VIKRAM UNIVERSITY, UJJAIN

MASTER OF SCIENCE

M.Sc. MATHEMATICS

UNDER CBCS (2016-2017)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
	SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1	CORE	MAT-C101	6	6	Advanced Abstract Algebra I	10	40	50
2	CORE	MAT-C102	6	6	Real Analysis I	10	40	50
3	CORE	MAT-C103	6	6	Topology I	10	40	50
4	CORE	MAT-C104	6	5	Complex Analysis I	10	40	50
5	ELECTIVE	MAT-E105(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)** A. Programming in C-I (Theory +Practical) B. Differential Equation I C. Advanced Discrete Mathematics I D. Differential Geometry of Manifolds I	 10 10 10 10	 25+15 40 40 40	50
6	CORE	MAT-C106	6	2	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7	CORE	MAT-C201	6	6	Advanced Abstract Algebra II	10	40	50
8	CORE	MAT-C202	6	6	Lebesgue Measure and Integration	10	40	50
9	CORE	MAT-C203	6	6	Topology II	10	40	50
10	CORE	MAT-C204	6	5	Complex Analysis II	10	40	50
11	ELECTIVE	MAT-E205(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)** A. Programming in C-II (Theory +Practical) B. Differential Equation II C. Advanced Discrete Mathematics II D. Differential Geometry of Manifolds II	 10 10 10 10	 25+15 40 40 40	50
12	CORE	MAT-C106	**6**	**2**	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**

19.10.2016

19/10/2016.

19.10.2016

19.10.2016

SEMESTER III						CIA	Uni. Exam	Total
13	CORE	MAT-C301	6	6	Integration Theory and Functional Analysis-I	10	40	50
14	CORE	MAT-C302	6	6	Fundamentals of Computer Science(Theory)-I Fundamentals of Computer Science (Practical)-I	10 -	25 15	35 15
15	ELECTIVE-I	MAT-E303 (A,B,C,D,E)	6	6	**(to choose 1 out of 5)** A. Advanced Functional Analysis-I B. Partial Differential Equations C. Differentiable Structures on manifolds-I D. General Theory of Relativity and Cosmology-I E. Abstract Harmonic Analysis-I F. Mathematics of Finance & Insurance -I	10	40	50
16	ELECTIVE-II	MAT-E304 (A,B,C,D,E)	6	5	**(to choose 1 out of 5)** A. Theory of Linear Operator I B. Advanced Numerical Analysis –I C. Fuzzy Sets and their Applications-I D. Advanced Graph Theory-I E. Advanced Special Function-I F. Spherical Trigonometry and astronomy-I	10	40	50
17	ELECTIVE-III	MAT-E305 (A,B,C,D,E)	6	5	**(to choose 1 out of 5)** A. Operations Research -I B. Computational Biology –I C. Fluid Mechanics –I D. Bio- Mechanics -I E. Analytic Number Theory-I F. Integral Transform-I	10	40	50
18	CORE	MAT-C306	**6**	**2**	Comprehensive Viva-Voce	-	**50**	**50**
			36	**30**		**50**	**250**	**300**

Badshah 19.10.2016

19/10/2016

19.10.2016

19.10.2016

SEMESTER IV						CIA	Uni. Exam	Total
19	CORE	MAT-C401	6	6	Functional Analysis-II	10	40	50
20	CORE	MAT-C402	6	6	Fundamentals of Computer Science(Theory)-II Fundamentals of Computer Science (Practical)-II	10 -	25 15	35 15
21	ELECTIVE-I	MAT-E403 (A,B,C,D,E)	6	6	**(to choose 1 out of 6)** A. Advanced Functional Analysis-II B. Mechanics C. Differentiable Structures on manifolds-II D. General Theory of Relativity and Cosmology-II E. Abstract Harmonic Analysis-II F. Mathematics of Finance & Insurance -II	10	40	50
22	ELECTIVE-II	MAT-E404 (A,B,C,D,E)	6	4	**(to choose 1 out of 6)** A. Theory of Linear Operator II B. Advanced Numerical Analysis –II C. Fuzzy Sets and their Applications-II D. Advanced Graph Theory-II E. Advanced Special Function-II F. Spherical Trigonometry and astronomy-II	10	40	50
23	ELECTIVE-III	MAT-E405 (A,B,C,D,E)	6	4	**(to choose 1 out of 6)** A. Operations Research -II B. Computational Biology –II C. Fluid Mechanics –II D. Bio- Mechanics -II E. Analytic Number Theory-II F. Integral Transform-II	10	40	50
24	CORE	MAT-C406	**6**	**2**	Comprehensive Viva-Voce	-	**50**	**50**
25	CORE	MAT-P407		**2**	Job Oriented Project Work	-	**50**	**50**
			36	**30**		**50**	**300**	**350**

19/10/2016.

19/10/2016.

19.10.2016

19.10.2016

COURSE STRUCTURE FOR

School of Studies in Mathematics

Under CBCS

M.Sc. Mathematics

(Regular)

I & II Semester 2016-2017

and

M.Sc. Mathematics

(Regular)

III & IV Semester 2017-2018

VIKRAM UNIVERSITY, UJJAIN

MASTER OF SCIENCE

M.Sc. MATHEMATICS

UNDER CBCS (2016-2017)

The Course of Study and the Scheme of Examinations

S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
	SEMESTER I					CIA	Uni. Exam	Total
1	CORE	MAT-C101	6	6	Advanced Abstract Algebra I	10	40	50
2	CORE	MAT-C102	6	6	Real Analysis I	10	40	50
3	CORE	MAT-C103	6	6	Topology I	10	40	50
4	CORE	MAT-C104	6	5	Complex Analysis I	10	40	50
5	ELECTIVE	MAT-E105(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)**			
					A. Programming in C-I (Theory +Practical)	10	25+15	50
					B. Differential Equation I	10	40	
					C. Advanced Discrete Mathematics I	10	40	
					D. Differential Geometry of Manifolds I	10	40	
6	CORE	MAT-C106	6	2	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**
	SEMESTER II					CIA	Uni. Exam	Total
7	CORE	MAT-C201	6	6	Advanced Abstract Algebra II	10	40	50
8	CORE	MAT-C202	6	6	Lebesgue Measure and Integration	10	40	50
9	CORE	MAT-C203	6	6	Topology II	10	40	50
10	CORE	MAT-C204	6	5	Complex Analysis II	10	40	50
11	ELECTIVE	MAT-E205(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)**			
					A. Programming in C-II (Theory +Practical)	10	25+15	50
					B. Differential Equation II	10	40	
					C. Advanced Discrete Mathematics II	10	40	
					D. Differential Geometry of Manifolds II	10	40	
12	CORE	MAT-C106	**6**	**2**	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**

19.10.2016

19/10/2016.

19.10.2016

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VIKRAM UNIVERSITY, UJJAIN

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M.Sc. MATHEMATICS

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S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title					CIA	Uni. Exam	Total
	SEMESTER I							
1	CORE	MAT-C101	6	6	Advanced Abstract Algebra I	10	40	50
2	CORE	MAT-C102	6	6	Real Analysis I	10	40	50
3	CORE	MAT-C103	6	6	Topology I	10	40	50
4	CORE	MAT-C104	6	5	Complex Analysis I	10	40	50
5	ELECTIVE	MAT-E105(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)** A. Programming in C-I (Theory +Practical) B. Differential Equation I C. Advanced Discrete Mathematics I D. Differential Geometry of Manifolds I	10 10 10 10	25+15 40 40 40	50
6	CORE	MAT-C106	6	2	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**
	SEMESTER II					CIA	Uni. Exam	Total
7	CORE	MAT-C201	6	6	Advanced Abstract Algebra II	10	40	50
8	CORE	MAT-C202	6	6	Lebesgue Measure and Integration	10	40	50
9	CORE	MAT-C203	6	6	Topology II	10	40	50
10	CORE	MAT-C204	6	5	Complex Analysis II	10	40	50
11	ELECTIVE	MAT-E205(A,B,C,D)	6	3+2=5	**(to choose 1 out of 4)** A. Programming in C-II (Theory +Practical) B. Differential Equation II C. Advanced Discrete Mathematics II D. Differential Geometry of Manifolds II	10 10 10 10	25+15 40 40 40	50
12	CORE	MAT-C206	6	2	Comprehensive Viva-Voce	-	50	50
			36	**30**		**50**	**250**	**300**

19/10/2016

19.10.2016

19.10.2016

19.10.2016

SEMESTER III						CIA	Uni. Exam	Total
13	CORE	MAT-C301	6	6	Integration Theory and Functional Analysis-I	10	40	50
14	CORE	MAT-C302	6	6	Fundamentals of Computer Science(Theory)-I Fundamentals of Computer Science (Practical)-I	10 -	25 15	35 15
15	ELECTIVE-I	MAT-E303 (A,B,C,D,E)	6	6	**(to choose 1 out of 5)** A. Advanced Functional Analysis-I B. Partial Differential Equations C. Differentiable Structures on manifolds-I D. General Theory of Relativity and Cosmology-I E. Abstract Harmonic Analysis-I F. Mathematics of Finance & Insurance -I	10	40	50
16	ELECTIVE-II	MAT-E304 (A,B,C,D,E)	6	5	**(to choose 1 out of 5)** A. Theory of Linear Operator I B. Advanced Numerical Analysis –I C. Fuzzy Sets and their Applications-I D. Advanced Graph Theory-I E. Advanced Special Function-I F. Spherical Trigonometry and astronomy-I	10	40	50
17	ELECTIVE-III	MAT-E305 (A,B,C,D,E)	6	5	**(to choose 1 out of 5)** A. Operations Research -I B. Computational Biology –I C. Fluid Mechanics –I D. Bio- Mechanics -I E. Analytic Number Theory-I F. Integral Transform-I	10	40	50
18	CORE	MAT-C306	6	2	Comprehensive Viva-Voce	-	50	50
			36	30		50	250	300

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19.10.2016

SEMESTER IV						CIA	Uni. Exam	Total
19	CORE	MAT-C401	6	6	Functional Analysis-II	10	40	50
20	CORE	MAT-C402	6	6	Fundamentals of Computer Science(Theory)-II Fundamentals of Computer Science (Practical)-II	10 -	25 15	35 15
21	ELECTIVE-I	MAT-E403 (A,B,C,D,E)	6	6	**(to choose 1 out of 6)** A. Advanced Functional Analysis-II B. Mechanics C. Differentiable Structures on manifolds-II D. General Theory of Relativity and Cosmology-II E. Abstract Harmonic Analysis-II F. Mathematics of Finance & Insurance -II	10	40	50
22	ELECTIVE-II	MAT-E404 (A,B,C,D,E)	6	4	**(to choose 1 out of 6)** A. Theory of Linear Operator II B. Advanced Numerical Analysis –II C. Fuzzy Sets and their Applications-II D. Advanced Graph Theory-II E. Advanced Special Function-II F. Spherical Trigonometry and astronomy-II	10	40	50
23	ELECTIVE-III	MAT-E405 (A,B,C,D,E)	6	4	**(to choose 1 out of 6)** A. Operations Research -II B. Computational Biology –II C. Fluid Mechanics –II D. Bio- Mechanics -II E. Analytic Number Theory-II F. Integral Transform-II	10	40	50
24	CORE	MAT-C406	**6**	**2**	Comprehensive Viva-Voce	**-**	**50**	**50**
25	CORE	MAT-P407		**2**	Job Oriented Project Work	**-**	**50**	**50**
			36	**30**		**50**	**300**	**350**

19/10/2016.

19/10/2016

19.10.2016

19.10.2016

विक्रम विश्वविद्यालय,उज्जैन

गणित अध्ययन मण्डल

गणित के विषय के अध्ययन मण्डल की दिनांक 18/02/2016. को माधव भवन, विक्रम विश्वविद्यालय, उज्जैन में आयोजित बैठक का कार्यविवरण।

—:: उपस्थिति ::—

1. प्रो. एच. एच. बादशाह
2. प्रो. एच. के. गुप्ता
3. डा. एस. डी. न
4. डा. एस. के. तिवारी
5. डा. अरि. के. तिवारी.
6.
7.
8.

—:: कार्य विवरण ::—

आज दिनांक 18.2.2016 को गणित अध्ययन बोर्ड की बैठक शलाका दीर्घा में आहुत की गई। केन्द्रीय अध्ययन मंडल द्वारा choice based credit system (CBCS) सत्र 2016 से लागू करने हेतु अध्ययनशाला में स्नातकोत्तर स्तर के पाठ्यक्रम को credit में विभाजित करने हेतु समिति द्वारा अनुशंसा की गई।

अत: इसकी स्कीम में कोई भी minor change की आवश्यकता पड़ती है तो अध्ययन मंडल के अध्यक्ष को अधिकृत किया जाता है। केन्द्रीय अध्ययन मंडल बोर्ड द्वारा स्नातक स्तर के B.Sc/B.A. गणित के पंचम एवं षष्टम सेमेस्टर के पाठ्यक्रम को अंगीकृत किया गया।

महाविद्यालयों में संचालित स्नातक एवं स्नातकोत्तर स्तर के पाठ्यक्रम यथावत रहेंगे।

18.2.16. 18/02/2016. 18.2.2016. 18.02.2016.

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VIKRAM UNIVERSITY, UJJAIN

MASTER OF SCIENCE

M.Sc. MATHEMATICS

UNDER CBCS(2016-2017)

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S.NO.	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
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1	CORE	MAT-C101	6	5	Advanced Abstract Algebra I	10	40	50
2	CORE	MAT-C102	6	5	Real Analysis I	10	40	50
3	CORE	MAT-C103	6	5	Topology I	10	40	50
4	CORE	MAT-F104	6	3	Foundation	10	40	50
5	ELECTIVE	MAT-E105(A,B,C,D)	6	3	**(to choose 1 out of 4)** A. **Complex Analysis I** B. Differential Equation I C. Advanced Discrete Mathematics I D. Differential Geometry of Manifolds I	10	40	50
6	CORE	MAT-C106		2	Comprehensive Viva-Voce	-	50	50
			30	**23**		**50**	**250**	**300**
	SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7	CORE	MAT-C201	6	4	Advanced Abstract Algebra II	10	40	50
8	CORE	MAT-C202	6	4	Lebesgue Measure and Integration	10	40	50
9	CORE	MAT-C203	6	4	Topology II	10	40	50
10	CORE	MAT-C204	6	(3+1) =4	Programming in C (Theory) Programming in C (Practical)	10 -	25 15	35 15
11	ELECTIVE	MAT-E205(A,B,C,D)	6	3	**(to choose 1 out of 4)** A. **Complex Analysis II** B. Differential Equation II C. Advanced Discrete Mathematics II D. Differential Geometry of Manifolds II	10	40	50
12	CORE	MAT-C206		**2**	Comprehensive Viva-Voce	-	50	50
			30	**21**		**50**	**250**	**300**

18/2

18.2.16

18/2/16

18.2.2016

SEMESTER III						CIA	Uni. Exam	Total
13	CORE	MAT-C301	6	5	Inregration Theory and Functional Analysis-I	10	40	50
14	CORE	MAT-C302	6	4	Fundamentals of Computer Science(Theory)-I Fundamentals of Computer Science (Practical)-I	10 -	25 15	35 15
15	ELECTIVE-I	MAT-E303 (A,B,C,D,E)	6	4	**(to choose 1 out of 5)** A. Advanced Functional Analysis-I **B. Partial Differential Equations** C. Differentiable Structures on manifolds-I D. General Theory of Relativity and Cosmology-I E. Abstract Harmonic Analysis-I F. Mathematics of Finance & Insurance -I	10	40	50
16	ELECTIVE-II	MAT-E304 (A,B,C,D,E)	6	4	**(to choose 1 out of 5)** **A. Theory of Linear Operator I** B. Advanced Numerical Analysis –I C. Fuzzy Sets and their Applications-I D. Advanced Graph Theory-I E. Advanced Special Function-I F. Spherical Trigonometry and astronomy-I	10	40	50
17	ELECTIVE-III	MAT-E305 (A,B,C,D,E)	6	4	**(to choose 1 out of 5)** **A. Operations Research -I** B. Computational Biology –I C. Fluid Mechanics –I D. Bio- Mechanics -I E. Analytic Number Theory-I F. Integral Transform-I	10	40	50
18	CORE	MAT-C306		2	Comprehensive Viva-Voce	-	50	50
			30	23		50	250	300

18/2

18-2-16

18.2.2016

18/2/16

SEMESTER IV					M.Sc. Mathematics(CBCS) 2017-18	CIA	Uni. Exam	Total
19	CORE	MAT-C401	6	5	**Functional Analysis-II**	10	40	50
					Fundamentals of Computer Science(Theory)-II	10	25	35
20	CORE	MAT-C402	6	4	Fundamentals of Computer Science (Practical)-II	-	15	15
21	ELECTIVE-I	MAT-E403 (A,B,C,D,E)	6	4	**(to choose 1 out of 6)** A. Advanced Functional Analysis-II **B. Mechanics** C. Differentiable Structures on manifolds-II D. General Theory of Relativity and Cosmology-II E. Abstract Harmonic Analysis-II **F.** Mathematics of Finance & Insurance -II	10	40	50
22	ELECTIVE-II	MAT-E404 (A,B,C,D,E)	6	3	**(to choose 1 out of 6)** **A. Theory of Linear Operator II** **B.** Advanced Numerical Analysis –II C. Fuzzy Sets and their Applications-II D. Advanced Graph Theory-II E. Advanced Special Function-II **F.** Spherical Trigonometry and astronomy-II	10	40	50
23	ELECTIVE-III	MAT-E405 (A,B,C,D,E)	6	3	**(to choose 1 out of 6)** **A. Operations Research -II** B. Computational Biology –II C. Fluid Mechanics –II D. Bio- Mechanics -II E. Analytic Number Theory-II **F.** Integral Transform-II	10	40	50
24	CORE	MAT-C406		2	**Comprehensive Viva-Voce**	-	50	50
25	CORE	MAT-P407		2	**Job Oriented Project Work**	-	50	50
			30	23		50	300	350

Total 90 1250

18.2.2016

18.2.2016

18/2/16

उच्च शिक्षा विभाग, म.प्र. शासन

बी.एससी / बी.ए. कक्षाओं के लिये एकल प्र नपत्र प्रणाली सेमेस्टर के अनुसार पाठ्यक्रम

केन्द्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

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

B.Sc./ B.A. Single Paper System Semester wise syllabus

As Recommended by central Board of studies and Approved by the Governor of M.P.

सत्र / Session : 2013-14

अधिकतम अंक / Max. Marks : 125

Class/ कक्षा	:	B.Sc. /B.A.
Semester/ सेमेस्टर	:	**VI**
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Title / शीर्षक	:	**Metric Spaces, Numerical Analysis and optional**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Compulsory** (V unit optional)

: Particulars/ विवरण :

Unit -1	Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Subspace of a metric space. Cauchy sequences. Completeness, Cantor's intersection theorem, Contraction principle. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem. Separable, first and second countable spaces.
इकाई–1	दूरीक समष्टि की परिभाषा एवं उदाहरण, सामीप्य, सीमा बिन्दु, अंतः बिन्दु, विवृत्त एवं संवृत समुच्चय, संवरणक एवं अभ्यंतर, परिसीमा बिन्दु, दूरीक समष्टि की उप समष्टि। कौशी अनुकम, पूर्णता, केन्टर का सर्वनिष्ठ प्रमेय, संकुचन सिद्धांत, पूर्ण कमित क्षेत्र के रूप में वास्तविक संख्यायें, सघन समुच्चय, बेयर का संवर्ग प्रमेय। विघटीय, प्रथम एवं द्वितीय गणनीय समष्टि।
Unit -2	Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces, Finite intersection property. Continuous functions and compact sets. Connectedness
इकाई–2	संतत फलन, विस्तार प्रमेय, एकसमान सांतत्य। संहतता, अनुक्रमणीय संहतता, पूर्ण परिबद्ध समष्टि,परिमित सर्वनिष्ठ प्रगुण। संतत फलन एवं संहत समुच्चय, संबद्धता।
Unit -3	Solution of Equations: Bisection. Secant, Regula Falsi. Newton, Method. Roots of second degree Polynomials, Interpolation, Lagrange interpolation, Divided Differences, Interpolation formulae using Differences, Numerical Quadrature, Newton-Cote's Formulae, Gauss Quadrature Formulae.

18/2/16 18/2/16 Approved 18.2.16 18.2.2016

इकाई–3	समीकरणों के हल : द्विभाजन, सीकेंन्ट, रेग्युला फाल्सी तथा न्युटन विधि। द्वितीय घात बहुपदों के मूल । अर्न्तवेशन : लागरांज अर्न्तवेशन विभाजित अन्तर, अन्तर के उपयोग से अर्न्तवेशन सूत्र ,संख्यात्मक क्षेत्रकलन न्युटन कोर्ट्स सूत्र, गाउस क्षेत्रकलन सूत्र ।
Unit -4	Linear Equations: Direct Methods for Solving Systems of Linear Equations (Guass elimination, LU Decomposition. Cholesky Decomposition), Iterative methods (Jacobi. Gauss - Seidel Reduction Methods). Ordinary Differential Equations: Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method. Methods Based on Numerical Integration, Methods Based on numerical Differentiation.
इकाई–4	रैखिक समीकरण : रैखिक समीकरणों के निकाय को हल करने की प्रत्यक्ष विधियां (गाउस विलोपन, एल यू वियोजन, चोलेस्की वियोजन) पुनरावृती विधियां (जेकोबी, गाउस सिडेल) साधारण अवकल समीकरणः आयलर विधि, एकल चरण विधि, रुंग कुट्टा विधि, बहुचरण विधि, मिलने सिम्पसन विधि, संख्यात्मक समाकलन पर आधारित विधियां, संख्यात्मक अवकलन पर आधारित विधियां ।
Unit -5	**ELEMENTARY STATITICS** Measures of dispersion-range, inter quartile range, Mean deviation, Standard deviation, moments, skewness and kurtosis. Probability, Continuous probability, probability density function and its applications (for finding the mean, mode, median and standard deviation of various continuous probability distributions) Mathematical expectation, expectation of sum and product of random variables. Theoretical distribution- binomial, Poisson distributions and their properties and use, Moment generating functions.
इकाई -5	विक्षेपण की मापें: परिसर, अन्तः चतुर्थक परिसर , माध्य विचलन, मानक विचलन, आघूर्ण , विषमता तथा ककुदता, प्रायिकता, सतत प्रायिकता, प्रायिकता घनत्व फलन तथा उनके अनुप्रयोग (सतत प्रायिकता बंटन के लिये माध्य, बहुलक,माध्यिका तथा मानक विचलन ज्ञात करने के लिये) गणितीय प्रत्यशा ,यादृच्छिक चरों के योग एवं गुणन की प्रत्याशा। सैद्धांतिक बंटन–द्विपद,पॉयज़न बंटन तथा उसके गुणधर्म एवं उपयोग, आघूर्ण जनक फलन
	OR
Unit -5	**PRINCIPLES OF COMPUTER SCIENCE** Data Storage of bits Ram Memory. Mass srorage. Coding Information of Storage. The Binary System Storing integers fractions, communication errors. Data Manipulation - The Central Processing Unit The Stored Program concept. Programme Execution,. Anthmetic/Logic Instruction. Computer-Peripheral Communication. Operation System : The Evolution of Operating System.(Dos, Window) Operating System Architecture. Coordinating the Machine's Activities. Other Architectures.
इकाई -5	बीटों का डेडास्टोरेज, रेम स्मृति। वृहद भण्डारण। भण्डारण की कूटकृत सूचना। बायनरी सिस्टम । पूर्णांक, भिन्नांक का भण्डारण, संचारण त्रुटियां। डाटा मेनिपूलेशन–सेन्ट्रल प्रोसेसिंग यूनिट, भण्डारित प्रोग्राम अभिधारणा। प्रोग्राम का संचालन। गणितीय/तार्किक निर्देश। कम्प्यूटर–सह उपकरण (पेरीफेरल्स) के मध्य संचार। आपरेटिंग सिस्टमः का उद्भव (DOS, Windows) आपरेटिंग सिस्टम आर्किटेक्चर कम्प्यूटर मशीन की गतिविधियों का समन्वयन। अन्य आर्किटेक्चर
	OR

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Unit -5	**METHEMATICAL MODELING** The process of Applied Mathematics. Setting up first order differential equations. Qualitative solution sketching. Stability of solutions. Difference and differential equation models of growth and decay. Single species population model, Exponential and logistic population models.
इकाई -5	प्रयुक्त गणित की विधि। प्रथम कोटि अवकल समीकरण की स्थापना। गुणात्मक हल चित्रण। हलो का स्थायित्व। अंतर एवं अवकल समीकरण मॉडल का विकास एवं क्षय। एकल स्पाइसेस पापूलेशन मॉडल, एक्सोपोंनेशियल एवं लॉजिस्टिक पापूलेशन मॉडल्स

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उच्च शिक्षा विभाग, म.प्र. शासन

बी.एससी. / बी.ए. कक्षाओं के लिये एकल प्रश्नपत्र प्रणाली सेमेस्टर के अनुसार पाठ्यक्रम

केन्द्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

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

B.Sc./ B.A. Single Paper System Semester wise syllabus

As Recommended by central Board of studies and Approved by the Governor of M.P.

सत्र / Session : 2013-14

अधिकतम अंक / Max. Marks : 125

Class/ कक्षा	:	B.Sc. /B.A.
Semester/ सेमेस्टर	:	**V**
Title of subject Group / विषय समूह का शीर्षक	:	Mathematics
Title / शीर्षक	:	**Real Analysis, Linear Algebra and Discrete Mathematics**
Compulsory / अनिवार्य या Optional /वैकल्पिक	:	**Compulsory**

: Particulars/ विवरण :

Unit -1	Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus, Partial derivatives and differentiability of real-valued functions of two variables.
इकाई–1	रीमान समाकल, सतत एवं एकदिष्ट फलनों की समाकलनीयता, समाकलन का मूलभूत प्रमेय, समाकलनो के माध्यमान प्रमेय, दो चरों के वास्तविक मान फलनों के आंशिक अवकलज एवं अवकलनीयता ।
Unit -2	Schwarz and Young's theorem, Implicit function theorem, Fourier series of half and full intervals, Improper integrals and their convergence, Comparison test, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter.
इकाई–2	स्वार्ज एवं यंग के प्रमेय,अस्पष्ट फलन प्रमेय, अर्द्ध एवं पूर्ण अंतराल की फूरिये श्रेणी, विषम समाकल एवं उनका अभिसरण, तुलना परीक्षण, आबेल एवं डिरिक्ले का परीक्षण, फुलानी समाकल, प्राचलिक फलनों के रूप में समाकल ।
Unit -3	Definition and examples of vector spaces, subspaces, Sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis, Finite dimensional vector spaces, Existence theorem for basis, Invariance of the number of elements of a basis set, Dimension, Dimension of sums of vector subspaces.

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इकाई–3	सदिश समष्टि की परिभाषा एवं उदाहरण, उपसमष्टि, उपसमष्टियों का योग एवं सीधा योग । रैखिक विस्तृति, रैखिक आश्रितता, स्वतंत्रता एवं उनके मूल गुणधर्म। आधार, परिमित विमीय सदिश समष्टियॉं, आधार का अस्तित्व प्रमेय, आधार समुच्चय में अवयवों की संख्या की अपरिवर्तनशीलता । विमा, सदिश उपसमष्टियों के योग की विमा ।
Unit -4	Linear transformations and their representation as matrices, The Algebra of linear transformations, The rank- nullity theorem, Eigen values and eigen vectors of a linear transformation, Diagonalisation. Quotient space and its dimension.
इकाई–4	रैखिक रूपांतरण एवं उनका आव्यूह निरूपण, रैखिक रूपांतरणों का बीज गणित, जाति शून्यता प्रमेय, रैखिक रूपांतरणों के आयगन मान एवं आयगन सदिश, विकर्णीकरण विभाग समष्टि एवं उसकी विमा।
Unit -5	Binary Relations, Equivalence Relations, Partitions and Partial Order Relation . Graphs, Multigraphs, Weighted Graphs, Paths and Circuits, Shortest Paths. Trees and their properties.
इकाई–5	द्विचर संबंध, तुल्यता संबंध, विभाजन एवं आंशिक क्रम संबंध की ग्राफ, बहुग्राफ, भारित ग्राफ, पथ एवं परिपथ, लघुतम पथ, वृक्ष एवं उसके गुणधर्म ।

Text Books :

1. R.R Goldberg, Real Analysis, Oxford & IBH Publishing Co., New Delhi, 1970.
2. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.
3. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs,New Jersey.1971.
4. C.L. Liu,Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science scries 1986.
6. Narsingh Deo : Graph Theory, McGraw Hill.
7. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Book:-

1. T.M Apostol, Mathematical Analysis. Norosa Publishing House. New Delhi, 1
2. S. Lang. Undergraduate Analysis, Springer-Veriag, New York, 1983.
3. D. Somasundaram and B. Choudhary, A first Course in Mathematical Analysis. Narosa Publishing House, New Delhi 199 /.
5. Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.
6. RK. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi. 2000.
7. R. V. Churchill & J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hili New. York. 1990
8. Mark; J. Ablowitz & A. S. Fokas. Complex Variables : Introduction and Applications, Cambridge University Press, South Asian Edition, 1998
9. Ponnuswamy : Complex Analysis, Narosa Publishing Co.
10. Babu Ram, Discrete Mathematics, Vinayak Publication.
11. K.B. Datta. Matrix and Linear Algebra, Prentice hall of India Pvt Ltd., New Delhi, 2000.
12. S.K. Jain, A. Gunawardena & P.B. Bhattacharya. Basic Linear Algebra with MATLAB Key college Publishing (Springer-Verlag) 2001
13. S. Kumarsaran, Linear Algebra, A Geometric Approach Prentice – Hall of India, 2000

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उच्च शिक्षा विभाग, म.प्र. शासन

बी.एससी / बी.ए. कक्षाओं के लिये एकल प्रश्नपत्र प्रणाली सेमेस्टर के अनुसार पाठ्यक्रम

केन्द्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

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

B.Sc./ B.A. Single Paper System Semester wise syllabus

As Recommended by central Board of studies and Approved by the Governor of M.P.

Name of Paper	Theory (M.M.)	Mini Passing Marks in Theory	C.C.E.	Mini Passing Marks in CCE	Practical MM	Mini Passing M.	Total
Compulsory Metric Spaces and Numerical Analysis And Optional	125	42	25	8	----	----	150

Note: There are three sections in the question paper. All questions from each section will be compulsory.

Section –A (20 marks.) will contain 10 objective type questions , two from each unit, with the weightage of 2 marks.

Section –B (35 marks.) will contain 5 short answer type questions (each having internal choice), one from each unit having 7 marks.

Section –C (70 marks.) will contain 5 long answer type questions (each having internal choice), one from each unit, having 14 marks.

There should be at least 9 teaching periods per week.

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