BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH

FACULTY OF SCIENCE

SYLLABUS FOR

MATHEMATICS

(CBCS)

BACHELOR OF SCIENCE

(Semester - 3)

(Three Year Full Time Course)

With Effect From June-2019

(2019-20)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY – JUNAGADH

Faculty: Science Subject: Mathematics Semester- 3 & 4 ACADEMIC YEAR-2019-20

SN	Level UG or PG	Semester	Course Group Core Elective -1 Elective -2/ Allied/SEC/ DSE	Course (Paper) Title	Paper No.	Credit	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total Marks
1	UG	3	Core	Linear Algebra & Real Analysis	3(A)	4	60	30	70	-	-	100
1	UG	3	Core	Numerical Methods	3(B) (Practical)	3	60	-	-	15	35	50
2	UG	4	Core	Linear Algebra, Real Analysis & Differential Geometry	4(A)	4	60	30	70	-	-	100
2	UG	4	Core	Introduction to SciLab	4(B) (Practical)	3	60	-	-	15	35	50

BHAKT KAVI NARSINH MEHTAUNIVERSITY JUNAGADH

Syllabus of B.Sc.Semester-3
According to Choice Based Credit System

(Updated on Dt. 15/02/2019)
(New Syllabus Effective from June - 2019)

• **Program:**	**B.Sc.**
• **Semester:**	**3**
• **Subject:**	**Mathematics**
• **Course code:**	**03 (A)-Theory**
• **Title of Course:**	**Linear Algebra & Real Analysis**
• **Segment-wise Distribution of Marks for Internal Examination:**	**Internal exam.→ 10 Marks** **Assignments → 10 Marks** **MCQ test → 05 Marks** **Attendance → 05 Marks** **Total Marks →30 Marks**
• **Credit Of The Course**	**4 Credits**

BHAKT KAVI NARSINH MEHTAUNIVERSITY JUNAGADH

B.Sc. SEMESTER -3 (CBCS)

MATHEMATICS PAPER- 03 (A)Theory

(Linear Algebra & Real Analysis)

[70 Marks/ $2\frac{1}{2}$ Hours]

Unit 1: Vector space, Linear Independence of Vectors [14 MARKS]

Definitions of group, ring and Field, Definition of Vector space and examples of it, Properties of a Vector space, Some Standard Vector spaces, Linear Combination, Span and Subspace & their examples, Theorem related to subspaces and Linear span, Linear independence of vectors -- Theorems & Examples on these, Geometrical Representation of Linearly Dependent and Independent vectors.Sum and Direct sum of subspaces and their examples, Disjoint subspaces, Complementary subspace, Quotient space.

Unit 2: Basis & Dimension of a Vector space [14 MARKS]

Basis of a vector space, Co-ordinates of vectors w.r.t. to a basis, Existence theorem for basis, Invariance of the number of the elements of a basis set, Examples and theorem of basis.
Definition of dimension of a Vector space, Existence of Complementary subspace of a finite dimensional vector space, Dimension of sum of subspaces, Theorems & Example based on dimension.

UNIT 3: Vector Differentiation [14 MARKS]

Vector point and Scalar point functions, Vector Differentiation,Laplace operator, Gradient, Divergence and Curl.

UNIT 4: Multiple Integral [14 MARKS]

Double and triple integrals, Applications of double and triple integration as area and volume, Change of variables by Jacobian, Change of variables from Cartesian to polar co-ordinates and triple integration in spherical co-ordinates and cylindrical co-ordinates.

UNIT 5: Vector Integration, Beta & Gamma Functions [14 MARKS]

Line integral and Green's theorem& its applications to simple problems, Surface integral, Volume Integral, Statement of Divergence theorem(Gauss's Theorem)& its applications to simple problems, Stoke's theorem (**without proof**)& its applications to simple problems.

Beta & Gamma functions and their relations. Value of $\int_{-\infty}^{\infty} e^{-x^2} dx$ as gamma function, Duplication formula. Legendre's Formula(**without proof**).

Note:

- There shall be **SIX** periods of 55 minutes per week for Mathematics-**03 (A)-Theory.**
- There shall be one question paper of 70 marks &$2\frac{1}{2}$ hours for Mathematics-**03 (A)-Theory**

Format of Question Paper

- **There shall be FIVE questions from all five units one each of 14 marks.**
- **Each question will be of the following form**

Question no.	**(A)**	**Answer any Two out of Three**	**10 Marks**
	(B)	**Answer any One out of Two**	**04 Marks**
		TOTAL	**14 MARKS**

Reference Books :

1. An Introduction to Linear Algebra by Krishnamurthy, Mainra and Arora
2. Mathematical Analysis by S. C. Malik and Savita Arora, New Age International(P) Ltd, Publishers, 2nd Edition.
3. Integral Calculus by Narayan Shanti and Mittal P.K., S. Chand & Sons.
4. A course of Mathematical Analysis by Shantinarayan, S. Chand & Sons.
5. Principle of Mathematical Analysis by Walter Rudin, MC Graw-Hill Book & Company, 2nd Edition.
6. Differential Calculus by Shanti Narayan, S.Chand & co., New Delhi
7. Differential Calculus by Gorakhprasad, Pothishala Pvt. Ltd., Allahabad
8. Linear Algebra by J.N. Sharma and A.R. Vasishtha, Krishna Prakashan Mandir, Meerut
9. Matrix and Linear Algebra by K.B. Datta, Prentice Hall of India Pvt. Ltd. New Delhi
10. Linear Algebra by K.Hoffman and R. Kunza

BHAKT KAVI NARSINH MEHTAUNIVERSITY JUNAGADH

Syllabus of B.Sc.Semester-4
According to Choice Based Credit System

(Updated on Dt. 15/02/2019)
(New Syllabus Effective from June - 2019)

• **Program:**	**B.Sc.**
• **Semester:**	**4**
• **Subject:**	**Mathematics**
• **Course code:**	**04 (A)-Theory**
• **Title of Course:**	***Linear Algebra, Real Analysis & Differential Geometry***
• **Distribution of Marks for External Examination:**	**Total Marks →70 Marks**
• **Segment-wise Distribution of Marks for Internal Examination:**	**Internal exam.→ 10 Marks** **Assignments → 10 Marks** **MCQ test → 05 Marks** **Attendance → 05 Marks** **Total Marks →30 Marks**
• **Credit Of The Course**	**4 Credits**

BHAKT KAVI NARSINH MEHTA UNIVERSITY,JUNAGADH

B.Sc. SEMESTER -4 (CBCS)

MATHEMATICS PAPER- 04 (A) (Theory)

(*Linear Algebra, Real Analysis & Differential Geometry*)

[70 Marks / $2\frac{1}{2}$ Hours]

UNIT 1: Sequences [14 MARKS]

Definition of a sequence, Bounded sequences, Convergence of a sequence, Limit point of a sequence, Limits Inferior and Superior, Bolzano-Weierstrass Theorem, Convergent sequences, Cauchy's sequence, General principle of convergence of a sequence, Algebra of sequences, Subsequence, Monotonic sequences, Some important sequences including $\left\{\sqrt[n]{n}\right\};\left\{\frac{a_1+a_2+...+a_n}{n}\right\}$

Unit 2: Infinite Series [14 MARKS]

Series of non-negative terms, Geometric series, p-test, Comparison test, Cauchy's Root test, D'Alembert's Ratio test, Raabe's test, Logarithmic Test, Alternating series. (All the tests without proof).

Unit 3: Linear Transformation:- [14 MARKS]

Definition of Linear Transformation, Zero and Identity Linear Transformation, Properties of a Linear Transformation, Examples of Linear Transformations, Kernel & Range(Image) spaces of a Linear Transformation, Rank & Nullity of a Linear Transformation, Rank-Nullity Theorem and Examples based on it. Representation of Transformations by Matrices & its examples.

Unit 4: Inner Product Spaces [14 MARKS]

Inner product spaces, Cauchy-Schwartz inequality, Triangular inequality, Orthogonal vectors, Orthonormal vectors, Orthogonal sets and basis, Orthonormal basis , Gram- Schmidt orthogonalization process.

Unit 5: Curvature, Asymptotes and Multiple points:- [14 MARKS]

Definition of Curvature,Various formulae for curvature(formulae for Cartesian coordinates, parametric equations and Polar coordinates only), Newton's method for finding curvature at origin.

Concavity, Convexity and point of inflexion, Asymptotes parallel to co-ordinate axes, oblique type , Algebraic methods for finding asymptotes , Rules for finding asymptotes, Multiple points, Types of double points.

Note:-

- There shall be **SIX**periods of **55** minutes per week for Mathematics-**04 (A)-Theory.**
- There shall be one question paper of **70** marks &$2\frac{1}{2}$ hours for Mathematics-**04 (A)-Theory**

Format of Question Paper

- **There shall be FIVE questions from all five units one each of 14 marks.**
- **Each question will be of the following form**

Question no.	**(A)**	**Answer any Two out of Three**	**10 Marks**
	(B)	**Answer any One out of Two**	**04 Marks**
		TOTAL	**14 MARKS**

Reference Books :

1. An Introduction to Linear Algebra by Krishnamurthy, Mainra and Arora
2. Mathematical Analysis by S. C. Malik and Savita Arora, New Age International(P) Ltd, Publishers, 2nd Edition.
3. Integral Calculus by Narayan Shanti and Mittal P.K., S. Chand & Sons.
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10. Linear Algebra by K.Hoffman and R. Kunza

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH

Syllabus of B.Sc.Semester-3
According to Choice Based Credit System

(New Syllabus Effective from June - 2019)

• **Programme:**	**B.Sc.**
• **Semester:**	**3**
• **Subject:**	**Mathematics**
• **Course code:**	**03(B) (Practical)**
• **Title of Course:**	**Numerical Methods**
• **Total Marks of External Practical Examination:**	**35 Marks**
• **Total Marks of Internal Practical Examination:**	**15 Marks** **Continuous internal assessment of practical work**
• **Total Marks of Practical Examination:**	**External→35 Marks** **Internal→15 Marks** **Total→ 50 Marks**
• **Credit Of The Course**	**3 Credits**

BHAKT KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH

B.Sc. SEMESTER -3 (CBCS)

MATHEMATICS PAPER-03(B) (Practical)*(Numerical Methods)*

Pr. No. (1) Solution of algebraic and transcendental equations by Graphical method
Pr. No. (2) Solution of algebraic and transcendental equations by Bisection method
Pr. No. (3) Solution of algebraic and transcendental equations by False position method (Regula Falsi Method)
Pr. No. (4) Find all asymptotes for given curve.
Pr. No. (5) Solution of algebraic and transcendental equations by Iteration method
Pr. No. (6) Solution of algebraic and transcendental equations by Newton-Raphson's method
Pr. No. (7) Applications of Newton-Raphson's method
Pr. No. (8) Transformation of an equation
Pr. No. (9) Derivatives of a polynomial by synthetic division method
Pr. No. (10) Horner's method for solving polynomial equation.

Note :

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-**3.**
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for external practical examination.
- There shall be **15 marks** for **Continuous internal assessment of practical work**

Formatof Question Paper for External Practical Examination

(For paper 03(B) & paper 04(B))

Question 1	Answer any THREE out of FIVE	[9+9+9=	27 Marks
Question 2	Journal and Viva:	[	08 Marks
		Total :	**35 Marks**

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH

SyllabusofB.Sc.Semester-4

AccordingtoChoiceBasedCreditSystem

(New SyllabusEffective from June - 2019)

• **Programme:**	**B.Sc.**
• **Semester:**	**4**
• **Subject:**	**Mathematics**
• **Course code:**	**04(B) (Practical)**
• **Title of Course:**	***Introduction to SciLab***
• **Total Marks of External Practical Examination:**	**35 Marks**
• **Total Marks of Internal Practical Examination:**	**15 Marks (Continuous internal assessment of practical work)**
• **Total Marks of Practical Examination:**	**External→35 Marks** **Internal→15 Marks** **Total → 50 Marks**
• **Credit Of The Course**	**3 Credits**

B. Sc. SEMESTER -4 (CBCS)

MATHEMATICS-PAPER- 04(B) (Practical) [35 Marks / 3Hours]

Introduction to SciLab

Practical no.	Objectives of Practical	MARKS
1.	(1) To input row vectors and column vectors. (2) To input square and rectangular matrices.	9 Marks
2.	(1) To obtain addition, subtraction and Multiplication, division of matrices and multiplication of matrix with scalar. (2) To obtain sub matrices of given matrix and to Delete rows and columns.	
3.	(1) To find minors, cofactors and adjoint of a matrix. (2) To find inverse of the matrix using adjointof a matrix (3) To learn commands zeros, ones, eye, rand,det(), inv(),	
4.	(1) To draw the graph of a circle. (2) To draw the graph of a parabola	18 Marks
5.	(1) To draw the graph of an ellipse. (2) To draw the graph of a hyperbola.	
6.	(1) To draw graph of $y = \sin(x)$ (2) To draw graph of $y = \cos(x)$. (3) To draw graph of $y = \sec(x)$	
7.	(1) To draw graph of $y = \operatorname{cosec}(x)$. (2) To draw graph of $y = \tan(x)$ (3) To draw graph of $y = \cot(x)$.	
8	(1) To draw graph of $y = \sin^{-1}(x)$ (2) To draw graph of $y = \cos^{-1}(x)$. (3) To draw graph of $y = \sec^{-1}(x)$	
9.	(1) To draw graph of $y = \operatorname{cosec}^{-1}(x)$. (2)To draw graph of $y = \tan^{-1}(x)$. (3)To draw graph of $y = \cot^{-1}(x)$.	
10	(1) To draw graph of $y = \exp(x)$. (2) To draw graph of $y = \log_e(x)$ (3) To draw graph of $y = \log_{10}(x)$.	
11	(1) To draw graph of $y = \cosh(x)$ (2) To draw graph of $y = \tanh(x)$	
12	(1) To draw graph of $y = \operatorname{sech}(x)$ (2) To draw graph of $y = \operatorname{csch}(x)$.	
	Journal and Viva	8 Marks
	Total Marks	35 Marks