TELANGANA TRIBAL WELFARE RESIDENTIAL

DEGREE COLLEGE FOR (GIRLS) ASIFABAD

DIST:KUMRAM BHEEM (ASIFABAD)-504293

TELANGANA STATE

(Affiliated to Kakatiya University)

Department of Mathematics

DEPARTMENT SYLLABUS

Telangana State Council of Higher Education

Government of Telangana

Mathematics Course Structure

(B.Sc. Common Core Syllabus for All Universities of Telangana State
for the Students Admitted from the Academic Year 2019-2020 Ba

Affiliated By Kakatiya University

Warangal – T.S. 506 009

Mathematics Course Structure

B.Sc. Common Core Syllabus for All the Students Admitted from the Academic Year 2019-2020 Batch onwards

B.Sc.(Mathematics)Course Structure

W.E.F. 2019-20 academic year batch onwards

Year	Paper	Semester	Subject	Hours/Per Week		credits	Marks (IA)	Marks (Theory)	Total Marks
					Tutorials*				
1	**DSC I**	I	Differential & Integral Calculus	5	1	5	25	100	125
	DSC II	II	Differential Equations	5	1	5	25	100	125
2	**DSC III**	III	Real Analysis	5	1	5	25	100	125
	DSC IV	IV	Algebra	5	1	5	25	100	125
3	**DSC V**	V	Linear Algebra	5	1	5	25	100	125
	DSE VI	VI	**(A)**Numerical Analysis	5	1	5	25	100	125
		VI	**(B)** Integral Transforms	5	1	5	25	100	125
		VI	**(C)**Analytical Solid Geometry	5	1	5	25	100	125
2	**SEC-I**	III	Theory of Equations	2	-	2	10	40	50
2	**SEC-II**	III	Logic & Sets	2	-	2	10	40	50
2	**SEC-III**	IV	Number Theory	2	-	2	10	40	50
2	**SEC-IV**	IV	Vector Calculus	2	-	2	10	40	50
3	**Generic Elective**	V-A **Or** V-B	Basic Mathematics Or Mathematics of Finance &Insurance	4	-	4	20	80	100
3	**Project / Optional**	VI*	Mathematical Modelling	4	-	4	20	80	100

*__Tutorials:__ Problems solving session for each 20 students one batch.
IA Internal Assessment

Note: No Mathematics Practical's for the students who admitted from the Academic year 2019-2020 academic batch onwards.

SEMESTER-I

Differential and Integral Calculus

(w.e.f. academic year 2019-20 batch onwards)

DSC-I

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to some basic notions in Differential calculus.

Outcome: By the time students complete the course they realize wide ranging applications of the subject.

Unit- I

Partial Differentiation: Introduction - Functions of two variables - Neighbourhood of a point (a; b) - Continuity of a Function of two variables, Continuity at a point - Limit of a Function of two variables - Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions.

Unit- II

Theorem on Total Differentials - Composite Functions - Differentiation of Composite Functions - Implicit Functions - Equality of $f_{xy}(a; b)$ and $f_{yz}(a; b)$ - Taylor's theorem for a function of two Variables - Maxima and Minima of functions of two variables Lagrange's Method of undetermined multipliers.

Unit- III

Curvature and Evolutes: Introduction - Definition of Curvature - Radius of Curvature - Length of Arc as a Function, Derivative of arc - Radius of Curvature - Cartesian Equations - Newtonian Method - Centre of Curvature - Chord of Curvature.

Evolutes: Evolutes and Involutes - Properties of the evolute.

Envelopes: One Parameter Family of Curves - Consider the family of straight lines - Definition - Determination of Envelope.

Unit- IV

Lengths of Plane Curves: Introduction - Expression for the lengths of curves $y = f(x)$ - Expressions for the length of arcs $x = f(y)$; $x = f(t)$, $y = \varphi(t)$; $r = f(\theta)$

Volumes and Surfaces of Revolution: Introduction - Expression for the volume obtained by revolving about either axis - Expression for the volume obtained by revolving about any line - Area of the surface of the frustum of a cone - Expression for the surface of revolution - Pappus Theorems - Surface of revolution.

Text:

Shanti Narayan, P.K. Mittal Differential Calculus, S.CHAND, NEW DELHI Shanti Narayan Integral Calculus, S.CHAND, NEW DELHI

References:

1) William Anthony Granville, Percey F Smith and William Raymond Longley; Elements of the differential and integral calculus

2) Joseph Edwards , Differential calculus for beginners Smith and Minton,

Calculus 3) Elis Pine, How to Enjoy Calculus

4) Hari Kishan, Differential Calculus

SEMESTER-II

Differential Equations

(w.e.f. academic year 2019-20 batch onwards)

DSC-II

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The main aim of this course is to introduce the students to the techniques of solving Differential equations and to train them to apply their skills in solving some of the problems of engineering and science.

Outcome: After learning the course the students will be equipped with the various tools to solve a few types Differential equations that arise in several branches of science.

Unit- I

Differential Equations of first order and first degree: Introduction - Equations in which Variables are Separable - Homogeneous Differential Equations - Differential Equations Reducible to Homogeneous Form - Linear Differential Equations - Differential Equations Reducible to Linear Form - Exact Differential equations - Integrating Factors - Change in variables - Total Differential Equations - Simultaneous Total Differential Equations - Equations

of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

Unit- II

Differential Equations of first order but not of first degree: Equations Solvable for *p* - Equations Solvable for *y* - Equations Solvable for *x* - Equations that do not contain *x (or y)*- Equations Homogeneous in *x* and *y* - Equations of the Fifirst Degree in x and y - Clairaut's equation. **Applications of First Order Differential Equations :** Growth and Decay - Dynamics of Tumour Growth - Radioactivity and Carbon Dating - Compound Interest - Orthogonal Trajectories .

Unit- III

Higher order Linear Differential Equations: Solution of homogeneous linear Differential equations with constant coefficients - Solution of non-homogeneous Differential equations $P(D)y = Q(x)$ with constant coefficients by means of polynomial operators when $Q(x)=be^{ax}$ V e^{ax} - Method of undetermined coefficients. K $bSin(ax/)$ $bCos(ax);bx$

Unit- IV

Method of variation of parameters - Linear Differential equations with non constant coefficients - The Cauchy - Euler Equation - Legendre's Linear Equations - Miscellaneous Differential equations.

Partial Differential Equations: Formation and solution- Equations easily integrable - Linear equations of first order.

Text:

Zafar Ahsan,Differential Equations and Their Applications

References:

1] Frank Ayres Jr, Theory and Problems of Differential Equations.

2] Ford, L.R ; Differential Equations.

3] Daniel Murray, Differential Equations.

4] S. Balachandra Rao, Differential Equations with Applications and Programs.

5] Stuart P Hastings, J Bryce McLead; Classical Methods in Ordinary Differential Equations.

SEMESTER-III

Real Analysis

(w.e.f. academic year 2019-20 batch onwards)

DSC-III

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to the foundations of analysis which will be useful in understanding various physical phenomena.

Outcome: After the completion of the course students will be in a position to appreciate beauty and applicability of the course.

Unit- I

Sequences: Limits of Sequences- A Discussion about Proofs-Limit Theorems for Sequences Monotone Sequences and Cauchy Sequences -Subsequences-Limit sup's and Limit inf's - Series Alternating Series and Integral Tests .

Unit- II

Continuity: Continuous Functions -Properties of Continuous Functions -Uniform Continuity - Limits of Functions

Unit- III

Differentiation: Basic Properties of the Derivative - The Mean Value Theorem - L'Hospital Rule - Taylor's Theorem.

Unit- IV

Integration : The Riemann Integral - Properties of Riemann Integral-Fundamental Theorem of Calculus.

Text:

Kenneth A Ross,Elementary Analysis-The Theory of Calculus

References:

1] S.C. Malik and Savita Arora, Mathematical Analysis, Second Edition, Wiley Eastern Limited, New Age International (P) Limited, New Delhi, 1994.

2] William F. Trench, Introduction to Real Analysis

3] Lee Larson , Introduction to Real Analysis I

4] Shanti Narayan and Mittal, Mathematical Analysis

5] Brian S. Thomson, Judith B. Bruckner, Andrew M. Bruckner; Elementary Real analysis 6] Sudhir R., Ghorpade, Balmohan V., Limaye; A Course in Calculus and Real Analysis

SEMESTER-IV

Algebra

(w.e.f. academic year 2019-20 batch onwards)

DSC-IV

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to learn some basic algebraic structures like groups, rings etc.

Outcome: On successful completion of the course students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

Unit- I

Groups: Definition and Examples of Groups- Elementary Properties of Groups-Finite Groups - Subgroups -Terminology and Notation -Subgroup Tests - Examples of Subgroups. Cyclic Groups: Properties of Cyclic Groups - Classification of Subgroups Cyclic Groups.

Unit- II

Permutation Groups: Definition and Notation -Cycle Notation-Properties of Permutations -A

Check Digit Scheme Based on D_5. Isomorphisms ; Motivation- Definition and Examples - Cayley's Theorem Properties of Isomorphisms -Automorphisms-Cosets and Lagrange's Theorem Properties of Cosets 138 - Lagrange's Theorem and Consequences-An Application of Cosets to Permutation Groups -The Rotation Group of a Cube and a Soccer Ball.

Unit- III

Normal Subgroups and Factor Groups: Normal Subgroups-Factor Groups -Applications of Factor Groups -Group Homomorphisms - Definition and Examples -Properties of Homomorphisms -The Fifirst Isomorphism Theorem.

Introduction to Rings: Motivation and Definition -Examples of Rings -Properties of Rings - Subrings.

Integral Domains: Definition and Examples - Fields Characteristics of a Ring.

Unit- IV

Ideals and Factor Rings: Ideals -Factor Rings -Prime Ideals and Maximal Ideals.
Ring Homomorphisms: Definition and Examples-Properties of Ring-Homomorphisms.

Text:

Joseph A Gallian, Contemporary Abstract algebra (9th edition) **References:**

1] Bhattacharya, P.B Jain, S.K.; and Nagpaul, S.R,Basic Abstract

Algebra 2] Fraleigh, J.B, A Fifirst Course in Abstract Algebra.

3] Herstein, I.N, Topics in Algebra

4] Robert B. Ash, Basic Abstract Algebra 5] I

Martin Isaacs, Finite Group Theory 6] Joseph

J Rotman, Advanced Modern Algebra

SEMESTER-V
Linear Algebra

(w.e.f. academic year 2019-20 batch onwards)

DSC-V

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The students are exposed to various concepts like vector spaces,bases, dimension, Eigen values etc.
Outcome: After completion this course students appreciate its interdisciplinary nature.

Unit- I

Vector Spaces: Vector Spaces and Subspaces -Null Spaces, Column Spaces, and Linear Transformations -Linearly Independent Sets; Bases -Coordinate Systems -The Dimension of a Vector Space

Unit- II

Rank-Change of Basis - Eigenvalues and Eigenvectors - The Characteristic Equation

Unit- III

Diagonalization: -Eigenvectors and Linear Transformations -Complex Eigenvalues - Applications to Differential Equations.

Unit- IV

Orthogonality and Least Squares : Inner Product, Length, and Orthogonality -Orthogonal Sets -Orthogonal Projections - The Gram-Schmidt Process.

Text:

David C Lay,Linear Algebra and its Applications 4e

References:

1] S Lang, Introduction to Linear Algebra

2] Gilbert Strang , Linear Algebra and its Applications

3] Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence; Linear

Algebra 4] Kuldeep Singh; Linear Algebra.

5] Sheldon Axler; Linear Algebra Done Right

SEMESTER-VI
(A) Numerical Analysis

(w.e.f. academic year 2019-20 batch onwards)

DSE-VI

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: Students will be made to understand some methods of numerical analysis.
Outcome: Students realize the importance of the subject in solving some problems of algebra and calculus.

Unit- I

Errors in Numerical Calculations - Solutions of Equations in One Variable: The Bisection Method - The Iteration Method - The Method of False Position-Newton's Method - Muller's Method - solution of Systems of Nonlinear Equations.

Unit- II

Interpolation and Polynomial Approximation: Interpolation - Finite Differences - Differences of Polynomials - Newton's formula for Interpolation - Gauss's central differences formula - Stirling's and Bessel's formula - Lagrange's Interpolation Polynomial - Divided differences - Newton's General Interpolation formula - Inverse Interpolation.

Unit- III

Curve Fitting: Least Square Curve Fitting: Fitting a Straight Line-Nonlinear Curve Fitting. **Numerical Differentiation and Integration:** Numerical Differentiation - Numerical Integration: Trapezoidal Rule-Simpson's 1/3rd-Rule and Simpson's 3/8th-Rule - Boole's and Weddle's Rule - Newton's Cotes Integration Formulae.

Unit- IV

Numerical Solutions of Ordinary Differential Equations: Taylor's Series Method - Picard's Method - Euler's Methods - Runge Kutta Methods.

Text:

S.S.Sastry,Introductory Methods of Numerical Analysis, PHI

References:

1] Richard L. Burden and J. Douglas Faires,Numerical Analysis (9e)

2] M K Jain, S R K Iyengar and R K Jain, Numerical Methods for Scientific and Engineering computation

3] B.Bradie , A Friendly introduction to Numerical Analysis

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
CBCS PATTERN IN SEMESTER SYSTEM

Scheme of Theory Question Paper from Academic year 2019-2020 batch.
[DSC & DSE Subjects only]
Course : B. Sc, Subject : Mathematics

Time: 3 Hours Max. Marks: 100 **SECTION-A**
(Short Answer questions)

I. Answer any **EIGHT** questions out of 12 (8 · 5=40 marks)

1. From UNIT – I
2. From UNIT – I
3. From UNIT – I

4. From UNIT – II
5. From UNIT – II
6. From UNIT – II

7. From UNIT – III
8. From UNIT – III
9. From UNIT – III

10. From UNIT – IV
11. From UNIT – IV
12. From UNIT – IV

SECTION-B

Answer **ALL** questions (4 · 15=60 marks)

(Essay type questions)

13. (a) OR (b) From Unit-I
14. (a) OR (b) From Unit-II
15. (a) OR (b) From Unit-III
16. (a) OR (b) From Unit-IV

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
CBCS PATTERN IN SEMESTER SYSTEM

Scheme of Internal Assessment-I, from Academic year 2019-2020 batch.

[DSC & DSE Subjects only]

Course : B. Sc, Subject : Mathematics

Time: 90 Min. Max. Marks: 25 Answer ALL Questions. Each question carries equal marks (10 x 2 ½ = 25 marks)

1. From UNIT – I
2. From UNIT – I
3. From UNIT – I
4. From UNIT – I
5. From UNIT – I
6. From UNIT – II
7. From UNIT – II
8. From UNIT – II
9. From UNIT – II
10. From UNIT – II

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
CBCS PATTERN IN SEMESTER SYSTEM

Scheme of Internal Assessment-II, from Academic year 2019-2020 batch.
[DSC & DSE Subjects only]
Course : B. Sc, Subject : Mathematics

Time: 90 Min. Max. Marks: 25 Answer ALL Questions. Each question carries equal marks (10 x 2 ½ = 25 marks)

1. From UNIT – III
2. From UNIT – III
3. From UNIT – III
4. From UNIT – III
5. From UNIT – III
6. From UNIT – IV
7. From UNIT – IV
8. From UNIT – IV
9. From UNIT – IV
10. From UNIT – IV