COURSE STRUCTURE

Bachelor of Science

Mathematics

GOKUL GLOBAL UNIVERSITY, SIDHPUR

FACULTY OF SCIENCE

B.Sc. Semester – I Course Structure

MATHEMATICS DEPARTMENT

(IN EFFECT FROM ACADEMIC YEAR: 2021-22)

Semester	Subject Code	Study Component	Hrs./Week	Marks Pattern			Credit PerPaper
				Internal	Uni. Exam	Total	
Semester- I		**DISCIPLINE SPECIFIC COURSE (DSC)**					
	BMAT101UDSC	CORE COURSE- I (PAPER-I) (MATHEMATICS) DIFFERENTIALCALCULUS	4	30	70	100	4
	BPHY101UDSC	CORE COURSE- II (PAPER-II) (PHYSICS)MECHANICS AND BASIC ELECTRONICS	4	30	70	100	4
	BCHE101UDSC	CORE COURSE- III (PAPER-III) (CHEMISTRY) INORGANIC, ORGANIC, PHYSICAL &VOLUMETRIC ANALYSIS	4	30	70	100	4
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT101UPRA	PRACTICAL CORE COURSE- I (PAPER-I) (MATHEMATICS) MATHEMATICS PRACTICAL – I	4	--	50	50	2
	BPHY01UPRA	PRACTICAL CORE COURSE- II (PAPER-II) (PHYSICS) PRACTICAL MODULE-01	4	--	50	50	2
	BCHE101UPRA	PRACTICAL CORE COURSE- III (PAPER-IIII) (CHEMISTRY) PRACTICAL CORE COURSE-III(CHEMEISTRY)	4	--	50	50	2

	ELECTIVE COURSE (ES) **(CHOOSE ANY ONE)**					
BMAT101USE	ELECTIVE COURSE- I (COURSE-I) BUSINESS MATHEMATICS -I	2	15	35	50	2
	ELECTIVE GENERIC					
B101EG	ELECTIVE GENERIC: COMMUNICATION SKILLS	2	50	--	50	2

GOKUL GLOBAL UNIVERSITY, SIDHPUR

FACULTY OF SCIENCE

B.Sc. Semester - II Course Structure

MATHEMATICS DEPARTMENT

(IN EFFECT FROM ACADEMIC YEAR: 2021-22)

Semester	Subject Code	Study Component	Hrs./Week	Marks Pattern			Credit PerPaper
				Internal	Uni. Exam	Total	
Semester- II		**DISCIPLINE SPECIFIC COURSE (DSC)**					
	BMAT201UDSC	CORE COURSE- I (PAPER-III) (MATHEMATICS) INTEGRAL CALCULUS & DIFFERENTIAL EQUATION	4	30	70	100	4
	BPHY201UDSC	CORE COURSE-II (PAPER-II) (MATHEMATICS) INTEGRAL CALCULUS & DIFFERENTIAL EQUATION	4	30	70	100	4
	BCHE201UDSC	CORE COURSE- III (PAPER-III) (MATHEMATICS) INTEGRAL CALCULUS & DIFFERENTIAL EQUATION	4	30	70	100	4
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT201UPRA	PRACTICAL CORE COURSE- I (PAPER-II) (MATHEMATICS) MATHEMATICS PRACTICAL – II	4	--	50	50	2
	BPHY201UPRA	PRACTICAL CORE COURSE- II (PAPER-II) (PHYSICS) PRACTICAL MODULE-02	4	--	50	50	2

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BCHE201UPRA	PRACTICAL CORE COURSE- III (PAPER-II) (CHEMISTRY) PRACTICAL CORE COURSE-III(CHEMEISTRY)	4	--	50	50	2
	ELECTIVE COURSE (ES) (CHOOSE ANYONE)					
BCHE201USE	ELECTIVE SUBJECT- I (COURSE-I) MEDICINAL CHEMISTRY	2	15	35	50	2
BMAT201USE	ELECTIVE COURSE- I (COURSE-I) BUSINESS MATHEMATICS -II					
	ELECTIVE GENERIC					
B201EG	ELECTIVE GENERIC: DISASTER MANAGEMENT	2	50	--	50	2

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FACULTY OF SCIENCE

B.Sc. Semester – III Course Structure

MATHEMATICS DEPARTMENT

(IN EFFECT FROM ACADEMIC YEAR: 2022-23)

Semester	Subject Code	Study Component	Hrs./ Week	Marks Pattern			Credit Per Paper
				Internal	Uni. Exam	Total	
		DISCIPLINE SPECIFIC COURSE (DSC)					
	BMAT301UDSC	CORE COURSE- I (PAPER-I) (MATHEMATICS) **LINEAR ALGEBRA AND CALCULUS**	3	30	70	100	3
	BMAT302UDSC	CORE COURSE- II (PAPER-II) (MATHEMATICS) **NUMERICAL ANALYSIS**	3	30	70	100	3
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT301UPRA	PRACTICAL CORE COURSE- I (PAPER-I) (MATHEMATICS) **MATHEMATICS PRACTICAL -III**	3	--	50	50	3
		ELECTIVE COURSE (ES)					
	BMAT301USE	ELECTIVE COURSE- I (COURSEI) **BUSINESS MATHEMATICS -III**	2	15	35	50	2
		ELECTIVE GENERIC					
	B201EG	ELECTIVE GENERIC: PERSONALITY DEVELOPMENT	2	50	--	50	2

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B.Sc. Semester – IV Course Structure

MATHEMATICS DEPARTMENT

(IN EFFECT FROM ACADEMIC YEAR: 2022-23)

Semester	Subject Code	Study Component	Hrs./ Week	Marks Pattern			Credit Per Paper
				Internal	Uni. Exam	Total	
		DISCIPLINE SPECIFIC COURSE (DSC)					
	BMAT401UDSC	CORE COURSE- I (PAPER-I) (MATHEMATICS) **ADVANCED CALCULUS**	3	30	70	100	3
	BMAT402UDSC	CORE COURSE- II (PAPER-II) (MATHEMATICS) **ADVANCED LINEARALGEBRA**	3	30	70	100	3
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT401UPRA	PRACTICAL CORE COURSE- I (PAPER-I) (MATHEMATICS) **MATHEMATICS PRACTICAL -IV**	3	--	50	50	3
		ELECTIVE COURSE (ES)					
	BMAT401USE	ELECTIVE COURSE- I (COURSEI) **BUSINESS MATHEMATICS -IV**	2	15	35	50	2
		ELECTIVE GENERIC					
	B201EG	ELECTIVE GENERIC: HUMAN RIGHTS	2	50	--	50	2

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B.Sc. Semester – V Course Structure
MATHEMATICS DEPARTMENT
(IN EFFECT FROM ACADEMIC YEAR: 2020-21)

Semester	Subject Code	Study Component	Hrs./ Week	Internal	Uni. Exam	Total	Credit Per Paper
		DISCIPLINE SPECIFIC COURSE (DSC)					
	BMAT501DSC	CORE COURSE- I (PAPER-I) (MATHEMATICS) GROUP THEORY - I	3	30	70	100	3
	BMAT502DSC	CORE COURSE- I (PAPER-II) (MATHEMATICS) MATHEMATICAL ANALYSIS - I	3	30	70	100	3
	BCHE503DSC	CORE COURSE- I (PAPER-III) (MATHEMATICS) DIFFERENTIAL EQUATIONS	3	30	100	100	3
	BMAT504DSC	CORE COURSE- I (PAPER-IV) (MATHEMATICS) OPERATIONS RESEARCH - I	3	30	70	100	3
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT501PRA	PRACTICAL CORE COURSE- I (PAPER-V) (MATHEMATICS) MATHEMATICS PRACTICAL - V	6	--	200	200	6
		ELECTIVE COURSE (ES) (CHOOSE ANY ONE)					
	BMAT501SE	ELECTIVE SUBJECT- I (COURSE-I) BUSINESS MATHEMATICS - V	2	15	35	50	2
	BMAT502SE	ELECTIVE SUBJECT- II(COURSE-II) BUSINESS MATHEMATICS - VI					

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FACULTY OF SCIENCE

B.Sc. Semester – VI Course Structure

MATHEMATICS DEPARTMENT

(IN EFFECT FROM ACADEMIC YEAR: 2020-21)

Semester	Subject Code	Study Component	Hrs./ Week	Marks Pattern			Credit Per Paper
				Internal	Uni. Exam	Total	
				Internal	Uni. Exam	Total	
		DISCIPLINE SPECIFIC COURSE (DSC)					
	BMAT601DSC	CORE COURSE- I (PAPER-I) (MATHEMATICS)RING THEORY	3	30	70	100	3
	BMAT602DSC	CORE COURSE- I (PAPER-II) (MATHEMATICS) MATHEMATICAL ANALYSIS - II	3	30	70	100	3
	BMAT603DSC	CORE COURSE- I (PAPER-III) (MATHEMATICS)TOPOLOGY	3	30	100	100	3
	BMAT604DSC	CORE COURSE- I (PAPER-IV) (MATHEMATICS) OPERATIONS RESEARCH - II	3	30	70	100	3
		DISCIPLINE SPECIFIC PRACTICAL COURSE (PRA)					
	BMAT601PRA	PRACTICAL CORE COURSE- I (PAPER-VI) (MATHEMATICS) MATHEMATICS PRACTICAL - VI	6	--	200	200	6
		ELECTIVE COURSE (ES) (CHOOSE ANY ONE)					
	BMAT601SE	ELECTIVE SUBJECT- I (COURSE-I) BUSINESS MATHEMATICS - VII	2	15	35	50	2
	BMAT602SE	ELECTIVE SUBJECT- II (COURSE-II) BUSINESS MATHEMATICS - VIII					

GOKUL GLOBAL UNIVERSITY, SIDHPUR

Programme code :	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT101UDSC	Semester :	I

DIFFERENTIAL CALCULUS

Course type :	Discipline Specific Course	Total Credit :	04

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
60	----	30	70	100

Unit		Content	Hrs.	Weightage
1	**Matrices:**			
	1.1	Introduction of matrices, different types of matrices, Operations on matrices, theorems on matrices.		
	1.2	Symmetric and skew -symmetric matrices, Hermitian and skew-Hermitian matrices.		
	1.3	Linear dependence and independence of row and column matrices.		
	1.4	Row rank, Column rank and rank of matrix, Row reduced Echelon form of a matrix and matrix inversion using it.	**15**	**25%**
2	**Vector analysis:**			
	2.1	Vector analysis: scalar and vector product of three vectors, Product of four vectors.		
	2.2	Reciprocal vectors, vector differentiation.	**15**	**25%**
	2.3	Polar co-ordinates		
	2.4	Spherical and cylinder co-ordinates and their relations.		
3	**Successive differentiation:**			
	3.1	Successive Derivatives, Some standard results for n^{th} derivatives.	**15**	**25%**

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	3.2	Leibnitz's Theorem and its examples, Cauchy's Mean Value Theorem.		
	3.3	Taylor's Theorem (without proof), Maclaurin's series (without proof)and its examples		
	3.4	Expansion of power series of sinx, cosx, e^x		
4	**Geometry:**			
	4.1	**Sphere, Cone and Cylinder and introduction to Conicoids:** Plane section of sphere, intersection of two sphere, intersection of sphere and line, power at a point, tangent plane and normal Plane of contact, angle of intersection of two Spheres, condition of orthogonality.	15	25%
	4.2	**Cone:** Definition of cone, vertex, guiding curve, generators, equation of a cone with a given vertex and a guiding curve, right Circular cone with given vertex, axis and semi vertical angle.		
	4.3	**Cylinder:** Definition of a cylinder, equation of a cylinder whose generators intersect a given cone and are parallel to a given line equation of a right circular cylinder		
	4.4	**Conicoids**: Standard equation of ellipsoid, hyperboloid of one and two sheets, Elliptic cone and are parallel to a given line, equation of a right circular cylinder.		

Reference Books:

1. Shantinarayan: Text book of Matrices, S. Chand and Co.
2. Vector Analysis, by Murry R. Spiegel.
3. Vector Analysis, by Dr. K. S. Rawat, SARUP& SONS, DELHI
4. Gorakhprasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad

Course Outcomes: At the end of the course, students shall be able to

CO1	The students will be solve differentiable equation, define power series and solve other equation of cone, sphere.
CO2	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bendiness of a curve.
CO3	Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods

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CO4	Learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	1	1	2		2	2	3	
CO2		3					1	1	1		2
CO3				1	2	2	1	1			1
CO4	3	3	1	2		1			1	2	

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Programme code:	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT101USE	Semester :	I
Business Mathematics – I			
Course type :	Elective Course	Total Credit :	02

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
30	----	15	35	50

Unit	Content	Hrs.	Weightage
1	**Differentiation:** Definition of derivatives of function (x), Derivative of definition. Derivatives of function of the type x^n, a^x and $\log x$ (without proof). Rules of differentiation (without proof). Logarithmic differentiation. Maxima and Minima. Cases of one variable involving second order derivative.	15	50%
2	**Business Application of Derivatives:** Mathematical functions of demand and supply, price elasticity of demand and supply, Cost functions-average, marginal cost, marginal revenue and average revenue and their relationship with Elasticity of demand. Market equilibrium, Monopoly problems.	15	50%

List of References:

1. Business Statistics by Rana, Dalal and others By SudhirPrakashan, Ahmedabad.
2. Hooda R.P.: Statistics for Business and Economics, Macmillan, New Delhi.
3. Levin and Rubin: Statistics of Management, Prentice-Hall of India, New Delhi

Course Outcomes: At the end of the course, students shall be able to

CO1	Understanding the application of Differentiation.
CO2	Know about the Business Application of Derivatives.
CO3	Study and use Hedging parameters, trading strategies and currency swaps.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2	3		1	1	2	3	
CO2		3			2	2			1		3
CO3	3	3	1	2	1		1	1		2	

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Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT201UDSC	**Semester :**	II
INTEGRAL CALCULUS & DIFFERENTIAL EQUATION			
Course type :	Discipline Specific Course	**Total Credit :**	04

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
60	----	30	70	100

Unit		Content	Hrs.	Weightage
1		**Integration:**	15	25%
	1.1	Reduction formula: $$\int_0^{\frac{\pi}{2}} sin^n\theta \, d\theta, \int_0^{\frac{\pi}{2}} cos^n\theta \, d\theta, \int_0^{\frac{\pi}{2}} sin^m\theta \, cos^n\theta \, d\theta, \, m, n \in N$$		
	1.2	Application of definite integrals to :Summation of the series		
	1.3	Application of definite integrals to :Rectification		
	1.4	Application of definite integrals to : Surface and volume revolution		
2		**De 'Morve's theorem and its applications:**		
	2.1	Roots of a complex number		
	2.2	Application of Expansion of $sin^n\theta$, $cos^n\theta$, $n \in N$ in terms of sine and cosine of multiples of θ		

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	2.3	Expansion of sin , cos $n\theta$ and tan$n\theta$ in terms power of sine, cosineand tangent respectively.		
	2.4	Exponential, Circular and hyperbolic function, Logarithmic and inverse functions	15	25%
3	**Linear Differential Equation:**			
	3.1	Linear differential equation $\frac{dy}{dx} + Py = Q \cdot P$ and Q are functions of x, Bernoulli's differential equation		
	3.2	Differential equation of first order and higher degree solvable For x, solvable for y, solvable for $P = \frac{dy}{dx}$.	15	25%
	3.3	Solution of Clairaut's and Lagrange's differential equation.		
	3.4	Linear differential equation with constant coefficients.		
4	**Sequence and series:**			
	4.1	Definition of sequence & series.		
	4.2	Definition of convergence and divergence of sequence and series, Partial sum	15	25%
	4.3	Application of Comparison test, ratio test, root test and its examples.		

Course Outcomes: At the end of the course, students shall be able to

CO1	Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
CO2	Compare and contrast the ideas of continuity and differentiability
CO3	To inculcate to solve algebraic equations and inequalities involving the sequence root and modulus function.
CO4	Solve basic application problems described by second order linear differential equations with constant coefficients.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		1	2	2			2	2	3	
CO2		3	2		1		1		2		2
CO3	3	3		2		2	1	2		2	
CO4			1		1	2		1	1		2

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GOKUL GLOBAL UNIVERSITY, SIDHPUR

Programme code:	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT201USE	**Semester :**	II
Business Mathematics – II			
Course type :	**Elective Course**	**Total Credit :**	02

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
30	----	15	35	50

Unit	Content	Hrs.	Weightage
1	**Integration: (Only examples)**	**15**	**50%**
	Indefinite Integral: Definition, Working rules of integration, integration of x^n, a^n, e^x integration of $\frac{1}{x^2 \pm a^2}$, $\frac{1}{\sqrt{x^2 \pm a^2}}$, $\frac{1}{\sqrt{a^2 - x^2}}$, $\frac{1}{|x|\sqrt{x^2 - a^2}}$ Integration of trigonometric functions , integration by method of substitution **Some standard results:** $\int [f(x)]^n f'(x) dx, \int \frac{f(x)}{f'(x)} dx, \int \frac{1}{ax^2 + bx + c} dx, \int \frac{1}{\sqrt{ax^2 + bx + c}} dx.$		
2	**Permutations and Combinations: [only examples]**	**15**	**50%**
	Fundamental rules of counting, Definition of Permutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results andexamples.		

List of References:

1. Business Mathematics by. D. C. Sancheti & V. K. Kapoor, Sultan Chad & Sons Publication,New Delhi.
2. Business Mathematics by. B. S. Shah Prakashsan, Ahmedabad.
3. Any Advance Calculus books used in Science Streme.

Course Outcomes: At the end of the course, students shall be able to

CO1	Understanding the application of Integral Calculus.
CO2	find indefinite integration by using direct formulae
CO3	Know about the Permutations and Combinations.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3		2				2	2	3	
CO2	3		2		1	2	1		1		2
CO3		3	2		1		2		2	3	

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Programme code :	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT301UDSC	**Semester :**	III
Linear Algebra And Calculus			
Course type :	Discipline Specific Course	**Total Credit :**	03

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Credit	Weightage
1	**Vector Space And Linear Transformation:** Vector spaces, Subspaces, Span of a set, More about subspaces, Linear dependence and Independence, Dimension and Basis. Definition and examples of linear transformation, Range and kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Consequences of a Rank-nullity theorem, The space L(U,V),Composition of a linear map, Operator equations.	1	33%
2	**Limit , Continuity And Partial Derivatives:** Function of severable variables, their limits and continuity, Partial derivatives, Differentiability and Differential, Conditions for commutativity of independent variables in higher ordered derivatives, Derivatives of implicit functions, Schwarz theorem	1	33%
3	**Application Of Partial Derivatives:** Euler's theorem on homogeneous function, Young's theorem, Extreme of function of severable variables, Application of Lagrange's method of undetermined multiplies, Tailor and Maclaurin's expansion for function of two variables, Tangent line and normal plane to twisted curves, Tangent plane and normal to surfaces.	1	34%

Reference Books:

1. ' Differential Calculus' by Shantinarayan, S. Chand , New Delhi
2. ' An Introduction to Linear Algebra, by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi
3. Advanced Calculus, R C Buck, Mac Millan
4. Kalan Shashtra Part I , D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati)
5. Kalan Shashtra Part Il, A M Vaudya and V H Pandya, University Granth Nirman Board
6. Linear Algebra Problem Book, P R Holmos, Cambridge University Press
7. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
8. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut

Course Outcomes: At the end of the course, students shall be able to

CO1	Linear Algebra emphasizes the concept of vector spaces and linear transformations which are essential in simplifying various scientific problems.
CO2	It aims at inculcating problem solving skills within students to enable them compute large linear systems.
CO3	Vector calculus motivates the study of vector differentiation and integration in two and three dimensional spaces.
CO4	Understand the combination of two important aspects of modern mathematics via Linear Algebra and Vector Calculus.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2		2		2	2	3	
CO2		3			1		1		1		2
CO3	3		2	2	2				1	2	
CO4		3	1		1		1	1			2

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Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT302UDSC	**Semester :**	III
Numerical Analysis			
Course type :	Discipline Specific Course	**Total Credit :**	03

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Credit	Weight
1	**Finite Differences table and theory of interpolation:** Ascending and Descending differences , Symbolic operators Difference of polynomial, Factorial polynomials, Gregory-Newton's forward and backward interpolation formula	1	33%
2	**Divided Differences:** Newton's divide difference interpolation formula, Lagrange's interpolation formula for equal and unequal intervals. **Central Differences Interpolation Formula:** Gauss forward and backward interpolation formula, Stirling interpolation formula, Bessel's interpolation formula.	1	33%
3	**Numerical Differentiation and Integration & Numerical Solution of ordinary differentiation equation:** Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Picard's method, Taylor's method, Euler's Method, Modified Euler's Method	1	34%

Reference Books:

1. Numerical Analysis by Kunz, McGraw Hill
2. Numerical Analysis by R. Gupta, Anmol Pub. Pvt.Ltd, New Delhi.
3. Numerical Analysis P. N. Chatterjiaeons Prakashanmandir, Meerut.
4. Methods in Numerical Analysis K. W. NelsonMac-Millan

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5. Numerical Methods Dr. V. N. Vedomurthy, Vikas Publishing House Pvt. Ltd .
6. Numerical Methods in Engineering and Science, Dr. B. S. Grewal, Khanna Pub.

Course Outcomes: At the end of the course, students shall be able to

CO1	The course will cover the classical fundamental topics in numerical methods such as, approximation, numerical integration, and numerical linear algebra, solution of nonlinear algebraic systems and solution of ordinary and partial differential equations.
CO2	Understand the difference operators and the use of interpolation
CO3	Code a numerical method in a modern computer language.
CO4	Evaluate a derivative at a value using an appropriate numerical method

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2		2		2	1	3	
CO2		3		2	1		1		1		2
CO3	3			1		1		1		2	
CO4		3	1			1	2	1	1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR			
Programme code:	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT301USE	**Semester :**	III
Business Mathematics – III			
Course type :	Elective Course	**Total Credit :**	02

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
30	----	15	35	50

Unit	Content	Credit	Weight
1	**Logic and Set Theory: [only examples]**	**1**	**50%**
	Logic: Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements. **Set Theory:** Definition and methods of sets, types of sets, Venn diagrams, Operations on sets, De-Morgan's law, Finite and infinite sets.		
2	**Transportation Problem:**	**1**	**50%**
	Meaning, Definition, Uses and Mathematical form of the Transportation Problem, Obtaining the initial feasible solution by North-West corner rule, Least cost method and Vogel's approximation methods.		

List of References:

1. Business Mathematics. By D. C. Sancheti & V. K. Kapoor, Sultan Chad & Sons Publication, New Delhi.
2. Business Mathematics. By. B. S. Shah Prakashsan, Ahmedabad.
3. Operations Research, By. J. K. Sharma. Macmillan Publishers India Ltd.

Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the importance of Leaders and Leadership in the context of Business Organizations.
CO2	Know about the Permutations and Combinations.
CO3	Understand the important role Mathematics plays in all facets of the business world

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2		2	1	2	2	3	
CO2		3			1	2			2		2
CO3	3	3		2		1		1		1	

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GOKUL GLOBAL UNIVERSITY, SIDHPUR

Programme code :	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT401UDSC	**Semester :**	IV
Advanced Calculus			
Course type :	Discipline Specific Course	**Total Credit :**	03
Teaching time (hours)		**Examination Marking scheme**	

Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
45	----	30	70	100

Unit	Content	Credit	Weight
1	**Curvature & Radius Of Curvature:** Curvature of Plane curve, Radius of curvature of plane curve, Singular point of plane curve, Point of inflexion for plane curve. **Improper Integral:** Beta function and Gamma function, Convergence of Beta function and Gamma function, Relation between them, Its Simple properties and applications, Several forms of Beta function.	1	33%
2	**Multiple Integral:** Double Integral, Integral on non-rectangle regions, transformation to polar coordinate, Change of the order of integration, Triple integration and transformation to polar and cylindrical co – ordinate.	1	33%
3	**Vector Analysis, Line & Surface Integral:** Gradient of scalar function, Divergence and Curl of a vector function, Line integral, Surface Integral, Green's theorem, Stoke's and Gauss's Theorem.	1	34%

Reference Books:

1. Integral Calculus, Shantinarayan S. Chand, New Delhi (Course Book)
2. Advanced Calculus, D V Widder , Prentice Hall , New Delhi
3. Advanced Calculus Vol : I & II, T M Apostol, Blaisdoll
4. Advanced Calculus, R C Buck, MacMillan.
5. Kalan Shashtra Part I , D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati)
6. Kalan Shashtra Part Il, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati)

Course Outcomes: At the end of the course, students shall be able to

CO1	Perform the vector calculus operations by applying addition, subtraction, scalar multiplication, dot product, and cross product.
CO2	Take derivatives of multivariable functions by using appropriate rules.
CO3	Work with power series by applying the iterated derivatives.
CO4	Students will be able to perform vector calculus operations by partial derivatives, and matrix partial derivatives.
CO5	Do double and triple integrals by applying appropriate methods and rules. Students will be able to differentiate vectors to understand gradient, divergence and curl by using the appropriate rules.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2	2		1	2		3	
CO2		3			1	2			2		2
CO3	3		1				1		1	2	
CO4		3	1		1	2		2			1
CO5	3			1	2		2		2		2

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GOKUL GLOBAL UNIVERSITY, SIDHPUR

Programme code :	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT402UDSC	**Semester :**	IV
Advanced Linear Algebra			
Course type :	Discipline Specific Course	**Total Credit :**	03

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Credit	Weight
1	**Matrices of a Linear Transformation:** Definition of a Matrix of a linear transformation, Linear Transformation associated with a matrix, the dimension of L(U,V) and its determination, Rank and Nullity of a Matrix, invertibility of system of linear equations.	1	33%
2	**Linear Functional And Duality:** Definition of linear functional and its examples, Definition of Dual space and Dual basis and its examples, Adjoint of a linear operator, its properties and examples. **Inner Product Space:** Definition of inner product space, Norm, Orthogonality, Schwarz's & Triangular inequality, Parallelogram law, Orthonormal basis, Gram-Schmidt Orthogonalization Process (Without proof) and its examples	1	33%
3	**Eigen Values And Eigen Vectors:** Eigen values and Eigen vectors of a linear transformation, Characteristic polynomial, Cayley – Hamilton theorem, Finding inverse of a matrix using Cayley – Hamilton theorem, minimal polynomial deductions.	1	34%

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Reference Books:

1. An Introduction to Linear Algebra' by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi
2. Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mac Graw Hill.
3. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
4. Linear Algebra, S K Berberion, Oxford University Press.
5. Linear Algebra Problem Book, P R Holmos, Cambridge University Press.
6. Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut.

Course Outcomes: At the end of the course, students shall be able to

CO1	Solve an algebraic or transcendental equation using an appropriate numerical method.
CO2	Calculate a definite integral using an appropriate numerical method.
CO3	Approximate a function using an appropriate numerical method.
CO4	Evaluate a derivative at a value using an appropriate numerical method.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3	2	2		2	1	2		3	
CO2	3		2		1		2		2		2
CO3		3		1		1			1	2	
CO4	3		1	2			1		1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR

Programme code:	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT401USE	Semester :	IV
Business Mathematics – IV			
Course type :	Elective Course	Total Credit :	02

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
30	----	15	35	50

Unit	Content	Credit	Weight
1	**Laplace Transformation: (Only examples)**	1	50%
	Laplace transform- Definition and its properties. Rules of manipulation. Laplace transform of derivatives and integrals.		
2	**Inverse Laplace Transformation: (only examples)**	1	50%
	Properties of inverse Laplace transform. Convolution theorem. Solve Differential equation using Laplace Transforms		

Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the concept of Laplace Transforms, Inverse Laplace Transform and its application.
CO2	Understand the important role Mathematics plays in all facets of the business world
CO3	Understand the different Determinants of Individual Behavior and how these can be used for the benefit of the Organization

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3		2	2		1		2	3	

| CO2 | 3 | | | 1 | | 1 | 1 | | 2 |
| CO3 | 3 | | 2 | 1 | 1 | | 1 | | 1 |

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Programme code :	BMAT	Programme Name :	B.Sc. Mathematics
Course Code	BMAT501DSC	Semester :	V

Group Theory – I

Course type :	Discipline Specific Course	Total Credit :	03

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weightage
1	**Groups and Subgroups:** Definition and examples of a group including permutation groups and quaternion groups, Elementary properties of groups, Subgroups and examples of subgroups,	**15**	**33%**
2	**Permutation Groups:** Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating groups; Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem; Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.	**15**	**33%**
3	**Cyclic Groups and Group Homomorphisms:** Properties of cyclic groups, Classification of subgroups of cyclic groups. Generator of a cycle group. Group homomorphisms, Properties of homomorphisms, Group isomorphisms, Cayley's theorem. Definition of an isomorphism of a group and its illustrations Properties of isomorphisms, Isomorphism of cyclic groups, First, Second and Third isomorphism theorems for groups.	**15**	**34%**

Reference Books:

1. Gallian, Joseph. A. (2013). Contemporary Abstract Algebra (8th ed.). Cengage Learning India Private Limited, Delhi. Fourth impression, 2015.
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.

3. Artin, M., Algebra, Prentice Hall of India, 1991.
4. Jacobson, N., Basic Algebra, Vol. II, Hundastan Publ. Co., Delhi,1984.
5. P. B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra (2/e), Cambridge University Press, South Indian Edition 2002.

Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the concept of group & a finite cyclic group.
CO2	Extend group structure to finite permutation groups.
CO3	Solve problem in group theory & prove new definitions and theorems.
CO4	Understand, formulate and use quantitative models arising in social science, business and other contexts

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2		2		2	2	3	
CO2		3	2		1		1	1			2
CO3	3	3		1		1			1	2	
CO4	3		2	1		1		1			1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR				
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics	
Course Code	BMAT502DSC	**Semester :**	V	
Mathematical Analysis – I				
Course type :	Discipline Specific Course	**Total Credit :**	03	
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weightage
1	**Number System:** The real field to be developed by ordered set approach, Equivalence of this approach and Dedikind's approach, Extended real number system, The complex number system, Euclidean spaces..	**15**	**33%**
2	**Basic Topology:** Finite, Countable and Uncountable sets, Metric space, Neighborhoods in metric spaces, Limit point of a set, Open, Closed, Bounded, Compact, Perfect, Connected and Convex subsets of metric spaces	**15**	**33%**
3	**Sequences and Series:** Convergence sequence, Sub sequences, Cauchy sequences, Upper and lower limits, Special sequences and Series, Series of non negative terms, Roots and Ratio Test. Power Series with Real (Complex) terms, Interval (circle) of convergence and radius of convergence of a power series, Summation by parts, absolute convergence, addition and multiplication of series.	**15**	**34%**

Reference Books:

1. "Principles of Mathematical Analysis" by Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.

2. "A First Course in Mathematical Analysis" by D. Somasundaram & B. Choudhary, Narosa Publishing House
3. "Fundamentals of Mathematical Analysis" by G. Das & S. Pattnayak Tata Mcgraw Hill Pub.Co
4. "Fundamental of Real Analysis" by S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.

Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the concept of number system.
CO2	Develop an understanding of basic topology.
CO3	Gain knowledge about sequence and series.
CO4	To learn basic properties of real numbers and its subsets which is backbone of Real Analysis.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3		2		2	1	2		3	
CO2	3		2	1		2		1	2		2
CO3	3	3			1		1			2	
CO4		3	1		1				1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR				
Programme code :	BMAT	**Programme Name :**		B.Sc. Mathematics
Course Code	BMAT503DSC	**Semester :**		V
Differential Equation				
Course type :	Discipline Specific Course	**Total Credit :**		03
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70 (Paper of 3 hrs)	100

Unit	Content	Hrs.	Weight
1	Formation of Differential Equations, Symbolic Operator, Method of finding C.F., Sybolic Operator $1/f(D)$, Method of finding P.I., Shorter method of finding P.I., To find P.I. when $X = e^{ax}$, where a is constant, To finding P.I. when $X = Cosax$ or $Sinax$, To find the value of $1/f(D).x^m$, where m is positive integer, To find the value of $1/f(D).(e^{ax}V)$, where a is constant and V is a function of x. To evaluate $1/f(D).(XV)$, where V is a function of x.	15	33%
2	Condition of Exactness of the linear differential equations, Solution of non-linear equations which are Exact, Equations of the form $y^{(n)} = f(x)$, Equations of the form $y^{(2)} = f(y)$, Equation do not contain y directly, Equation that do not contain x directly, Equation in which y appears in only two derivatives whose orders differ by two, Equation in which y appears in only two derivatives whose order differ by unity.	15	33%
3	Method of solving $y^{(2)} + Py^{(1)} + Qy = R$ when an integral included in the C.F. is known, Method of solving $y^{(2)} + Py^{(1)} + Qy = R$ by changing the dependent variable, $y^{(2)} + Py^{(1)} + Qy = R$ by changing the independent variable, Solution by factorization of the Operator, Method of variation of Parameters, Method of Undetermined Co-efficient.	15	34%

Reference Books:

1. Erwin Kreyszing, Advanced Engineering mathematics, By. John Wiley & Sons Inc. New York, 1999.
2. D.A.Murray, Introductory course on Differential Equations, By. Orient Longman,(India), 1967.
3. A.R.Forsyth, A Terastise on Differential Equations, Macmillan and Co.Ltd., London.
4. Ian N. Sneddon, Elements of partial Differential Equations, McGraw-Hill Book Compony, 1998.

Course Outcomes: At the end of the course, students shall be able to

CO1	Will be able to explain the concept of differential equation.
CO2	Can solve the problems of linear differential equations.
CO3	Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
CO4	Solve simultaneous linear equations with constant coefficients and total differential equations.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3		2		2	1	2		3	
CO2	3		2	1		2		1	2		2
CO3	3	3			1		1			2	
CO4		3	1		1				1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR				
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics	
Course Code	BMAT504DSC	**Semester :**	V	
Operations Research – I				
Course type :	Discipline Specific Course	**Total Credit :**	03	
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70 (Paper of 3 hrs)	100

Unit	Content	Hrs.	Weightage
1	Introduction: Nature and scope of Operations Research. Linear programming: (a) LP Model and method of solution- Graphical method, Slack-Surplus and unrestricted variables, Simplex Algorithm, Simplex Method	15	33%
2	Artificial Slack variables, Two phase method, Big-M / Penalty method, Variation in simplex method solution- unbounded, infeasible solutions and concept of degeneracy	15	33%
3	(a) Duality Theory-The essence of duality theory, primal-dual relationships, Duality theorems, Dual simplex method. (b) Integer Programming- The need of integer solutions, The concept of the Cutting – Plane, Gomory's Cutting Plane Algorithm	15	34%

Reference Books:

1. Operations Research , by. J. K. Sharma. Macmillan Publishers India Ltd.
2. Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.

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3. Operations Research (Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Course Outcomes: At the end of the course, students shall be able to

CO1	Solve real world problems using different Mathematical technique.
CO2	Be able to build and solve Transportation Models and Assignment Models.
CO3	Define basic components of Network and find critical path
CO4	Define queue characteristics , transient and steady state

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2	2		1		2		3
CO2		3			1	1			1	3	
CO3	3		1							2	
CO4	3	3				2	1		1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR				
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics	
Course Code	BMAT501SE	**Semester :**	V	
Business Mathematics – V				
Course type :		Elective Course	**Total Credit:**	02
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
30	---	15	35	50

Unit	Content	Hrs.	Weightage
1	**Probability: (Only examples)**	**15**	**50%**
	Classical- Statistical (or Empirical)- Axiomatic (Modern) definition of probability, Definitions of event, equally likely, mutually exclusive and exhaustive events, Probability theorems, Statements of Baye's theorem and its examples, Conditional probability and its examples.		
2	**Probability Distribution: (only examples)**	**15**	**50%**
	Definitions of a Random variable, Probability Distribution of a random variable, Binomial distribution, Poisson distribution, Normal distribution, Exponential distribution and its examples.		

List of References:

1. Business Statistics, by Bharat Jhunjhunwala, S. Chand Prakashan.
2. Business Statistics, by R.S. Bhardwaj
3. Statistics (Chapter – 18 & 19) by, R.S.N.Pillai & V. Bagavathi,S. Chand & Company, New- Delhi

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Course Outcomes: At the end of the course, students shall be able to

CO1	Calculating the degree of certainty of events in ideal conditions.
CO2	Solve Business and finance problems.
CO3	After completion of this course students will be able to

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3	2	2		2	1	2			3
CO2	3		2		1		1		2	2	
CO3	3			1		2			1	2	

GOKUL GLOBAL UNIVERSITY, SIDHPUR				
Programme code :	BMAT		**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT601DSC		**Semester :**	VI
Ring Theory				
Course type :	Discipline Specific Course		**Total Credit :**	03
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weight
1	Definition of a Ring and illustrations, Properties of a Ring, Zero divisors and Integral domain, Characteristic of an Integral Ring, Solution of the equation ax = b in a ring R, Subrings, Ideals, Quotient ring,	**15**	**33%**
2	Introduction of Polynomials, Integral Domain D[x], Familiar form of Integral domain D[x], Unique factorization of Polynomials, Solutions of a Polynomial Equation, Eisenstein Criterion for irreducibility	**15**	**33%**
3	Homomorphism: Definition and some examples, Kernel of homomorphism, Homomorphism of rings, Isomorphism of rings, Fundamental theorem on homomorphism, homomorphism and characteristic., Maximal Ideal, Prime Ideal.	**15**	**34%**

Reference Books:

1. Gallian, Joseph. A. (2013). Contemporary Abstract Algebra (8th ed.). Cengage Learning India Private Limited, Delhi. Fourth impression, 2015.

2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
3. Artin, M., Algebra, Prentice Hall of India, 1991.
4. Jacobson, N., Basic Algebra, Vol. II, Hundastan Publ. Co., Delhi,1984.
5. P. B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra (2/e), Cambridge University Press, South Indian Edition 2002

Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the concept of group & a finite cyclic group.
CO2	Extend group structure to finite permutation groups.
CO3	Solve problem in Ring theory & prove new definitions and theorems.
CO4	To study the Rings of polynomials and its factorization over a field.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3	2	2			1	1	1		3
CO2	3		2		1	2		1		2	
CO3		3		1		1				2	
CO4	3	3	1				1	1			1

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Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT602DSC	**Semester :**	VI
Mathematical Analysis – II			
Course type :	Discipline Specific Course	**Total Credit :**	03

Teaching time (hours)		Examination Marking scheme		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weight
1	**Limits and Continuity:** Limits and Continuity for a functions from a metric space into another metric space, continuity of a composite function, Structural properties of continuous functions from a metric space in to Rk, Continuity and Compactness, Continuity and connectedness, Discontinuities, Monotonic function, Discontinuities of a monotonic function, Infinite limits and limits at infinity. **Differentiation:** Derivatives of a real function, Continuity and differentiability, Structural properties of the class of differentiable functions, Mean value theorems, Continuity of derivatives, L'Hospital rule, Derivatives of higher order, Taylor's theorem.	15	33%
2	**The Riemann – Stieltje's Integral:** Riemann integral and Stieltje's integral, properties of Riemann integral and Stieltje's integral, Integration and Differentiation, Integration of Vector Valued Functions, Rectifiable curves.	15	33%
3	**Sequences and Series of functions:** Sequences of functions, Limit of a Sequence of functions, Uniform convergence, tests for uniform convergence and continuity, Uniform convergence and differentiation.	15	34%

Reference Books:

1. Principles of Mathematical Analysis, Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.
2. A First Course in Mathematical Analysis, D. Somasundaram & B. Choudhary, Narosa Publishing House.
3. Fundamentals of Mathematical Analysis, G. Das & S. Pattnayak Tata Mcgraw Hill Pub.Co
4. Fundamental of Real Analysis, S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.
5. Principle of Real Analysis, S.C.Malik , Wiley Eastern Limited New Delhi, 1982.

Course Outcomes: At the end of the course, students shall be able to

CO1	Define metric and metric space.
CO2	Develop an understanding of Riemann – Stieltje's integral.
CO3	Gain knowledge about sequence and series of function.
CO4	To be able to check continuity of a function.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1		3	2	2			1	1	1		3
CO2	3		2		1	2		1		2	
CO3		3		1		1					2
CO4	3	3	1				1	1			1

GOKUL GLOBAL UNIVERSITY, SIDHPUR			
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT603DSC	**Semester :**	VI
Topology			
Course type :	Discipline Specific Course	**Total Credit :**	03
Teaching time (hours)		**Examination Marking scheme**	

Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weight
1	pology and Topological space, Neighbourhoods, Hausdorff space, Closure of a subset of a Topological space.	15	33%
2	erior of a subset of Topological space, Boundary of a subset of a Topological space, Continuity of a function from Topological space to Topological space, Homeomorphism between two Topological spaces.	15	33%
3	Subspace of a Topological space, connectedness of a Topological spaces, Some applications of connectedness, Components of a point of connected Topological space.	15	34%

Reference Books:

1. Introduction to Topology and Modern Analysis, by. "G F Symmons"., New York McGrawHill, 1963
2. General Topology by Kelly J L , NewYork, Van Nostrand 1955
3. Elementary topology by Beackett D W., new York Academic Press, 1967.

Course Outcomes: At the end of the course, students shall be able to

CO1	Demonstrate an understanding of the concepts of metric spaces and topological spaces,and their role in mathematics.
CO2	Demonstrate familiarity with a range of examples of these structures.
CO3	Prove basic results about completeness, compactness, connectedness and

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	convergence within these structures.
CO4	The Definition and some examples, Elementary concepts, Open bases and Open sub bases, Weak topologies.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2	2		2	1		1	3	
CO2	3	3	2		1		1		1		2
CO3		3		1		1		2		2	
CO4	3		1	2			1		1		1

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GOKUL GLOBAL UNIVERSITY, SIDHPUR			
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT604DSC	**Semester :**	VI
Operations Research – II			
Course type :	Discipline Specific Course	**Total Credit :**	03
Teaching time (hours)		**Examination Marking scheme**	

Theory (hrs)	Practical (hrs)	Internal (Marks)	External (Marks)	Total (Marks)
45	----	30	70	100

Unit	Content	Hrs.	Weight
1	**Transportation Problem:** Introduction, general method of a T.P., unbounded T.P. NWCM, Least cost method, VAM methods to find the initial solution, Dual of a T.P. and MODI method, degeneracy in a T.P., variations in T.P. Maximization T.P. and Prohibited routes. **Assignment Problem**: General model of A.P. (A.P. as a special case of a T.P.) Hungarian Method of solving a A.P., variations in a A. P maximization, prohibited assignments	15	33%
2	**Sequencing Problem:** Methods of sequencing, Johnson's Algorithm for a two machine problem, three machine problem and M-machine problem, Processing Two jobs through M-machines.	15	33%
3	**Game Theory:** Introduction, Two-person zero games, Minimax and Maximin principles, saddle point theorems, mixed strategies, method for solution of 2×2 game, dominance principles, solution of games without saddle points by using dominance and then mixed strategies, graphical method of solving $2\times m$ and $m\times2$ game, L.P. solution of games.	15	34%

Reference Books:

1. Operations Research , by. J. K. Sharma. Macmillan Publishers India Ltd.
2. Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.
3. Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press

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Course Outcomes: At the end of the course, students shall be able to

CO1	Understand the concept of transportation models and assignment problem.
CO2	Develop an understanding of sequencing problems.
CO3	Gain knowledge about game theory and dominance principle.
CO4	This helps them to get optimum solutions within the given constraints to problems arising in industry.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3		2		2		2	2		3
CO2		3	2		1		1				2
CO3	3			1		1			1	2	
CO4		3	1				1		1		2

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GOKUL GLOBAL UNIVERSITY, SIDHPUR			
Programme code :	BMAT	**Programme Name :**	B.Sc. Mathematics
Course Code	BMAT601SE	**Semester :**	VI
Business Mathematics – VII			
Course type :	Elective Course	**Total Credit:**	02
Teaching time (hours)		**Examination Marking scheme**	

Theory	Practical	Internal	External	Total
(hrs)	(hrs)	(Marks)	(Marks)	(Marks)
30	----	15	35	50

Unit	Content	Hrs.	Weight
1	**LPP Formulation & Graphical Method: (Only examples)** Introduction, Structure of linear programming problems, Important terms used in L P Problems, Objective function, constraints, Solution, feasible solution, Basic solution, BFS, Non-degenerate B.F.S, Degenerate solution, Infeasible, Unbounded & Multiple optimal solution, Slack & Surplus variables, Artificial variable, Formulation of LPP & a solution by Graphical method.	**15**	**50%**
2	**Correlation & Regression analysis: (Only examples)** Definition of correlation, positive & negative correlation, Scatter diagram, Carl – Pearson's coefficient of linear correlation, Properties of correlation coefficients and its examples, regression coefficient, properties of regression coefficient and its examples.	**15**	**50%**

List of References:

1. Operation Research, by J. K. Sharma.
2. Business Statistics , by R. S. Bhadyaj
3. Business Statistics , by Bharat Jhnujhunwala

Course Outcomes: At the end of the course, students shall be able to

CO1	Develop linear programming (LP) models for shortest path, maximum flow.
CO2	Analysis the general nonlinear programming problems.
CO3	Formulate the nonlinear programming models.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3		2		2		1		2		3
CO2		3		1		2	1		1	2	
CO3	3	3		1		1				2	