focas, Complex Variables : Introduct Press South Asian Edition, 1998. yan, Theory and Functions of a Complex Variable, S. Complex Variable, S. Complex Variable, S. Complex Spaces Cambridge University Press, 1968.	tion and Applications, Cambridg
Online Resources	: ( e- Resources/ e- Books/ e- Learning Portals)	
1. <u>https://onlin</u>	necourses.nptel.ac.in 2. https://swaya	am.gov.in
3. https://epqr	p.inflibnet.aci.in 4. https://www.	.mooc.org
Suggested Contin	nt and Evaluation uous Evaluation Methods: : 75 Marks	
Suggested Continu Maximum Marks Continuous Comp Semester End Exa Internal Assessment: Continuous Comprehensive	uous Evaluation Methods: 75 Marks prehensive Evaluation (CCE): 15 Marks	Best of Test and Assignment shall be considered against 15 marks
Suggested Contin Maximum Marks	uous Evaluation Methods: :: 75 Marks prehensive Evaluation (CCE): 15 Marks am (SEE): 60 Marks Internal Test – 15 Marks +	Assignment shall be considered against 15 marks it. Question A and B are c.
Suggested Continu Maximum Marks Continuous Comp Semester End Exa Internal Assessment: Continuous Comprehensive	uous Evaluation Methods:         ::       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks +         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each uni compulsory. Question C and D have internal choice	Assignment shall be considered against 15 marks it. Question A and B are b. type question (2 each) $02 \ge 5 = 10$ Mark
Suggested Continu Maximum Marks Continuous Comp Semester End Exa Internal Assessment: Continuous Comprehensive Evaluation (CCE) Semester End	uous Evaluation Methods:         ::       75 Marks         prehensive Evaluation (CCE):       15 Marks         am (SEE):       60 Marks         Internal Test – 15 Marks +         Assignment/ Seminar – one of 15 Marks         Pattern -FOUR Question A, B, C, D from each unit compulsory. Question C and D have internal choice         Question-A & B (Compulsory): Very short answer for the section of the section o	Assignment shall be considered against 15 marks it. Question A and B are b. type question (2 each)

Subject Expert - Dr. Madhu Shrivastava Mint /6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt Space 6.7.24 Representative Members Dr. Rakesh Tiwari - Tohur	Chairperson / H.O.D - Dr. Padmavati	80 65124	Faculty members:
Subject Expert - Dr. S. K. Bhatt Space 6.7.24 Dr. Rakesh Tiwari - Thur	Subject Expert - Dr. Madhu Shrivastava	puint/6-07-24	Dr. M.A. Siddiqui – //
	Subject Expert - Dr. Shabnam Khan		Siring and Sirangan
Representative Members	Subject Expert - Dr. S. K. Bhatt	nan 6.7.24	Dr. Rakesh Tiwari - Tohun
	Representative Members		
1. Dr. Anil Kashyap - Dr. (Smt.) Prachi Singh –	1. Dr. Anil Kashyap -		Dr. (Smt) Brachi Singh
2. Shri A. K. Pandey -	2. Shri A. K. Pandey -		Dr. (Sint.) Fracin Singir –
3. Dr. Mayur Puri Goswami - Roang	3. Dr. Mayur Puri Goswami -	NON	

							DSE
Part	t A: Intr	roduction					
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)			Class: B.Sc.	Semester	- VI	Session:2024-2025	
1	Course	Code					
2	Course Title Linear Algebra						
3	Course	Туре	Di	scipline Specific Ele	ective (I	DSE)	
4 Course Learning Outcome (CLO)			<ul> <li>Understand the their properties</li> <li>Relate matrices vectors of linea</li> </ul>	s. and linear transform r transformations.	paces, su nations, c	ibspaces, bases, dime compute eigen values	and eigen
			inner product s Realize importa form	paces. ance of adjoint of a li	inear tra	nd determine orthog ansformation and its Learning and Observ	canonical
5	Credi	t Value	AqC		iours -	Minimum Passing Ma	
6	Total	Marks	Maximum Marks :100	)		Minimum Fassing Mi	II K3.40
Pa	rt B: C	ontent of the	Course		Dawiada	(At Hours)	
		Total	no. of Teaching/ Lea	rning Periods =	Perious	(eo nours)	No. of
Unit Topics		Topics (CC	OURSE CONTENT	rs)		Periods	
	I	Vector Spaces Definition and sum of subspa	examples of Vector space a ces, Linearly independent	and Subspace, Linear sp and dependent sets, Ba	oan, Quot ises and o	tient space and direct dimension	<del>-09</del> -12
	II	Linear Transf	ormations examples, Algebra of line dinates, Rank and nullity	ar transformation. Mati	rix of a li	near transformation	-09/2
	III	Further Properties Isomorphism Eigen vectors	erties of Linear Transfor of vector spaces, Isomorpl and eigen values of a lii	<b>mations</b> hism theorems, Transpo	ose of a li	inear transformation,	<del>09</del> 12
	Cayley-Hamilton theorem.         Inner Product Spaces         IV       Inner product spaces and orthogonality, Cauchy-Schwarz inequality, Gram-Schmidt orthogonalization, Diagonalization of symmetric matrices.				<del>09</del> 12		
	VAdjoint of a Linear Transformation and Canonical FormsVAdjoint of a linear operator; Hermitian, unitary and normal linear transformations; Jordan canonical form, Triangular form, Trace and transpose, Invariant subspaces.				. <del>09</del> -12		
Nan	ne & Sig	nature of Me.	mbers of Board of Stud	ies:			
Ch Su	hairpers bject Ex	on / H.O.D - pert - Dr. Mac	Dr. Padmavati Ministava	1=(6-07-24 H		members: Siddiqui – 🛛 🗐	/
Su   Su	bject Ex bject Ex	pert - Dr. Sha pert - Dr. S. F	K. Bhatt	et 6.724		34	3
Re	1. Dr. 1	<b>ative Membe</b> Anil Kashyap	rs -			esh Tiwari -	T
		A. K. Pande Mayur Puri C			Dr. (Sm	t.) Prachi Singh – ¥	F

art C - Learning R	lesource			
	Text Books, Reference B	ooks,	Other Resources	
Prentice-H 2. Kenneth H 3. I.M. Gel'fa 4. Nathan Ja 5. Serge Lan 6. Vivek Sah 7. Gilbert St	I. Friedberg, Arnold J. Insel & Law Hall of India Pvt. Ltd. Hoffman & Ray Kunze (2015). Linea nd (1989). Lectures on Linear Alge cobson (2009). Basic Algebra I & H g (2005). Introduction to Linear Al ai & Vikas Bist (2013). Linear Alge rang (2014). Linear Algebra and its <b>e- Resources/ e- Books/ e- Lear</b>	ar Alge ebra. D (2nd e gebra bra (21 5 Appli	bra (2nd edition). P over Publications. edition). Dover Publ (2nd edition). Sprin nd Edition). Narosa I cations (2nd edition	rentice-Hall. ications. ger India. Publishing House.
1. https://online	courses.nptel.ac.in	2.	https://swayam.gov	in
3. <u>https://epqp.i</u>	nflibnet.aci.in	4.	https://www.mooc.	org
Part D: Assessmen	nt and Evaluation Lous Evaluation Methods:	_		
Semester End Exa Internal	<b>orehensive Evaluation (CCE):</b> <b>om (SEE):</b> Internal Test – 20 Marks	100 M 20 M 80 M	arks arks	Best of Test and Assignment shall be
Assessment:Assignment/ Seminar – one of 20 MarksContinuousComprehensiveEvaluation (CCE)				considered against 20 marks
Semester End Exam (SEE)	Pattern - <b>FOUR Question</b> A. B. compulsory. Question C and D I Question-A & B (Compulsory): Question-C: Short answer type o Question-D: Long answer type o	nave ir Very s questic	ternal choice. short answer type q ns	
Vame & Signature o	f Members of Board of Studies:			
Subject Expert - Dr Subject Expert - Dr	D.D - Dr. Padmavati Madhu Shrivastava Shabnam Khan . S. K. Bhatt	24	Faculty me Dr. M.A. Si Dr. Rakesh	ddiqui - K

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Dan		4				DSE
		troduction			u a : 2024.2026	
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)			Class: B.Sc.	Semester – V	I Session:2024-2025	)
1		e Code				
2	Cours	e Title		Integral Transf	orms	
3	Cours	е Туре		Discipline Specific Electiv		
4		rse Learning This Course will enable the students to:				
<ul> <li>Course Learning Outcome (CLO)</li> <li>Know about piece wise continuous functions. Dirac delta function transforms and its properties.</li> <li>Solve ordinary differential equations using Laplace transforms.</li> <li>Explain Parseval's identity, Plancherel's theorem and application Fourier transforms to boundary value problems.</li> </ul>						
5	Cred	it Value	<b>A</b> C		s – Learning and Obser	vation
, ;		l Marks	Maximum Marks :		Minimum Passing N	
		Content of the			0	
1 6				earning Periods = 🚯 Peri	ods (65 Hours)	
Ur	nit	I Ottil		COURSE CONTENTS)	005 (00110015)	No. of Periods
	I	Integral Tran		an Integral Transform, R 1, Linearity, Existence The		- <del>09</del> 12
	II	II Applications of Laplace Transforms Laplace Transforms of Derivatives and Integrals, Shifting Theorems, Change of Scale Property, Laplace Transforms of Periodic Functions, Dirac's Delta Function,				<u>.09</u> .12
	111	Theorem, Linearity Property of Inverse Laplace Transform, Translation Theorems				<del>4)9</del> -†2
	IV         Fourier Transforms Fundamentals           Fourier and Inverse Fourier Transforms, Fourier Sine and Cosine Transforms, Inverse Fourier Sine and Cosine Transforms, Linearity Property, Change of Scale           Property         Shifting Property				<del>.09</del> .)2	
	V         Applications of Fourier Transforms Solution of Integral Equation by Fourier Sine and Cosine Transforms, Convolution Theorem for Fourier Transform, Parseval's Identity for Fourier Transform, Plancherel's Theorem, Fourier Transform of Derivatives, Applications of Infinite Fourier Transforms to Boundary Value Problems, Finite Fourier Transform, Inversion Formula for Finite Fourier Transforms.					<del>09</del> ]2
am	e & Sig	nature of Men	nbers of Board of Stu	idies:		
Cha Sub Sub Sub Ref	airpers oject Ex oject Ex oject Ex oresent	on / H.O.D - E pert - Dr. Madl pert - Dr. Shab pert - Dr. S. K ative Member	Dr. Padmavati hu Shrivastava onam Khan . Bhatt	Facu Gridg6-07-24 Dr. N	<b>Ity members:</b> 1.A. Siddiqui – <b>A</b> akesh Tiwari – <b>T</b>	nun 2 h.
2	2. Shri	Anil Kashyap - A. K. Pandey Mayur Puri Go	-	> Dr. (\$	Smt.) Prachi Singh – 🦂	E

DSE

Part C - Learning				
Reference:	Text Books, Reference	Books,	Other Resources	
Reference:				
Hill Educat				Value Problems. McGraw
	Chui. An Introduction to Wavelets.			0011
	szig. Advanced Engineering Math in. Fourier Analysison Groups. Do			ey. 2011
	d. Trigonometric Series (3rdedition			Press. 2002
<b>Online Resources</b>	e (e- Resources/ e- Books/ e- Lear	ning P	ortals)	
1. <u>https://onlin</u>	necourses.nptel.ac.in	2.	https://swayam.gov	<u>.in</u>
3. <u>https://epqp</u>	hinflibnet.aci.in	4.	https://www.mooc.	org
	ent and Evaluation			
	uous Evaluation Methods:			
Maximum Mark		100 Ma		
Semester End Ex	prehensive Evaluation (CCE):	20 Ma 80 Ma		
Internal	Internal Test – 20 Marks	00 1914	1 K5	Best of Test and
Assessment:	Assignment/ Seminar - one of 20	0 Marks	-	Assignment shall be
Continuous				considered against 20
Comprehensive				marks
Evaluation (CCE) Semester End	Pottom FOUD Question A D	C D fue	un aaak unit Ouaa	tion A and D and
Exam (SEE)	Pattern -FOUR Question A, B, compulsory. Question C and D h			tion A and B are
	Question-A & B (Compulsory):	Very sh	ort answer type qu	. ,
	Question-C: Short answer type q	uestions	5	$04 \ge 5 = 20 \text{ Marks}$
				05 x 5 = 25 Marks
	Question-D: Long answer type q	uestions	3	07 x 5 = 35 Marks
				Total = 80 Marks
× *				Total = 80 Marl
ame & Signature o	f Members of Board of Studies:			
anno eo orginarare o	Themeone of Bound of Studios.			
Chairperson / H.O	D.D - Dr. Padmavati	1	Faculty men	nbers:
	Madhu Shrivastava	-24	Dr. M.A. Sid	diqui – 📈
Subject Expert - Dr	. Shabnam Khan			-
Subject Expert - Dr	.S.K.Bhatt		Dr. Rakesh T	iwari - TBhu

## **Representative Members**

- 1. Dr. Anil Kashyap -
- 2. Shri A. K. Pandey -
- 3. Dr. Mayur Puri Goswami -

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Dr. Rakesh Tiwari - Toku Dr. (Smt.) Prachi Singh --

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SEC

Par	t A: In	troduction				a		
Program: Bachelor's in science (Certificate /Diploma / Degree/Honors)			Class: B.Sc.	Semester IV/VI	Session:2024-2025			
1	Cours	e Code						
2	Cours	e Title		Set The	ory			
3	Cours	е Туре		Skill Enhancement	Course (SEC)			
4		e Learning		ll enable the students to				
	Outco	ome (CLO)	life proble	• Apply Concepts of sets, subset, set operations and Venn diagram in real life problems				
			<ul> <li>Evaluate practical problems on counting principal and power set of a set.</li> </ul>					
5	Cred	lit Value	2C		5 Hours – Learning and Observation			
6 Total Marks			Maximum Marks: 25 Minimum Passing Marks:10					
Pa	rt B: C	Content of the						
		Tota	l no. of Teaching/	Learning Periods = 30	Periods (30 Hours)			
Unit			Topics (COURSE CONTENTS)			No. of Periods		
	<ul> <li>Set Theory: Sets, subsets, set operations, the low of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersections and applications of above topics.</li> <li>Relation: product set, composition of relations. Types of relations partitions and its applications, Equivalence Relations with example of congruence modulo relation.</li> </ul>		tite sets and Standard set ference and alized union of relations	30				

Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Munt 16-07-24	Dr. M.A. Siddiqui – 🔏
Subject Expert - Dr. Shabnam Khan	0
Subject Expert - Dr. S. K. Bhatt Sported 6.7.2	Dr. Rakesh Tiwari - Dr. Rakesh Tiwari
Representative Members	0 11
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh -
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami - Rossing 19M	
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Part C. Loouning Decourses					
Part C - Learning Resource					
Text Books, Reference Books, Other Resources					
Reference					
1. E. Kamke, Theory of sets, Dover Publi	shers, 1950.				
2. P.R. Halmos, Naive set theory, Springe					
Online Resources: (e- Resources/ e- Books/		\$			
Omme Resources. (e- Resources/ e- Dooks/	e- Learning Fortais)	8			
1. https://onlinecourses.nptel.ac.in	https://guiosiam.com	-			
3. https://epqp.inflibnet.aci.in 4. https://www.mooc.org					
Part D: Assessment and Evaluation					
Suggested Continuous Evaluation Methods	S:				
Maximum Marks:	25 Marks				
Continuous Comprehensive Evaluation (C	CE): 5 Marks				
Semester End Exam (SEE):	20 Marks				
Semester End Exam (SEE).	20 Marks				
Internal Assessment:		Marks obtained in			
	Assignment 05 Marks	Assignment shall be			
Continuous Comprehensive Evaluation	8	considered against 05			
(CCE)					
	Dettern Atta d C	marks			
Semester End Exam (SEE)	Pattern -Attempt any five quest	tions out of given ten			
questions.					

Name & Signature of Members of Board of Studies:

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Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mutt 16-07-24	11
Subject Expert - Dr. Shabnam Khan	Dr. M.A. Siddiqui – 🕅
Subject Expert - Dr. S. K. Bhatt Representative Members	Dr. Rakesh Tiwari - DR. Mur
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh – 📿 🚶 🚽
2. Shri A. K. Pandey -	
3. Dr. Mayur Puri Goswami -	1
(Lines	

						SEC
Par	t A: In	troduction				
s	cience ( /Dip	Bachelor's in (Certificate bloma / e/Honors)	Class: B.SC.	Semester – IV/VI	Session:2024	-2025
1	Cours	se Code				8
2	Cours	se Title		Boolea	n Algebra	
3	Cours	ве Туре		Skill Enhancen	nent Course (SEC)	
4	Cours	e Learning ome (CLO)	<ul> <li>Reme dualit</li> <li>Unde algeb</li> <li>Apply</li> <li>Evalu</li> </ul>	se will enable the studen ember properties of ordere ty principal, maximal and erstand Lattices as order praic structures, sub lattice y concepts of Karnaugh d hate problems on Boolea nomials, minimal forms of	ed sets, partial order sets minimal elements. red sets, complete latt s, product and Homomo- iagrams, switching circu an algebras and its pro-	tices, lattices as orphism. iits.
5	Cred	lit Value	2C	1 credit =1	15 Hours – Learning and	Observation
6		l Marks	Maximum M		Minimum Pass	
Pa	rt B: C	Content of the	Course			1 ( 0)
		Total	no. of Teach	ing/ Learning Periods =	30 Periods (30 Hours)	
Un	lit		То	opics (COURSE CONTE	ENTS)	No. of Periods
	I	ordered sets, maximal and lattices as alg Definition, ex Complete la theorems. Bo minimal forr	, Partial orde minimal eleme ebraic structur xamples and p ttice, Comple polean Algebr ns of Boolea	basic properties of ordered ered set, Hasse Diagram ents. Lattices as ordered s res, sub-lattices, products properties of modular and emented lattice, Bounde ra and its properties, B an polynomials. Quinn- ching circuits and applic	n, duality principle, ets, complete lattices, and Homomorphism. d distributive lattices, d lattice and some coolean polynomials, -Mccluskey method,	30
Name	e & Sig	nature of Men	nbers of Board	l of Studies:		* ,*
Subj Subj	ect Exp ect Exp	on / <b>H.O.D</b> - Dr. pert - Dr. Madhu pert - Dr. Shabna	Shrivastava am Khan	presint /6-07-21	Faculty members: Dr. M.A. Siddiqui –	W Donu?
	resenta Dr. A Shri	ert - Dr. S. K. E tive Members Anil Kashyap - A. K. Pandey - Mayur Puri Gos	00	Shart 5 12	Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh	- RY
			1 Cost	or of a		

Part C - Learning	Resource	
	Text Books, Reference Books, Othe	er Resources
References:		
1. B. A. Davey	and H.A. Priestley, Introduction to lattices and	l order. Cambridge
university p	ress, Cambridge, 1990.	
2. Rudolf Lidl	and Gunter Pilz, Applied Abstract Algebra, 2nd	Ed., Undergraduate texts in
	cs, Springer (SIE), Indian reprint, 2004.	
	ments of Discrete Mathematics, Tata McGraw	-Hill Publishing Company Limited
5. 6. E. E.G, E.C	mente el protece mathematics, rata meoraw	And a substitute company cimited
Online Resources:	e (e- Resources/ e- Books/ e- Learning Porta	ls)
	(*g	
		https://swayam.gov.in
	· · · ·	https://www.mooc.org
	ent and Evaluation	
Maximum Mark	uous Evaluation Methods: s: 25 Marks	
	prehensive Evaluation (CCE): 5 Marks	
Semester End Ex		
Internal		
Assessment:		Marks obtained in
Continuous	Assignment 05 Marks	Assignment shall be considered against 05
Comprehensive		marks
Evaluation(CCE)		marko
Semester End	Pattern - Attempt any five questions out of gi	

Name & Signature of Members of Board of Studies:

Chairperson / H.O.D - Dr. Padmavati	Faculty members:
Subject Expert - Dr. Madhu Shrivastava Mint 6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	R
Subject Expert - Dr. S. K. Bhatt SPAL 67.24	Dr. Rakesh Tiwari – Takhu
Representative Members	011
1. Dr. Anil Kashyap -	Dr. (Smt.) Prachi Singh –
2. Shri A. K. Pandey -	DI. (Sint.) I fuell Singh
3. Dr. Mayur Puri Goswami -	
<u>Gr</u>	

Do	ut A . T.					DSC
]	Program ence (Ce	ntroduction : Bachelor's in rtificate /Diploma ree/Honors)	Class: B.Sc.	Semester – VI	Session:2024-2025	5
1	Cour	se Code				
2	Cour	se Title		Project		
3		se Type		Discipline Specific Cours	e (DSC)	
4	Cour	se Learning	This Course w	ill enable the students to:	• (====)	
	Outo	ome (CLO)	<ul> <li>Understand</li> <li>Of mathema</li> </ul>	t into significant advancements ir fields by Indian mathematicians t the cultural and historical contex tical ideas in India. lasting impact of Indian mathem s.	hroughout history. ts influencing the de	velopment
5		lit Value	1C	1 credit =15 Hours -	Learning and Obser	vation
5		ıl Marks	Maximum Mark	ks: 25	Minimum Passing M	the second se
Pa	rt B: (	Content of the				
	-	Total	no. of Teaching/	/ Learning Periods = 15 Periods	(15 Hours)	
Un	hit			s (COURSE CONTENTS)		No. of Periods
	I	Apastambha, I Pandit, Kamal geometry, calc	ontributions and Panini, Varahami akara, and Jyesht	life stories of Indian mathematici hira, Brahmagupta, Parameshvar tadeva. Analyze their achievemer reas, exploring how their work having	a, Narayana Its in algebra	15

Name & Signature of Members of Board of Studies:

Chai	irperson / H.O.D - Dr. Padmavati	Faculty members:
Subj	ect Expert - Dr. Madhu Shrivastava	
Subje	ect Expert - Dr. Shabnam Khan 6-07-24	Dr. M.A. Siddiqui – 📈
Subje	ect Expert - Dr. S. K. Bhatt	and the second s
Repr	resentative Members	Dr. Rakesh Tiwari - Dolun
1.	Dr. Anil Kashyap -	0 h
2.	Shri A. K. Pandey -	Dr. (Smt.) Prachi Singh –
3.	Dr. Mayur Puri Goswami	
	Cido	

Part C - Learning Resource	
Text Books, Ref	erence Books, Other Resources
References:	the Brens, only Resources
<ol> <li>George Gnevergnese Joseph, The Crest of Princeton University Press, 2000.</li> <li>Robert Kanigel, The Man Who Knew Infin Press, 1991.</li> </ol>	s: Rich Traditions and Legacies, Springer, 2017. the Peacock: Non-European Roots of Mathematics, nity: A Life of the Genius Ramanujan, Washington Square
Online Resources: ( e- Resources/ e- Books/	e- Learning Portals):
1. https://onlinecourses.nptel.ac.in	2. https://swayam.gov.in
3. https://epqp.inflibnet.aci.in	4. https://www.mooc.org
Part D: Assessment and Evaluation Suggested Continuous Evaluation Methods	
Project:	20 Marks
Internal Assessment:	20 Marks Quiz (05 Marks)
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Quiz (05 Marks)
Project: Internal Assessment: Continuous Comprehensive Evaluation (CCE) Project	
Internal Assessment: Continuous Comprehensive Evaluation (CCE) Project Jame & Signature of Members of Board of Stud Chairperson / H.O.D - Dr. Padmavati	Quiz (05 Marks)         Project work (20 Marks)         lies:         TAM         Faculty members:
Internal Assessment: Continuous Comprehensive Evaluation (CCE) Project ame & Signature of Members of Board of Stud Chairperson / H.O.D - Dr. Padmavati Subject Expert - Dr. Madhu Shrivastava	Quiz (05 Marks) Project work (20 Marks) lies:
Internal Assessment: Continuous Comprehensive Evaluation (CCE) Project Iame & Signature of Members of Board of Stud Chairperson / H.O.D - Dr. Padmavati	Quiz (05 Marks)         Project work (20 Marks)         lies:         TAM         Faculty members:

3. Dr. Mayur Puri Goswami -

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