SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUP)

B.Sc. First and Second Semester

As per provision of NEP-2020(Central Board)
Implemented fromAcademic Year 2024-25 onwards



Session 2025-26

DEPARTMENT OF MATHEMATICS

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE,

RAJNANDGAON (C.G.)

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28) DEPARTMENT OF MATHEMATICS COURSE CURRICULUM

(Cer	rogram: Bachelor in Science rtificate/Diploma/Degree/Honors	Semester - I Session:2024	1-2025
1	Course Code	MASC-01	
2	Course Title		
3	Course Type	Elementary Calculus	
4	Pre-requisite(if any)	DSC Vroyaled as a Classic Different Action of the Control of the C	
5	Course Learning Outcome	Knowledge of basic Differential and Integral calculus	
	(CLO)	 This Course will enable the students to: Know about ancient Indian Mathematicians and their contribution Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various test to determine convergence. Understand the consequences of various mean value theorems. Understand concepts of Curvature and Asymptotes. Draw curves in Cartesian and polar coordinate systems Understand the elementary integration of transcendental function 	
5	Credit Value	and understand applications of reduction formulae. 4 C 1Credit = 15 hours- Learning and	observation
	Total Marks Maximum Marks : 100 Minimum Passing Marks: 40		
art	B: Content of the Course	2 250115	171d1 KS. 40
'otal	no of teaching - learning per	iod =60 Periods (60 Hours)	
UNI		Topics	No of Period
Bodhayan, Apasthamb, Bhaskarachaya in special co Sequences, Continuity and Notion of convergence of		d Differentiability: sequences and series of real numbers, Definition of al valued function; Differentiability and its geometrical	15
	Expansion of Functions: Rolle's Theorem, Lagrange	's mean value theorem. Cauchy's mean value 4b	//
п	and their geometrical inte	rpretations, Successive differentiation and Leibnitz aylor's theorems for expansion of a function.	15

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IV	Integration: Elementary integration, Integration of Transcendental function, Reduction formulae, Definite integral.	15
	1 - 1 malac, Definite integral	

Part C - Lear	ning Resor	irce			
100	Text R	ooks, Reference Books, Other Reso	urces		
Text Books Rec	viiimended-				
1. Howard	1. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.				
2. Gabrier F	Llambauer (1	986). Aspects of Calculus Springer-	Verlag		
J. Wieslaw	Krawcewicz	& BindhyachalRai (2003) Calculus	with Maple Labs, Narosa.		
4. Golakii F	rasad (2016)	Differential Calculus (10th edition)	Pothishala Pvt. Ltd.		
celefence Book	s Recommen	ded-			
George B	. Thomas Jr.	, Joel Hass, Christopher Heil& Mauri	ce D. Weir (2018)		
Tho	mas' Calculu	s (14th edition). Pearson Education.	00 D. Well (2010).		
6. Jerrold N	farsden, An	thony J. Tromba& Alan Weinstein	(2000) Basic Multivariable		
Calculus,	Springer Ind	ia Pvt. Limited.	(2009). Basic Walitarianie		
7. James Ste	wart (2012)	Multivariable Calculus (7th edition).	Brooks/Cole Cangage		
8. Monty J.	Strauss, Ge	erald L. Bradley & Karl J. Smith (2	2011) Calculus (3rd edition)		
Pears	son Educatio	n. Dorling Kindersley (India) Pvt. Ltd	e calculus (Siu edition).		
-resources: htt	ps://onlinec	ourses.nptel.ac.in	* Early St. Annual States of Control of Control		
	ps://epqp.inf				
	ps://swayam.				
	ps://www.mo				
Part D: Asses		The state of the s			
Suggested Cont	inuous Eval	uation Methods:			
Maximum Mar	ks:	100 M	arks		
Continuous Inte			rks		
End Semester 1			rks		
Continuous Inter		Test /Quiz – 20+20 Marks	Better marks out of two test/quiz +		
Assessment (CIA) Conducted by course teacher)		Assignment/Seminar- 10 Marks	obtained marks in Assignment shall be considered against 30 marks		
End Semester	Two Section	n-A&R	be considered against 30 marks		
Examination			nort answer type question-5x4=20mar		
(ESE)	Section-B:	Descriptive answer type question 1 o	ut of 2 from each unit- 10x4= 40 Mar		



FOUR YEAR UNDER GRADUATE PROGRAM (2024-28) DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM Part A: Introduction Program: Bachelor in Science Session:2024-2025 Semester - I (Certificate/Diploma/Degree/Honors) Course Code MAGE-01 Course Title **Elementary Calculus** 3 Course Type Generic Elective (GE) Pre-requisite(if any) Knowledge of basic Differential and Integral calculus Course Learning Outcome This Course will enable the students to: Know about ancient Indian Mathematicians and their contribution (CLO) > Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence. > Understand the consequences of various mean value theorems. > Understand concepts of Curvature and Asymptotes. > Draw curves in Cartesian and polar coordinate systems > Understand the elementary integration of transcendental function and understand applications of reduction formulae. 1Credit = 15 hours- Learning and observation Credit Value 4 C Minimum Passing Marks:40 Maximum Marks: 100 **Total Marks** Part B: Content of the Course Total no of teaching - learning period =60 Periods (60 Hours) No of Periods **Topics** UNIT Contributions and Biography of Indian Mathematicians: Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta Bodhayan, Bhaskarachaya in special context of Leelavati. Sequences, Continuity and Differentiability: 15 I Notion of convergence of sequences and series of real numbers, Definition of limit and continuity of a real valued function; Differentiability and its geometrical interpretation. Elementary Differentiation. **Expansion of Functions:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem 15 П and their geometrical interpretations, Successive differentiation and Leibnitz theorem, Maclaurin's and Taylor's theorems for expansion of a function. Curvature, Asymptotes, Curve Tracing: Curvature; Asymptotes of general algebraic curves, Parallel asymptotes. Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of 15 Ш inflection, Tangents at origin, Multiple points, Position and nature of double points; Tracing of Cartesian, polar and parametric curves. Integration:

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formulae, Definite integral.

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Elementary integration, Integration of Transcendental function.

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Part C - Learning Resource Text Books, Reference Books, Other Resources Text Books Recommended-1. Howard Anton, I. Bivens& Stephan Davis (2016). Calculus (10th edition). Wiley India. 2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag. 3. Wieslaw Krawcewicz & BindhyachalRai (2003). Calculus with Maple Labs. Narosa. 4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd. Reference Books Recommended-5. George B. Thomas Jr., Joel Hass, Christopher Heil& Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education. 6. Jerrold Marsden, Anthony J. Tromba& Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited. 7. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd. E-resources: https://onlinecourses.nptel.ac.in https://epqp.inflibnet.aci.in https://swayam.gov.in https://www.mooc.org Part D: Assessment and Evaluation Suggested Continuous Evaluation Methods: Maximum Marks: 100 Marks Continuous Internal Assessment (CIA): 30 Marks End Semester Examination (ESE): 70 Marks Continuous Internal Test /Quiz -20+20 Marks Better marks out of two test/quiz + Assessment (CIA) Assignment/Seminar- 10 Marks obtained marks in Assignment shall (Conducted by course teacher) be considered against 30 marks **End Semester** Two Section-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Examination (ESE) Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICHILLIM

Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - II Session:2024-2025	
1	Course Code		
2	Course Title		MASC-02
3	Course Type	Algebra Discipline Specific Course (DSC) Knowledge of basic algebra, determinants and matrices. This Course will enable the students to: Learn about the Matrix algebra. Understand Set theory, Function and Relation Learn about the theory of equations. Learn about the fundamental concepts of groups, Subgroups. Understand cosets and normal subgroups	
4	Pre requisite		
5	Course Learning Outcome (CLO)		
Credit Value		4 C	
		70	1Credit = 15 hours- Learning and
	Total Marks	Maximum Marks: 100	Observation
		THE PROPERTY OF THE PARTY OF TH	Minimum Passing Marks:40

rart B:	Content of the Course	
I OTAL NO	of teaching — learning period =60 Periods (60 Hours)	
UNIT	Tonics	No of Period
I	Matrix Algebra: Introduction, elementary operations of matrices, Inverse of a matrix. Special types of matrices: Transpose of a matrix, Symmetric and Skew symmetric matrices, Hermitian and Skew Hermitian matrix, Rank of a matrix, Echelon form of a matrix, Normal form, Application of matrices to a system of linear (both homogeneous and non-homogeneous) equations, Theorems on consistency of a system of linear equations. Eigen values and Eigen vectors, relation between Eigen values and Eigen vectors. Process of finding Eigen values and Eigen vectors, Cayley Hamilton theorem, and its use in finding inverse of a matrix.	15
п	Sets Theory & Functions: Sets, subsets Set operations and the laws 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 a set. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersection. Relations and Functions: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations. Function, Types of Function, Inverse Function, Composite of functions, Modular arithmetic and basic properties of congruences	15

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Ш	Theory of equations: Symmetric functions of the roots of an equation Root of a multiplicity, Synthetic division, Greatest common Divisors, Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardon method), Biquadrate equation.	15
IV	Group Theory:Definition and properties of a group, Abelian groups, Examples of groups, Subgroups and examples, Cosets and their properties, Lagrange's theorem and its applications, Normal subgroups and their properties, Simple groups, Factors groups.	15

Part C - Learni	ng Resource			
	Text Books	, Reference Books, Other Resource	es	
Text Books Recom	mended-			
 RamjiLal (2 	017). Algebra	1: Groups, Rings, Fields and Arithm	netic. Springer.	
 RamjiLal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer. Nathan Jacobson (2009). Basic Algebra I (2nd edition). Dover Publications 				
3. John B. Fra	eigh (2007). A	First Course in Abstract Algebra (7	7th edition). Pearson	
Reference Books F	Recommende	-		
4. Michael Art	in (2014). <i>Alg</i>	ebra (2 nd edition). Pearson.		
J. Stephen H.	riedberg, Ari	old I Insel& Lawrence F. Spence (2)	003). Linear Algebra (4th edition).	
1 TOTILICE-TIALI	or maia Pvt.	Lt		
6. Joseph A. G	allian (2017).	Contemporary Abstract Algebra (9th	edition). Cengage.	
7. IZCIIIICIII NO	uman & Ray	Kunze (2015). <i>Linear Algebra</i> (2 nd ea	dition) Prentice-Hall	
o. i. iv. nerster	n (2006). <i>Top</i>	ics in Algebra (2nd edition). Wiley In	dia.	
E-resources: https	://onlinecour	ses.nptel.ac.in		
https	://epap.inflibr	et.aci.in		
	://swayam.go			
	://www.mooc			
Part D: Assessi				
Suggested Contin		ion Methods:		
Maximum Marks	•	100 Mar		
Continuous Inter				
End Semester Ex				
Continuous Intern	al	Test /Quiz – 20+20 Marks	Better marks out of two test/quiz +	
Assessment (CIA)		Assignment/Seminar- 10 Marks	obtained marks in Assignment shall	
(Conducted by course			be considered against 30 marks	
End Semester	Two Sectio			
Examination			hort answer type question-5x4=20mar	
(ESE) Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Ma				

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS COURSE CURRICULUM

Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - II Session:2024-2025		
	Course Code		MACE 02	
2	Course Title	MAGE-02		
3	Course Type	Algebra		
4	Pre requisite	Knowledge of basic	Generic Elective (GE) algebra, determinants and matrices.	
5	Course Learning Outcome (CLO)	 Learn about the N Understand Set th Learn about the th Learn about the Subgroups. 	able the students to: [atrix algebra.	
	Credit Value	4 C	1Credit = 15 hours- Learning and	
Total Marks		Maximum Marks : 1	Observation Observation Minimum Passing Marks:40	

Part B:	Content of the Course	
Total no	of teaching – learning period =60 Periods (60 Hours)	
UNIT	Topics	No of Period
I	Matrix Algebra: Introduction, elementary operations of matrices, Inverse of a matrix. Special types of matrices: Transpose of a matrix, Symmetric and Skew symmetric matrices, Hermitian and Skew Hermitian matrix, Rank of a matrix, Echelon form of a matrix, Normal form, Application of matrices to a system of linear (both homogeneous and non-homogeneous) equations, Theorems on consistency of a system of linear equations. Eigen values and Eigen vectors, relation between Eigen values and Eigen vectors. Process of finding Eigen values and Eigen vectors, Cayley Hamilton theorem, and its use to finding inverse of a matrix.	15
п	Sets Theory & Functions: Sets, subsets Set operations and the laws 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 a set. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersection. Relations and Functions: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations. Function, Types of Function, Inverse Function, Composite of functions, Modular arithmetic and basic properties of congruences	15

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m	Theory of equations: Symmetric functions of the roots of an equation Root of a multiplicity, Synthetic division, Greatest common Divisors, Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardon method), Biquadrate equation.	15
IV	Group Theory: Definition and properties of a group, Abelian groups, Examples of groups, Subgroups and examples, Cosets and their properties, Lagrange's theorem and its applications, Normal subgroups and their properties, Simple groups, Factors groups.	
		15

Part C - Learn	ning Resour	ce	
	Text Boo	ks, Reference Books, Other Resour	Pag
Text Books Reco	mmended-		
1. RamjiLal	(2017). Algebi	a 1: Groups, Rings, Fields and Arith	matia Carinasa
action ya	~0020H (500A)	Basic Algebra I (2 dedition) Dover	Dublications
3. John B. Fr	aleigh (2007).	A First Course in Abstract Algebra (7th edition) Person
Reference Books	D	- Tourse in Nosiruci Aigebra (7 edition). Pearson
4 Michael A	Recommend	ed-	
5 Stonbar II	rtin (2014). Al	gebra (2 nd edition). Pearson.	
J. Stephen H.	Friedberg, A	rnold J.Insel& Lawrence E. Spence (2	2003). Linear Algebra (4th edition).
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7 Konneth II	Gallian (2017)	. Contemporary Abstract Algebra (9th	h edition). Cengage.
. Remietti fi	uliman & Kav	Kiinze (2015) Linear Alcabra (2nd -	dia:) D .: ** .:
6. 1. 14. Herst	em (2006). <i>To</i>	pics in Algebra (2 nd edition). Wiley In	ndia.
E-resources: http	os://onlinecou	rses.nptel.ac.in	
<u>http</u>	s://epqp.inflib	net.aci.in	
	s://swayam.go		
http	s://www.mood	c.org	
Part D: Assess	ment and l	Evaluation	
Suggested Contin	nuous Evalua	tion Methods:	
Maximum Mark	s:	100 Mai	dra
Continuous Inter	nal Assessme	ent (CIA): 30 Mark	
End Semester E	xamination (I	ESE): 70 Mark	
Continuous Intern	al	Test /Quiz - 20+20 Marks	
Assessment (CIA)		Assignment/Seminar- 10 Marks	Better marks out of two test/quiz +
Conducted by course teacher)		1 toolgriment Schillar- To Warks	obtained marks in Assignment shall
End Semester	Two Section	n_A&R	be considered against 30 marks
Examination			
(ESE)	Section D. I	21.00jective= 10x1=10 marks QZ, Sj	nort answer type question-5x4=20marks
The state of the s	Decrion-B: I	descriptive answer type question, 1 o	ut of 2 from each unit- 10x4= 40 Marks

Name and signature of convener & members of CBOS
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