

**NAGARJUNA GOVT.COLLEGE, NALGONDA
(AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
Constitution of Board of Studies 2014-15**

S.NO	CATEGORY	NAME & DESIGNATION
1	Chairman Board of studies	Sri.V.Srinivasa Reddy, N.G.College,Nalgonda.
2	University Nominee	D.Hymavathi, Asso.Prof., in Maths M.G.University,Nalgonda.
3	Subject expert from out side the college	Dr.G.Upendar Reddy, Asso.Prof.,in Maths M.G.University,Nalgonda
4	Subject expert from out side the college	Sri.B.Madan Mohan, Lecturer in maths GDC, HayathNagar, Ranga Reddy (Dist)
5	Members: All The Faculty members of the Dept.	1).Sri A.Keshava Reddy, Lecturer in Maths, N.G.College,Nalgonda 2.).Dr.S.Upender Lecturer in Maths, N.G.College,Nalgonda

Submitted by



In-charge/Chairman BOS

Proposals approved by

Principal/Chairman academic council


Prinathal
Nagarjuna Govt. Degree College,
NALGONDA,







7. Approved to conduct the Practical examinations at the end of II, IV and VI Semesters. Each paper consists 50 marks. The syllabus is approved and followed the practical question bank (as per University Question bank).

8. Approved to evaluate the Progression of the students, co-curriculum and extra curriculum activities should be considered.

9. Approval the panel of examiners for paper setting and evaluation for the academic year 2014-15.

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

SIGNATURES OF THE MEMBERS.

- | | | |
|--|-----------------------|---|
| 1. V. SAINIVASAREDDY | Chairman BOS in Maths | 
23/5/14 |
| 2. D. Hymavathi
Asst. Prof. MGU | University Nominee | 
23/05/14 |
| 3. DR. G. UPENDER REDDY
Asst. Prof. MGU | Member | 
23/5/14 |
| 4. DR. S. U PENDER
Lecturer in Maths | Member | 
05/05/14 |
| 5. B. Madan Mohan | Member |  |
| 6. A. Keshav Reddy | Member |  |

RESOLUTIONS

1. The Choice Based Credit System (CBCS) and Cumulative Grade Point Average (CGPA) System can be implemented for the B.Sc. I Year (I & II Semesters) students for the academic year 2014-15.
2. The modules and allotted Credits is approved for B.Sc. I year (I & II semesters) students for the academic year 2014-15.
3. Unitization of syllabus into 4 units for each paper (module)
4. The evaluation of the students for each semester of I & II, Consists 100 marks in the ratio of 70:30 External End Theory exam – 70 marks and internal exam consist 30 marks.

- (i) The design of External end exam Question Paper for each module is in the following lines.

SECTION – A (Very short questions) 5 x 2 = 10

Answer all the questions – 5 questions – 2 marks each

SECTION – B (Very short questions) 4 x 5 = 20

Answer any four – 6 questions given – 5 marks each

SECTION – C (Essay type questions) 4 x 10= 40

Answer all the questions – four questions given with internal choices.

- (ii) For Internal assessments – 30 marks, The Written exam consists 20 marks, Assignment – 5 marks and student seminars – 5 marks. For Internal written exams two should be conducted, the best of two is taken for consideration.

5. For B.Sc.II & III year (III, IV, V & VI semesters) continuation of old system is followed. The external exam consists – 40 marks and Internal assignments – 10 marks.
6. Approved the syllabus for I, II, III, V, VII & VIII papers and model question papers.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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

DEPARTMENT OF MATHEMATICS

BOARD OF STUDIES MEETING

The members of Board of Studies in Mathematics department, N.G.College, Nalgonda met under the chairmanship of Sri.V.Srinivas Reddy on 23/5/2014 at Department of Mathematics, N.G.College, and passed the following resolutions.

AGENDA

1. To consider and approve the Choice Based Credit System (CBCS) and Cumulative Grade Point Average (CGPA) system for B.Sc.I Year students (I & II Semesters) for the academic year 2014-15.
2. To consider and approve the syllabus for B.Sc.I, II, III years (I, II, III, IV, V & VI Semesters) for the academic year 2014-15.
3. To consider and approve the modules and setting of Question papers as 70:30 for Theory External and Internal assignments for B.Sc.I Year (I & II Semesters) for the academic year 2014-15.
4. To consider and approve the continuation of 80:20 pattern for External and Internal Assessment for B.Sc.II & III Year (III, IV, V & VI semesters) for the academic year 2014-15 i.e., External exam 40 marks, Internal assessment 10 marks.
5. To consider and approve the practical examinations at the end of II, IV, VI semesters for B.Sc. I , II & III year students.
6. To consider and approve the model question papers for B.Sc.I, II & III year for the academic year 2014-15.
7. To consider and approve the list examinations for paper setting and evaluation for the academic year 2014-15.

Any other related academic matters.

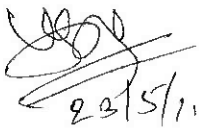
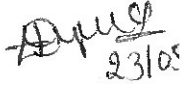

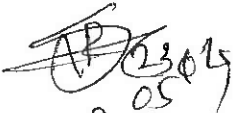
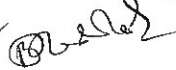
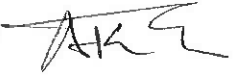
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23/5/15 |
| 2. | D. Hymavathi
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Nominee | 
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Asst. Prof. MGU | Member | 
23/5/2014 |
| 4. | Dr. S. Upender
Lecturer in Maths | Member | 
23/05 |
| 5. | B. Madan Mohan | Member |  |
| 6. | A. Keshav Reddy | Member |  |

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Constitution of Board of Studies 2014-15**

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Submitted by

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DEPARTMENT OF MATHEMATICS

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 7. To consider and approve the list examinations for paper setting and evaluation for the academic year 2014-15.
- Any other related academic matters.

**NAGARJUNA GOVT.COLLEGE, NALGONDA
(AUTONOMOUS)**

From
The Principal
N.G.College,
Nalgonda.
Nalgonda.

To
.....D. Hymavathy
.....~~Assistant~~ Assistant Prof. in Maths
.....H.G.
.....Nalgonda

Lt.No 25 NGC/BOS/2013-14

Dt. 16/9/13

Sir,

Sub:Autonomous-Board of studies meeting framing of syllabus for the
Academic year 2013-14 Reg.

With reference to the subject cited, I request you to kindly make it convenient to
Attend the meeting of BOS of Mathematics.....,NG.College, Nalgonda on 20/9/13
at 10 AM to discuss the framing of syllabus for I to VI Semesters of B.A/B.Com/B.Sc
All years, preparation and approval of model question papers and other related
academic matters.

Thanking you Sir,

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Yours faithfully.

(Handwritten signature)

Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

NAGARUJUNA GOVT.COLLEGE(AUTONOMOUS),NALGONDA
(Reaccredited by NAAC with "A" Grade)

ALLOCATION OF CREDITS AT SUBJECT LEVEL
Course: **SCIENCE** Subject: **Mathematics**

S.No	Semester	Model (Paper)	Hours Per week	Max. Marks	Credits
1	I (Core)	Differential Equations	4	100	3
2	II (core)	Solid Geometry	4	100	3
3	Practical	Differential Equation & Solid Geometry	3	50	2
4	III (core)	Real Analysis	4	100	3
5	IV (core)	Abstract Algebra	4	100	3
6	Practical	Real Analysis & Abstract Algebra	3	50	2
7	V(Advanced)	Linear Algebra	4	100	3
8	V (Elective)	(i) Numerical Analysis (ii) Laplace transformation	3	100	2
9	Practical	Linear Algebra	3	50	2
10	VI(skill)	Vector calculus & Multiple integrals	4	100	3
11	VI(Elective)	(i) Fourier transforms & series (ii) Special functions (iii) Operation research	3	100	2
12	Practical	Vector calculus & multiple integral	3	50	2
13	Project Work				1
14	General Electives	(i) Quantitative Techniques (ii) Business Mathematics	2		2

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INAGARJUNA GOVERNMENT COLLEGE, NALGONDA

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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.

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 homogeneous condition 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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SYLLABUS FOR MATHEMATICS

B.Sc. II Year - III Semester – III Paper (w.e.f. 2014-15)

REAL ANALYSIS

UNIT – I

The Completeness Properties of \mathbb{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

Introduction to series, Absolute convergence, test for absolute convergence, test for non-absolute convergence

UNIT – III

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

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. 2014-15)

ABSTRACT ALGEBRA

UNIT – I

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

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

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

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

Prescribed Text Book:

Scope and treatment as in "The First Course in Abstract Algebra" (3rd edition) by John 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 MATHEMATICS

B.Sc. III Year - V Semester – V Paper (w.e.f. 2014-15)

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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SYLLABUS FOR MATHEMATICS

B.Sc. III Year - V Semester – VI (a) Paper (w.e.f. 2014-15)

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, Stirlings 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 (w.e.f. 2014-15)

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 (w.e.f. 2014-15)

MULTIPLE INTEGRALS 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 \mathbb{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 (w.e.f. 2014-15)

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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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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SYLLABUS FOR MATHEMATICS

B.Sc. III Year - VI Semester - VIII (b Paper (w.e.f. 2014-15))

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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**NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS) NALGONDA
TENTATIVE SCHEME OF EVALUATION**

COURSE: B.Sc
Semester: I
Max: Marks: 70

Subject: Mathematics
Module: Differential Equations
Time: 2:30

PART-A

(Very Short Questions)

Answer all the questions

5 x 2 = 10

- 1.
- 2.
- 3.
- 4.
- 5.

PART-B

(Short Questions)

Answer any four of the following

4 x 5 = 20

(At least one question from each unit)

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

PART-C

(Essay Type Questions)

Answer the following questions

4 x 10 = 40

(Unit wise)

12.A)

B)

(OR)

C)

D)

(OR)

13.A)

B)

(OR)

C)

D)

(OR)

14.A)

B)

(OR)

C)

D)

(OR)

15
A)
B)
or
C)
D)

Internal Assessment-30

Internal periodical Tests-20 (Best of Two)

C0-Curricular Activities-10

(Assignment-5, Seminal-5)

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NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS) NALGONDA
TENTATIVE SCHEME OF EVALUATION

COURSE: B.Sc
Semester: I
Max: Marks: 70

Subject: Mathematics
Module: Solid Geometry
Time: 2:30

PART-A

(Very Short Questions)

Answer all the questions

5 x 2 = 10

- 1.
- 2.
- 3.
- 4.
- 5.

PART-B

(Short Questions)

Answer any four of the following

4 x 5 = 20

(At least one question from each unit)

- 6.
- 7.
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Answer the following questions

4 x 10 = 40

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12.A)

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C)

D)

(OR)

14.A)

B)

(OR)

C)

D)

(OR)

15 A)
B)
OR
C)
D)

Internal Assessment-30

Internal periodical Tests-20 (Best of Two)

C0-Curricular Activities-10

(Assignment-5, Seminal-5)

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NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS) NALGONDA

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B.Sc.II Yr. III Semester-End Examination Model Question Paper W.e.f.2014-15

MATHEMATICS - III (REAL ANALYSIS)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

- (a) State and prove monotone convergence theorem.
(or)
(b) A sequence of real numbers is convergent iff it is a Cauchy sequence.
- (a) State and prove limit comparison test. Using this prove that $\sum_{n=1}^{\infty} \frac{1}{n^2 + n}$ is convergent.
(or)
(b) State and prove ratio test.
- (a) State and prove maximum and minimum theorem.
(or)
(b) State and prove cauchy mean value theorem.
- (a) If $f: [a, b] \rightarrow \mathbb{R}$ is continuous on $[a, b]$ then prove that $f \in R[a, b]$.
(or)
(b) State and prove fundamental theorem of integral calculus.

Section - B (4 x 3 = 12)

Answer any Four questions, each question carries 3 marks

- Let $x_1 = 1$ and $x_{n+1} = \sqrt{1 + x_n}$. Show that (x_n) is convergent.
- Test the convergence of the series $\sum \frac{1}{n \log n}$ by cauchy condensation test.
- Test the convergence and absolute convergence of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n+1}$.
- Define uniform continuous of a function and give an example.
- Find $\lim_{x \rightarrow 0^+} \frac{\tan x - x}{x^3}$.
- Using cauchy criterion show that $f(x) = \begin{cases} 1 & \text{if } x \in \mathbb{Q} \\ 0 & \text{if } x \notin \mathbb{Q} \end{cases}$ is not Riemann integrable on $[0, 1]$.

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NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS) NALGONDA

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B.Sc.II Yr. IV Semester-End Examination Model Question Paper W.e.f.2014-15
MATHEMATICS - IV (Abstract Algebra)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

- (a) Show that a nonempty subset H of a group G is a subgroup of G iff $ab^{-1} \in H \forall a, b \in H$
(or)
(b) Define cyclic group. Show that a sub group of a cyclic group is cyclic.
- (a) State and prove Cayley's Theorem.
(or)
(b) State and prove Lagrange's Theorem on groups and using this any group of prime order has no proper sub-groups.
- (a) Show that every field is an integral domain. Is the converse true? Justify your answer.
(or)
(b) Show that the real quaternions L form a skew field under addition and multiplication.
- (a) If $N \neq R$ is an ideal of commutative ring with unity then show that R/N is an integral domain iff N is a Prime ideal in R .
(or)
(b) State and prove division algorithm for polynomials.

Section - B (4 x 3= 12)

Answer any Four questions, each question carries 3 marks

- If $(G, *)$ is a group and $a, b \in G$ then show that $a*x=b$ has unique solution in G .
- If $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix}$, $\mu = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix}$ then find $\sigma^2\mu, \sigma^{100}$.
- Define (i) Factor group (ii) Kernel of a group homomorphism.
- Define (i) Characteristic of a ring. (ii) Maximal ideal
- Solve the equation $x^2 - 5x + 6 = 0$ in Z_{12} .
- Show that the cyclotomic polynomial $\phi_p(x) = x^{p-1} + x^{p-2} + \dots + x + 1$ is irreducible over Q for any Prime 'P'.

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B.Sc.III Yr. V Semester-End Examination Model Question Paper (w.e.f. 2014-15)

MATHEMATICS - V (LINEAR ALGEBRA)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) Define subspace. The union of two subspaces of vector space V is a subspace of V iff one is contained in the other.
(OR)
(b) Define basis. Show that every linearly independent subset of finite dimensional vector space of V can be extended to a basis for V .

2. (a) Define Linear Transformation. If T is a linear transformation from a vector space U to vector space V then show that null space of T is a subspace of U and Range of T is a subspace of V .
(OR)
(b) State and prove that Rank nullity theorem.

3. (a) Find all the eigen values and eigen vectors of the Matrix $A = \begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$.
(OR)
(b) State and prove cayley hamilton theorem.

4. (a) State and prove Schwarz's Inequality.
(OR)
(b) State and prove Bessel's Inequality.

Section - B (4 x 3 = 12)

Answer any Four questions, each question carries 3 marks

5. Define vectorspace, dimension of a vector space.
6. Show that $\{(1,2,0), (0,3,1), (-1,0,1)\}$ is L.I
7. Define linear transformation and null space of linear transformation.
8. Find the eigen values of the Matrix $\begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$.
9. State and prove triangle inequality.
10. Any orthogonal set of non zero vectors in a Inner Product Space V is Linearly independent.

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B.Sc.III Yr. V Semester-End Examination Model Question Paper (w.e.f. 2014-15)

MATHEMATICS - VI (a) (NUMERICAL ANALYSIS-I)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) Define Absolute error, Relative error Evaluate the sum $s = \sqrt{3} + \sqrt{5} + \sqrt{7}$ up to four significant digits and find its absolute and relative errors.
(OR)
(b) Explain the bisection method and using this find the real root of the equation $x^3 - 2x - 5 = 0$.
2. (a) Explain the Newton-Raphson method and using this find the root of the equation $x = e^{-x}$.
(OR)
(b) Explain the Ramanujan's method and using this find the root of the equation $xe^x = 1$.
3. (a) Define Δ, ∇, δ and show that
(i) $E = 1 + \Delta$ (ii) $\mu^2 = 1/4(\delta^2 + 4)$
(OR)
(b) Using the following table find (i) $f(0.23)$ (ii) $f(0.29)$

X	.2	.22	.24	.26	.28	.3
$f(x)$	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139
4. (a) Using Gauss's forward formula find the value of $f(32)$ given that $f(25)=0.2707, f(30)=.3027, f(35)=.3386, f(40)=.3794$
(OR)
(b) State and prove that Newton's general interpolation formula.

Section - B (4 x 3= 12)

Answer any Four questions, each question carries 3 marks

5. Find the percentage error in u at $v = 1$ if $u = 3v^7 - 6v$ and the error in v is 0.05.
6. Explain the iteration method.
7. Explain the Muller's method.
8. State the Stirling's formula.
9. If $f(x) = 1/x^2$ then find the differences $[a, b]$ and $[a, b, c]$.
10. Show that $E = 1 + \Delta, E^{-1} = 1 - \nabla$.

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MATHEMATICS - VI (b) (LAPLACE TRANSFORMS)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) State and prove first shifting theorem, Using this find the laplace transform of $(t+3)^2 e^t$.
(OR)
(b) Show that $L\{tF(t)\} = \frac{d}{dp} f(p)$ and using this find $L\{t \sin t\}$.
2. (a) Find (i) $L^{-1}\left(\frac{1}{p^2 - 6p + 10}\right)$ (ii) $L^{-1}\left(\frac{4p+5}{(p-1)^2(p+2)}\right)$.
(OR)
(b) (i) if $L^{-1}(f(p)) = F(t)$ then show that $L^{-1}\left(\int_p^\infty f(x) dx\right) = \frac{F(t)}{t}$ (ii) Find $L^{-1}\left(\frac{e^{-3p}}{p^3}\right)$.
3. (a) State and prove that convolutoin theorem.
(OR)
(b) Solve $((D+2)^2 y = 4e^{-2t}, y(0) = -1$ and $y'(0) = 4$.
4. (a) Solve $y'' - ty' + y = 1$ if $y(0) = 1, y'(0) = 2$.
(OR)
(b) Solve $\frac{dy}{dt} = 2 \frac{\partial^2 y}{\partial x^2}$ where $y(0,t) = 0$ and $y(x,0) = 10 \sin 4\pi x$.

Section - B (4 x 3 = 12)

Answer any Four questions, each question carries 3 marks

5. Find $L\{e^t \sin^2 t\}$.
6. Show that $L\{\sin t / t\} = \tan^{-1} \frac{1}{p}$.
7. Find $L^{-1}\left\{\frac{3p+1}{(p+1)^4}\right\}$
8. State the Heaviside's expansion formula.
9. Solve $\frac{d^2 y}{dt^2} + y = 0, y = 1, dy/dt = 0$ when $t=0$.
10. Find $L^{-1}\left\{\log \frac{p+3}{p+2}\right\}$

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MATHEMATICS - VII

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) Evaluate $\int_C (2x^2 + y^2)dx + (3y - 4x)dy$ by around the triangle ABC whose vertices are
 $A = (0,0), B = (2,0), C = (2,1)$.

(OR)

(b) Prove that $\int_0^1 dx \int_x^{\frac{1}{x}} \frac{ydy}{(1+xy)^2(1+y^2)} = \frac{\pi-1}{4}$.

2. (a) Show that $\int_0^2 \int_0^x \{(x+y+1)^2 - 4xy\}^{\frac{1}{2}} dx dy = \frac{1}{2} \log\left(\frac{16}{e}\right)$.

(OR)

- (b) Find the area of the surface cut from the cylinder $x^2 + z^2 = a^2$ by the cylinder $x^2 + y^2 = a^2$.

3. (a) Prove that $\text{curl}(\vec{A} \times \vec{B}) = \vec{A} \text{div} \vec{B} - \vec{B} \text{div} \vec{A} + (\vec{B} \cdot \nabla) \vec{A} - (\vec{A} \cdot \nabla) \vec{B}$.

(OR)

- (b) Define divergence and curl of a vector point function. If $\vec{f} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$ then find $\text{div} \vec{f}$ and $\text{curl} \vec{f}$.

4. (a) If $\vec{F} = (x + y^2)\vec{i} - 2x\vec{j} + 2yz\vec{k}$, evaluate $\int_S \vec{F} \cdot \vec{N} ds$, where S is the surface of the plane $2x + y + 2z = 6$ in the first octant.

(OR)

- (b) State and prove Gauss divergence theorem.

Section - B (4 x 3 = 12)

Answer any FOUR questions.

5. Evaluate $\int \int xy(x^2 + y^2) dx dy$ over $[0, a; 0, b]$.
6. Find the length of the curve $x = at^2, y = 2at, z = at$ where $0 \leq t \leq 1$.
7. Find the directional derivative of $\phi = xyz$ at $(1, 1, 1)$ in the direction of the vector $\vec{i} + \vec{j} + \vec{k}$.
8. Prove that $\text{curl}(\text{grad} \phi) = 0$.
9. Evaluate $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = 3x^2\vec{i} + (2xz - y)\vec{j} + z\vec{k}$ along the straight line C from $(0, 0, 0)$ to $(2, 1, 3)$.
10. State the Stoke's theorem.

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B.Sc.III Yr. V Semester-End Examination Model Question Paper (w.e.f. 2014-15)

MATHEMATICS - VIII (a) (NUMERICAL ANALYSIS-II)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) Find the values of a_0 and a_1 so that $Y = a_0 + a_1X$ fits the data given in the table.

X	0	1	2	3	4
Y	1	2.9	4.8	6.7	8.6

(OR)

- (b) Find the values of a, b and c. So that $y = a + bx + cx^2$ is the best fit to the data.

x	0	1	2	3	4
y	1	0	3	10	21

2. (a) Using following tabel find $dy/dx, d^2y/dx^2$ at $x = 1.2$.

x	1	1.2	1.4	1.6	1.8	2	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

(OR)

- (b) Evaluate $\int_0^{\pi} \sqrt{\sin x} dx$ by using Simpson's Rule with $h = \pi/12$.

3. (a) Solve the equations $2x + 3y + z = 9$, $x + 2y + 3z = 6$, $3x + y + 2z = 8$ by LU Decomposition method.

(OR)

- (b) Solve the equatons by using Jaccobi's method $83x + 11y - 4z = 95$, $7x + 52y + 13z = 104$, $3x + 8y + 29z = 71$.

4. (a) Determine value of y when $x=0.1$ given that $y(0)=1$ and $y' = x^2 + y$ by modified Euler's method.

(OR)

- (b) Use the Runge - Kutta fourth order method to find the value of y when $x = 1$ given that $y=1$ when $x=0$ and $dy/dx = y - x/y + x$.

Section - B (4 x 3 = 12)

Answer any Four questions, each question carries 3 marks

5. Explain the least squares curve fitting method to fit a straight-line for the given data.
6. State the Trepizodial Rule.
7. Explain the Gauss Siedal Method.
8. Explain the Euler's Method.
9. Explain the Miline method.
10. Given that $y' = y - x/y + x, y(0) = 1$. Use Picard's method to find $y(0.1)$.

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(Accredited by NAAC with "A" Grade)

B.Sc.III Yr. V Semester-End Examination Model Question Paper (w.e.f. 2014-15)

MATHEMATICS - VIII (b) (FOURIER ANALYSIS)

Time: 2.30 Hrs

Max Marks: 40

Section - A (4 x 7 = 28)

Answer all the questions, each question carries 7 marks.

1. (a) Find the values of Fourier series of $f(x) = x^2$ in the interval $(-\pi, \pi)$.

(OR)

- (b) Find the Fourier series of $f(x) = |x|$ in $(-\pi, \pi)$ and hence show that

$$1 + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \pi^2/8.$$

2. (a) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2 & \text{if } |x| < 1 \\ 0 & \text{if } |x| > 1 \end{cases}$ and hence

evaluate $\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} dx$.

(OR)

- (b) State and prove Modulation theorem.

3. (a) State and prove convolution theorem.

(OR)

- (b) Find the finite Fourier sine and cosine transform of $f(x) = x$.

4. (a) Solve $\frac{\partial u}{\partial t} = 2 \frac{\partial^2 u}{\partial x^2}$ if $u(0, t) = 0, u(x, 0) = e^{-x}, u(x, t)$ is bounded where $x > 0, t > 0$.

(OR)

- (b) Solve $\frac{\partial u}{\partial t} = 2 \frac{\partial^2 u}{\partial x^2}$ if $u_x(0, t) = 0, u(x, 0) = x$ if $0 < x < 1$ 0 if $x > 1$ and $u(x, t)$ is bounded where $x > 0, t > 0$.

Section - B (4 x 3 = 12)

Answer any Four questions, each question carries 3 marks

- Find Fourier sine series of $f(x) = x$ in $(0, \pi)$.
- State and prove changes of scale property for Fourier transform.
- Find the Fourier transform of $e^{-|x|}$.
- State and prove Parseval's identity for Fourier transform.
- Find the inverse Fourier transform of $e^{-|p|y}$. Where $y \in (-\infty, \infty)$.
- Find the finite Fourier sine transform of $f(x) = 1$.

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