



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SEMESTER: III

SUBJECT NAME: Advance Calculus

SUBJECT CODE:4SC03MTC1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester								
Th	Tu	Pr	Total		Theory				Practical				Total Marks
					Sessional Exam		University Exam		Internal		University		
					Marks	Hrs	Marks	Hrs	Pr	TW			
3	0	0	3	3	30	1.5	70	3	--	--	--	100	

Objectives: -The objectives of this course are

- To identify Concave upwards and concave downwards functions
- To calculate Improper Integral using Beta – Gamma Functions.
- To learn partial differentiation.
- To identify maximum and minimum values using partial differentiation.
- To learn expansion of function using Taylor's and Maclaurin's series.

Prerequisites:-

Students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students should have basic knowledge of limit, differentiation and integration.

Course outline:-

Sr. No.	Course Contents	Hours
1	Increasing and decreasing functions, Concave upwards and concave downwards functions, Points of inflexion, Asymptotes.	9



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2	Beta and Gamma functions, relation between Beta and Gamma functions, Duplication formula, Properties of Beta and Gamma functions.	9
3	Real functions of several variables, Their limit and continuity, (Repeated limits and limits in R^2 to be explained), Partial derivatives of functions of n variable (For special case $n = 2$ notation, D_{12} and D_{21} to be explained)	9
4	Differentiability, Chain rule, Partial derivatives of higher order, Condition for commutative property of variables in higher order partial derivatives, Derivatives of implicit functions.	9
5	Euler's theorem on partial derivatives of homogeneous functions. Extrema of functions of several variables, Lagrange's method of undetermined multipliers, Taylor's and Maclaurin's expansions for functions of several variables (Proof for cases of two variables only)	9

Learning Outcomes:-

After the successful completion of the course, students will be able to

- Identify Concave upwards and concave downwards functions
- Calculate Improper Integral and partial differentiation
- Use partial differentiation in daily life.
- Identify maximum and minimum value of function.
- Apply Taylor's and Maclaurin's expansions in function of two variable.

Books Recommended:-

1. 'Advanced Calculus', **David Widder**, *Prentice hall, New Delhi*.
2. 'Advanced Calculus Volume-II', **T. M. Apostol**, *Blaisdell*.
3. 'Differential Calculus', **Shanti Narayan**, *S. Chand*.
4. 'Integral Calculus', **Shanti Narayan**, *S. Chand*.
5. 'Partial Differential Equation', **T. Amarnath**, *Narosa*.
6. 'Calculus', **James Stewart**, *Brooks/Cole publishing company*.
7. 'Applied Calculus', **S. T. Tan**, *Brooks/Cole publishing company*.

E-Resources:-

1. http://en.wikipedia.org/wiki/Partial_derivative
2. <http://math.feld.cvut.cz/mt/txt/d/5/txe3da5h.htm>
3. <http://mathworld.wolfram.com/BetaFunction.html>



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4. <http://www.millersville.edu/~bikenaga/calculus/graph/graph.html>
5. <http://calculus.nipissingu.ca/tutorials/curves.html>

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SEMESTER: III

SUBJECT NAME: Linear Algebra-I

SUBJECT CODE: 4SC03MTC2

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
Th	Tu	Pr	Total		Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
3	0	0	3	3	30	1.5	70	3	--	--	--	100

Objectives: -

- To use and understand matrix and vector notation.
- Construct visualizations of matrices related to vector.
- To provide students with a good understanding of the concepts and methods of linear algebra
- To help the students develop the ability to solve problems using linear algebra.
- To connect linear algebra to other fields both within and without mathematics.

Prerequisites:-

Students must be familiar with the properties of set theory, function, Determinant and Matrices. Students should have basic knowledge of vector calculus.

Course outline:-

Sr. No.	Course Contents	Hours
1	Vector space, Definition and examples, Vector Subspaces, Linear dependence and independence.	9



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2	Span of a set, Basis and dimension of a vector space.	9
3	Linear transformation, Representation of linear transformation by a matrix, Kernel and image of a linear transformation.	9
4	Linear isomorphism, Geometric ideas and rank, Identity, Stretch along axes, Reflection with respect to axes, Rotation, Shear, Projection, Their Combinations.	9
5	Inner product spaces, the Euclidean plane and the dot product, general inner product spaces.	9

Learning Outcomes:-

- Analyze real world scenarios to recognize when vectors, matrices, or linear systems are appropriate, formulate problems about the scenarios, creatively model these scenarios
- Work with vectors, matrices, or linear systems symbolically and geometrically in various situations
- Give examples and non-examples of linear transformations, evaluate the matrix representations of a linear transformation

Books Recommended:-

1. 'Linear Algebra – A Geometric Approach', **S.Kumaresan**, *Prentice Hall, New Delhi*.
2. 'Finite Dimensional Vector spaces', **P.Halmos**, *Literary Licensing, LLC*.
3. 'Matrix and Linear algebra', **K.B. Dutta**, *Prentice Hall, New Delhi*.
4. 'Linear Algebra-A problem book', **P. R. Halmose**, *Cambridge university Press*.
5. 'Linear Algebra', **G.Paria**, *New central book agency-Calcutta*.
6. 'Linear algebra and applications', **Gilbert Strang Thomson**, *Cole publishing company*.

E-Resources:-

1. <http://www.math.clarku.edu/~djoyce/ma130/vectorspace.pdf>
2. <http://www.saylor.org/courses/ma211/>
3. http://en.wikipedia.org/wiki/Linear_algebra
4. <https://www.khanacademy.org/math/linear-algebra>



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FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SUBJECT NAME: Numerical Analysis

SEMESTER: III

SUBJECT CODE: 4SC03MTE1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
Th	Tu	Pr	Total		Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
3	0	0	3	3	30	1.5	70	3	--	--	--	100

Objectives: -The objectives of this course are

- Find the Lagrange Interpolation Polynomial for any given set of points.
- Use finite differences for interpolation, differentiation, etc.

Prerequisites:-

Basic knowledge of Linear Algebra and differential equations.

Course outline:-

Sr. No.	Course Contents	Hours
1	Error in calculation and calculus of finite differences, interpolation. Significant error, Relative error, Estimation of error, Application of error formula.	9
2	Forward differences, Backward differences, Shift operator, Polynomial in factorial notation.	9
3	Interpolation: error in interpolation, Central difference, Gauss's forward and backward formula.	9
4	Stirling's interpolation formula, Bessel's and Everett's formulae, Lagrange's formula.	9



5	Divided difference, Newton's divided difference formula, inverse interpolation, its application.	9
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Learning Outcomes:-

After successful completion of this course students will be able to

- Analyze errors and have an understanding of error estimation.
- Be able to use polynomials in several ways to approximate both functions and data, and to match the type of polynomial approximation to a given type of problem.
- Be able to solve equations in one unknown real variable using iterative methods and to understand how long these methods take to converge to a solution.
- Derive formulas to approximate the derivative of a function at a point, and formulas to compute the definite integral of a function of one or more variables.
- Choose and apply any of several modern methods for solving systems of initial value problems based on properties of the problem.

Books Recommended:-

1. 'Numerical Analysis and Computational Procedures', **S.A. Moolah**, *New Central Book Agency (P) Ltd., Calcutta.*
2. 'Elementary Numerical analysis', **S.S. Sastry**, *Prentice Hall, New Delhi.*
3. 'Numerical mathematical analysis 6th edition', **Scarborough**, *Oxford & IBH.*
4. 'Numerical analysis', **S.Kunz**, *Mcgraw Hill Book New York.*
5. 'Numerical Analysis', **Richard Burden and J. Douglas Thomson**, *Cole Pub Co; 6th edition (December 24, 1996)*

E-Resources:-

1. <http://mathfaculty.fullerton.edu/mathews/numerical.html>
2. http://en.wikipedia.org/wiki/Numerical_analysis
3. <http://ocw.mit.edu/courses/mathematics/18-330-introduction-to-numerical-analysis-spring-2012/>
4. http://math.mercyhurst.edu/~platte/syllabi/numerical_analysis_spring_09_10.html



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SUBJECT NAME: Statistics-I

SEMESTER: III

SUBJECT CODE: 4SC03MTE2

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
Th	Tu	Pr	Total		Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
3	0	0	3	3	30	1.5	70	3	--	--	--	100

Objectives: -The main objective of this course is to acquaint students with some basic concerns statistics. They will be introduced to some elementary statistical methods of analysis and Probability.

Prerequisites: -Knowledge of basic Mathematics of school level.

Course outline:-

Sr. No.	Course Contents	Hours
1	Introduction to Statistics:- Meaning of the word statistics Scope of Statistics : In industry , Biological and Medical Sciences, Economics, Social and Management Sciences. Statistical Organizations in India : CSO, NSS, ISI (Indian Statistical Institute), IIPS (Indian Institute of Population Studies), Bureau of Economics and Statistics, their aims and functions. Indian Statisticians and their contributions.	3



2	<p>Nature of Data :</p> <p>Meaning of primary and secondary data.</p> <p>Qualitative data (Attributes) : Nominal Scale and Ordinal scale, Quantitative data (Variables) : Interval Scale and ratio scale, discrete and continuous variables, raw data.</p> <p>Classification of data: Discrete and continuous frequency distribution, inclusive and exclusive methods of classification, cumulative frequency distribution, relative frequency.</p> <p>Graphical representation of data : Histogram, frequency polygon, frequency curve and Ogive curves.</p> <p>Illustrative Examples.</p>	9
3	<p>Measures of Central Tendency:</p> <p>Concept of central tendency of statistical data, statistical average, requirements of good statistical average.</p> <p>Arithmetic Mean (A. M.) : Definition, effect of change of origin and scale, deviation of observations from A. M., Mean of pooled data, weighted A. M.</p> <p>Geometric Mean (G. M.) : Definition</p> <p>Harmonic Mean (H. M.) : Definition</p> <p>Relation : $A. M. \geq G. M. \geq H. M.$ (Proof for $n = 2$, positive observations)</p> <p>Media : Definition, Derivation of formula for grouped frequency distribution.</p> <p>Mode : Definition for ungrouped and grouped data derivation of formula</p> <p>Empirical relation between Mean, Median and Mode</p> <p>Partition Values : Quartiles, Deciles and Percentiles</p> <p>Graphical method of determination of Median, Mode and Partition values.</p> <p>Comparison between averages in accordance with requirements of good average.</p> <p>Situations where one kind of average is preferable to others.</p> <p>Examples to illustrate the concept.</p>	13
4	<p>Measures of Dispersion:</p> <p>Concept of dispersion, Absolute and Relative measures of dispersion, Requirements of a good measure of dispersion.</p> <p>Range : Definition, Coefficient of range.</p> <p>Quartile Deviation (Semi-interquartile range) : Definition, coefficient of Q.D.</p> <p>Mean Deviation: Definition, coefficient of M. D., Minimal property of M. D.</p> <p>Mean Square Deviation, Definition, minimal property of M. S. D.</p> <p>Variance and Standard Deviation : Definition, Effect of change of origin and scale, S. D. of pooled data (without proof).</p> <p>Coefficient of Variation : Definition and use.</p> <p>Comparison of absolute and relative measures of dispersion.</p> <p>Examples of illustrate the concept.</p>	10



5	Moments, Skewness and Kurtosis: Moments : Raw moments (μ'_r) and central moments (μ_r) for ungrouped and grouped data. Effect of change of origin and scale on moments, relation between central moments and raw moments (up to 4th order) Sheppard's correction, need of Sheppard's correction and its importance. Skewness : Concept of Skewness of a frequency distribution, Types of Skewness and its interpretation. Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness, Measure of skewness based on moments. Kurtosis : Concept of kurtosis of a frequency distribution, Types of kurtosis and its interpretations. Measure of kurtosis based on moments. Illustrative Examples.	10
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Learning Outcomes:-

At the end of this course students are expected to be able.

- To prepare frequency distribution and represent it by graphically with the help of tables.
- To compute various measures of central tendency, dispersion, moments, Skewness, Kurtosis and to interpret them.

Books Recommended:-

1. 'Statistics :A Beginner's Text Vol. 1', **Bhat B. R., Srivenkatramana, T and Madhava K. S.,** *New Age International (P), Ltd.*
2. 'Applied General Statistics', **Croxton F. E., Cowden D. J. and Kelin S.,** *Prentice Hall of India.*
3. 'Fundamentals of Statistics Vol. I and II', **Goon, Gupta and Dasgupta,** *World Press, Calcutta.*
4. 'Statistical Methods', **Gupta S. P.**
5. 'Statistical Methods', **Snedecor G. W. and Cochran W. G.,** *Lowa State University Press.*
6. 'Mathematical Statistics Paper I', **Kumbhojkar G. V.**
7. 'Mathematical Statistics Paper II', **Kumbhojkar G. V.**

E-Resources:-

1. <http://en.wikipedia.org/wiki/Statistics>
2. <http://www.statistics.com/glossary/>



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3. http://en.wikipedia.org/wiki/Central_tendency
4. <https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php>
5. http://onlinestatebook.com/2/summarizing_distributions/measures.html



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.

SUBJECT NAME: Mathematics Practical-III

SEMESTER: III

SUBJECT CODE:4SC03MTP1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
Th	Tu	Pr	Total		Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
0	0	4	4	2	--	--	--	--	10	10	30	50

Objectives:- The objectives of this course are

- To find the Lagrange interpolation polynomial for any given set of points.
- To use finite differences for interpolation, differentiation etc.

Prerequisites:- Basic knowledge of linear algebra and differential equations.

Course outline:-

Sr. No.	Course Contents
1	Euler's theorem on homogeneous function, Change of variable.
2	Taylor's expansion and Maxima-Minima for a function of two variable.
3	Errors and Their Computation.
4	To Find Value of Function using Gauss's forward interpolation formula.
5	To Find Value of Function using Gauss's backward interpolation formula.
6	To find Value of function using Sterling's central interpolation formula.
7	To find Value of function using Bessel's formulas.
8	To find value of function using Laplace Everest's formula.
9	To find polynomial solving given values using Newton's divided difference formula and interpolation with unequal intervals.



10	Iterative method of solution of simultaneous linear system by Gauss-seidel and Determination of Eigen values by power method.
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Learning Outcomes:-

After the successful completion of the course, Students will be able to

- Analyze errors and have an understanding of error estimation.
- Be able to use polynomials in several ways to approximate both functions and data, and to match the type of polynomial approximation to a given type of problem.
- Be able to solve equations in one unknown real variable using iterative methods and to understand how long these methods take to converge to a solution.
- Derive formulas to approximate the derivative of a function at a point, and formulas to compute the definite integral of a function of one or more variables.
- Choose and apply any of several modern methods for solving systems of initial value problems based on properties of the problem.

Books Recommended:-

1. 'Numerical Analysis and computational Procedures', **S. A. Moolah**, *New Central Book Agency (p) Ltd., Calcutta.*
2. 'Elementary Numerical analysis', **S.S. Sastry**, *Prentice Hall, New Delhi.*
3. 'Numerical mathematical analysis 6th edition', **Scarborough**, *Oxford & IBH.*
4. 'Numerical analysis', **S.Kunz**, *McGraw Hill Book New York.*
5. 'Numerical Analysis', **Richard Burden and J. Dougals Thomson**, *Cole Pub co.*
6. 'Advanced Calculus', **David Widder**, *Prentice hall, New Delhi.*
7. 'Advanced Calculus Volume-II', **T. M. Apostol**, *Blaisdoll.*
8. 'Differential Calculus', **Shanti Narayan**, *S. Chand.*
9. 'Integral Calculus', **Shanti Narayan**, *S. Chand.*

Notes:-

1. Problem solving skill in mathematics is an important aspect in the teaching of mathematics.
2. There would be problem solving session of FOUR hours per week and they will be conducted in batches.



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FACULTY OF SCIENCE
DEPARTMENT OF ENGLISH

COURSE: B.Sc.

SEMESTER: III

SUBJECT NAME: Communication Skills in English (CSE)

SUBJECT CODE: 4SC03CSE1

Teaching & Evaluation Scheme:-

Teaching Scheme				Credit	Evaluation Scheme						
Th	Tu	Pr	Total		Th	Hrs	Sessional Exam	Hrs	Term Work	Practical / Comprehensive Viva	Total
02	02	--	04	03	70	3	30	1.5	20	30	150

Objectives:

- To train them in basic fundamentals skills of Communication – LSRW through study of Literature

Prerequisites:

- Students should have basic knowledge of English Language and grammar.
- Students should have ability to speak and write correct sentences in their day to day language.
- Students should be familiar with correct usage of language.

Detail Course Content:

Unit No.	Content In details including Its Sub Topics	Min.Hours
	Part-A Communication	
1	Fundamental Concepts of Communication	10
	<ul style="list-style-type: none"> Meaning and objectives of communication Functions of communication Definitions of communication Process of communication Characteristics of communication Levels of communication Scope of communication Non Verbal Communication 	
2	Role of Language In Communication/Language & Communication Relationship	04
	<ul style="list-style-type: none"> Role of Languages in Communication Characteristics of Language English as a Language of Global Communication 	-
3	Reading Skill	06
	<ul style="list-style-type: none"> Fundamental Concepts of Reading Techniques of Reading: Scanning & Skimming Paraphrasing Reading selected text in the class room, where students will explorer/express their own views/Ideas in Reading, Writing & Speaking. 	-



4	Writing Skills	06
	Informal Letter Writing <ul style="list-style-type: none"> - Introduction to Informal Letter - Characteristics of Letter - Types of Letter - Official Letters: to the university, college principal, Municipal Corporation etc. Essay Writing <ul style="list-style-type: none"> - How to Write Essay(s) effectively? - List of Select Essays for Practice (Technical and Non Technical) 	-
5	Speaking Skills (Students Forum) <ul style="list-style-type: none"> - Foreign Language Club will be Started (Student Forum) - Students will express their views on Current Topics/ Issues in Group / Individually (Technical & Non Technical Topics) Speaking English through Correct Phonetic Transcription <ul style="list-style-type: none"> - Basic Concepts in Phonetics - Articulation of sound - Symbols of vowels and consonants - Phonetic transcription of words Conversation Skills <ul style="list-style-type: none"> - An Introduction - Situation based conversation - Telephonic conversation 	08
6	Concepts of Grammar	06
	<ul style="list-style-type: none"> • Degree of Comparison • Transformation of Sentences • Interchange of Simple, Complex and Compound sentences 	
7	Vocabulary Building <ul style="list-style-type: none"> • Suffixes • Prefixes • Confusable 	02
	Part-B Literary Text	
	"One Night @ the Call Centre" by Chetan Bhagat- Rupa Publication	18

Resources:

- "One Night @ the Call Centre" by Chetan Bhagat- Rupa Publication
- Green Andy, Effective Personal Communication Skills For Public Relations, Kogan Page, Limited, 2006
- Basic Business Communication, by Flatly and Lesicar
- Basic Communication Skills for Technology, by Andrea J. Rutherford, by Pearson Education
- From sentence to paragraph, by William J. Kelly and Deborah L. Lawton, by Longman
- Technical Communication : Principles and Practice, by Meenaxi Raman and Sangeeta Sharma, Oxford University Press
- An Intermediate English Grammar, Raymond Murphy, Cambridge University Press
- A High School English Grammar, Wren & Martin, S. Chand Publication
- A Course in Phonetics for Spoken English, Sethi & Dhamija

6	Learning Phonetics for Effective Speaking
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	<ul style="list-style-type: none"> • Speech Mechanism • Sounds, Vowels & Consonants • Accents, Tone, Syllable, Intonation Pattern & Phonetics Transcription
7	Revision of Grammar Some of the grammatical topics should be revised to strengthen LSRW SKILLS of the students
8	Vocabulary Developing <ul style="list-style-type: none"> • Homophones • Homonyms • One word Substitute
9	PART – B Literature Prose (One Act Play) <ul style="list-style-type: none"> • “A Marriage Proposal” by Anton Chekhov Poetry <ul style="list-style-type: none"> • “The Night of Scorpion ” by Nissim Ezekiel • “The Lamb” by William Black • “The Pulley ” by George Herbert

Resources:

- Green Andy, Effective Personal Communication Skills For Public Relations, Kogan Page, Limited, 2006
- Technical Communication, by D.K.Chakrader, Tech-max publication
- Basic Business Communication, by Flatly and Lesicar
- Basic Communication Skills for Technology, by Andrea J. Rutherford, by Pearson Education
- From sentence to paragraph, by William J. Kelly and Deborah L. Lawton, by Longman
- Technical Communication : Principles and Practice, by Meenaxi Raman and Sangeeta Sharma, Oxford University Press
- An Intermediate English Grammar, Raymond Murphy, Cambridge University Press
- A High School English Grammar, Wren & Martin, S. Chand Publication
- A Course in Phonetics for Spoken English, Sethi & Dhamija
- Masks: One Act Plays (Ed) D. S. Maini. Macmillan.
- Wing word: A Collection of Poetries.