

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &
SCIENCE**

VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)

Accredited by NAAC with "A" Grade

2021-2022



DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

EVEN SEMESTER

30-03-2022

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of
AG & SG Siddhartha Degree College of Arts & Science, Vuyuru, held at
2.30PM on 30 - 03 - 2022 through online.

N.V. Srinivasa Rao

Presiding

Members Present:

- | | | |
|--|-----------------------|---|
| 1) <u>N.V. Srinivasa Rao</u>
(N.V. Srinivasa Rao) | Chairman | Head, Department of
Mathematics,
AG & SG S Degree College. |
| 2) _____
(Dr. K. Jaya Lakshmi) | University
Nominee | Department of Mathematics,
Krishna University,
Machilipatnam. |
| 3) _____
(M. Venkateswara Rao) | Subject
Expert | Department of Mathematics,
Govt. Degree College,
Avanigadda. |
| 4) _____
(I. V. Venkateswara Rao) | Subject
Expert | Department of Mathematics,
P. B. Siddhartha College,
Vijayawada |
| 5) <u>D. Sunitha</u>
(D. Sunitha) | Member | Lecturer in Mathematics
AG & SG S Degree College. |
| 6) <u>A. Bhargavi</u>
(A. Bhargavi) | Member | Lecturer in Mathematics
AG & SG S Degree College. |
| 7) <u>Noor Mohammad</u>
(Noor Mohammad) | Member | Lecturer in Mathematics
AG & SG S Degree College. |
| 8) <u>K. Rajya Lakshmi</u>
(K. Rajya Lakshmi) | Member | Lecturer in Mathematics
AG & SG S Degree College. |
| 9) <u>B. Durga Praveen</u>
(B. Durga Praveen) | Student
Member | III B.Sc M.C.Cs
AG & SG S Degree College. |
| 10) <u>M. Rose Manasa</u>
(M. Rose Manasa) | Student
Member | III B.Sc M.P.C (E)
AG & SG S Degree College. |

Agenda of B.O.S Meeting:

1. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 2nd Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2021-22.
2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 4th Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2021-22.
3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 6th Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2021-22.
4. Any other matter.

Resolutions.

1. Discussed and recommended that changes are required in Syllabi, Model Question Papers, Guidelines to be followed by the question paper setters in Mathematics for 2nd Semesters from Academic year 2021-22. The maximum marks for IA is 25 and SE is 75. Each IA written examination is of 1 Hr. duration for 15 marks. The tests will be conducted centrally. The average of two such IA is calculated for 15 marks. 5 marks will be allotted basing on Assignment. 5 marks will be allotted basing on performance of seminar, group discussion, surprise tests etc. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/ she gets out of 75) and the result shall be declared as 'PASS' from the Academic year 2021-22.
2. Discussed and recommended that changes are required in Syllabi, Model Question Papers, Guidelines to be followed by the question paper setters in Mathematics of 4th Semesters from Academic year 2021-22. The maximum marks for IA is 30 and SE is 70. Each IA written examination is of 1 Hr. 30 min duration for 20 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks. 5 marks will be allotted basing on Assignment. 5 marks are allotted for attendance. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2021-22.
3. Discussed and recommended that no changes are required in syllabi, Model Question Papers, Guidelines for question paper setters in Mathematics for the 6th Semester for the Academic year 2021-22.
4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations, Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V. [Signature]
Chairman

A. G & S. G Siddhartha Degree College of Arts and Science (Autonomous), Vuyyuru

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

NAAC recredited at 'A' level

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: REAL ANALYSIS

Semester: II

Course Code	MAT T21B	Course Delivery Method	Class Room / Blended Mode - Both
Credits	5	CIA Marks	25
No. of Lecture Hours / Week	6	Semester End Exam Marks	75
Total Number of Lecture Hours	75	Total Marks	100
Year of Introduction :2021-22	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: 0%

Course Outcomes:

After successful completion of this course, the student will be able to

1. Get clear idea about the real numbers and real valued functions.
2. Obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
3. Test the continuity and differentiability and Riemann integration of a function.
4. Know the geometrical interpretation of mean value theorems.

Course Syllabus:

UNIT – I (12 Hours) REAL NUMBERS:

The algebraic and order properties of \mathbb{R} , Absolute value and Real line, Completeness property of \mathbb{R} , Applications of supremum property; intervals. (No question is to be set from this portion).

Real Sequences:

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence. The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

UNIT –II (12 Hours) INFINITE SERIES:

Series: Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Cauchy's n^{th} root test or Root Test.
3. D'Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence.

UNIT – III (12 Hours) CONTINUITY :

Limits : Real valued Functions, Bounded ness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. (No question is to be set from this portion).

Continuous functions: Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV (12 Hours) DIFFERENTIATION AND MEAN VALUE THEORMS:

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT – V (12 Hours) RIEMANN INTEGRATION :

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

Text Book:

Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, published by John Wiley.

Reference Books:

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D.Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.

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SEMESTER – II , REAL ANALYSIS

B.Sc MATHEMATICS MODEL PAPER

Time: 3Hrs

Max.Marks:75M

SECTION - A

Answer any FIVE questions. Each question carries FIVE marks.

5x5 = 25M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION - B

Answer ALL the questions. Each question carries TEN marks.

5 X 10 M = 50 M

9. a) OR b)
10. a) OR b)
11. a) OR b)
12. a) OR b)
13. a) OR b)

BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-IV, REAL ANALYSIS

Unit	TOPIC	S.A.Q	E.Q	Total Marks
I	Real Number System and Real Sequence	1	2	25
II	Infinite Series	1	2	25
III	Limits and Continuity	2	2	30
IV	Differentiation and Mean Value Theorem	2	2	30
V	Riemann Integration	2	2	30
	TOTAL	8	10	140

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 75 .

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NAAC reaccruited at 'A' level

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: REAL ANALYSIS

Semester: IV

Course Code	MAT - 401	Course Delivery Method	Class Room / Blended Mode - Both
Credits	5	CIA Marks	30
No. of Lecture Hours / Week	6	Semester End Exam Marks	70
Total Number of Lecture Hours	75	Total Marks	100
Year of Introduction :2021-22	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Course Outcomes:

After successful completion of this course, the student will be able to

1. Get clear idea about the real numbers and real valued functions.
2. Obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
3. Test the continuity and differentiability and Riemann integration of a function.
4. Know the geometrical interpretation of mean value theorems.

Course Syllabus:

UNIT – I (12 Hours) REAL NUMBERS:

The algebraic and order properties of \mathbb{R} , Absolute value and Real line, Completeness property of \mathbb{R} , Applications of supremum property; intervals. (No question is to be set from this portion).

Real Sequences:

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence. The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

UNIT –II (12 Hours) INFINITE SERIES:

Series: Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Cauchy's n^{th} root test or Root Test.
3. D'Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence.

UNIT – III (12 Hours) CONTINUITY :

Limits : Real valued Functions, Bounded ness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. (No question is to be set from this portion).

Continuous functions: Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV (12 Hours) DIFFERENTIATION AND MEAN VALUE THEORMS:

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT – V (12 Hours) RIEMANN INTEGRATION :

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

Text Book:

Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, published by John Wiley.

Reference Books:

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi.

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SEMESTER – IV , REAL ANALYSIS

B.Sc MATHEMATICS MODEL PAPER

Time: 3Hrs

Max.Marks:70M

SECTION - A

Answer any FOUR questions. Each question carries FIVE marks.

Choosing at least ONE question from each part.

4 X 5 M=20 M.

Part – 1

1. Unit - I
2. Unit - II
3. Unit - II
4. Unit - III

Part – 2

5. Unit - IV
6. Unit - IV
7. Unit - V
8. Unit - V

SECTION - B

Answer any FIVE questions. Each question carries TEN marks.

Choosing at least TWO question from each part

5 X 10 M = 50 M

Part – 1

9. Unit - I
10. Unit - II
11. Unit - II
12. Unit - III

Part – 2

13. Unit - IV
14. Unit - IV
15. Unit - V
16. Unit - V

BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-IV, REAL ANALYSIS

Unit	TOPIC	S.A.Q	E.Q	Total Marks
I	Real Number System and Real Sequence	1	1	15
II	Infinite Series	2	2	30
III	Limits and Continuity	1	1	15
IV	Differentiation and Mean Value Theorem	2	2	30
V	Riemann Integration	2	2	30
	TOTAL	8	8	120

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : $4 \times 5 \text{ M} = 20 \text{ M}$

Essay questions : $5 \times 10 \text{ M} = 50 \text{ M}$

Total Marks = 70 .

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NAAC reaccredited at 'A' level

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper : LINEAR ALGEBRA

Semester: IV

Course Code	MAT - 402	Course Delivery Method	Class Room / Blended Mode - Both
Credits	5	CIA Marks	30
No. of Lecture Hours / Week	6	Semester End Exam Marks	70
Total Number of Lecture Hours	75	Total Marks	100
Year of Introduction :2021-22	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Course Outcomes:

After successful completion of this course, the student will be able to;

1. Understand the concepts of vector spaces, subspaces, basis, dimension and their properties
2. Understand the concepts of linear transformations and their properties
3. Apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods
4. Learn the properties of inner product spaces and determine orthogonality in inner product spaces.

Course Syllabus:

UNIT – I (12 Hours) Vector Spaces-I:

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT –II (12 Hours) Vector Spaces-II:

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

UNIT –III (12 Hours) Linear Transformations:

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

UNIT –IV (12 Hours) Matrix :

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic equations, Characteristic Values & Vectors of square matrix, Cayley – Hamilton Theorem.

UNIT –V (12 Hours) Inner product space:

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram – Schmidt orthogonalization process. Bessel's inequality and Parseval's Identity.

Co-Curricular Activities (15 Hours)

Seminar/ Quiz/ Assignments/ Linear algebra and its applications / Problem Solving.

Text Book:

Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.

Reference Books :

1. Matrices by Shanti Narayana, published by S.Chand Publications.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
3. Linear Algebra by Stephen H. Friedberg et. al. published by Prentice Hall of India Pvt. Ltd. 4th Edition, 2007.

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SEMESTER – IV , LINEAR ALGEBRA

B.Sc MATHEMATICS MODEL PAPER

Time: 3Hrs

Max.Marks:70M

SECTION - A

Answer any FOUR questions. Each question carries FIVE marks.

Choosing at least ONE question from each part.

4 X 5 M=20 M.

Part – 1

1. Unit - I
2. Unit - II
3. Unit - III
4. Unit - III

Part – 2

5. Unit - IV
6. Unit - IV
7. Unit - V
8. Unit - V

SECTION - B

Answer any FIVE questions. Each question carries TEN marks.

Choosing at least TWO question from each part

5 X 10 M = 50 M

Part – 1

9. Unit - I
10. Unit - II
11. Unit - III
12. Unit - III

Part – 2

13. Unit - IV
14. Unit - IV
15. Unit - V
16. Unit - V

BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-V, LINEAR ALGEBRA

Unit	Topic	S.A.Q	E.Q	Total Marks
I	Vector spaces - I	1	1	15
II	Vector spaces - II	1	1	15
III	Linear Transformation	2	2	30
IV	Matrix	2	2	30
V	Inner product spaces	2	2	30
Total		8	8	120

S.A.Q. = Short answer questions (5 marks)

E.Q. = Essay questions (10 marks)

Short answer questions : $4 \times 5 \text{ M} = 20 \text{ M}$

Essay questions : $5 \times 10 \text{ M} = 50 \text{ M}$

Total Marks = 70 M

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MATHEMATICS	MAT-601GE	w.e.f.2020-21	III B.Sc
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SEMESTER-VI	PAPER-VII	Max.Marks:70
Hours/ Week: 5		No.of Credits: 5

ELECTIVE–VII-(B); NUMERICAL ANALYSIS

UNIT- I:	10 hours
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Errors in Numerical computations: Errors and their Accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation.

UNIT – II:	12 hours
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Solution of Algebraic and Transcendental Equations: The bisection method, the iteration method, the method of false position, Newton Raphson method, Generalized Newton Raphson method.

UNIT – III:	12 hours
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Finite Differences and Interpolation: Errors in polynomial interpolation, Finite Differences, Forward differences, Backward differences, Symbolic relations, Detection of errors by use of Differences Tables, Differences of a polynomial, Newton’s formulae for interpolation

UNIT – IV:	12 hours
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Central Differences: Central Differences, Central Difference Interpolation Formulae, Gauss’s central difference formulae, Stirling’s central difference formula, Bessel’s Formula, Everett’s Formula.

UNIT – V:	14 hours
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Interpolation – III:

Interpolation with unevenly spaced points, Lagrange’s formula, Error in Lagrange’s formula, Divided differences and their properties, Relation between divided differences and forward differences, Relation between divided differences and backward differences Relation between divided differences and central differences, Newton’s general interpolation Formula, Inverse interpolation.

Reference Books:

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall of India Pvt. Ltd., New Delhi. (Latest Edition)
2. Numerical Analysis by G. SankarRao published by New Age International Publishers, New – Hyderabad.
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.

Suggested Activities:

Seminar/ Quiz/ Assignments

**A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE,
VUYYURU – 521165, KRISHNA Dt., A.P.**

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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2020-21)

MATHEMATICS Paper VII MAT- 601GE MAX.MARKS: 70 TIME: 3 hrs

ELECTIVE–VII-(B):NUMERICAL ANALYSIS

Section – A (short answer questions)

Answer any Four of the following questions.

4x5 = 20M

Choosing at least ONE question from each Part.

PART - I

1. Evaluate the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to four significant digits and find its absolute and relative errors.
2. Find the real root of the equation $x^3 + x - 1 = 0$ by Iteration method, given that the root lies near 1
3. Find the real root of the equation $x \log_{10} x = 1.2$ by Newton – Raphson method
4. Prove that $e^x = \left(\frac{\Delta^2}{E}\right) e^{x \frac{Ee^x}{\Delta^2 e^x}}$ the interval of differencing being unity.

PART - II

5. If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$ find the value of $\Delta^5 u_0$
6. Prove that i) $\mu^2 = 1 + \frac{1}{4} \delta^2$ ii) $\Delta = \frac{1}{2} \delta^2 + \delta \sqrt{1 + \frac{1}{4} \delta^2}$
7. Apply Gauss’s Forward formula to find the value of u_9 if $u_0 = 14, u_4 = 24, u_8 = 32, u_{12} = 35, u_{16} = 40$
8. Find the third divided difference for the function $f(x) = x^3 + x + 2$ for the arguments 1, 3, 6, 11

Section – B (long answer questions)

Answer any FIVE of the following questions.

5x10 = 50M

Choosing at least TWO question from each Part.

PART - I

9. If $U = 5xy^2 / z^3$ then find relative maximum error in U, given that $\Delta x = \Delta y = \Delta z = 0.001$ and $x = y = z = 1$
10. Find the real root of the equation $x^2 - 4x - 10 = 0$ by bisection method.
11. Find the real root of the equation $x^3 - 2x - 5 = 0$ by Regula – Falsi method.
12. State and prove Newton’s Gregory forward interpolation formula

PART - II

13. The following table gives the marks obtained by 100 students in Mathematics in a certain examination

Marks obtained: 30-40 40-50 50-60 60-70 70-80

No.of Students: 25 35 22 11 7

How many students got more than 55 marks.

14. The population of town is as follows. Find the population for the year 1956 by Gauss's Backward formula from the following table

Year : 1931 1941 1951 1961 1971

Population : 15 20 27 39 52
(in thousand)

15. State and prove Stirling's formula
16. State and prove Newton's Divided difference formula

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MATHEMATICS	MAT-602CE	w.e.f.2020-21	III B.Sc
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SEMESTER-VI

PAPER-VIII

Max.Marks:70

Hours/ Week: 5

No.of Credits: 5

Cluster Elective- VIII-A-1: INTEGRAL TRANSFORMS

UNIT-1:Application of Laplace Transform to solutions of Differential Equations 12 hrs

Solutions of ordinary Differential Equations. Solutions of Differential Equations with constants co-efficient Solutions of Differential Equations with Variable co-efficient

UNIT – 2:Application of Laplace Transform : - 12 hrs

Solution of simultaneous ordinary Differential Equations.Solutions of partial Differential Equations.

UNIT – 3:Application of Laplace Transforms to Integral Equations : - 12 hrs

Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type, Integro Differential Equations. Application of L.T. to Integral Equations.

UNIT –4: Fourier Transforms-I : - 12 hrs

Definition of Fourier Transform – Fourier's sine Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform shifting property – modulation theorem.

UNIT – 5: Fourier Transform-II : - 12 hrs

Convolution Definition – Convolution Theorem for Fourier transform – parseval's Identify Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finte Fourier Transforms : -

Finte Fourier Sine Transform – Finte Fourier Cosine Transform – Inversion formula for sine and cosine Transforms only statement and related problems.

Reference Books :-

1. Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. A Course of Mathematical Analysis by ShanthiNarayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.
3. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.
4. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
5. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments

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MATHEMATICS	MAT-603CE	w.e.f.2020-21	III B.Sc
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SEMESTER-VI	PAPER-VIII	Max.Marks:70
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Hours/ Week: 5

No.of Credits: 5

ELECTIVE – VIII-A-2: ADVANCED NUMERICAL ANALYSIS

Unit – I Curve Fitting: 10 Hours

Least – Squares curve fitting procedures, fitting a straight line, Polynomial fitting, Curve fitting by a power functions and exponential function.

UNIT- II Numerical Differentiation: 12 hours

Derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formula, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.

UNIT- III Numerical Integration: 12 hours

General quadrature formula, Trapezoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, Boole's rule and Weddle's rules (only problems),

UNIT – IV Solutions of simultaneous Linear Systems of Equations: 14 hours

Solution of linear systems – Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization. Iterative methods – Jacobi's method, Gauss-siedal method.

UNIT – V Numerical solution of ordinary differential equations: 12 Hours

Introduction, Solution by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge – Kutta methods.

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall India (Latest Edition).
2. Numerical Analysis by G. SankarRao, published by New Age International Publishers, Hyderabad.
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.

Suggested Activities:

Seminar/ Quiz/ Assignments

A.G & S.G SIDDHARTHA DEGREE COLLEGE: VUYYURU-521165

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

Accredited with "A" Grade by NAAC, Bengaluru

MATHEMATICS	MAT-604CE	w.e.f.2020-21	III B.Sc
SEMESTER-VI	PAPER-VIII		Max.Marks:70
Hours/ Week: 5		No.of Credits: 5	

ELECTIVE – VIII-A-3: Project

Applications of advanced Numerical Analysis with 'C' Programme

**A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE,
VUYYURU – 521165, KRISHNA Dt., A.P.**

(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2020-21)

MATHEMATICS Paper VIII MAT-602CE MAX.MARKS: 70 TIME: 3 hrs

Cluster Elective- VIII-A-1: INTEGRAL TRANSFORMS

Section – A (short answer questions)

Answer any **Four** of the following questions.

4x5 = 20M

Choosing at least **ONE** question from each Part.

PART – I

1. Solve $(D^2 - 2D + 2)y = 0$, $y = Dy = 1$, when $t = 0$.
2. Solve $(D^2 - 3D + 2)y = 1 - e^{2t}$, if $y = 1$, $Dy = 0$, when $t = 0$.
3. Solve $(D - 2)x + 3y = 0$, $2x + (D - 1)y = 0$ if $x(0) = 8$ and $y(0) = 3$.
4. Solve $\frac{\partial y}{\partial x} = 2\frac{\partial y}{\partial t} + y$, $y(x, 0) = 6e^{-3x}$ which is bounded for $x > 0$, $t > 0$.

PART – II

5. Convert $y''(t) - 3y'(t) + 2y(t) = 4 \sin t$, $y(0) = 1$, $y'(0) = -2$ into integral equation.
6. Solve the integral equation $F(t) = t + 2 \int_0^t \cos(t - u) F(u) du$.
7. Find the Fourier sine and cosine transform of $f(x) = x$
8. Show that $\int_0^\infty \frac{\cos \lambda x}{\lambda^2 + 1} d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

Section – B (long answer questions)

Answer any **FIVE** of the following questions.

5x10 = 50M

Choosing at least **TWO** question from each Part.

PART – I

9. Solve $(D + 1)^2 = t$, given that $y = -3$, when $t = 0$ and $y = -1$ when $t = 1$.
10. Solve $y'' - t y' + y = 1$ if $y(0) = 1$, $y'(0) = 2$.
11. Solve $(D^2 - 3)x - 4y = 0$, $x + (D^2 + 1)y = 0$, $t > 0$ if $x = y = Dy = 0$, $Dx = 2$.
12. Solve $\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(\frac{\pi}{2}, t) = 0$, $(\frac{\partial y}{\partial x})_{x=0} = 0$ and $y(x, 0) = \cos 3x$.

PART – II

13. Solve the integral equation $F(t) = 1 + \int_0^t F(u) \sin(t - u) du$ and verify your solution.

14. Solve the integral equation $\int_0^t \frac{F(u) du}{\sqrt{(t-u)}} = 1 + t + t^2$.

15. Find the Fourier transform of $f(x)$ defined by $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$ and hence evaluate

$$i \int_{-\infty}^{\infty} \frac{\sin pa \cos px}{p} dp \text{ ii) } \int_0^{\infty} \frac{\sin p}{p} dp.$$

16. Find the finite Fourier sine and cosine transforms of the function $f(x) = 2x, 0 < x < 4$.

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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2020-21)

MATHEMATICS Paper VIII MAT-603CE MAX.MARKS: 70 TIME: 3 hrs

Cluster Elective VIII-A-2: ADVANCED NUMERICAL ANALYSIS

Section – A (short answer questions)

Answer any **Four** of the following questions.

4x5 = 20M

Choosing at least **ONE** question from each Part.

PART – I

1. Find the least square line $y = a + bx$ for the data

Xi: -2 -1 0 1 2

Yi: 1 2 3 3 4

2. Find $f^{-1}(5)$ from the following table

x: 1 2 4 8 10

f(x): 0 1 5 21 27

3. Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by Trapezoidal rule

4. Evaluate $\int_0^4 e^x dx$ by Simpson's $\frac{1}{3}$ rule

PART – II

5. Solve $3x + y + 2z = 3$, $2x - 3y - z = -3$, $x + 2y + z = 4$ by Matrix inversion method

6. Solve $x + y + z = 9$, $2x + 5y + 7z = 52$, $2x + y - z = 0$ by Cramer's rule

7. Given D.E is $\frac{dy}{dx} = 1 + xy$ with $y = 1$ when $x = 0$ compute $y(0.1)$

8. Solve the equation $y' = -y$ with $y(0) = 1$ for $x = 0.04$ in four steps

Section – B (long answer questions)

Answer any **FIVE** of the following questions.

5x10 = 50M

Choosing at least **TWO** question from each Part.

PART – I

9. Find the least square power function of the form $y = ax^b$ for the data
- X_i : 1 2 3 4
 Y_i : 3 12 21 35
10. Using the given table find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.2$
- x : 1.0 1.2 1.4 1.6 1.8 2.0 2.2
 y : 2.7183 3.3201 4.0552 4.9530 6.0496 7.3891 9.0250
11. Find the value of $\int_0^1 \frac{1}{1+x^2} dx$ by using Simpson's 3/8 rule and hence find the value of " π "
12. Evaluate $\int_4^{5.2} \log x dx$ by using Weddle's rule.

PART – II

13. Solve $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$ by Gauss elimination method
14. Solve $3x + 2y + 4z = 7$, $2x + y + z = 7$, $x + 3y + 5z = 2$ by Factorization method
15. Solve the D.E $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$ by Picard's method
16. Given $\frac{dy}{dx} = y - x$ with $y(0) = 2$ find $y(0.1)$ and $y(0.2)$ correct to four decimal places by RK method.

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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2020-21)**

MATHEMATICS Paper VIII MAT-604CE MAX.MARKS: 70 TIME: 3 hrs

**Cluster Elective- VIII-A-3: PROJECT
Applications of advanced Numerical Analysis with ‘C’ Programme**

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2020-21

Time: 3 Hrs **Elective.MAT- 601GE** Max.Marks:70

Paper Title : Numerical analysis

Note :- 1). Answer any FOUR questions out of 8 in Section-A.
Each question carries 5 marks. (4x5=20 Marks)

2). Answer any FIVE questions out of 8 in Section-B.
Each question carries 10 marks. (5x10 =50 marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
<u>Section-A</u> (Short Answer Questions)	1	2	2	2	1
<u>Section-B</u> (Essay Questions)	1	2	2	2	1

-The End -

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2020-21

Time: 3 Hrs **Cluster.MAT- 602CE**

Max.Marks:70

Paper Title: Integral Transforms

Note :- 1). Answer any FOUR questions out of 8 in Section-A.
Each question carries 5 marks.

(4x5=20 Marks)

2). Answer any FIVE questions out of 8 in Section-B.
Each question carries 10 marks.

(5x10 =50 marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
<u>Section-A</u> (Short Answer Questions)	2	2	2	1	1
<u>Section-B</u> (Essay Questions)	2	2	2	1	1

-The End -

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2020-21

Time: 3 Hrs **Cluster.MAT- 603CE**

Max.Marks:70

Paper Title: Advanced Numerical Analysis

Note :- 1). Answer any FOUR questions out of 8 in Section-A.

Each question carries 5 marks.

(4x5=20 Marks)

2). Answer any FIVE questions out of 8 in Section-B.

Each question carries 10 marks.

(5x10 =50 marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
<u>Section-A</u> (Short Answer Questions)	1	1	2	2	2
<u>Section-B</u> (Essay Questions)	1	1	2	2	2

-The End -