2015-2016

**NAGARJUNA GOVERNEMT COLLEGE:: NALGONDA**
**(AUTONOMOUS)**
**(Re-Accredited by NAAC with A Grade)**

**Date: 21-09-2015**

To
The Principal
NG College
Nalgonda

Sir,

Sub: Grant of Autonomous status –Constitution of the Board of Studies in Mathematics – request for approval – Reg.

Ref: 1. No.F.22-1/2007(AC) Dt.3 Apr 2007
2. OU Lr. NoMR.69/H/2007/Acad, Dt:12-06-07.
3. GORt. No.467 HE. (CE-1) Dept. Dt.29.6.2007.
4. MGU Lr. 191/MGU/NLG/2015-16. Dt.28-08-2015

With reference to the subject cited, I am submitting the list of Board of studies for academic years 2015-17 for your approval.

| S.No | Name | Designation |
|---|---|---|
| 1 | V. Srinivas Reddy<br>In-Charge Department of Maths & Associate Professor Nagarjuna Government College<br>Nalgonda | Chair Person |
| 2 | Dr. Maddilati MADDILETI . P<br>Asst. Professor<br>MG University,Nalgonda | University Nominee |
| 3 | Dr. G. Upender Reddy<br>Asst. Professor<br>MG University, Nalgonda | Subject Expert |
| 4 | Sri. B.Madanmohan<br>Lecturer in Maths<br>GDC, Hayath Nagar | Subject Expert |
| 5 | Sri. A. Keshava Reddy<br>Lecturer in Maths<br>Nagarjuna Government College, Nalgonda | Member |
| 6 | Dr. S. Upender<br>Asst. Professor<br>Nagarjuna Government College, Nalgonda | Member |
| 7 | Sri. D. Madhukar<br>Contract Lecturer in Maths<br>N.G. College Nalgonda | Member |
| 8 | Sri. Kanakaiah<br>Contract Lecturer in Maths<br>N.G. College, Nalgonda | Memeber |

Submitted by

In-Charge/Chairman BOS

Proposals approved

Principal / Chair Person, Academic Council

9. Approval the panel of examiners for paper setting and evaluation for the academic year 2015-16.

1. Sri B.Madan Mohan, Lecturer in Mathematics, GDC, Hayathnagar, Hyderabad.
2. Sri P.Ram Mohan Reddy, Associate Professor in Mathematics, Giriraj GDC, Nizambad.
3. Sri B.Rajender Kumar, Associate Professor in Mathematics, Tara GDC, Sangareddy.
4. Sri K.Anantha Rao, Lecturer in Mathematics, Giriraj GDC, Nizambad.
5. Sri V.Yadaiah, Asst. Professor in Mathematics, GDC, Jogipet.
6. Sri G.Narender Reddy, Asst. Professor in Mathematics, GDC, Ramannapet.
7. Sri P.B.Rajasekhar, Asst. Professor in Mathematics, GDC, Ramannapet.
8. Sri Janaiah, Asst. Professor in Mathematics, MKRGDC, Devarakonda.
9. Sri Venkat Goud, Asst. Professor in Mathematics, MKRGDC, Devarakonda.
10. Sri Dr.G.Upender Reddy, Asst.Professor, MGU, Nalgonda.
11.

SIGNATURES OF THE MEMBERS.

1 V. Srinivasa Reddy — Chairperson — 30/9/15
2. Dr. Maddileti — University nominee — 30/09/15
3. Dr. G. Upender Reddy — Subject expert
Subject expert — 30/9/15
4. B. Madan Mohan — Member
5. A. Keshav Reddy — Member
6. Dr. S. Upender — Member
7. D. Madhukar — Member
Kanakaiah

# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(Autonomous, Accredited by NAAC with "A" Grade)

## SYLLABUS FOR MATHEMATICS

## B.Sc. I Year - I Semester – MODULE – I (w.e.f. 2014-15)

## DIFFERENTIAL EQUATIONS

15 Hours

### UNIT – I

**Differential equations of first order and first degree**

Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables; Total differential equations.

15 Hours

### UNIT - II

**Differential equations of the first order but not of the first degree:**

Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Equations of the first degree in x and y – Clairaut's equations.

**Applications of first order differential equations:**
Orthogonal trajectories.

15 Hours

### UNIT - III

**Higher order linear differential equations.**
Solution of homogeneous linear differential equations of order n with constant coefficients, Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.

15 Hours

### UNIT - IV

Method of undetermined coefficients; Method of variation of parameters; Linear differential equations with non-constant coefficients; The Cauchy-Euler equation.

**System of linear differential equations:**

Solution of a system of linear equations with constant coefficients; An equivalent triangular system. Degenerate Case: $p_1(D)p_4(D) - p_2(D)p_3(D) = 0$.

**Partial Differential equations:**
Formation of Partial Differential equations., Linear Partial differential equations of order one.

**Prescribed Text Books:** (1) Scope and treatment as in "Differential Equations and Their Applications" by Zafar Ahsan, published by Prentice-Hall of India Pvt.Ltd. New Delhi – Second edition:
(2) Rai Singhania, "Ordinary and Partial Differential Equations", S.Chand & Company, New Delhi.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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SYLLABUS FOR MATHEMATICS
B.Sc. I Year - II Semester –MODULE II (w.e.f. 2014-15)

## Solid Geometry

15 Hours

### UNIT – I

**The Plane**

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles of between two planes, Combined equation of two planes, Orthogonal projection on a plane.

**The Line:**

Equations of a line, Angle between a line and a plane, The Condition that a given line may lie in a given plane,

10 Hours

### UNIT - II

The condition that two given lines are coplanar, Number of arbitrary constants in the equations of a straight line. Sets of conditions which determine a line, The shortest distance between two lines,. The length and equations of the line of shortest distance between two straight lines, Length of the perpendicular from a given point to a given line, Intersection of three planes, Triangular Prism.

15 Hours

### UNIT - III

**The Sphere**

Definition and equation of the sphere, Equation of the sphere through four given points, Plane sections of a sphere. Intersection of two spheres, Equation of a circle. Sphere through a given circle. Intersection of a sphere and a line. Power of a point Tangent plane. Plane of contact. Polar plane. Pole of plane, Conjugate points, Conjugate planes; Angle of intersection of two spheres. Conditions for two spheres to be orthogonal, Radical plane. Coaxial system of spheres, Simplified form of the equation of two spheres

20 Hours

### UNIT - IV

**Cones**

Definitions of a cone, vertex, guiding curve, generators, Equation of the cone with a given vertex and guiding curve. Enveloping cone of a sphere. Equations of cones with vertex at origin are homogeneouscondition that the general equation of the second degree should represent a cone Condition that a cone may have three mutually perpendicular generators Intersection of a line and quadric cone. Tangent lines and Tangent plane at a point. Condition that a plane may touch a cone. Reciprocal cones. Intersection of two cones with a common vertex, Right circular cone. Equation of the right circular cone with a given vertex, axis and semi-vertical angle

**Cylinders:**

Definition of a cylinder. Equation to the cylinder whose generators intersect a given conic and are parallel to a given line. Enveloping cylinder of a sphere. The right circular cylinder. Equation of the right circular cylinder with a given axis and radius

**Prescribed Text book:** Scope as in "Analytical Solid Geometry" by Shanti Narayan and P.K.Mittal, Published by S.Chand & Company Ltd. Seventeenth edition:
P.K.Jain and Khaleel Ahmed, "A Text Book of Analytical Geometry of Three Dimentions", Wiley Easatern Ltd., 1999.

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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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## SYLLABUS FOR MATHEMATICS

B.Sc. II Year - III Semester – III Paper (w.e.f. 2015-16)

## REAL ANALYSIS

**15 Hours**

### UNIT – I

The Completeness Properties of R, Applications of the Supremum Property.

**Sequences** and their limits, limit theorems, Monotonic Sequences, Sub-sequences and the Bolzano-Weirstrass theorem, The Cauchy's Criterion, Properly divergent sequences.

### UNIT – II

**15 Hours**

**Introduction to series**, Convergence of series, Comparison test, limit comparison test, Root test, Ratio test, Absolute convergence, test for absolute convergence, test for non-absolute convergence

### UNIT – III

**15 Hours**

**Continuous Functions**-continuous functions, combinations of continuous functions, continuous functions on intervals, Uniform continuity.

**The derivative**, The mean value theorems, L'Hospital Rule, Taylor's Theorem

### UNIT – IV

**15 Hours**

**Riemann Integration**-Riemann integral, Riemann integrable functions, Fundamental theorem.

Prescribed text book:

Scope as in "Introduction to Real Analysis", by Robert G.Bartle and Donald R.Sherbert, John Wiley, 3rd edition. Chapter 3, (3.1 to 3.7), Chapter 5 (5.1 to 5.4), Chapter 6 (6.1 to 6.4), Chapter 7 (7.1 to 7.3), Chapter 9 (9.1. 9.2 and 9.3).

Reference books:


1. "A course of Mathematical Analysis", Shanthi Narayan and P.K.Mittal, S.Chand & Company
2. "Mathematical analysis" by S.C.Malik and Savita Arora, Wiley Eastern Ltd.,


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## SYLLABUS FOR MATHEMATICS

B.Sc. II Year - IV Semester – IV Paper (w.e.f. 2015-16)

## ABSTRACT ALGEBRA

### UNIT – I

**15 Hours**

Binary operations – Definitions and properties, Groups-Definition and elementary properties, Finite groups and group composition tables, Subgroups and cyclic subgroups. Permutations-Functions and permutations, groups of permutations, cycles and cyclic notation, even and odd permutations, The alternating groups. Cyclic groups – Elementary properties, The classification of cyclic groups, sub groups of finite cyclic groups.

### UNIT – II

**15 Hours**

Isomorphism – Definition and elementary properties, Cayley's theorem, Groups of cosets, Applicatoins, Normal subgroups – Factor groups, Criteria for the existence of a coset group, Inner automorphisms and normal subgroups, factor and simple groups, Homomorphism – Definition and elementary properties, The fundamental theorem of homomorphisms, applications.

### UNIT – III

**Rings**

**15 Hours**

Definition and basic properties, Fields, Integral domains, divisors of zero and Cancellation laws, integral domains, The characteristic of a ring, some non-commutative rings examples, Matrices over a field, The real quaternions. Homomorphism of Rings – Definition and elementary properties.

### UNIT – IV

**15 Hours**

Maximal and Prime ideals, Prime fields. Rings of Polynomials – Polynomials in an indeterminate form, The evaluation homomorphism, Euclidean Algorthism.

**Prescribed Text Book:**

Scope and treatment as in "The First Course in Abstract Algebra" (3rd edition) by Johon B Fraleigh, Narosa Publishing house, Chapter 1 to 7, 11 to 13, 23, 24.1 to 24.3, 25.1, 25.4 and chapter 29 to 31.

**Reference Books:**

1. "Topics in Algebra", I.N.Herstein, Wiley Eastern
2. "Contemporary Abstract algebra" by Joseph A Gallian, Narosa Publishing House

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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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## SYLLABUS FOR FUNDAMETALS OF MATHEMATICS (IDE)

**(General Elective)**

**15 Hours**

**Unit-I:**

Set, Subset, Types of sets-operations on sets-Venn Diagram Demorgan Laws Applications of set Theory – Laws of Indices.

Arithmetic Progressions – Geometric Progressions – Harmonic, Progressions. Time and Work, Time and Distance

**15 Hours**

**Unit – II:**

Differentiation and integration – Elementary knowledge and Simple Problems.

Simple Problems on Areas of triangles, Circles, Square and Rectangle

Meaning and Operations – Matrix Algebra – Types of Matrices – Matrix addition – Matrix Multiplication – Matrix Determinants – Matrix inversion.

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - V Semester – V Paper

## LINEAR ALGEBRA

### UNIT – I

Vector spaces, General properties of vector spaces, subspaces, Algebra of subspaces, linear combination of vectors. Linear span, linear sum of two subspaces, linear independence of vectors, Basis of vector space. Finite dimensional vector spaces, Dimension of a vector space, Dimension of a subspace.

### UNIT - II

Linear transformations, linear operators, Range and null space of linear transformations, Rank and nullity of linear transformations, linear transformations as vectors, Product of linear transformations, Invertible linear transformation.

### UNIT – III

The ad-joint or transpose of a linear transformation, Sylvester's law of nullity, characteristic values and characteristic vectors. Cayley Hamilton Theorem, Diagonalizable operators.

### UNIT - IV

Inner product spaces, Euclidean and Unitary spaces. Norm or length of a vector, Schwartz inequality, Orthogonally, Orthonormal set. Complete orthonormal set, Gram – Schmidt orthogonal process.

**Prescribed text book:**

"Linear Algebra" by J.N.Sharma and A.R.Vasista Krishna Prakasham Mandir Meeru 250002.

**Reference books:**


1. "Linear Algebra" by Kenneth Hoffman and Ray Kunze, Pearson Educatoin (low priced edition), New Delhi.
2. "Linear Algebra" by Stephen H.Friedberg Prentice Hall of India Pvt.Ltd. 4th edition 2007.


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# NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - V Semester – VI (a) Paper

## NUMERICAL ANALYSIS - I

### UNIT - I

Errors in Numerical Computations: Numbers and their Accuracy, Errors and their computation, Absolute, Relative and Percentage errors, A general formula, Error in a series function. Solution of Algebraic and Transcendental Equations by bisection method, the Iteration method.

### UNIT - II

The method of False position, Newton – Raphson method, Generalized Newton-Raphson, Ramanujan's method, Muller's method.

### UNIT - III

Errors in polynomial interpolation, Forward difference, Backward differences, Central differences, Symbolic relations, Detection of errors by use Difference Tables, formula of a polynomial, Newton's formula for interpolation formula.

### UNIT - IV

Gauss's central difference formula, Strilings central difference formula, Interpolation with unevenly spaced points Langrange's formula, Error in Langrange's formula, Derivation of governing equations, End conditions, Divided differences and their properties, Newton's general interpolation.

**Prescribed text book:**

Scope as in "Introductory method of Numerical Analysis" by S.S.Sastry, Prentice Hall India (4th Edition)

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - V Semester – VI (b) Paper

### LAPLACE TRANSFORMS

### UNIT – I

Definition of Laplace transform, linearly property, piecewise continuous function, Existence of Laplace transform, Functions of exponential order and of class A, First and second shifting theorems of Laplace transform, change of scale property, Laplace transform of derivatives, final and initial value theorems, Laplace transform of integrals, multiplication by t, division by t.

### UNIT - II

Laplace transform of periodic functions and error function. Beta function and Gamma functions. Definition of inverse Laplace transform, linearity property, first and second shifting theorems of inverse Laplace transform, change of scale property, division by p,

### UNIT - III

Convolution theorem, Heavisides expansion formula , Application of Laplace transform to the solution of ordinary differential equations with constant coefficients.

### UNIT - IV

Application of Laplace transform to the solutions of ordinary differential equations. with variable coefficients. Simultaneous ordinary differential equations, partial differential equations.

**Prescribed Text Book:**

Scope as in "integral transform" by A.R.Vasistha and Dr.K.Gupta published by Krishna Prakashan Media Pvt.Ltd., Meerut.

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - VI Semester – VII Paper

### MULTIPLE INTIGRALS AND VECTOR CALCULUS

#### UNIT – I

**Multiple integrals:** Introduction, the concept of a plane. Curve, line integral-sufficient condition for the existence of the integral. The area of a subset of $R^2$. Calculation of double integrals. Jordan curve, Area, Change of the order of integration.

#### UNIT – II

Double integral as a limit, change of variable in a double integration. Lengths of curves, surface areas, Integral expression for the length of a curve surfaces, surface areas.

#### UNIT – III

Vector differentiation. Ordinary derivatives of vectors, Space curves, Continuity, Differentiable, Gradient, Divergence, Curl operation. Formula involving these operators.

#### UNIT – IV

Vector integration, Theorems of Gauss and Stokes, Green's theorem in plane and application of these theorems.

**Prescribed Text Book:**

1. "A course of mathematical analysis" by Santhi Narayana and P.K.Mittal, S.Chand publication (Chapter 16 and 17).
2. "Vector Analysis" by Murray R.Spiegel, Schaum series publishing Company (chapters 3, 4, 5, 6 and 7).

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - VI Semester – VIII (a) Paper

### NUMERICAL ANALYSIS – II

### UNIT – I

**Curve fitting:** Least-squares curve fitting procedures, fitting a straight line, non linear curve fitting, curve fitting by a sum of exponentials.

### UNIT - II

**Numerical differentiation**, errors in numerical differentiation, Maximum and minimum values of a tabulated function, Numerical integration, Trapezoidal rule, Simpson's 1/3-rule, Simpson's 3/8-rule, Boole's and Weddle's rule.

### UNIT - III

**Linear systems of equations**, Solutions of linear systems – Direct methods, Matrix inversion method, Gaussian elimination method, Method of factorization, Iterative methods, Jacobi's method, Gauss-siedal method.

### UNIT - IV

**Numerical solutions of ordinary differential equations:** Introductoin, solution by Taylor's series, Picard's method of successive approximations. Euler's method, Modified Euler's method, Runge-Kutta method, Predictor-corrector methods, Milne's method.

**Prescribed Text Book:**

Scope as in "Introductory Methods of Numerical Analysis" by S.S.Sastry, Prentice Hall India (4th Edition)

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## SYLLABUS FOR MATHEMATICS

## B.Sc. III Year - VI Semester – VIII (b) Paper

### FOURIER ANALYSIS

### UNIT – I

Fourier series, theorem, Dirichlet's conditions. Fourier series for even and odd functions. Half range Fourier series, other forms of Fourier series.

### UNIT - II

Dirichlet's conditions, Fourier integral formula (without proof). Fourier transform, Inverse Theorem for Fourier transform. Fourier sine and cosine transforms and their inversion formula. Linearity property of Fourier transform, change of scale property, Shifting theorem, Modulation theorem.

### UNIT - III

Convolution theorem of Fourier transforms, Parseval's identity, Finite Fourier cosine transform, Inversion formula for cosine transform.

### UNIT - IV

Application of Fourier transform to initial and boundary value problems.

**Prescribed Text Book:**

1. Scope as in "A course of mathematical analysis" by Santhi Narayana and P.K.Mittal published by S.Chand and company (chapter 10).

2. Scope as in "Integral transform" by A.R.Vasistgha and Dr.K.Gupta published by Krishna Prakashan Media Pvt.Ltd., Meerut.

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