

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH.

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

*(Updated on Dt. 21/08/2017)
(New Syllabus Effective from June - 2018)*

- **Program:** **B.Sc.**
- **Semester:** **3**
- **Subject:** **Mathematics**
- **Course code:** **03 (A)-Theory**
- **Title of Course:** **Real Analysis**
- **Distribution of Marks for External Examination:** **Total Marks →70 Marks**
- **Segment-wise Distribution of Marks for Internal Examination:**

Assignments	→ 10 Marks
QUIZ test	→10 Marks
Internal exam.	→ 10 Marks
Total Marks	→30 Marks
- **Credit Of The Course** **4 Credits**

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH.

B.Sc. SEMESTER -3 (CBCS) MATHEMATICS PAPER- 03 (A) Theory Real Analysis

[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 $\{\sqrt[n]{n}\}; \left\{ \frac{a_1 + a_2 + \dots + a_n}{n} \right\}$

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: Vector Differentiation

[14 MARKS]

Vector point functions and Scalar point functions, Vector Differentiation, Laplacian 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 variable 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 application to simple problems, Surface integral, Volume Integral, Statement of Divergence(Gauss) theorem & its application to simple problems and Stoke's theorem (**without proof**) & its application 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
(Effective from Academic Year 2018-19 onwards)

- 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 one out of two (Theory Question)	07 Marks
	(B)	Answer any one out of two (Applications/Examples/Problems/Theory)	04 Marks
	(C)	Answer any one out of two (Short Answer/One word/One line/True or False/Fill up blanks)	03 Marks
TOTAL			14 MARKS

Suggested Reference Books :

1. Mathematical Analysis by S. C. Malik and Savita Arora,
New Age International(P) Ltd, Publishers, 2nd Edition.
2. Integral Calculus by Narayan Shanti and Mittal P.K., S. Chand & Sons.

More REFERENCE BOOKS:

1. A course of Mathematical Analysis by Shantinayakan, S. Chand & Sons.
2. Principle of Mathematical Analysis by Walter Rudin, MC Graw-Hill Book & Company, 2nd Edition.
3. Differential Calculus by Shanti Narayan, S.Chand & co., New Delhi
4. Differential Calculus by Gorakhprasad, Pothishala Pvt. Ltd., Allahabad
5. Real Analysis by R.R. Goldberg, Oxford and I.B.H. Publishing Co. Pvt. Ltd.

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH.

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

(Updated on Dt. 21/08/2017)
(New Syllabus Effective from June - 2018)

- **Program:** **B.Sc.**
- **Semester:** **4**
- **Subject:** **Mathematics**
- **Course code:** **04 (A)-Theory**
- **Title of Course:** **Linear Algebra &
Differential Geometry**
- **Distribution of Marks
for External
Examination:** **Total Marks →70 Marks**
- **Segment-wise
Distribution of Marks
for Internal
Examination:**

Assignments	→ 10 Marks
QUIZ test	→10 Marks
Internal exam.	→ 10 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 & Differential Geometry)

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

Unit 1: **Vector space, Linear Dependence, Independence of Vectors and Basis of a Vector space:-** **[14 MARKS]**

Definition of a Field, Definition of Vector space and examples of vector spaces, Properties of a Vector space, Some Standard Vector spaces, Linear Combination, Span and Subspace & their examples, Theorem related to subspaces and Linear span, Linear dependence of vectors and 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 of a Vector space & 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: **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.

Unit 4 : **Representation of Transformations by Matrices:-** **[14 MARKS]**

Definition of Linear functional, Dual of a vector space, Adjoint of a Linear Transformation, Eigen value and Eigen vectors of Linear Transformation, Eigen basis and Diagonalization of Linear Transformations.

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
(Effective from Academic Year 2018-19 onwards)

- 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 one out of two (Theory Question)	07 Marks
	(B)	Answer any one out of two (Applications/Examples/Problems/Theory)	04 Marks
	(C)	Answer any one out of two (Short Answer/One word/One line/True or False/Fill up blanks)	03 Marks
TOTAL			14 MARKS

SUGGESTED REFERENCE BOOKS :

1. An Introduction to Linear Algebra by Krishnamurthy, Mainra and Arora
2. Differential Calculus by Shanti Narayan, S.Chand & co., New Delhi
3. A course of Mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

More REFERENCE BOOKS:

1. Linear Algebra by J.N. Sharma and A.R. Vasishtha, Krishna Prakashan Mandir, Meerut
2. Matrix and Linear Algebra by K.B. Datta, Prentice Hall of India Pvt. Ltd. New Delhi
3. Linear Algebra by K.Hoffman and R. Kunza
4. A text book of Modern Abstract Algebra by Shanti Narayan, S.Chand & Co., New Delhi
5. Basic Linear Algebra with Matlab by S. K. Jain, A. Gunawardena & P.B. Bhattacharya.

BHAKT KAVI NARSINH MEHTA UNIVERSITY JUNAGADH

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

(New Syllabus Effective from June - 2018)

- **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

[50 Marks / 3Hours]

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

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 practical examination
- There shall be 15 marks for Internal Practical Examination
(i.e. Continuous internal assessment of performance of each student during the practical work.)

Format of Question Paper for 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:	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
TOTAL		[	50 Marks

BHAKT KAVI NARSINH MEHTA UNIVERSITY

JUNAGADH

Syllabus of B.Sc. Semester-4 **According to Choice Based Credit System** ***(New Syllabus Effective from June - 2018)***

- **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.	Objective 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 adjoint of a matrix (3) To learn commands zeros, ones, eye, rand, det(), inv(), command for transpose.	
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