ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS)

DEPARTMENT OF MATHEMATICS

2018-2019

BOARD OF STUDIES

Minutes of Meeting

11-04-2018

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 A.M on 11-04-2018 .

N.V. Srinivasa Rao *Presiding*

Members Present:

1)..... (N.V.Srinivasa Rao)	Chairman	Head, Department of Mathematics AG & SG S Degree College.
2)..... (Prof K. Pandu Ranga Rao)	University Nominee	Department of Mathematics Acharya Nagarjuna University Guntur
3)..... (Dr.K.Naveen Kumar)	Subject Expert	Lecturer in Mathematics K.B.N Degree College, Vijayawada
4)..... (P.Babu Rao) 11/04/2018	Subject Expert	Lecturer in Mathematics P.B.Siddhartha Degree College, Vijayawada
5)..... (D.Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6)..... (A.Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)..... (Noor Mohammad)	Member	Lecturer in Mathematics 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 1st and 2nd Semesters as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2018-19.
2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 3rd and 4th Semesters as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2018-19 and Foundation Course "Analytical Skills" for 4th Semester for all the second Degree students from the Academic Year 2018-19.
3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th and 6th Semesters as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2018-19.
4. Any other matter.

RESOLUTIONS

1) Discussed and recommended that no changes are required in Syllabi. Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 1st and 2nd Semesters from the Academic year 2018-19. The maximum marks for IA is 30 and SE is 70. Each IA written examination is of 1 hour 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 and 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 the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2018-19.
2) Discussed and recommended that changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for 3rd and 4th Semesters for the Academic year 2018-19 and Foundation Course "Analytical Skills" for 4th Semester for all the second Degree students for the Academic Year 2018-19.
3) Discussed and recommended that no changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 5th and 6th Semesters and followed General Elective, Cluster Electives from the Academic year 2017-18 and followed same pattern for the Academic Year 2018 - 19.
4) Discussed and recommended for organizing certificate course, seminars, Guest lecturers, Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V.Raj
Chairman

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MATHEMATICS	**MAT-101**	**I B.Sc**	**w.e.f 2018-2019**
SEMESTER-I		**PAPER-I**	**Max.Marks:100**

Hours/ Week: 6 **DIFFERENTIAL EQUATIONS** **No.of Credits: 5**

UNIT – I (12 Hours), 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.

UNIT – II (12 Hours): Orthogonal Trajectories, Differential Equations of 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 Equation.

UNIT – III (14 Hours), Higher order linear differential equations-I :
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.
General Solution of f(D)y=0
General Solution of f(D)y=Q when Q is a function of x.
f (D) is Expressed as partial fractions.
P.I. of f(D)y = Q when Q= be^{ax}
P.I. of f(D)y = Q when Q is b sin ax or b cosax.

UNIT – IV (12 Hours), Higher order linear differential equations-II :
Solution of the non-homogeneous linear differential equations with constant coefficients.
P.I. of f(D)y = Q when Q= bx^k
P.I. of f(D)y = Q when Q= $e^{ax}V$
P.I. of f(D)y = Q when Q= xV
P.I. of f(D)y = Q when Q= $x^m V$

UNIT –V (10 Hours), Higher order linear differential equations-III :
Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation.

Reference Books :
1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-Second edition.
2. A text book of mathematics for BA/BSc Vol 1 by N. Krishna Murthy & others, published by S. Chand & Company, New Delhi.
3. Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.
4. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradhauniversities press.

Suggested Activities:
Seminar/ Quiz/ Assignments/ Project on Application of Differential Equations in Real life

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VUYYURU - 521 165, KRISHNA Dt., A.P.
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EXAMINATION AT THE END OF FIRST SEMISTER (w.e.f: 2016-17)

Mathematics Paper - I Mat - 101 C Max. Marks : 75 Pass Mark : 30 Time : 3 hrs.

SECTION - A (Short Answer Questions)

5x5 = 25M

Answer any **FIVE** questions

1. Solve $(1+xy)xdy+(1-xy)ydx=0$
2. Solve $x\frac{dy}{dx}+y=y^2\log x$
3. Solve $y+px=p^2x^4$
4. Solve $x^2(y-px)=p^2y$
5. Solve $(D^2-5D+6)y=e^{4x}$
6. Solve $(D^2+4)\,y=\text{Cos } 2x$
7. Solve $(D^2-5D+6)y=xe^{4x}$
8. Solve $(D^2+1)\,y=\text{Cosec } x$ by the method of Variation of Parameters.

SECTION - B

5x10 = 50M

Answer any **FIVE** questions.

9. Solve $x^2ydx-(x^3+y^3)dy=0$
10. Solve $\frac{dx}{z^2-2yz-y^2}=\frac{dy}{xy+xz}=\frac{dz}{xy-xz}$
11. Show that the family of confocal conics $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}=1$ is self orthogonal

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12. Solve $p^2 + 2py \cot x = y^2$

13. Solve $x p^3 = a + bp$

14. Solve $(D^2 + 9) y = \cos^3 x$

15. Solve $(D^2 - 2D + 1) y = x e^x \sin x$

16. Solve $(D^2 + a^2)y = \tan ax$ by the method of Variation of Parameters

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 HrsMAT-101Max.Marks:70Min. Marks: 28

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

2). Answer any FIVE questions out of 8 in Section-B. Eachquestion carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	2	2	2	1	1
Section-B (Essay questions)	1	1	2	2	2

---The End---

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MATHEMATICS	**MAT-201**	**I B.Sc**	**w.e.f 2018-2019**

SEMESTER-IIPAPER-II **Max.Marks:100**

Hours/Week: 6 **SOLID GEOMETRY** **No.of Credits: 5**

UNIT – I (10 hrs) : 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 between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT – II (12 hrs) : The Line :

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of 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;

UNIT – III (12 hrs) : 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 a Plane; Conjugate points; Conjugate planes;

UNIT – IV (14 hrs) : Sphere &Cones :

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres.

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 homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators;

UNIT – V (12 hrs) Cones & Cylinders :

Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Conditionthat 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. 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.

Reference Books :

1.Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.

2. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.

3.A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.

4.Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Application of Solid Geometry in Engineering

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EXAMINATION AT THE END OF SECOND SEMESTER (w.e.f: 2016-17)

Mathematics Paper - II Mat - 201 C Max. Marks : 75 Pass Mark : 30 Time : 3 hrs.

SECTION - A (Short Answer Questions)

Answer any FIVE questions **5 x 5 = 25 M**

1. Find the equation of the plane through (4, 4, 0) and perpedicular to the planes $x+2y+2z=5$ and $3x+3y+2x-8=0$
2. Find the epuation to the plane through the line of intersection of $x-y+3z+5=0$ and $2x+y-2z+6=0$ and passing through $(-3, 1, 1)$.
3. Find the image of the point $(1, 3, 4)$ in the plane $2x-y+z+3=0$.
4. Find the equation to the plane containing the parallel lines $\frac{x-3}{4}=\frac{y-2}{-5}=\frac{z-4}{-1}$ and $\frac{x+2}{-4}=\frac{y}{5}=\frac{z-3}{1}$.
5. Find the equation of the sphere through the points $(0, 0, 0), (0, 1, -1), (-1, 2, 0), (1, 2, 3)$.
6. Find the equation of the sphere for which the circle $x^2+y^2+z^2+7y-2z+2=0, 2x+3y+4z=8$
7. Find the epuation to the cone which passes through the three co-ordinate axes and the lines $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3} \& \frac{x}{2}=\frac{y}{1}=\frac{z}{1}$.
8. Find the equation to the right circular cylinder of radius 2 whose axis passes through the point $(1, 2, 3)$ and has durection ratios $(2, -3, 6)$

SECTION - B

Answer any FIVE questions **5 x 10 = 50 M**

9. Show that the equation $x^2+4y^2+9z^2-12yz-6zx+4xy+5x+10y-15z+6=0$ represents a pair of par allel planes and find the distance between them.
10. Find the length and equation to the line of S. D between the lines $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-1}{2}, \frac{x-4}{4}=\frac{y-5}{5}=\frac{z-2}{3}$
11. Find the equations of the spheres passing through the circle $x^2+y^2=4, z=0$ and is intersected by the plane $x+2y+2z=0$ in a circle of radius 3.

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12. Find the limiting points of the coaxal system spheres $x^2+y^2+z^2-20x+30y-40z+29+\lambda(2x-3y+4z)=0$

13. Show that the two lines of intersection of the plane $ax+by+cz=0$ with the cone $yz+zx+xy=0$ will be perpendicular if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

14. Show that the general equation to a cone which touches the three co-ordinate planes is $\sqrt{ax}+\sqrt{by}+\sqrt{cz}=0$

15. Find the equation of the cylinder whose generators are parallel to the line $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3}$ and whose base curve is $x^2+2y^2=1, z=3$.

16. Find the equation to the right circular cylinder whose guiding circle is $x^2+y^2+z^2=9, x-y+z=3$.

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MATHEMATICS MAT-301 B.Sc.(E.M,T.M& CS)w.e.f: 2018-2019

SEMESTER-IIIPAPER-III Max.Marks:100

Hours per week: 6 **Abstract Algebra and Real Analysis-I** **No.of Credits:5**

UNIT – 1 : (10Hrs) GROUPS : -

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementaryproperties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

UNIT – 2 : (10Hrs) SUBGROUPS : -

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition– examples-criterion for a complex to be subgroups.Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem: -Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange'sTheorem.

UNIT –3 : (12Hrs) NORMAL SUBGROUPS : -

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Subgroup of index 2 is a normal sub group – simple group – quotient group – criteria for the existenceof a quotient group.

UNIT – 4 (14hrs) : REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme 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 – Cauchey's general principle of convergence theorem.

UNIT –5 (14hrs) : INFINITIE SERIES :

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

1. P-test, 2. Cauchey's n^{th}root test or Root Test. 3. D'-Alemberts' Test or Ratio Test.
4. Alternating Series – Leibnitz Test. Absolute convergence and conditional convergence.

Reference Books:

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house.
2. Real Analysis by Rabert&Bartely and .D.R. Sherbart, Published by John Wiley.
3.A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published byS.Chand& Company, New Delhi.
4.Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/Group discussions.

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EXAMINATION AT THE END OF THE THIRD SEMESTER (w.e.f 2018-2019)

Mathematics Paper III MAT- 301 Max. Marks: 70Pass Mark: 28 Time: 3 hrs.

Abstract Algebra and Real 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. Show that in a group G for a, b∈ G, $(a\ b)^2 = a^2\ b^2 \Leftrightarrow$ G is abelian.
2. If H, K is two sub groups of a group G, then show that H∩K is also a sub group of G.
3. State and prove Lagrange's Theorem.
4. A subgroup H of a group G is normal subgroup iff$xHx^{-1}=H$, for all x∈ G.

Part - II

5. Every convergent sequence is bounded? Is the converse true?
6. Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}$ is convergent.
7. Test for convergence of $\sum \sqrt{n+1} - \sqrt{n}$
8. Examine the conditionally convergence of $\sum (-1)^{n+1} \frac{n}{n^2+1}$

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9. Show that the set of Q^+ of all +ve rational numbers forms an abelian group under the composition defined by 'o' such that aob= $\frac{ab}{3}$ for a, b ϵ Q^+.
10. If H is a non-empty complex of a group G. The necessary and sufficient condition for H to be a sub group of G is a, b$\in$H $\Longrightarrow$ab$^{-1}\in$H here b^{-1} is the inverse of b.
11. If H_1, H_2 are two subgroups of a group G, then $H_1 \cup H_2$ is a sub group of G if and only if $H_1 \subseteq H_2$ (or) $H_1 \subseteq H_2$.
12. A subgroup H of a group G is normal subgroup of G iff the product of two right (left) cosets of H in G is again a right (left)coset of H in G.

Part - II

13. A sequences is convergent if and only if it is a Cauchy's sequence
14. State and prove Cauchy's First theorem on sequence.
15. Test for convergence of $\sum \frac{1.3.5.....(2n-1)}{2.4.6.....2n} x^{n-1}$ (x>0)
16. State and prove Leibnitz's test.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs. **MAT-301** **Max.Marks:70** **Min. Marks: 28**

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 Carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	1	2	1	2	2
Section-B (Essay questions)	1	2	1	2	2

---The End---

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs **MAT- 201** **Max.Marks:70** **Min. Marks: 28**

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

2) Answer any FIVE questions out of 8 in Section-B. Each question carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	**Unit-2**	**Unit-3**	**Unit-4**	**Unit-5**
Section-A (Short answer questions)	2	2	2	1	1
Section-B (Essay questions)	1	1	2	2	2

---The End---

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MATHEMATICS	**MAT-401**	**B.Sc(E.M,T.M, CCs& CS)**	**w.e.f 2018-2019**
SEMESTER-IV		**PAPER-IV**	**Max.Marks:100**
Hours/ Week: 6			**No.of Credits: 5**

Abstract Algebra and Real Analysis – II

UNIT – 1 : (14 Hrs) HOMOMORPHISM : -

Definition of homomorphism – Image of homomorphism elementary properties of Homomorphism – Isomorphism – automorphism definitions and elementary properties– kernel of ahomomorphism – fundamental theorem on Homomorphism and applications.

UNIT – 2 : (12 Hrs) PERMUTATIONS AND CYCLIC GROUPS : -

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups: -Definition of cyclic group – elementary properties – classification of cyclic groups.

UNIT – III (10 hrs) : LIMITS AND CONTINUITY :

Limits : Real valued Functions, Boundedness 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 hrs) : 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; Role's Theorem, Lagrange's Theorem, Cauchhy's Mean value Theorem

UNIT – V (12 hrs) : 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.

Reference Books :

1. Real Analysis by Rabert & Bartely and .D.R. Sherbart, Published by John Wiley.
2. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/Group discussions.

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EXAMINATION AT THE END OF THE FOURTH SEMESTER (w.e.f 2018-19)

Mathematics Paper IV MAT- 401 Max. Marks: 70Pass Mark: 28Time: 3 hrs.

Abstract Algebra and Real Analysis – II

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. The set of all automorphisms of a group G forms a group w.r.to composition of mappings.
2. If f = (1 2 3 4 5 8 7 6), g = (4 1 5 6 7 3 2 8) are cyclic permutations, then show that $(fg)^{-1} = g^{-1}f^{-1}$.
3. Every sub group of a cyclic group is cyclic
4. Show that f: R→R is defined by f(x) = 1 if x∈Q and f(x) = -1 if x∈ R −Q is discontinuous for all x∈R

Part - II

5. Show that f(x)= |x|+|x − 1| is continuous at x=0,1 but not derivable at x=0,1.
6. Using Lagrange's Mean value Theorem show that $x>\log(1+x)>\frac{x}{1+x}$ if f(x)=log(1+x), x>0
7. If $f(x)=x^2$ on [0, 1] and P={0,1/4,2/4,3/4,1} find U(p, f) and L(p, f)
8. Show that $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{n}{n^2+r^2} = \frac{\pi}{4}$

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9. State and prove Fundamental theorem of group homomorphism.
10. If f: G→G^1 is a group homomorphism, then show that "Ker f" is a normal subgroup of G.

11. State and prove Cayley's theorem for permutation groups.

12. If f: [a, b]→R is continuous on [a, b] then f is bounded on [a, b]

Part - II

13. State and prove Rolle's Theorem

14. Find c of Cauchy's Mean value Theorem for f(x)=$\sqrt{x}$; g(x)=$\frac{1}{\sqrt{x}}$ in [a, b] where o<a<b

15. State and prove Fundamental Theorem of Integral calculus

16. Prove that$\frac{1}{\pi} \leq \int_0^1 \frac{\sin \pi x}{1+x^2} dx \leq \frac{2}{\pi}$by First mean value theorem in integral calculus.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 401 Max.Marks:70 Min. Mark: 28

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
Section-A (Short answer questions)	1	2	1	2	2
Section-B (Essay questions)	2	1	1	2	2

---The End---

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

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

MATHEMATICS	MAT-501	III B.Sc	w.e.f 2018-19

SEMESTER-V **PAPER-V** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

VECTOR CALCULUS &RING THEORY

UNIT – 1: VECTOR DIFFERENTIATION: - **(12 hrs)**

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, divergence, Curl operators, Formulae Involving these operators.

UNIT – 2: VECTOR INTEGRATION: - **(10 hrs)**

Line Integral, Surface Integral and Volume integral with examples.

UNIT – 3: VECTOR INTEGRATION APPLICATIONS: - **(12 hrs)**

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

UNIT – 4: RINGS-I: - **(14 hrs)**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring – The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 5: RINGS-II: - **(12 hrs)**

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism

Maximal Ideals – Prime Ideals.

Reference Books:-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house.

2. Vector Calculus by SanthiNarayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.

3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.

4. Vector Calculus by R. Gupta, Published by Laxmi Publications.

5. Vector Calculus by P.C. Matthews, Published by Springer Verlagpublicattions.

6. Rings and Linear Algebra by Pundir&Pundir, Published by PragathiPrakashan.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

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

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 501 Max.Marks:70Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

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)
EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2018-19)

MATHEMATICS Paper V MAT- 501 MAX.MARKS: 70 TIME: 3 hrs

(VECTOR CALCULUS AND RING THEORY)

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) If r = $a\cos ti + asintj + at\ tan\theta k$ find $\left|\frac{dr}{dt} \times \frac{d^2r}{dt^2}\right|$ and $\left[\frac{dr}{dt}\frac{d^2r}{dt^2}\frac{d^3r}{dt^3}\right]$

2) Find div f and curl f where $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$.

3) If $F = 3xyi - y^2j$ evaluate $\oint_c F \cdot dr$ where 'c' is the curve $y = 2x^2$ in the xy plane from (0, 0) to (1, 2).

4) If $F = 2xzi - xj + y^2k$ evaluate the $\int_v F \cdot dv$ where v is the region bounded by the surface $x = 0$, $x = 2$, $y = 0$, $y = 6, z = x^2, z = 4$.

Part - II

5) State and prove Green's theorem in a plane.

6) Prove that $Z_m = \{0,1,2,3,\ldots\ldots\ldots m-1\}$ is a ring with respect to addition and multiplication modulo 'm'

7) Prove that a field has no Zero divisors.

8) If f is homomorphism of a ring R into a ring R^1 then kerf is an ideal of R

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) Prove that $\text{grad}(A \cdot B) = (B \cdot \nabla)A + (A \cdot \nabla)B + B \times \text{curl}\, A + A \times \text{curl}\, B$.

10) Evaluate $\int_s F \cdot N ds$ where $F = zi + xj - 3y^2zk$ and s is the surface $x^2 + y^2 = 16$ included in the first octant between z=0 and z =5.

11) State and prove Gauss divergence Theorem.

12) Verify Green's Theorem in the plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the region bounded by $y = \sqrt{x}$ and $y = x^2$.

Part - II

13) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$at the point P (1, 2, 3) in the direction of the line PQ where Q = (5, 0, 4).

14) Define Field. Prove that every field is an integral domain.

15) Prove that Q ($\sqrt{2}$) = {a + b$\sqrt{2}$ / a, b ∈ Q} is a ring with respect to ordinary addition and multiplication.

16) State and prove fundamental theorem of ring homomorphism.

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

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

MATHEMATICS	MAT-502	III B.Sc	w.e.f 2018-19

SEMESTER-V **PAPER-VI** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

LINEAR ALGEBRA

UNIT –I Matrix: **(12 hrs)**

Matrices, Elementary Properties of Matrices, Triangular form, Echelon form, Normal form Inverse Matrices, Non – Singular form, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT – II Vector Spaces-I: **(12 hrs)**

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 –III Vector Spaces-II: **(12 hrs)**

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 –IV Linear Transformations: **(12 hrs)**

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 –V Inner product space: **(12 hrs)**

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

Reference Books:

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

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

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 502 Max.Marks:70 Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

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)

EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2018-19)

MATHEMATICS Paper VI MAT- 502 MAX.MARKS: 70 TIME: 3 hrs

LINEAR ALGEBRA

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) Show that the rank of the transpose of a matrix is equal to the rank of the original matrix. i.e., $\rho(A) = \rho(A^T)$.

2) Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ by reducing it in the Normal form

3) If S is a subset of a vector space V(F), then prove that S is a subspace of V$\Leftrightarrow L(S) = S$

4) Let w1 and w2 be two subspaces of R^4 given by w_1 ={(a,b,c,d) ;b-2c+d=0}, w_2={(a,b,c,d); a=d, b=2c}.Find the basis and dimension (i)w_1 (ii)w_2 (iii) $w1 \cap w2$ and hence find the $dim(w1 + w2)$

Part - II

5) Let T:$R^2 \rightarrow R^2$ be a linear transformation defined by T(1,0)=(1,1),T(0,1)=(-1,2) then find a linear transformation T

6) The mapping T: $V_3(R) \rightarrow V_2(R)$ is defined by T(x, y, z) = (x – y , x – z) is a linear transformation.

7) State and prove Cauchy – Schwarz's inequality

8) State and prove Triangle inequality

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) State and prove Cayley – Hamilton theorem in Matrices.

10) Find the characteristic roots and the corresponding characteristic vectors of the matrix

$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$

11) Let V (F) be a vector space. A non-empty set W⊆V. The necessary and sufficient condition for W to be a subspace of V is a,b ∈F and $\alpha, \beta \in V \Longrightarrow a\alpha + b\beta \in W$

12) Let W be a subspace of a finite dimensional vector space V(F) then

$\dim V/W = dimV - dimW.$

Part - II

13) Find the linear Transformation T(x, y, z) where T : $R^3 \rightarrow R$ isdefined by

T(1, 1, 1) = 3, T(0, 1, -2) = 1 and T(0, 0, 1) = -2.

14) State and prove Rank-nullity theorem

15) State and prove Bessel's inequality

16) If (1, 0, 1, 1) (-1, 0,-1, 1) (0,-1, 1, 1) forms a basis of a subspace of $R^4(R)$use Gram-Schmidt process to obtain an orthonormal basis.

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MATHEMATICS	**MAT-601GE**	**w.e.f.2018-19**	**III B.Sc**

SEMESTER-VI **PAPER-VII** **Max.Marks:70**

Hours/ Week: 5 **No.of Credits: 5**

ELECTIVE–VII-(B); NUMERICAL ANALYSIS

UNIT- I: **10 hours**

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**

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**

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**

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**

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.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
Accredited with "A" Grade by NAAC, Bengaluru
EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2018-19)

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 $\mathbf{e^x} = \left(\frac{\Delta^2}{\mathbf{E}}\right) \mathbf{e^x} \frac{\mathbf{Ee^x}}{\Delta^2 \mathbf{e^x}}$ 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 TWOquestion 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 (in thousand)	:	15	20	27	39	52

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.2018-19**	**III B.Sc**

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'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'sIndentify 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

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-603CE w.e.f.2018-19 III B.Sc

SEMESTER-VI PAPER-VIII Max.Marks:70

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

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MATHEMATICS	**MAT-604CE**	**w.e.f.2018-19**	**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.

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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2018-19)

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$\boldsymbol{y}''(t) - 3\boldsymbol{y}'(t) + 2y(t) = 4\sin t$, y(0) = 1, $\boldsymbol{y}'(0) = -2$ 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 $\int_o^\infty \frac{\cos\lambda x}{\lambda^2+1} d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

Choosing at least TWOquestion 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 $\boldsymbol{y}'' - t\,\boldsymbol{y}' + y = 1$ if $y(0) = 1$, $\boldsymbol{y}'(0) = 2$.
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$\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(\frac{\pi}{2}, t) = 0$, $\left(\frac{\partial y}{\partial x}\right)_{x=0} = 0$ and y(x,0) = cos3x.

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 $\int_o^t \frac{F(u)du}{\sqrt{(t-u)}} = 1 + t + t^2$.

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) $\int_{-\infty}^{\infty} \frac{sinpa\ cospx}{p}\ dp$) ii) $\int_0^{\infty} \frac{sinp}{p}\ dp$.

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 2018-19)

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 $y^{1} = -y$ 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 TWOquestion 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 $\int_4^{5.2} logx$ 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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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)
EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2018-19)

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

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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

Accredited with "A" Grade by NAAC, Bengaluru

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2018-19

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
Section-A (Short Answer Questions)	1	2	2	2	1
Section-B (Essay Questions)	1	2	2	2	1

-The End -

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2018-19

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
Section-A (Short Answer Questions)	2	2	2	1	1
Section-B (Essay Questions)	2	2	2	1	1

-The End -

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2018-19

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
Section-A (Short Answer Questions)	1	1	2	2	2
Section-B (Essay Questions)	1	1	2	2	2

-The End -

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

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

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2019-2020

DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

EVEN SEMESTER

18-10-2019

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 A.M on 18-10-2019.

N.V. Srinivasa Rao *Presiding*

Members Present:

1) ....N.V. ..... (N.V. Srinivasa Rao)	Chairman	Head, Department of Mathematics, AG & SG S Degree College.
2) ..... (Dr. K. Naveen Kumar)	University Nominee	Department of Mathematics, K.B.N Degree College, Vijayawada.
3) ..... (Dr B. Jagan Mohan Rao)	Subject Expert	Prof and HOD of Mathematics, Sir C.R.R College, Eluru.
4) ..... (Dr J.Vijayasekhar)	Subject Expert	Associate. Professor, Department of Mathematics, School of Science, GITAM University, Hyderabad.
5) ..... (Dr P.Srinivasa Rao)	Subject Expert Alumni member	Director and Principal, Sri Srinivasa Educational Institutions, Vuyyuru.
6) ..... (D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
7) ..... (A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
8) ..... (Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
9) ..... (K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
10) ...P. Naga durga..... (P. Naga Durga)	Student Member	III B.Sc M.C.Cs AG & SG S Degree College.
11) ..G. Ravi kishore..... (G. Ravi Kishore)	Student Member	III B.Sc M.P.C (T) 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 question paper setters in Mathematics for 2nd Semester as per the guidelines and instructi under CBCS prescribed by Krishna University from the Academic Year 2019-20.

2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed b question paper setters in Mathematics for 4th Semester as per the guidelines and instruction under CBCS prescribed by Krishna University and Foundation Course "Analytical Skills" for 4 Semester for all the second Degree students from the Academic Year 2019-20.

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 instruction under CBCS prescribed by Krishna University from the Academic Year 2019-20.

4. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 2nd Semester from the Academic year 2018-19 and followed same pattern for the Academic Year 2019 - 20.

2. Discussed and recommended that changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 4th Semesters from the Academic year 2019-20. 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 and 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 the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' and discussed and recommended that changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Foundation Course "Analytical Skills" for 4th Semester for all the second Degree students from the Academic year 2019-20.

3. Discussed and recommended that no changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 6th Semester and followed General Elective, Cluster Electives from the Academic year 2017-18 and followed same pattern for the Academic Year 2019 - 20.

4. Discussed and recommended for organizing certificate course online/offline, seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V. Chairman

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

Accredited with "A" Grade by NAAC, Bengaluru

MATHEMATICS	**MAT-201**	**I B.Sc**	**w.e.f 2019-20**

SEMESTER-II PAPER-II Max.Marks:100

Hours/Week: 6 SOLID GEOMETRY No.of Credits: 5

UNIT – I (10 hrs) : 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 between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT – II (12 hrs) : The Line :

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of 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;

UNIT – III (12 hrs) : 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 a Plane; Conjugate points; Conjugate planes;

UNIT – IV (14 hrs) : Sphere &Cones :

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres.

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 homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators;

UNIT – V (12 hrs) Cones & Cylinders :

Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Conditionthat 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. 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.

Reference Books :

1.Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.

2. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.

3.A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.

4.Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Application of Solid Geometry in Engineering

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VUYYURU - 521 165, KRISHNA Dt., A.P.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam, A.P., India)
EXAMINATION AT THE END OF SECOND SEMESTER (w.e.f: 2016-17)

Mathematics Paper - II Mat - 201 C Max. Marks : 75 Pass Mark : 30 Time : 3 hrs.

SECTION - A (Short Answer Questions)

Answer any FIVE questions **5 x 5 = 25 M**

1. Find the equation of the plane through (4, 4, 0) and perpedicular to the planes $x+2y+2z=5$ and $3x+3y+2x-8=0$
2. Find the epuation to the plane through the line of intersection of $x-y+3z+5=0$ and $2x+y-2z+6=0$ and passing through $(-3, 1, 1)$.
3. Find the image of the point $(1, 3, 4)$ in the plane $2x-y+z+3=0$.
4. Find the equation to the plane containing the parallel lines $\frac{x-3}{4}=\frac{y-2}{-5}=\frac{z-4}{-1}$ and $\frac{x+2}{-4}=\frac{y}{5}=\frac{z-3}{1}$.
5. Find the equation of the sphere through the points $(0, 0, 0), (0, 1, -1), (-1, 2, 0), (1, 2, 3)$.
6. Find the equation of the sphere for which the circle $x^2+y^2+z^2+7y-2z+2=0, 2x+3y+4z=8$
7. Find the epuation to the cone which passes through the three co-ordinate axes and the lines $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3} \& \frac{x}{2}=\frac{y}{1}=\frac{z}{1}$.
8. Find the equation to the right circular cylinder of radius 2 whose axis passes through the point $(1, 2, 3)$ and has durection ratios $(2, -3, 6)$

SECTION - B

Answer any FIVE questions **5 x 10 = 50 M**

9. Show that the equation $x^2+4y^2+9z^2-12yz-6zx+4xy+5x+10y-15z+6=0$ represents a pair of par allel planes and find the distance between them.
10. Find the length and equation to the line of S. D between the lines $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-1}{2}, \frac{x-4}{4}=\frac{y-5}{5}=\frac{z-2}{3}$
11. Find the equations of the spheres passing through the circle $x^2+y^2=4, z=0$ and is intersected by the plane $x+2y+2z=0$ in a circle of radius 3.

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12. Find the limiting points of the coaxal system spheres $x^2+y^2+z^2-20x+30y-40z+29+\lambda(2x-3y+4z)=0$

13. Show that the two lines of intersection of the plane $ax+by+cz=0$ with the cone $yz+zx+xy=0$ will be perpendicular if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

14. Show that the general equation to a cone which touches the three co-ordinate planes is $\sqrt{ax}+\sqrt{by}+\sqrt{cz}=0$

15. Find the equation of the cylinder whose generators are parallel to the line $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3}$ and whose base curve is $x^2+2y^2=1, z=3$.

16. Find the equation to the right circular cylinder whose guiding circle is $x^2+y^2+z^2=9, x-y+z=3$.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs **MAT- 201** **Max.Marks:70** **Min. Marks: 28**

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

2) Answer any FIVE questions out of 8 in Section-B. Each question carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	**Unit-2**	**Unit-3**	**Unit-4**	**Unit-5**
Section-A (Short answer questions)	2	2	2	1	1
Section-B (Essay questions)	1	1	2	2	2

---The End---

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MATHEMATICS	**MAT-401**	**B.Sc(E.M,T.M, CCs& CS)**	**w.e.f 2019-2020**
SEMESTER-IV		**PAPER-IV**	**Max.Marks:100**
Hours/ Week: 6			**No.of Credits: 5**

Abstract Algebra and Real Analysis – II

UNIT – 1 : (14 Hrs) HOMOMORPHISM : -

Definition of homomorphism – Image of homomorphism elementary properties of Homomorphism – Isomorphism – automorphism definitions and elementary properties– kernel of ahomomorphism – fundamental theorem on Homomorphism and applications.

UNIT – 2 : (12 Hrs) PERMUTATIONS AND CYCLIC GROUPS : -

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups: -Definition of cyclic group – elementary properties – classification of cyclic groups.

UNIT – III (10 hrs) : LIMITS AND CONTINUITY :

Limits : Real valued Functions, Boundedness 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 hrs) : 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; Role's Theorem, Lagrange's Theorem, Cauchhy's Mean value Theorem

UNIT – V (12 hrs) : 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.

Reference Books :

1. Real Analysis by Rabert & Bartely and .D.R. Sherbart, Published by John Wiley.
2. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/Group discussions.

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(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
EXAMINATION AT THE END OF THE FOURTH SEMESTER (w.e.f 2019-20)

Mathematics Paper IV MAT- 401 Max. Marks: 70Pass Mark: 28Time: 3 hrs.

Abstract Algebra and Real Analysis – II

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. The set of all automorphisms of a group G forms a group w.r.to composition of mappings.
2. If f = (1 2 3 4 5 8 7 6), g = (4 1 5 6 7 3 2 8) are cyclic permutations, then show that $(fg)^{-1} = g^{-1}f^{-1}$.
3. Every sub group of a cyclic group is cyclic
4. Show that f: R→R is defined by f(x) = 1 if x∈Q and f(x) = -1 if x∈ R −Q is discontinuous for all x∈R

Part - II

5. Show that f(x)= |x|+|x − 1| is continuous at x=0,1 but not derivable at x=0,1.
6. Using Lagrange's Mean value Theorem show that $x>\log(1+x)>\frac{x}{1+x}$ if f(x)=log(1+x), x>0
7. If $f(x)=x^2$ on [0, 1] and P={0,1/4,2/4,3/4,1} find U(p, f) and L(p, f)
8. Show that $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{n}{n^2+r^2} = \frac{\pi}{4}$

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9. State and prove Fundamental theorem of group homomorphism.
10. If f: G→G^1 is a group homomorphism, then show that "Ker f" is a normal subgroup of G.

11. State and prove Cayley's theorem for permutation groups.

12. If f: [a, b]→R is continuous on [a, b] then f is bounded on [a, b]

Part - II

13. State and prove Rolle's Theorem

14. Find c of Cauchy's Mean value Theorem for f(x)=$\sqrt{x}$; g(x)=$\frac{1}{\sqrt{x}}$ in [a, b] where o<a<b

15. State and prove Fundamental Theorem of Integral calculus

16. Prove that$\frac{1}{\pi} \leq \int_0^1 \frac{\sin \pi x}{1+x^2} dx \leq \frac{2}{\pi}$by First mean value theorem in integral calculus.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 401 Max.Marks:70 Min. Mark: 28

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
Section-A (Short answer questions)	1	2	1	2	2
Section-B (Essay questions)	2	1	1	2	2

---The End---

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MATHEMATICS	**MAT-601GE**	**w.e.f.2019-20**	**III B.Sc**

SEMESTER-VI **PAPER-VII** **Max.Marks:70**

Hours/ Week: 5 **No.of Credits: 5**

ELECTIVE–VII-(B); NUMERICAL ANALYSIS

UNIT- I: **10 hours**

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**

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**

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**

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**

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

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(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
Accredited with "A" Grade by NAAC, Bengaluru
EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2019-20)

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 $\mathbf{e^x} = \left(\frac{\Delta^2}{\mathbf{E}}\right) \mathbf{e^x} \frac{\mathbf{Ee^x}}{\Delta^2 \mathbf{e^x}}$ 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 TWOquestion 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 (in thousand)	:	15	20	27	39	52

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.2019-20**	**III B.Sc**

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'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'sIndentify 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

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-603CE w.e.f.2019-20 III B.Sc

SEMESTER-VI PAPER-VIII Max.Marks:70

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

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MATHEMATICS	**MAT-604CE**	**w.e.f.2019-20**	**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)

Accredited with "A" Grade by NAAC, Bengaluru

EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2019-20)

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 $\boldsymbol{y}''(t) - 3\boldsymbol{y}'(t) + 2y(t) = 4\sin t$, y(0) = 1, $\boldsymbol{y}'(0) = -2$ 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 $\int_o^\infty \frac{\cos\lambda x}{\lambda^2+1}\, d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

Choosing at least TWOquestion 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 $\boldsymbol{y}'' - t\,\boldsymbol{y}' + y = 1$ if y(0) = 1, $\boldsymbol{y}'(0) = 2$.
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 $\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(\frac{\pi}{2}, t) = 0$, $\left(\frac{\partial y}{\partial x}\right)_{x=0} = 0$ and y(x,0) = cos3x.

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 $\int_o^t \frac{F(u)du}{\sqrt{(t-u)}} = 1 + t + t^2$.

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) $\int_{-\infty}^{\infty} \frac{sinpa\ cospx}{p}\ dp$) ii) $\int_0^{\infty} \frac{sinp}{p}\ dp$.

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 2019-20)

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 $y^{1} = -y$ 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 TWOquestion 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 $\int_4^{5.2} logx$ 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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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)
EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 2019-20)

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

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2019-20

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
Section-A (Short Answer Questions)	1	2	2	2	1
Section-B (Essay Questions)	1	2	2	2	1

-The End -

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2019-20

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
Section-A (Short Answer Questions)	2	2	2	1	1
Section-B (Essay Questions)	2	2	2	1	1

-The End -

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 2019-20

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
Section-A (Short Answer Questions)	1	1	2	2	2
Section-B (Essay Questions)	1	1	2	2	2

-The End -

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

Accredited by NAAC with "A" Grade

2019-2020

DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

ODD SEMESTER

15-04-2019

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 A.M on 15-04-2019.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	(N.V. Srinivasa Rao)	Chairman	Head, Department of Mathematics, AG & SG S Degree College.
2)	(Dr. K. Naveen Kumar)	University Nominee	Department of Mathematics, K.B.N Degree College, Vijayawada.
3)	(Dr B. Jagan Mohan Rao)	Subject Expert	Prof and HOD of Mathematics, Sir C.R.R College, Eluru.
4)	(Dr J.Vijayasekhar)	Subject Expert	Asst. Professor, Department of Mathematics, School of Technology, GITAM University, Hyderabad.
5)	(Dr P.Srinivasa Rao)	Subject Expert Alumni member	Director and Principal, Sri Srinivasa Educational Institutions, Vuyyuru.
6)	(D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	(K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
10)	(A. Sahithi)	Student Member	III B.Sc M.P.Cs AG & SG S Degree College.
11)	(S. Raja)	Student Member	III B.Sc M.P.C (T) 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 1st Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2019-20.

2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 3rd Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2019-20.

3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2019-20.

4. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 1st Semester for the Academic year 2019-20.

2. Discussed and recommended that changes are required in Syllabi. Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 3rd Semesters from the Academic year 2019-20. 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 and 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 the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2019-20.

3. Discussed and recommended that no changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 5th Semester and followed General Elective, Cluster Electives from the Academic year 2017-18 and followed same pattern for the Academic Year 2019 - 20.

4. Discussed and recommended for organizing certificate course online/offline, seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

15/4/19 15/4/19 Chairman

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VUYYURU-521165, KRISHNA Dt, A.P.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	**MAT-101**	**I B.Sc**	**w.e.f 2019-20**
SEMESTER-I		**PAPER-I**	**Max.Marks:100**

Hours/ Week: 6 **DIFFERENTIAL EQUATIONS** **No.of Credits: 5**

UNIT – I (12 Hours), 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.

UNIT – II (12 Hours): Orthogonal Trajectories, Differential Equations of 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 Equation.

UNIT – III (14 Hours), Higher order linear differential equations-I :
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.
General Solution of f(D)y=0
General Solution of f(D)y=Q when Q is a function of x.
f (D) is Expressed as partial fractions.
P.I. of f(D)y = Q when Q= be^{ax}
P.I. of f(D)y = Q when Q is b sin ax or b cosax.

UNIT – IV (12 Hours), Higher order linear differential equations-II :
Solution of the non-homogeneous linear differential equations with constant coefficients.
P.I. of f(D)y = Q when Q= bx^k
P.I. of f(D)y = Q when Q= $e^{ax}V$
P.I. of f(D)y = Q when Q= xV
P.I. of f(D)y = Q when Q= $x^m V$

UNIT –V (10 Hours), Higher order linear differential equations-III :
Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation.

Reference Books :
1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-Second edition.
2. A text book of mathematics for BA/BSc Vol 1 by N. Krishna Murthy & others, published by S. Chand & Company, New Delhi.
3. Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.
4. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradhauniversities press.

Suggested Activities:
Seminar/ Quiz/ Assignments/ Project on Application of Differential Equations in Real life

AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS),
VUYYURU - 521 165, KRISHNA Dt., A.P.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam, A.P., India)
EXAMINATION AT THE END OF FIRST SEMISTER (w.e.f: 2016-17)

Mathematics Paper - I Mat - 101 C Max. Marks : 75 Pass Mark : 30 Time : 3 hrs.

SECTION - A (Short Answer Questions)

5x5 = 25M

Answer any **FIVE** questions

1. Solve $(1+xy)xdy+(1-xy)ydx=0$
2. Solve $x\frac{dy}{dx}+y=y^2\log x$
3. Solve $y+px=p^2x^4$
4. Solve $x^2(y-px)=p^2y$
5. Solve $(D^2-5D+6)y=e^{4x}$
6. Solve $(D^2+4)\,y=\text{Cos } 2x$
7. Solve $(D^2-5D+6)y=xe^{4x}$
8. Solve $(D^2+1)\,y=\text{Cosec } x$ by the method of Variation of Parameters.

SECTION - B

5x10 = 50M

Answer any **FIVE** questions.

9. Solve $x^2ydx-(x^3+y^3)dy=0$
10. Solve $\frac{dx}{z^2-2yz-y^2}=\frac{dy}{xy+xz}=\frac{dz}{xy-xz}$
11. Show that the family of confocal conics $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}=1$ is self orthogonal

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12. Solve $p^2 + 2py \cot x = y^2$

13. Solve $x p^3 = a + bp$

14. Solve $(D^2 + 9) y = \cos^3 x$

15. Solve $(D^2 - 2D + 1) y = x e^x \sin x$

16. Solve $(D^2 + a^2)y = \tan ax$ by the method of Variation of Parameters

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT-101 Max.Marks:70 Min. Marks: 28

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 carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	2	2	2	1	1
Section-B (Essay questions)	1	1	2	2	2

---The End---

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)

MATHEMATICS MAT-301 B.Sc.(E.M,T.M& CS)w.e.f: 2019-2020

SEMESTER-III PAPER-III Max.Marks:100

Hours per week: 6 **Abstract Algebra and Real Analysis-I** **No.of Credits:5**

UNIT – 1 : (10Hrs) GROUPS : -

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementaryproperties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

UNIT – 2 : (10Hrs) SUBGROUPS : -

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition– examples-criterion for a complex to be subgroups.Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem: -Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange'sTheorem.

UNIT –3 : (12Hrs) NORMAL SUBGROUPS : -

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Subgroup of index 2 is a normal sub group – simple group – quotient group – criteria for the existenceof a quotient group.

UNIT – 4 (14hrs) : REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme 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 – Cauchey's general principle of convergence theorem.

UNIT –5 (14hrs) : INFINITIE SERIES :

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

1. P-test, 2. Cauchey's n^{th}root test or Root Test. 3. D'-Alemberts' Test or Ratio Test.
4. Alternating Series – Leibnitz Test. Absolute convergence and conditional convergence.

Reference Books:

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house.
2. Real Analysis by Rabert&Bartely and .D.R. Sherbart, Published by John Wiley.
3.A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published byS.Chand& Company, New Delhi.
4.Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/Group discussions.

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

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

EXAMINATION AT THE END OF THE THIRD SEMESTER (w.e.f 2019-20)

Mathematics Paper III MAT- 301 Max. Marks: 70Pass Mark: 28 Time: 3 hrs.

Abstract Algebra and Real 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. Show that in a group G for a, b∈ G, $(a\ b)^2 = a^2\ b^2 \Leftrightarrow$ G is abelian.
2. If H, K is two sub groups of a group G, then show that H∩K is also a sub group of G.
3. State and prove Lagrange's Theorem.
4. A subgroup H of a group G is normal subgroup iff$xHx^{-1}=H$, for all x∈ G.

Part - II

5. Every convergent sequence is bounded? Is the converse true?
6. Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}$ is convergent.
7. Test for convergence of $\sum \sqrt{n+1} - \sqrt{n}$
8. Examine the conditionally convergence of $\sum (-1)^{n+1} \frac{n}{n^2+1}$

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9. Show that the set of Q^+ of all +ve rational numbers forms an abelian group under the composition defined by 'o' such that aob= $\frac{ab}{3}$ for a, b ϵ Q^+.
10. If H is a non-empty complex of a group G. The necessary and sufficient condition for H to be a sub group of G is a, b$\in$H $\Longrightarrow ab^{-1} \in H$ here b^{-1} is the inverse of b.
11. If H_1, H_2 are two subgroups of a group G, then $H_1 \cup H_2$ is a sub group of G if and only if $H_1 \subseteq H_2$ (or) $H_1 \subseteq H_2$.
12. A subgroup H of a group G is normal subgroup of G iff the product of two right (left) cosets of H in G is again a right (left)coset of H in G.

Part - II

13. A sequences is convergent if and only if it is a Cauchy's sequence
14. State and prove Cauchy's First theorem on sequence.
15. Test for convergence of $\sum \frac{1.3.5.....(2n-1)}{2.4.6.....2n} x^{n-1}$ (x>0)
16. State and prove Leibnitz's test.

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS), VUYYURU-521165

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

DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs. **MAT-301** **Max.Marks:70** **Min. Marks: 28**

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 Carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	1	2	1	2	2
Section-B (Essay questions)	1	2	1	2	2

---The End---

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

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MATHEMATICS	MAT-501	III B.Sc	w.e.f 2019-20

SEMESTER-V **PAPER-V** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

VECTOR CALCULUS &RING THEORY

UNIT – 1: VECTOR DIFFERENTIATION: - **(12 hrs)**

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, divergence, Curl operators, Formulae Involving these operators.

UNIT – 2: VECTOR INTEGRATION: - **(10 hrs)**

Line Integral, Surface Integral and Volume integral with examples.

UNIT – 3: VECTOR INTEGRATION APPLICATIONS: - **(12 hrs)**

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

UNIT – 4: RINGS-I: - **(14 hrs)**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring – The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 5: RINGS-II: - **(12 hrs)**

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism

Maximal Ideals – Prime Ideals.

Reference Books:-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house.

2. Vector Calculus by SanthiNarayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.

3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.

4. Vector Calculus by R. Gupta, Published by Laxmi Publications.

5. Vector Calculus by P.C. Matthews, Published by Springer Verlagpublicattions.

6. Rings and Linear Algebra by Pundir&Pundir, Published by PragathiPrakashan.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

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

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

DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 501 Max.Marks:70Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

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)
EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2019-20)

MATHEMATICS Paper V MAT- 501 MAX.MARKS: 70 TIME: 3 hrs

(VECTOR CALCULUS AND RING THEORY)

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) If r = $a\cos ti + asintj + at\ tan\theta k$ find $\left|\frac{dr}{dt} \times \frac{d^2r}{dt^2}\right|$ and $\left[\frac{dr}{dt}\frac{d^2r}{dt^2}\frac{d^3r}{dt^3}\right]$

2) Find div f and curl f where $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$.

3) If $F = 3xyi - y^2j$ evaluate $\oint_c F \cdot dr$ where 'c' is the curve $y = 2x^2$ in the xy plane from (0, 0) to (1, 2).

4) If $F = 2xzi - xj + y^2k$ evaluate the $\int_v F \cdot dv$ where v is the region bounded by the surface $x = 0$, $x = 2$, $y = 0$, $y = 6, z = x^2, z = 4$.

Part - II

5) State and prove Green's theorem in a plane.

6) Prove that $Z_m = \{0,1,2,3,\ldots\ldots\ldots .m-1\}$ is a ring with respect to addition and multiplication modulo 'm'

7) Prove that a field has no Zero divisors.

8) If f is homomorphism of a ring R into a ring R^1 then kerf is an ideal of R

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) Prove that $\text{grad}(A \cdot B) = (B \cdot \nabla)A + (A \cdot \nabla)B + B \times \text{curl}\, A + A \times \text{curl}\, B$.

10) Evaluate $\int_s F \cdot N ds$ where $F = zi + xj - 3y^2zk$ and s is the surface $x^2 + y^2 = 16$ included in the first octant between z=0 and z =5.

11) State and prove Gauss divergence Theorem.

12) Verify Green's Theorem in the plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the region bounded by $y = \sqrt{x}$ and $y = x^2$.

Part - II

13) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$at the point P (1, 2, 3) in the direction of the line PQ where Q = (5, 0, 4).

14) Define Field. Prove that every field is an integral domain.

15) Prove that Q ($\sqrt{2}$) = {a + b$\sqrt{2}$ / a, b ∈ Q} is a ring with respect to ordinary addition and multiplication.

16) State and prove fundamental theorem of ring homomorphism.

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

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MATHEMATICS	MAT-502	III B.Sc	w.e.f 2019-20

SEMESTER-V **PAPER-VI** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

LINEAR ALGEBRA

UNIT –I Matrix: **(12 hrs)**

Matrices, Elementary Properties of Matrices, Triangular form, Echelon form, Normal form Inverse Matrices, Non – Singular form, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT – II Vector Spaces-I: **(12 hrs)**

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 –III Vector Spaces-II: **(12 hrs)**

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 –IV Linear Transformations: **(12 hrs)**

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 –V Inner product space: **(12 hrs)**

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

Reference Books:

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

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

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 502 Max.Marks:70 Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

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)

EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2019-20)

MATHEMATICS Paper VI MAT- 502 MAX.MARKS: 70 TIME: 3 hrs

LINEAR ALGEBRA

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) Show that the rank of the transpose of a matrix is equal to the rank of the original matrix. i.e., $\rho(A) = \rho(A^T)$.

2) Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ by reducing it in the Normal form

3) If S is a subset of a vector space V(F), then prove that S is a subspace of V$\Leftrightarrow L(S) = S$

4) Let w1 and w2 be two subspaces of R^4 given by w_1 ={(a,b,c,d) ;b-2c+d=0}, w_2={(a,b,c,d); a=d, b=2c}.Find the basis and dimension (i)w_1 (ii)w_2 (iii) $w1 \cap w2$ and hence find the $dim(w1 + w2)$

Part - II

5) Let T:$R^2 \rightarrow R^2$ be a linear transformation defined by T(1,0)=(1,1),T(0,1)=(-1,2) then find a linear transformation T

6) The mapping T: $V_3(R) \rightarrow V_2(R)$ is defined by T(x, y, z) = (x – y , x – z) is a linear transformation.

7) State and prove Cauchy – Schwarz's inequality

8) State and prove Triangle inequality

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) State and prove Cayley – Hamilton theorem in Matrices.

10) Find the characteristic roots and the corresponding characteristic vectors of the matrix

$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$

11) Let V (F) be a vector space. A non-empty set W⊆V. The necessary and sufficient condition for W to be a subspace of V is a,b ∈F and $\alpha, \beta \in V \Longrightarrow a\alpha + b\beta \in W$

12) Let W be a subspace of a finite dimensional vector space V(F) then

$\dim V/W = dimV - dimW.$

Part - II

13) Find the linear Transformation T(x, y, z) where T : $R^3 \rightarrow R$ isdefined by

T(1, 1, 1) = 3, T(0, 1, -2) = 1 and T(0, 0, 1) = -2.

14) State and prove Rank-nullity theorem

15) State and prove Bessel's inequality

16) If (1, 0, 1, 1) (-1, 0,-1, 1) (0,-1, 1, 1) forms a basis of a subspace of $R^4(R)$use Gram-Schmidt process to obtain an orthonormal basis.

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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, Vuyyuru, held at 2.30PM on 30 – 03 – 2022 through online.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	N.V. (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)	D. Sunitha (D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6)	A. Bhargavi (A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	K. Rajya Lakshmi (K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	B. Durga Praveen (B. Durga Praveen)	Student Member	III B.Sc M.C.Cs AG & SG S Degree College.
10)	M. Rose Manasa (M. Rose Manasa)	Student Member	III B.Sc M.P.C (E) AG & SG S Degree College.

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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 two such IA is calculated for 15 marks. 5 marks will be allotted basing on Assignment. 5 marks be allotted basing on performance of seminar, group discussion, surprise tests etc. There is minimum passing for IA and there is no provision for improvement in IA. Even though the candid 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 wri examination is of 1 Hr. 30 min duration for 20 marks. The tests will be conducted centrally. 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 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 'PA 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 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 approva the Academic Council.

N.V. Chairman

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

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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 fortesting 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 R, Absolute value and Real line, Completeness property of 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) INFINITIE 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.

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

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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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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 fortesting 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 R, Absolute value and Real line, Completeness property of 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) INFINITIE 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 X 5 M = 20 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 70 .

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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.

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

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

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 PATTERNCOURSE-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 X 5 M = 20 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 70 M

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MATHEMATICS	**MAT-601GE**	**w.e.f.2020-21**	**III B.Sc**

SEMESTER-VI **PAPER-VII** **Max.Marks:70**

Hours/ Week: 5 **No.of Credits: 5**

ELECTIVE–VII-(B); NUMERICAL ANALYSIS

UNIT- I: **10 hours**

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**

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**

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**

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**

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

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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 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 $\mathbf{e^x} = \left(\frac{\Delta^2}{\mathbf{E}}\right) \mathbf{e^x} \frac{\mathbf{E}e^x}{\Delta^2 e^x}$ 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 TWOquestion 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 : (in thousand)	15	20	27	39	52

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**

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'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'sIndentify 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

SEMESTER-VI PAPER-VIII Max.Marks:70

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

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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.

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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$\boldsymbol{y}''(t) - 3\boldsymbol{y}'(t) + 2y(t) = 4 \sin t$, y(0) = 1, $\boldsymbol{y}'(0)$ = -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 $\int_o^\infty \frac{\cos \lambda x}{\lambda^2+1}\, d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

Choosing at least TWOquestion 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 $\boldsymbol{y}'' - t\,\boldsymbol{y}' + y = 1$ if y(0) = 1, $\boldsymbol{y}'(0) = 2$.
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$\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(\frac{\pi}{2}, t) = 0$, $\left(\frac{\partial y}{\partial x}\right)_{x=0} = 0$ and y(x,0) = cos3x.

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 $\int_o^t \frac{F(u)du}{\sqrt{(t-u)}} = 1 + t + t^2$.

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) $\int_{-\infty}^{\infty} \frac{sinpa\ cospx}{p}\ dp$) ii) $\int_0^{\infty} \frac{sinp}{p}\ dp$.

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 $y^{1} = -y$ 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 TWOquestion 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 $\int_4^{5.2} logx$ 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

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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
Section-A (Short Answer Questions)	1	2	2	2	1
Section-B (Essay Questions)	1	2	2	2	1

-The End -

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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
Section-A (Short Answer Questions)	2	2	2	1	1
Section-B (Essay Questions)	2	2	2	1	1

-The End -

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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
Section-A (Short Answer Questions)	1	1	2	2	2
Section-B (Essay Questions)	1	1	2	2	2

-The End -

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

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2020-2021

DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

ODD SEMESTER

15-07-2020

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 12.00 Noon on 15 – 07 – 2020.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	(N.V. Srinivasa Rao)	Chairman	Head, Department of Mathematics, AG & SG S Degree College.
2)	(Dr. K. Naveen Kumar)	University Nominee	Department of Mathematics, K.B.N Degree College, Vijayawada.
3)	(Dr B. Jagan Mohan Rao)	Subject Expert	Prof and HOD of Mathematics, Sir C.R.R College, Eluru.
4)	(Dr J.Vijayasekhar)	Subject Expert	Associate. Professor, Department of Mathematics, School of Science, GITAM University, Hyderabad.
5)	(Dr P.Srinivasa Rao)	Subject Expert Alumni member	Director and Principal, Sri Srinivasa Educational Institutions, Vuyyuru.
6)	(D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	(K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
10)	(Sk. Ayesha Begum)	Student Member	III B.Sc M.C.Cs AG & SG S Degree College.
11)	(K. Naga Sri Lakshmi)	Student Member	III B.Sc M.P.C (T) AG & SG S Degree College.

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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 1st Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2020-21.
2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 3rd Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2020-21.
3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th Semester as per the guidelines and instructions under CBCS prescribed by Krishna University from the Academic Year 2020-21.
4. To note any changes in the syllabus are made by APSCHE for the academic year 2020-21.
5. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 1st Semester for the Academic year 2020-21.
2. Discussed and recommended that no changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 3rd Semester for the Academic year 2020-21.
3. Discussed and recommended that changes are required in Syllabi. Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 5th Semesters from the Academic year 2020-21. 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 and 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 the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2020-21.
4. Discussed and recommended to incorporate the 70% of the new syllabus if introduced / made by APSCHE for the academic year 2020-21. The same syllabus shall be incorporated as per the guidelines.
5. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N. V. [illegible]
Chairman

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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)

MATHEMATICS	**MAT-101**	**I B.Sc**	**w.e.f 2020-2021**
SEMESTER-I		**PAPER-I**	**Max.Marks:70**

Hours/ Week: 6 **DIFFERENTIAL EQUATIONS** **No. of Credits: 5**

UNIT – I (12 Hours), 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.

UNIT – II (12 Hours): Orthogonal Trajectories, Differential Equations of 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 homogeneous in x and y**, Equations of the first degree in x and y – Clairaut's Equation.

UNIT – III (14 Hours), Higher order linear differential equations-I :
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.
General Solution of f(D)y=0
General Solution of f(D)y=Q when Q is a function of x.
1/f (D) is Expressed as partial fractions.
P.I. of f(D)y = Q when Q= be^{ax}
P.I. of f(D)y = Q when Q is b sin ax or b cosax.

UNIT – IV (12 Hours), Higher order linear differential equations-II :
Solution of the non-homogeneous linear differential equations with constant coefficients.
P.I. of f(D)y = Q when Q= bx^k
P.I. of f(D)y = Q when Q= $e^{ax}V$
P.I. of f(D)y = Q when Q= xV
P.I. of f(D)y = Q when Q= x^mV

UNIT –V (10 Hours), Higher order linear differential equations-III :
Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, **Legendre's linear equations, Miscellaneous differential equations.**

Reference Books :
1. Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-Second edition.
2. A text book of mathematics for BA/BSc Vol 1 by N. Krishna Murthy & others, published by S. Chand & Company, New Delhi.
3. Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.
4. Differential Equations with applications and programs – S. BalachandraRao& HR Anuradha universities press.

Co – Curricular Activities(15 Hours) :
Seminar/ Quiz/ Assignments/ Project on Application of Differential Equations in Real life Problem/ Problem solving.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 HrsMAT-101 Max.Marks:70 Min. Marks: 28

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 carries10 marks.
(5x10=50 Marks)

Questions to be set as follows:

Blue Print for Question Paper pattern.

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	2	2	2	1	1
Section-B (Essay questions)	1	1	2	2	2

---The End---

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MATHEMATICS	**MAT-101**	**I B.Sc**	**w.e.f 2020-2021**

SECTION – A (Short Answer Questions)

Answer any **FOUR** of the following questions **4X5=20M**

1. Solve $(1+xy)xdy+(1-xy)ydx=0$
2. Solve $x\frac{dy}{dx}+y=y^2\log x$
3. Solve $y+px=p^2x^4$
4. Solve $x^2(y-px)=p^2y$
5. Solve $(D^2-5D+6)y=e^{4x}$
6. Solve $(D^2+4)y=\text{Cos}\,2x$
7. Solve $(D^2-5D+6)y=xe^{4x}$
8. Solve $[(1+x)^2D^2+(1+x)D+1]y=4C\,\text{os}\log(1+x)$ by legender's equation

SECTION - B

Answer any **FIVE** questions. **5x10 = 50M**

9. Solve $x^2ydx-(x^3+y^3)dy=0$
10. Show that the family of confocal conics $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}=1$ is self orthogonal
11. Solve $(D^2-4D+3)y=\sin 3x\cos 2x$
12. Solve $(D^2-3D+2)y=\cosh x$
13. Solve $(D^2-2D+4)y=8(x^2+e^{2x}+\sin 2x)$
14. Solve $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+13y=8e^{3x}\sin 2x$
15. Solve $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=\frac{1}{(1-x)^2}$
16. Solve $(D^2+a^2)y=\tan ax$ by the method of Variation of Parameters

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MATHEMATICS MAT-301 B.Sc.(E.M,T.M& CS)w.e.f: 2019-2020

SEMESTER-III PAPER-III Max.Marks:100

Hours per week: 6 **Abstract Algebra and Real Analysis-I** **No.of Credits:5**

UNIT – 1 : (10Hrs) GROUPS : -

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementaryproperties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

UNIT – 2 : (10Hrs) SUBGROUPS : -

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition– examples-criterion for a complex to be subgroups.Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem: -Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange'sTheorem.

UNIT –3 : (12Hrs) NORMAL SUBGROUPS : -

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Subgroup of index 2 is a normal sub group – simple group – quotient group – criteria for the existenceof a quotient group.

UNIT – 4 (14hrs) : REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme 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 – Cauchey's general principle of convergence theorem.

UNIT –5 (14hrs) : INFINITIE SERIES :

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

1. P-test, 2. Cauchey's n^{th}root test or Root Test. 3. D'-Alemberts' Test or Ratio Test.
4. Alternating Series – Leibnitz Test. Absolute convergence and conditional convergence.

Reference Books:

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house.
2. Real Analysis by Rabert&Bartely and .D.R. Sherbart, Published by John Wiley.
3.A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published byS.Chand& Company, New Delhi.
4.Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/ Quiz/ Assignments/Group discussions.

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

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

EXAMINATION AT THE END OF THE THIRD SEMESTER (w.e.f 2019-20)

Mathematics Paper III MAT- 301 Max. Marks: 70Pass Mark: 28 Time: 3 hrs.

Abstract Algebra and Real 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. Show that in a group G for a, b∈ G, $(a\ b)^2 = a^2\ b^2 \Leftrightarrow$ G is abelian.
2. If H, K is two sub groups of a group G, then show that H∩K is also a sub group of G.
3. State and prove Lagrange's Theorem.
4. A subgroup H of a group G is normal subgroup iff$xHx^{-1}=H$, for all x∈ G.

Part - II

5. Every convergent sequence is bounded? Is the converse true?
6. Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}$ is convergent.
7. Test for convergence of $\sum \sqrt{n+1} - \sqrt{n}$
8. Examine the conditionally convergence of $\sum (-1)^{n+1} \frac{n}{n^2+1}$

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9. Show that the set of Q^+ of all +ve rational numbers forms an abelian group under the composition defined by 'o' such that aob= $\frac{ab}{3}$ for a, b ϵ Q^+.
10. If H is a non-empty complex of a group G. The necessary and sufficient condition for H to be a sub group of G is a, b$\in$H $\Longrightarrow ab^{-1} \in H$ here b^{-1} is the inverse of b.
11. If H_1, H_2 are two subgroups of a group G, then $H_1 \cup H_2$ is a sub group of G if and only if $H_1 \subseteq H_2$ (or) $H_1 \subseteq H_2$.
12. A subgroup H of a group G is normal subgroup of G iff the product of two right (left) cosets of H in G is again a right (left)coset of H in G.

Part - II

13. A sequences is convergent if and only if it is a Cauchy's sequence
14. State and prove Cauchy's First theorem on sequence.
15. Test for convergence of $\sum \frac{1.3.5.....(2n-1)}{2.4.6.....2n} x^{n-1}$ (x>0)
16. State and prove Leibnitz's test.

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs. **MAT-301** **Max.Marks:70** **Min. Marks: 28**

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 Carries10 marks. (5x10=50 Marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
Section-A (Short answer questions)	1	2	1	2	2
Section-B (Essay questions)	1	2	1	2	2

---The End---

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

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MATHEMATICS	MAT-501	III B.Sc	w.e.f 2019-20

SEMESTER-V **PAPER-V** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

VECTOR CALCULUS &RING THEORY

UNIT – 1: VECTOR DIFFERENTIATION: - **(12 hrs)**

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, divergence, Curl operators, Formulae Involving these operators.

UNIT – 2: VECTOR INTEGRATION: - **(10 hrs)**

Line Integral, Surface Integral and Volume integral with examples.

UNIT – 3: VECTOR INTEGRATION APPLICATIONS: - **(12 hrs)**

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

UNIT – 4: RINGS-I: - **(14 hrs)**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring – The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 5: RINGS-II: - **(12 hrs)**

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism

Maximal Ideals – Prime Ideals.

Reference Books:-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house.

2. Vector Calculus by SanthiNarayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.

3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.

4. Vector Calculus by R. Gupta, Published by Laxmi Publications.

5. Vector Calculus by P.C. Matthews, Published by Springer Verlagpublicattions.

6. Rings and Linear Algebra by Pundir&Pundir, Published by PragathiPrakashan.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

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

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 501 Max.Marks:70Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

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)
EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2019-20)

MATHEMATICS Paper V MAT- 501 MAX.MARKS: 70 TIME: 3 hrs

(VECTOR CALCULUS AND RING THEORY)

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) If r = $a\cos ti + asintj + at\ tan\theta k$ find $\left|\frac{dr}{dt} \times \frac{d^2r}{dt^2}\right|$ and $\left[\frac{dr}{dt}\frac{d^2r}{dt^2}\frac{d^3r}{dt^3}\right]$

2) Find div f and curl f where $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$.

3) If $F = 3xyi - y^2j$ evaluate $\oint_c F \cdot dr$ where 'c' is the curve $y = 2x^2$ in the xy plane from (0, 0) to (1, 2).

4) If $F = 2xzi - xj + y^2k$ evaluate the $\int_v F \cdot dv$ where v is the region bounded by the surface $x = 0$, $x = 2$, $y = 0$, $y = 6, z = x^2, z = 4$.

Part - II

5) State and prove Green's theorem in a plane.

6) Prove that $Z_m = \{0,1,2,3,\ldots\ldots\ldots .m-1\}$ is a ring with respect to addition and multiplication modulo 'm'

7) Prove that a field has no Zero divisors.

8) If f is homomorphism of a ring R into a ring R^1 then kerf is an ideal of R

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) Prove that $\text{grad}(A \cdot B) = (B \cdot \nabla)A + (A \cdot \nabla)B + B \times \text{curl}\, A + A \times \text{curl}\, B$.

10) Evaluate $\int_s F \cdot N ds$ where $F = zi + xj - 3y^2zk$ and s is the surface $x^2 + y^2 = 16$ included in the first octant between z=0 and z =5.

11) State and prove Gauss divergence Theorem.

12) Verify Green's Theorem in the plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the region bounded by $y = \sqrt{x}$ and $y = x^2$.

Part - II

13) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$at the point P (1, 2, 3) in the direction of the line PQ where Q = (5, 0, 4).

14) Define Field. Prove that every field is an integral domain.

15) Prove that Q ($\sqrt{2}$) = {a + b$\sqrt{2}$ / a, b ∈ Q} is a ring with respect to ordinary addition and multiplication.

16) State and prove fundamental theorem of ring homomorphism.

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

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MATHEMATICS	MAT-502	III B.Sc	w.e.f 2019-20

SEMESTER-V **PAPER-VI** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

LINEAR ALGEBRA

UNIT –I Matrix: **(12 hrs)**

Matrices, Elementary Properties of Matrices, Triangular form, Echelon form, Normal form Inverse Matrices, Non – Singular form, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT – II Vector Spaces-I: **(12 hrs)**

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 –III Vector Spaces-II: **(12 hrs)**

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 –IV Linear Transformations: **(12 hrs)**

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 –V Inner product space: **(12 hrs)**

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

Reference Books:

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

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

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 502 Max.Marks:70 Min. Mark: 28

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:

Blue Print for Question Paper pattern.

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

-The End -

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE,
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EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2019-20)

MATHEMATICS Paper VI MAT- 502 MAX.MARKS: 70 TIME: 3 hrs

LINEAR ALGEBRA

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) Show that the rank of the transpose of a matrix is equal to the rank of the original matrix. i.e., $\rho(A) = \rho(A^T)$.

2) Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ by reducing it in the Normal form

3) If S is a subset of a vector space V(F), then prove that S is a subspace of V$\Leftrightarrow L(S) = S$

4) Let w1 and w2 be two subspaces of R^4 given by w_1 ={(a,b,c,d) ;b-2c+d=0}, w_2={(a,b,c,d); a=d, b=2c}.Find the basis and dimension (i)w_1 (ii)w_2 (iii) $w1 \cap w2$ and hence find the $dim(w1 + w2)$

Part - II

5) Let T:$R^2 \rightarrow R^2$ be a linear transformation defined by T(1,0)=(1,1),T(0,1)=(-1,2) then find a linear transformation T

6) The mapping T: $V_3(R) \rightarrow V_2(R)$ is defined by T(x, y, z) = (x – y , x – z) is a linear transformation.

7) State and prove Cauchy – Schwarz's inequality

8) State and prove Triangle inequality

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) State and prove Cayley – Hamilton theorem in Matrices.

10) Find the characteristic roots and the corresponding characteristic vectors of the matrix

$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$

11) Let V (F) be a vector space. A non-empty set W⊆V. The necessary and sufficient condition for W to be a subspace of V is a,b ∈F and $\alpha, \beta \in V \Longrightarrow a\alpha + b\beta \in W$

12) Let W be a subspace of a finite dimensional vector space V(F) then

$\dim V/W = dimV - dimW.$

Part - II

13) Find the linear Transformation T(x, y, z) where T : $R^3 \rightarrow R$ isdefined by

T(1, 1, 1) = 3, T(0, 1, -2) = 1 and T(0, 0, 1) = -2.

14) State and prove Rank-nullity theorem

15) State and prove Bessel's inequality

16) If (1, 0, 1, 1) (-1, 0,-1, 1) (0,-1, 1, 1) forms a basis of a subspace of $R^4(R)$use Gram-Schmidt process to obtain an orthonormal basis.

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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

ODD SEMESTER

10-11-2021

Minutes of the meeting of BOS in Mathematics for B.Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2.30 PM on 10 – 11 – 2021.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	(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)	(D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6)	(A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	(K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	(B. Durga Praveen)	Student Member	III B.Sc M.C.Cs AG & SG S Degree College.
10)	(M. Rose Manasa)	Student Member	III B.Sc M.P.C (E) AG & SG S Degree College.

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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 1st 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 and Analytical Skills for 3rd 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 5th 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 and Guidelines to be followed by the question paper setters in Mathematics for 1st Semesters from the Academic year 2021-22. The maximum marks for IA is 25 and SE is 75. 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. 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 40 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 and Guidelines to be followed by the question paper setters in Mathematics and Analytical Skills for all degree programs of 3rd Semesters from the 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 and 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 the 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. There is no IA for Analytical Skills and minimum pass marks is 20 out of 50 in SE.

3. Discussed and recommended that no changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 5th Semester for the Academic year 2021-22.

4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

V. Srinivasa Rao
Chairman

University Nominee

M. Venkateswarlu
Subject Expert

G. Venkateswara Rao
Subject Expert

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Department of Mathematics

COURSE STRUCTURE

Paper Title :- DIFFERENTIAL EQUATIONS **Semester : I**

Course Code	MATT11A	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	90	Total Marks	100
Year of Introduction : 2018-19	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT11A

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1	Determine the solution of differential equations of the first order and of the first degree by Exact, Linear and Bernoulli's method.	L2, PO –1
2	Understand the basic concepts of first order differential equations to find Orthogonal trajectories.	L2, PO - 1
3	Determine the solution of differential equations of the first order and of a degree higher than first by using methods of solvable for P, X, and Y.	L2,PO - 1
4	Compute all solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.	L3, PO – 1
5	Calculate the solutions of higher order differential equations by Cauchy Euler and Variation of parameters.	L2, PO – 1

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MATHEMATICS	MAT T11A	2021 – 22 onwards	B.Sc (MPC, MPCS, MCCS, MSCS)

DIFFERENTIAL EQUATIONS

SEMESTER-I **No of Credits: 5**

OBJECTIVES:

1. Understand all of the concepts relating to the order and linearity of ODEs, analytic and computational solution methods for ODEs, and the real-world applications of ODEs.
2. Apply your understanding of the concepts, formulas, and problem-solving procedures to thoroughly investigate relevant physical models.
3. Explain the concepts of linear systems, ODE solution methods, and related ideas at a fundamental level, as well as how and why we use the solution techniques that we use.

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER& FIRST DEGREE (12Hrs)

1.1 Linear Differential Equations
1.2 Differential Equations Reducible to Linear Form, Bernoulli's differential equations.
1.3 Exact Differential Equations
1.4 Integrating Factors, 1/Mx+Ny, 1/Mx-Ny, $e^{\int f(x)dx}$, $e^{\int g(y)dy}$, and Inspectionmethod
1.5 Change of Variables

UNIT-II: ORTHOGONAL TRAJECTORIES &DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT FIRST DEGREE (12Hrs)

2.1 Orthogonal Trajectories
2.2 Self-Orthogonal Trajectories
2.3 Equations solvable for p
2.4 Equations solvable for y
2.5 Equations solvable for x
2.6 Equations Homogeneous in X & Y
2.7 Equations that do not contain x (or y)
2.8 Clairaut's Equation and Equations reducible to clairaut's form.

UNIT – III: Higher order linear differential equations-I (12Hrs)

3.1 Solution of homogeneous linear differential equations of order n with constant coefficients
3.2 Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.
3.3 General Solution of f(D)y=0
3.4 General Solution of f(D)y=Q when Q is a function of x.
3.5 1/f(D) is Expressed as partial fractions.
3.6 P.I. of f (D) y = Q when Q= be^{ax}
3.7 P.I. of f (D) y = Q when Q is b sinax or b cosax.

UNIT – IV: Higher order linear differential equations-II (12Hrs)

4.1 Solution of the non-homogeneous linear differential equations with constant coefficients.
4.2 P.I. of f (D) y = Q when Q= bx^k
4.3 P.I. of f (D) y = Q when Q= $e^{ax}V$
4.4 P.I. of f (D) y = Q when Q= xV
4.5 P.I. of f (D) y = Q when Q= x^mV where v = sin bx and cosbx

UNIT-V: Higher order Differential Equations –III (12Hrs)

5.1 The Cauchy-Euler Equation.
5.2 Linear differential Equations with non-constant coefficients
5.3 Method of Variation of parameters.

Student Activities:

1) **Class-room activities:** Power point presentations, Assignments
2) **Library activities:** Visit to library and preparation of notes for Assignment problems.
3) **Activities in the Seminars, workshops and conferences:** Participation/presentation in seminar/workshop/conference.

CO-CURRICULAR ACTIVITES:

- Quiz Competitions, Seminars
- Group Discussions

WEB LINKS:

https://en.wikipedia.org/wiki/Differential_equation
https://tutorial.math.lamar.edu/classes/de/de.aspx
https://www.mathsisfun.com/calculus/differential-equations.html

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V. Krishna Murthy	A text book of Mathematics for B.A/B.ScVol – I	S-Chand&co	2015

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	Rai Singhania	Ordinary& Partial Differential Equations	S-Chand	2009
3	Zafar Ahsan	Differential Equations and their applications	Prentice-Hall of India Pvt Ltd, McGraw Hill	2000

Recommended Question Paper Pattern and Model BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-I, DIFFERENTIAL EQUATIONS

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	Differential Equations of 1st order and 1st degree	2	2	28
II	Orthogonal Trajectories, Differential Equations of 1st order but not of 1st degree	2	2	28
III	Higher Order Linear Differential Equations (with constant coefficients) – I	2	2	28
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	28
V	Higher Order Linear Differential Equations (with non-constant coefficients)	2	2	28
TOTAL		10	10	140

S.A.Q. = Short answer questions (4 marks)

E.Q. = Essay questions (10 marks)

Total Marks = 70 M

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COURSE-I, DIFFERENTIAL EQUATIONS

B.Sc MATHEMATICS MODEL PAPER (W.E.F 2022 – 2023)

Time: 3Hrs Max.Marks:70M

Answer the following questions. 5 x 14 = 70M

1. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
2. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
3. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
4. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
5. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M

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Title of the Paper: ABSTRACT ALGEBRA Semester: III

Course Code	**MAT - 301**	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: 2021 - 22	Year of Revision: ---- 2021-22	Percentage of Revision: 0%

Course Outcomes:

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

1. Acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
2. Get the significance of the notation of a normal subgroups.
3. Get the behavior of permutations and operations on them.
4. Study the homomorphisms and isomorphisms with applications.
5. Understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
6. Understand the applications of ring theory in various fields.

Course Syllabus:

UNIT – I: GROUPS: (12 Hours)

Binary Operation – Algebraic structure – semi group- monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group, Composition tables with examples.

UNIT – II: SUB - GROUPS: (12 Hours)

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition- examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem :

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

UNIT –III: NORMAL SUBGROUPS : (12 Hours)

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group –quotient group – criteria for the existence of a quotient group.

HOMOMORPHISM :

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

UNIT – IV: PERMUTATIONS AND CYCLIC GROUPS : (12 Hours)

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups :- Definition of cyclic group – elementary properties – classification of cyclic groups.

UNIT – V: RINGS : (12 Hours)

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub rings and Ideals (only definitions)

Co-Curricular Activities (15 Hours)

Seminar/ Quiz/ Assignments/ Group theory and its applications / Problem Solving.

Text Book:

A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, published by S.Chand & Company, New Delhi.

Reference Books:

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa publishing house.
2. Modern Algebra by M.L. Khanna.
3. Rings and Linear Algebra by Pundir & Pundir, published by Pragathi Prakashan.

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SEMESTER - III, ABSTRACT 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. Show that the set $G = \{x/\ x = 2^a , 3^b$ and a, b ∈ Z$\}$ is a group under multiplication.
2. Define order of an element of a Group. In a group G if a ∈ G then $O(a) = O(a^{-1})$.
3. If H and K are two subgroups of a group G, then prove that HK is a subgroup of G If and only if HK=KH
4. If G is a group and H is a subgroup of index 2 in G then prove that H is a normal subgroup.

Part – 2

5. The necessary and sufficient condition for a homomorphism f of a group G on to a group G^1 with kernel K to be an isomorphism of G into G^1 is that K = {e}
6. Examine whether the following permutations are even or odd

i) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 6 & 1 & 4 & 3 & 2 & 5 & 7 & 8 & 9 \end{pmatrix}$ ii) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 3 & 2 & 4 & 5 & 6 & 7 & 1 \end{pmatrix}$

7. Prove that a group of prime order is cyclic.
8. Every field is an integral domain.

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. Show that the set Q_+ of all +ve rational numbers forms an abelian group under the composition defined by " o " such that aob = ab/3 for a, b ∈ Q_+
10. Show that the set of nth roots of unity forms an abelian group under multiplication.
11. The Union of two subgroups is also a subgroup ⟺ one is contained in the other.
12. State and prove Langrage's theorem.

Part – 2

13. Prove that a subgroup H of a group G is a normal subgroup of G iff the product of two right coset of H in G is again a right coset of H in G.
14. State and prove fundamental theorem of homomorphisms of groups.
15. Prove that every subgroup of cyclic group is cyclic.
16. Prove that the characteristic of an integral domain is either prime or zero.

BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-III, ABSTRACT ALGEBRA

Unit	**TOPIC**	**S.A.Q** (including choice)	**E.Q** (including choice)	**Total Marks**
I	Groups	2	2	30
II	Subgroups, Cosets & Lagrange's theorem	1	2	25
III	Normal Subgroups and Homomorphism	2	2	30
IV	Permutations and Cyclic groups	2	1	20
V	Rings	1	1	15
	Total	8	8	120

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

E.Q. = Essay questions (10 marks)

Short answer questions : 4 X 5 M = 20 M

Essay questions : 5 X 10 M = 50 M

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Total Marks = 70 M

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Accredited with "A" Grade by NAAC, Bengaluru

Title of the Paper: Analytical Skills **Semester: III**

Course Code	ANS - 301	Course Delivery Method	Class Room / Blended Mode - Both
Credits	2	CIA Marks	0
No. of Lecture Hours / Week	2	Semester End Exam Marks	50
Total Number of Lecture Hours	30	Total Marks	50
Year of Introduction :2021-22	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: 0%

Course Objective: Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

Course Outcomes:

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

1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated Skills.
2) Acquire competency in the use of verbal reasoning.
3) Apply the skills and competencies acquired in the related areas
4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

UNIT – 1 **6 Hrs**

Test of Reasoning – I:-Coding – Decoding, Direction Test, Interchange of Signs, Logical Venn diagrams, Series Puzzles.

UNIT – 2 **6 Hrs**

Test of Reasoning – II: - Analogies of numbers and Alphabets completion of blank spaces following the pattern in A: B: C: D relationship odd thing out; Missing number in a sequence or a series.

UNIT – 3 **6 Hrs**

Arithmetic ability:-Algebraic operations BODMAS, Fractions, Divisibility rules, LCM and GCD (HCF).

Date, Time and Arrangement Problems: Calendar Problems, Clock Problems, Blood Relationship.

UNIT – 4 **6 Hrs**

Quantitative aptitude: - Averages, Ration and proportion, Problems on ages, Time-distance-speed.

UNIT – 5 **6 Hrs**

Business computations:- Percentages, Profit &loss, Partnership, simple, compound interest.

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude: Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill Publications.
5. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

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DEPARTMENT OF MATHEMATICS

Analytical Skills

Time: 2 Hrs **Code: ANS – 301** **Max. Marks: 50** **Min. Marks: 20**

Guidelines for Paper setter

To be set all the questions are "Multiple Choice" with four (or) five options.

Section – A

Unit – 1:- Ten questions. Each question carries **ONE** mark 10x1=10M

Unit – 2:- Ten questions. Each question carries **ONE** mark 10x1=10M

Section – B

Unit – 3:- Five questions. Each question carries **TWO** mark 5x2=10M

Unit – 4:- Five questions. Each question carries **TWO** mark 5x2=10M

Unit – 5:- Five questions. Each question carries **TWO** mark 5x2=10M

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MATHEMATICS MAT-501C 2021-22 III B.Sc (MPC, MPCs, MCCs)

SEMESTER-V **PAPER-V** **Max.Marks:70**

Hours/ Week: 5 **No. of Credits: 5**

VECTOR CALCULUS & RING THEORY

UNIT – 1: VECTOR DIFFERENTIATION: - **(12 hrs)**

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, divergence, Curl operators, Formulae Involving these operators.

UNIT – 2: VECTOR INTEGRATION: - **(12 hrs)**

Line Integral, Surface Integral and Volume integral with examples.

UNIT – 3: VECTOR INTEGRATION APPLICATIONS: - **(12 hrs)**

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

UNIT – 4: RINGS-I: - **(12 hrs)**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring – The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 5: RINGS-II: - **(12 hrs)**

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism

Maximal Ideals – Prime Ideals.

Reference Books:-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house.
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Vector Calculus by R. Gupta, Published by Laxmi Publications.
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publicattions.
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

Chairman University Nominee Subject Expert Subject Expert

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs **MAT- 501 C** **Max.Marks:70** **Min. Mark: 28**

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:

Questions to be set as follows:

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

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-The End -

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

MATHEMATICS Paper VI MAT- 502C MAX.MARKS: 70 TIME: 3 hrs

1)

LINEAR ALGEBRA

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) Show that the rank of the transpose of a matrix is equal to the rank of the original matrix. i.e., $\rho(A) = \rho(A^T)$.

2) Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ by reducing it in the Normal form

3) If S is a subset of a vector space V(F), then prove that S is a subspace of V$\Leftrightarrow L(S) = S$

4) Let w1 and w2 be two subspaces of R^4 given by w_1 ={(a,b,c,d) ;b-2c+d=0}, w_2={(a,b,c,d); a=d, b=2c}.Find the basis and dimension (i)w_1 (ii)w_2 (iii) $w1 \cap w2$ and hence find the $dim(w1 + w2)$

Part - II

5) Let T:$R^2 \rightarrow R^2$ be a linear transformation defined by T(1,0)=(1,1),T(0,1)=(-1,2) then find a linear transformation T

6) The mapping T: $V_3(R) \rightarrow V_2(R)$ is defined by T(x, y, z) = (x – y , x – z) is a linear transformation.

7) State and prove Cauchy – Schwarz's inequality

8) State and prove Triangle inequality

Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) State and prove Cayley – Hamilton theorem in Matrices.

10) Find the characteristic roots and the corresponding characteristic vectors of the matrix

$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$

11) Let V (F) be a vector space. A non-empty set W⊆V. The necessary and sufficient condition for W to be a subspace of V is a,b ∈F and $\alpha, \beta \in V \Longrightarrow a\alpha + b\beta \in W$

12) Let W be a subspace of a finite dimensional vector space V(F) then

$\dim V/W = dimV - dimW.$

Part - II

13) Find the linear Transformation T(x, y, z) where T : $R^3 \rightarrow R$ is defined by

T(1, 1, 1) = 3, T(0, 1, -2) = 1 and T(0, 0, 1) = -2.

14) State and prove Rank-nullity theorem

15) State and prove Bessel's inequality

16) If (1, 0, 1, 1) (-1, 0,-1, 1) (0,-1, 1, 1) forms a basis of a subspace of $R^4(R)$ use Gram-Schmidt process to obtain an orthonormal basis.

Chairman University Nominee Subject Expert Subject Expert

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MATHEMATICS MAT-502C 2021-22 III B.Sc (MPC, MPCs, MCCs)

SEMESTER-V PAPER-VI Max.Marks:70

Hours/ Week: 5 No. of Credits: 5

LINEAR ALGEBRA

UNIT –I Matrix: (12 hrs)

Matrices, Elementary Properties of Matrices, Triangular form, Echelon form, Normal form Inverse Matrices, Non – Singular form, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Vectors of square Matrix, Cayley – Hamilton Theorem.

UNIT – II Vector Spaces-I: (12 hrs)

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 –III Vector Spaces-II: (12 hrs)

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 –IV Linear Transformations: (12 hrs)

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 –V Inner product space: (12 hrs)

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

Reference Books:

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

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DEPARTMENT OF MATHEMATICS

Question Paper Guidelines for SEMESTER-END Examinations

Time: 3 Hrs MAT- 502 C Max.Marks:70 Min. Mark: 28

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:

Questions to be set as follows:

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

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-The End -

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VUYYURU – 521165, KRISHNA Dt., A.P.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
EXAMINATION AT THE END OF FIFTH SEMESTER (w.e.f 2020-21)

MATHEMATICS Paper V MAT- 501C MAX.MARKS: 70 TIME: 3 hrs

(VECTOR CALCULUS AND RING THEORY)

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) If $r = a\cos ti + asintj + at\ tan\theta k$ find $\left|\frac{dr}{dt} \times \frac{d^2r}{dt^2}\right|$ and $\left[\frac{dr}{dt}\ \frac{d^2r}{dt^2}\ \frac{d^3r}{dt^3}\right]$

2) Find div f and curl f where $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$.

3) If $F = 3xyi - y^2j$ evaluate $\oint_c F \cdot dr$ where 'c' is the curve $y = 2x^2$ in the xy plane from (0, 0) to (1, 2).

4) If $F = 2xzi - xj + y^2k$ evaluate the $\int_v F \cdot dv$ where v is the region bounded by the surface $x = 0$, $x = 2$, $y = 0$, $y = 6, z = x^2, z = 4$.

Part - II

5) State and prove Green's theorem in a plane.

6) Prove that $Z_m = \{0,1,2,3,\ldots\ldots\ldots m-1\}$ is a ring with respect to addition and multiplication modulo 'm'

7) Prove that a field has no Zero divisors.

8) If f is homomorphism of a ring R into a ring R^1 then kerf is an ideal of R

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Section – B (long answer questions)

Answer any **FIVE** of the following questions. **5x10 = 50M**

Choosing at least TWO questions from each Part.

Part - I

9) Prove that grad $(A \cdot B) = (B \cdot \nabla)A + (A \,.\nabla)B + B \times \text{curl}\, A + A \times \text{curl}\, B$.

10) Evaluate $\int_s F \cdot N ds$ where $F = zi + xj - 3y^2zk$ and s is the surface $x^2 + y^2 = 16$ included in the first octant between z=0 and z =5.

11) State and prove Gauss divergence Theorem.

12) Verify Green's Theorem in the plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the region bounded by $y = \sqrt{x}$ and $y = x^2$.

Part - II

13) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$ at the point P (1, 2, 3) in the direction of the line PQ where Q = (5, 0, 4).

14) Define Field. Prove that every field is an integral domain.

15) Prove that Q ($\sqrt{2}$) = {a + b$\sqrt{2}$ / a, b ∈ Q} is a ring with respect to ordinary addition and multiplication.

16) State and prove fundamental theorem of ring homomorphism.

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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, Vuyyuru, held at 2.30PM on 30 – 03 – 2022 through online.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	N.V. (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)	D. Sunitha (D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6)	A. Bhargavi (A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	K. Rajya Lakshmi (K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	B. Durga Praveen (B. Durga Praveen)	Student Member	III B.Sc M.C.Cs AG & SG S Degree College.
10)	M. Rose Manasa (M. Rose Manasa)	Student Member	III B.Sc M.P.C (E) AG & SG S Degree College.

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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 writ examination is of 1 Hr. duration for 15 marks. The tests will be conducted centrally. The average two such IA is calculated for 15 marks. 5 marks will be allotted basing on Assignment. 5 marks be allotted basing on performance of seminar, group discussion, surprise tests etc. There is minimum passing for IA and there is no provision for improvement in IA. Even though the candid 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 wri examination is of 1 Hr. 30 min duration for 20 marks. The tests will be conducted centrally. 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 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 'PA 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 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 approva the Academic Council.

N.V. Chairman

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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 fortesting 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 R, Absolute value and Real line, Completeness property of 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) INFINITIE 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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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 fortesting 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 R, Absolute value and Real line, Completeness property of 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) INFINITIE 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 X 5 M = 20 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 70 .

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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 PATTERNCOURSE-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 X 5 M = 20 M

Essay questions : 5 X 10 M = 50 M

Total Marks = 70 M

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MATHEMATICS	**MAT-601GE**	**w.e.f.2020-21**	**III B.Sc**

SEMESTER-VI **PAPER-VII** **Max.Marks:70**

Hours/ Week: 5 **No.of Credits: 5**

ELECTIVE–VII-(B); NUMERICAL ANALYSIS

UNIT- I: **10 hours**

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**

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**

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**

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**

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.
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)
Accredited with "A" Grade by NAAC, Bengaluru
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 $\mathbf{e^x} = \left(\frac{\Delta^2}{\mathbf{E}}\right) \mathbf{e^x} \frac{\mathbf{E}e^x}{\Delta^2 e^x}$ 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 TWOquestion 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 : (in thousand)	15	20	27	39	52

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**

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'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'sIndentify 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

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-603CE 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-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

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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)

Accredited with "A" Grade by NAAC, Bengaluru

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$\boldsymbol{y}''(t) - 3\boldsymbol{y}'(t) + 2y(t) = 4 \sin t$, y(0) = 1, $\boldsymbol{y}'(0)$ = -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 $\int_o^\infty \frac{\cos \lambda x}{\lambda^2+1}\, d\lambda = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

Choosing at least TWOquestion 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 $\boldsymbol{y}'' - t\,\boldsymbol{y}' + y = 1$ if y(0) = 1, $\boldsymbol{y}'(0) = 2$.
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$\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$, $y(\frac{\pi}{2}, t) = 0$, $\left(\frac{\partial y}{\partial x}\right)_{x=0} = 0$ and y(x,0) = cos3x.

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 $\int_o^t \frac{F(u)du}{\sqrt{(t-u)}} = 1 + t + t^2$.

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) $\int_{-\infty}^{\infty} \frac{sinpa\ cospx}{p}\ dp$) ii) $\int_0^{\infty} \frac{sinp}{p}\ dp$.

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

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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 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 $y^{1} = -y$ 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 TWOquestion 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 $\int_4^{5.2} logx$ 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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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)
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

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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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
Section-A (Short Answer Questions)	1	2	2	2	1
Section-B (Essay Questions)	1	2	2	2	1

-The End -

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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
Section-A (Short Answer Questions)	2	2	2	1	1
Section-B (Essay Questions)	2	2	2	1	1

-The End -

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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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
Section-A (Short Answer Questions)	1	1	2	2	2
Section-B (Essay Questions)	1	1	2	2	2

-The End -

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

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

Accredited by NAAC with "A" Grade

2022-2023

DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

EVEN SEMESTER

19-04-2023

Minutes of the meeting of BOS in Mathematics for B. Sc Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2.30 PM on 19 – 04 – 2023 through online mode.

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N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	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)	D. Sunitha (D. Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6)	A. Bhargavi (A. Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	(Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	K. Rajya Lakshmi (K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	Jahnavi. G (G . Jahanvi)	Student Member	III B.Sc M.P.Cs AG & SG S Degree College.
10)	N. Pavan Sai (N. Pavan Sai Kumar)	Student Member	III B.Sc M.P.C (E) AG & SG S Degree College.

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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 prescribed APSCHE and Krishna University from the Academic Year 2022-23.
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 prescribed APSCHE and Krishna University from the Academic Year 2022-23.
3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th/ 6th Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.
4. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in Syllabi. Changes are required in Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 2nd Semesters from the Academic year 2022-23. 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 for attendance and 5 marks are allotted for Assignment/ Activity. 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 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2022-23.

2. Discussed and recommended that changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 4th Semesters from the Academic year 2022-23. 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 and 5 marks are allotted for activity. 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 40 out of 75) and the result shall be declared as 'PASS' from the Academic year 2022-23.
3. Discussed and recommended that changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 5th/ 6th Semester for the Academic year 2022-23.
4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V.

Chairman

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

NAAC reaccredited 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 fortesting 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 R, Absolute value and Real line, Completeness property of 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) INFINITIE 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.

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

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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 .

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

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

Department of Mathematics

COURSE STRUCTURE

Sem	Course Code	Paper	Title of the Paper	Total Marks	Internal Exam	Sem.End Exam	Teaching Hours	Credits
IV	MATT 01A	CORE	SOLID GEOMETRY	100	25	75	6	5

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT01A

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1	Understand the basic concepts of plane to find the length of perpendicular from a given point to given plane, bisectors of angles between two planes, angle between the pair of planes.	L2, PO-1
2	Determine the equation of a line in various forms & image of a given point w.r.t. a line and plane.	L3, PO - 1
3	Compute the equations of the hallow spheres through the given points, plane section of a sphere.	L3,PO - 1
4	Determine orthogonal spheres, coaxial system of spheres. The equation of cone, vertex of a cone ,General equation of second degree should represent a cone.	L3, P0-1
5	Calculate the equation of enveloping cone, reciprocal cone, right circular cone and intersection of two cones with a common vertex.	L3, P0-1

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

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MATHEMATICS	**MATT01A**	**2022-23 onwards**	**B.Sc (MPC,MPCS, MSCs, MCCS)**

SOLID GEOMETRY

SEMESTER-IV No of Credits: 5

OBJECTIVE: TO ENHANCE DATA ANALYTICAL SKILLS AND LOGICAL THINKING SKILLS TO THE STUDENTS.

UNIT-I: The Plane (18Hrs)

1.1 Equation of plane in terms of its interception the axis, Equations of the plane through the given points

1.2 Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes

1.3 Plane passing through the intersection of two given planes, Orthogonal projection on a plane

1.4 Joint equation of a pair of planes, Angle between the pair of planes, Angle between the pair of parallel planes.

UNIT-I: The Line (18Hrs)

2.1 Equation of a line in symmetric form and parametric form; Angle between a line and a plane

2.2 The condition that a given line may lie in a given plane, The condition that two given lines are coplanar

2.3 Number of arbitrary constants or parameters in the equations of straight line

2.4 Length of the perpendicular from a given point to a given line.

2.5 The shortest distance between two lines, The length and equations of the line of shortest distance between two straight lines.

UNIT-III: Sphere: (18Hrs)

3.1 Definition and equation of the sphere; Equation of the sphere through given points

3.2 Plane sections of a sphere, Great Circle, Small Circle

3.3 Intersection of sphere and a line.

3.4 Conditions for a plane to intersect a sphere

3.5 Equation of a Sphere through a given circle

3.6 Intersection of a sphere and a line; tangent plane touching spheres, Power of a point;

3.7 Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes; Conjugate lines or polar lines, Angle of intersection of two spheres; Conditions for two Spheres to be orthogonal;

3.8 Radical plane; Radical line, Radical Centre, Coaxial system of spheres; Limiting points.

UNIT-IV: Cones **(18Hrs)**

4.1 Definition of a cone, Vertex, guiding curve, generators, Equation of the cone with a given Vertex and guiding curve

4.2 Condition that the general equation of the second degree should represent a cone

4.3 Enveloping cone of a surface, Equations of cones with vertex at origin

4.4 Condition that a cone may have three mutually perpendicular generators, Intersection of a line with a cone

4.5 Tangent lines and tangent plane at a point, Condition that a plane may touch a cone

4.6 Reciprocal cones, Intersection of two cones with a common vertex

4.7 Right circular cone, Equation of the right circular cone with a given vertex, Axis and semi-vertical angle.

UNIT-V: Cylinders: **(18Hrs)**

5.1 Definition of a cylinder, Equation to the cylinder whose generators intersect a given Conic and are parallel to a given line

5.2 Enveloping cylinder of a sphere

5.3 The right circular cylinder

5.4 Condition for tangents, Director Sphere.

Student Activities:

4) **Class-room activities:** Power point presentations, Assignments

5) **Library activities:** Visit to library and preparation of notes for Assignment problems.

6) **Activities in the Seminars, workshops and conferences:** Participation/presentation in seminar/workshop/conference.

CO-CURRICULAR ACTIVITES:

- Quiz Competitions, Seminars
- Group Discussions

WEB LINKS:

https://www.whitman.edu/mathematics/calculus online/sectionl 2.05.html
https://en.wikipedia.org/wiki/Sphere

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAROF PUBLICATION
1	V. Krishna Murthy	A text book of mathematics for B.A/B.ScVol-1	S-Chand	2015

Reference books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr. A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol-1	Deepthi Publications	2015
2	Shanti Narayan and P.K. Mittal	Analytical Solid Geometry	S.Chand& Company Ltd.	2010
3	Dr.C Govardhan	A text book of mathematics for B.A/B.ScVol-1	Telugu Academy	2009

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SEMESTER – IV

Model Paper

COURSE CODE : MAT T01A

TITLE OF THE PAPER : SOLID GEOMETRY

Time: 3hrs. **Max. Marks: 75**

Section-A

Answer any FIVE questions **(5x5=25 Marks)**

1. Find the equation of the plane through (4, 4, 0) and perpendicular to the planes x+2y+2z and 3x+3y+2z-8=0. (CO l, L2)
2. Find the angle between the planes 2x-3y-6z =6 and 6x+3y-2z=18. (CO l, L2)
3. Find the image of the point (2,-1,3) in the plane 3x-2y+z=9 (CO2, L3)
4. Find the equation to the sphere through 0=(0,0,0) and making intercepts a, b, c on the axes. (CO3, L3)
5. Find the equations of the spheres passing through the circle $x^2 + y^2 = 4$, z=0 and is intersected by the plane x+2y+2z=0 in a circle of radius 3. (CO3, L3)
6. Find the equation of the cone whose vertex is (1, 1, 0) and whose guiding curve is y=0, $x^2 + z^2 = 4$ (CO4, L3)
7. Find the equation to the cone which passes through the three coordinate axes and the lines (CO4, L3) – — – and – – –
8. Find the equation of the cylinder whose generators are parallel to and which – Passes through the curve $x^2 + y^2$=16, z=0 (COS, L3)

Section-B

Answer ALL questions. **(5 x 10 = 50 Marks)**

9(a). Prove that the equation $2x^2 - 6y^2 - 12z^2 + 18yz + 2zx + xy = 0$ represents a pair of planes, and find the angle between them. (COl, L2)

(OR)

9(b). Find the bisecting plane of the acute angle between the planes 3x-2y+6z+2 =0, 2x-y+2z+2=0 (COl, L2)

I0(a). Find the image of the line — — — in the plane x+y+z=l (CO2, L3)

OR)

I0(b). Find the length and equations to the line of S.D between the lines **(CO_2, L_3)**

— — — and — — —

l l(a). Show that the plane 2x-2y+z+12=0 touches the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$ and find the point of contact. (CO3, L3)

(OR)

l l(b). Find the limiting points of the co-axial system of spheres of which two members are $x^2 + y^2 + z^2 + 3x - 3y + 6 = 0$, $x^2 + y^2 + z^2 - 6y - 6z + 6 = 0$ (CO3, L3)

12(a). Find the vertex of the cone

$7x^2 + 2y^2 + 2z^2 - 10zx + 10xy + 26x - 2y + 2z - 17 = 0$ (CO4, L3)

(OR)

12(b). Find the equation to the right circular cone whose vertex is (1,-2,-1), axes the line — — — and semi vertical angle 60° (CO4, L3)

13(a). Find the equation to the right circular cylinder whose guiding circle is

$x^2 + y^2 + z^2 = 9$, $x - y + z = 3$ (CO5, L3)

(OR)

13(b). Find the equation of the enveloping cylinder of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 1 = 0$, having its generators parallel to the line x=y=z. (CO5, L3)

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DEPARTMENT OF MATHEMATICS

COURSE STRUCTURE

Semester	Course Code	Paper	Title of the paper	Total marks	Internal exam	Sem end exam	Teaching hours	credits
IV	MAT T41A	CORE	Linear Algebra	100	25	75	5	5

Programme Outcomes:

S.No	P. O
	At the end of the program the student will able to
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematics problem and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MAT T41A

S. No	C.O	
	Upon successful completion of their course, students should have the knowledge and skills to	
1.	Knowledge in fundamental concepts of vector spaces.	L2, PO-1
2.	Ability to understand the basic concepts of Basis and Dimensions.	L2, PO-1
3.	Discuss the linear transformations, rank and nullity.	L2, PO-1
4.	Appreciation in the concept of matrices as a tool in solving system of linear equations and determining eigen values and eigen vectors.	L2, PO-1
5	Ability to understand the basis concepts of inner product spaces and to develop hypothetical ideas and laws to solve the related problems in the context.	L4, PO-1

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MATHEMATICS	**MAT T41A**	**2022 – 23 Onwards**	**B.Sc.(MPC,MPCS,MCCs,MSCS)**

LINEAR ALGEBRA

SEMESTER-IV **No of Credits: 5**

OBJECTIVE: TO ENHANCE THE ANALYTICAL SKILLS AND APPLICATION SKILLS.

UNIT I: Vector spaces (18hrs)

1.1 Vector space definition – general properties of Vector space.

1.2 subspace definition – theorems & related problems.

1.3 Linear sum of two subspaces, linear combination of vectors and linear span of a set – theorems &related problems.

1.4 Linear dependence of vectors - theorems & related problems.

1.5 Linear independence of vectors - theorems & related problems.

UNIT II: Basis and Dimension (18hrs)

2.1 Basis of a vector space – definition, Basis existence, Basis extension, Basis Invariance, theorems.

2.2 Coordinates – definition & related problems.

2.3 Dimension of a vector space, dimension of a subspace - theorems & related problems.

2.4 Quotient space, dimension of Quotient space - theorems.

UNIT III: Linear Transformation (18hrs)

3.1 Vector space homomorphism – definitions

3.2 Linear transformation, Properties of L.T., Determination of L.T. - theorems & related problems.

3.3 Sum of linear transformations, scalar multiplication of L.T., product of linear transformations, Algebra of linear operators - theorems & related problems.

3.4 Range & Null space of a L.T. – Definitions, theorems & related problems.

3.5 Rank nullity theorem - related problems.

UNIT IV: Matrices (18hrs)

4.1 Fundamentals of Matrices.

4.2 Elementary matrix operations & elementary matrices.

4.3 Rank of a matrix – definition, related problems.

4.4 Echelon form of a matrix, reduction to normal form, PAQ form, Inverse of a matrix – related problems only.

4.5 System of linear equations – homogeneous & non homogeneous linear equations - related problems.

4.6 Eigen values & Eigen vectors of a matrix – definitions, theorems & related problems.

4.7 Cayley - Hamilton theorem, related problems.

UNIT V: Inner product spaces (18hrs)

5.1 Inner product spaces – definition, Norm (or) Length of a vector - theorems & related problems.

5.2 Schwarz in equality, Triangle inequality, parallelogram law – theorems.

5.3 Orthogonality – orthogonal, orthonormal vectors, orthogonal set, orthonormal sets of I.P.S - theorems & related problems.

5.4 Gram- Schmid orthogonalization process, Bessel’s Inequality and Parseval’s Identity.

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	V. Venkateswara Rao, N. Krishna Murthy.	A text book of Mathematics for B.A/B.ScVol – III. (Pg No: 111-192; 232 – 321 & 339 – 389; 395 – 434).	S-Chand & Co.	2006

Reference Text books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	J.N. Sharma and A. R. Vasistha	Linear Algebra	Krishna PrakashanMandir Meerut-250002.	
2.	Dr. A. Anjaneyulu	A Text Book of Mathematics B.A/B.Sc – Vol III	Deepthi Publications	3rd Edition 2006 - 2007

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SEMESTER – IV **Model Paper**

COURSE CODE : MAT T41A **Time: 3hrs.**

TITLE OF THE PAPER : LINEAR ALGEBRA **Max. Marks: 75**

SECTION – A

Answer any FIVE of the following questions **5X5=25M**

1. The set W of ordered triads (x, y, 0) where x, y ϵ F is a subspace of $V_3(F)$. (CO1, L2)
2. If two vectors are linearly dependent, prove that one of them is a scalar multiple of the other. (CO1, L2)
3. Show that the set { (1,0,0), (1,1,0),(1,1,1) } is a basis of $C^3(C)$.Hence find the coordinates of the vector (3+4i, 6i, 3+7i) in $C^3(C)$. (CO2,L4)
4. Describe explicitly the linear transformation T: $R^2 \rightarrow R^2$ such that T(2, 3) = (4, 5) and T(1, 0) = (0,0) (CO3,L2)
5. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. (CO4,L2)
6. Solve the system $2x_1 - x_2 + x_3 = 0$, $3x_1 + 2x_2 + x_3 = 0$, $x_1 - 3x_2 + 5x_3 = 0$. (CO4,L2)
7. Show that zero is a characteristic root of a matrix if and only if the matrix is singular. (CO4,L2)
8. State & prove the Triangle Inequality. (CO5,L2)

SECTION -B

Answer the following questions. **5X10=50M**

9a) If S, T are the subset of a vector space V (F), then prove that

i) $S \subseteq T \Rightarrow$ (i) $L(S) \subseteq L(T)$

ii) $L(S \cup T) = L(S) + L(T)$. (CO1,L2)

(OR)

9b). Let V (F) be a vector space and S = { $\alpha_1,\alpha_2,\alpha_3,\ldots\ldots\alpha_n$ } is a finite subset of non-zero vectors of V (F).Then S is linear dependent if and only if some vector $\alpha_k \in S$, $2 \leq k \leq n$, can be expressed as a linear combination of its preceding vectors**.** **(**CO1, L2)

10a) State and prove Basis extension theorem. (CO2, L2)

(OR)

10b) Let W be a subspace of a finite dimensional vector space V (F) then dim V/W = dim V – dim W. (CO2,L2)

11a) Find T (x, y, z) where T : $R^3 \rightarrow R$ is defined by T (1 , 1, 1) = 3; T(0, 1 ,-2) = 1; T(0, 0, 1) = -2. (CO3, L2)

(OR)

11b) State and prove Rank – nullity theorem. (CO3, L4)

12a) Show that the only number λ for which the system x + 2y + 3z = $\boldsymbol{\lambda}$x, 3x + y + 2z = $\boldsymbol{\lambda}$y, 2x + 3y + z = $\boldsymbol{\lambda}$z has non-zero solutions is 6. (CO4,L2)

(OR)

12b) State and prove Cayley – Hamilton theorem. (CO4,L2)

13a) State and prove Cauchy – Schwarz's Inequality. (CO5,L4)

(OR)

13b) Given {(2,1,3), (1, 2, 3), (1, 1, 1)} is a basis of R^3; Construct an orthonormal basis. (CO5,L4)

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

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

Accredited by NAAC with "A" Grade

2022-2023

DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

ODD SEMESTER

29-10-2022

Minutes of the meeting of BOS in Mathematics for B. Sc Degree Courses o AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2.30 PM on 29 – 10 – 2022 through online mode.

N.V. Srinivasa Rao — *Presiding*

Members Present:

1)	N.V Srinivasa Rao **(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)	D. Sunitha **(D. Sunitha)**	Member	Lecturer in Mathematics AG & SG S Degree College.
6)	A. Bhargavi **(A. Bhargavi)**	Member	Lecturer in Mathematics AG & SG S Degree College.
7)	Noor Mohammad **(Noor Mohammad)**	Member	Lecturer in Mathematics AG & SG S Degree College.
8)	K. Rajya Lakshmi **(K. Rajya Lakshmi)**	Member	Lecturer in Mathematics AG & SG S Degree College.
9)	Jahnavi. G **(G . Jahanvi)**	Student Member	III B.Sc M.P.Cs AG & SG S Degree College.
10)	Pavan Sai. N. **(N. Pavan Sai Kumar)**	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 1st Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.

2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics and Analytical Skills for 3rd Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.

3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th/ 6th Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.

4. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in Syllabi. Changes are required in Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for [illegible] Semesters from the Academic year 2022-23. 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 for attendance and 5 marks are allotted for Assignment/ Activity. 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 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2022-23.

2. Discussed and recommended that changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics and Analytical Skills for all degree programs of 3rd Semesters from the Academic year 2022-23. 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 and 5 marks are allotted for activity. 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 40 out of 75) and the result shall be declared as 'PASS' from the Academic year 2022-23. There is 10 marks IA (There is no minimum passing for IA) for Analytical Skills and minimum pass marks is 16 out of 40 in SE.

3. Discussed and recommended that changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 5th/ 6th Semester for the Academic year 2022-23.

4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V. Seshayya
Chairman

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Department of Mathematics

COURSE STRUCTURE

Paper Title :- DIFFERENTIAL EQUATIONS **Semester : I**

Course Code	MATT11A	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	90	Total Marks	100
Year of Introduction : 2018-19	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT11A

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1	Determine the solution of differential equations of the first order and of the first degree by Exact, Linear and Bernoulli's method.	L2, PO –1
2	Understand the basic concepts of first order differential equations to find Orthogonal trajectories.	L2, PO - 1
3	Determine the solution of differential equations of the first order and of a degree higher than first by using methods of solvable for P, X, and Y.	L2,PO - 1
4	Compute all solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.	L3, PO – 1
5	Calculate the solutions of higher order differential equations by Cauchy Euler and Variation of parameters.	L2, PO – 1

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MATHEMATICS	MAT T11A	2021 – 22 onwards	B.Sc (MPC, MPCS, MCCS, MSCS)

DIFFERENTIAL EQUATIONS

SEMESTER-I **No of Credits: 5**

OBJECTIVES:

1. Understand all of the concepts relating to the order and linearity of ODEs, analytic and computational solution methods for ODEs, and the real-world applications of ODEs.
2. Apply your understanding of the concepts, formulas, and problem-solving procedures to thoroughly investigate relevant physical models.
3. Explain the concepts of linear systems, ODE solution methods, and related ideas at a fundamental level, as well as how and why we use the solution techniques that we use.

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER& FIRST DEGREE (12Hrs)

1.1 Linear Differential Equations
1.2 Differential Equations Reducible to Linear Form, Bernoulli's differential equations.
1.3 Exact Differential Equations
1.4 Integrating Factors, 1/Mx+Ny, 1/Mx-Ny, $e^{\int f(x)dx}$, $e^{\int g(y)dy}$, and Inspectionmethod
1.5 Change of Variables

UNIT-II: ORTHOGONAL TRAJECTORIES &DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT FIRST DEGREE (12Hrs)

2.1 Orthogonal Trajectories
2.2 Self-Orthogonal Trajectories
2.3 Equations solvable for p
2.4 Equations solvable for y
2.5 Equations solvable for x
2.6 Equations Homogeneous in X & Y
2.7 Equations that do not contain x (or y)
2.8 Clairaut's Equation and Equations reducible to clairaut's form.

UNIT – III: Higher order linear differential equations-I (12Hrs)

3.1 Solution of homogeneous linear differential equations of order n with constant coefficients
3.2 Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.
3.3 General Solution of f(D)y=0
3.4 General Solution of f(D)y=Q when Q is a function of x.
3.5 1/f(D) is Expressed as partial fractions.
3.6 P.I. of f (D) y = Q when Q= be^{ax}
3.7 P.I. of f (D) y = Q when Q is b sinax or b cosax.

UNIT – IV: Higher order linear differential equations-II (12Hrs)

4.1 Solution of the non-homogeneous linear differential equations with constant coefficients.
4.2 P.I. of f (D) y = Q when Q= bx^k
4.3 P.I. of f (D) y = Q when Q= $e^{ax}V$
4.4 P.I. of f (D) y = Q when Q= xV
4.5 P.I. of f (D) y = Q when Q= x^mV where v = sin bx and cosbx

UNIT-V: Higher order Differential Equations –III (12Hrs)

5.1 The Cauchy-Euler Equation.
5.2 Linear differential Equations with non-constant coefficients
5.3 Method of Variation of parameters.

Student Activities:

1) **Class-room activities:** Power point presentations, Assignments
2) **Library activities:** Visit to library and preparation of notes for Assignment problems.
3) **Activities in the Seminars, workshops and conferences:** Participation/presentation in seminar/workshop/conference.

CO-CURRICULAR ACTIVITES:

- Quiz Competitions, Seminars
- Group Discussions

WEB LINKS:

https://en.wikipedia.org/wiki/Differential_equation
https://tutorial.math.lamar.edu/classes/de/de.aspx
https://www.mathsisfun.com/calculus/differential-equations.html

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V. Krishna Murthy	A text book of Mathematics for B.A/B.ScVol – I	S-Chand&co	2015

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	Rai Singhania	Ordinary& Partial Differential Equations	S-Chand	2009
3	Zafar Ahsan	Differential Equations and their applications	Prentice-Hall of India Pvt Ltd, McGraw Hill	2000

Recommended Question Paper Pattern and Model BLUE PRINT FOR QUESTION PAPER PATTERN COURSE-I, DIFFERENTIAL EQUATIONS

Unit	**TOPIC**	**S.A.Q**(including choice)	**E.Q**(including choice)	**Total Marks**
I	Differential Equations of 1st order and 1st degree	2	2	28
II	Orthogonal Trajectories, Differential Equations of 1st order but not of 1st degree	2	2	28
III	Higher Order Linear Differential Equations (with constant coefficients) – I	2	2	28
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	28
V	Higher Order Linear Differential Equations (with non-constant coefficients)	2	2	28
TOTAL		10	10	140

S.A.Q. = Short answer questions (4 marks)

E.Q. = Essay questions (10 marks)

Total Marks = 70 M

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COURSE-I, DIFFERENTIAL EQUATIONS

B.Sc MATHEMATICS MODEL PAPER (W.E.F 2022 – 2023)

Time: 3Hrs Max.Marks:70M

Answer the following questions. 5 x 14 = 70M

1. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
2. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
3. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
4. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M
5. (a) i) ------ 10 M
   ii) ------ 4M
   (OR)
   (b) i) ------ 10M
   ii) ------ 4 M

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Department of Mathematics

COURSE STRUCTURE

Paper Title :- ABSTRACT ALGEBRA **Semester : III**

Course Code	MATT31	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	90	Total Marks	100
Year of Introduction : 2018-19	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT31

S. No	C.O Upon successful completion of this course, students should have the knowledge and skills to:	Mapping
1	Understand concepts of groups and its properties.	L2, PO –1
2	Determine subgroups and whether the given subsets of a group are subgroups.	L4, PO – 1
3	Explain the significance of cosets, normal subgroups and factor groups.	L2,PO – 2
4	Determine group homomorphisms and isomorphisms.	L4, PO – 1

A.G & S.G Siddhartha Degree College of Arts and Science, Vuyyuru (An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

MATHEMATICS	MATT31	2022-2023	B.Sc.(MPC, MPCS, MCCS, MSCS)

ABSTRACT ALGEBRA

SEMESTER - III **No of Credits: 5**

OBJECTIVE: TO ENHANCE THE DATA EVALUATIONAL SKILLS,LOGICAL THINKINGNESS OF THE STUDENT

UNIT-I : GROUPS (16hrs)

1.1 Binary Operation, Semi group, Algebraic Structure, Monoid, Cancellation laws, Group definition, Abelian group, Elementary Properties.

1.2 Finite and Infinite groups with examples, Order of a group with examples.

1.3 Addition modulo m – Definition – theorem – Problems.

1.4 Multiplication Modulo P – definition- {1, 2, 3,…….p-1} where P is a prime number is a group – theorem – Problems.

1.5 Order of an element of a group – Definition – Theorems.

UNIT-II: SUB GROUPS (20 hrs)

2.1 Complex definition, Multiplication of two complexes, Inverse of a complex, subgroup definition, Identity and Inverse of a subgroup.

2.2 Criterion for a complex to be a subgroup, Criterion for the product of two subgroups to be a subgroup.

2.3 Union and Intersection of subgroups.

2.4 Cosets Definition – Properties of cosets.

2.5 Index of a subgroups of a finite groups, Lagrange's Theorem.

UNIT-III: NORMAL SUBGROUPS (18 hrs)

3.1 Definition of a normal subgroup, Proper and improper normal subgroups.

3.2 Intersection of two normal subgroups, Subgroup of index 2 is a normal subgroup, Simple Group.

3.3 Quotient group, Criteria for the existence of a Quotient group.

UNIT-IV: HOMOMORPHISM (16hrs)

4.1 Definition of a Homomorphism, Image of a Homomorphism, Properties of a Homomorphism.

4.2 Isomorphism, Automorphism definitions and elementary properties.

4.3 Kernel of a homomorphism, Fundamental theorem on homomorphism of groups and Applications.

4.4 Inner automorphism, Outer automorphism.

UNIT-V: PERMUTATIONS AND CYCLIC GROUPS (20 hrs)

5.1 Definition of a permutation group, Equal permutations, Permutation multiplications, Order of a permutation, Inverse of a permutation, Orbits and cycles of permutation

5.2 Transposition, Even and odd permutations – Theorem – Related Problems.

5.3 Cayley's theorem – Related Problems.

5.4 Definition of a cyclic group – Properties of Cyclic group.

5.5 Standard theorems on cyclic groups – related problems.

Prescribed Text book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.Venkateswara Rao, BVSS Sharma, S.AnjaneyaSastry & Others	A textbook of mathematics for B.A/B.ScVol – I	S-Chand	2015

Reference books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	M.L.Khanna	Modern Algebra	Jaya Prakashnadh & Co	2012

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

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

SEMESTER – III
Model Paper

COURSE CODE: MATT 31

TITLE OF THE PAPER: ABSTRACT ALGEBRA

Time: 3hrs. **Max. Marks: 75**

Section – A

Answer any FIVE questions **5x5=25**

1. In a group G, Show that the inverse of an element is unique. (L1,CO1)
2. H is a non-empty complex of a group G. Show that the necessary and sufficient condition for H to be a sub group of G is $a,b \in H \Rightarrow ab^{-1} \in H$. (L1,CO2)
3. Show that any two left (right) cosets of a sub group are either disjoint (or) identical.(L2,CO3)
4. Show that every subgroup of an abelian group is normal. (L3,CO3)
5. Prove that Every Quotient group of an abelian group is abelian. (L2,CO3)
6. If 'f' is a homomorphism of a group G into a group G', then show that the Kernel of f is a normal subgroup of G. (L3,CO3)
7. Use Cayley's theorem to find the regular permutation group isomorphic to the multiplicative group $\{1,-1, i,-i\}$. (L3,CO5)
8. Prove that every cyclic group is abelian. (L2,CO5)

Section – B

Answer ALL questions. **(5 x 10 = 50)**

Unit - I

9. (a). Prove that the set Z of all integers from an abelian group w.r.t to the operation defined by a * b = a+b+2 $\forall$ a,b$\in$ z. (L3, CO1)

(OR)

(b).Prove that G = {0,1,2,3,4,5} is an abelian group w.r.t. addition modulo 6.(L3,CO1)

Unit – II

10. (a).Prove that the union of two sub groups of a group G is a sub group of G if and only if one is contained in the other. (L1,CO2)

(OR)

(b). State and prove Lagrange's theorem on groups. (L1,CO2)

Unit – III

11. (a).If H is a normal subgroup of a group G, then prove that the set of all cosets of H in G is a group with respect to coset multiplication. (L1,CO3)

(OR)

(b).Prove that H is a normal subgroup of a group G iff product of two right cosets of H is again a right coset of H. (L1, CO3)

(P.T.O)

Unit – IV

12. (a).State and Prove Fundamental Theorem of Homomorphism. (L1,CO4)

(OR)

(b).Let 'a' be a fixed element of a group G. Prove that the mapping $f_a : G \to G$ defined by $f_a(x) = a^{-1}xa \ \forall x \in G$ is an automorphism of G. (L2, CO4)

Unit - V

13.(a).Prove that every finite group G is isomorphic to a permutation group. (L1,CO5)

(OR)

(b).Prove that every subgroup of a cyclic group is cyclic. (L1,CO5)

****

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

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LIFE SKILL COURSE	LSC003	2022 -'23	All Degree Programs

SEMESTER – III **Credits: 2** **(Total 30 Hrs)**

ANALYTICAL SKILLS

CO1: After studying this chapter student update them to analyze the data in Graphs, tables, passages etc.

CO2: After studying this chapter student understand to find missing object in a sequence and analyze the objects. And also the student easily identify the family relations, find the day of the week for a particular date and improve the calculations in an easy way.

CO3: After studying this chapter student understand the age related problems and how to calculate speed in different methods and also the student can update themselves to solve business related problems and banking related problems.

UNIT – 1 (5 Hours)

Data Interpretation:-The data given in a Table, Graph, Bar Diagram, Pie Chart, Venn diagram or a passage is to be analyzed and the questions pertaining to the data are to be answered.

UNIT – 2 (10 Hours)

Verbal Reasoning:- Analogies of numbers and alphabets completion of blank spaces following the pattern in A:b::C: d relationship odd thing out; Missing number in a sequence or a series. Coding & Decoding. Calendar Problems, Clock Problems, Blood Relationship

Arithmetic ability:- Algebraic operations BODMAS, Fractions, Divisibility rules, LCM&GCD (HCF).

.

UNIT - 3 (15Hours)

Quantitative aptitude:- Averages, Ration and proportion, Problems on ages, Time-distance – speed.

Business computations:- Percentages, Profit &loss, Partnership, simple compound interest.

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications.
5. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

Note: The teachers/students are expected to teach /learn the contents by not converting them to the problems of algebra at the maximum possible extent, but to use analytical thinking to solve the exercises related to those topics. This is the main aim of the course.

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE: VUYYURU-521165

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Accredited with "A" Grade by NAAC, Bengaluru

DEPARTMENT OF MATHEMATICS

ANALYTICAL SKILLS

(Model paper)

TIME:2HRS **MAX.MARKS: 40MARKS**

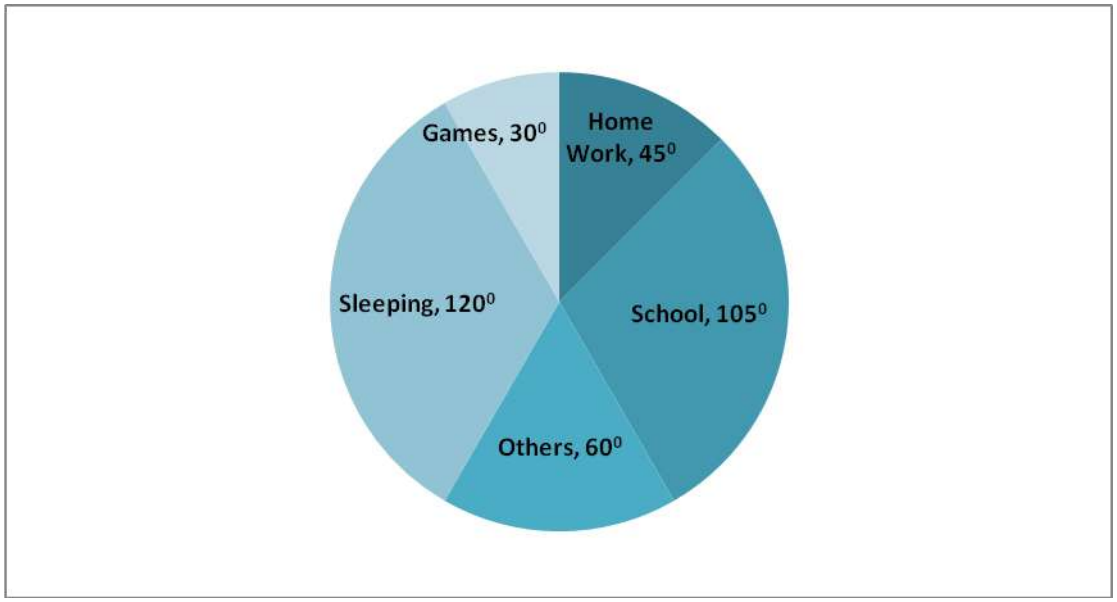
****

Choose the correct answer from the following.. (80questions* ½ =40M)

Directions (Q.No:1 to 5): Study the following pie chart carefully and answer the questions given below it.

The following Pie chart shows the Hourly distribution

(in degrees) of all the major activities of a Student.



1. The Approximate percentage of time, which he spends in School is?

a)38% b)30% c)40% d)25% e)None

2. How much time(in percentage) does he spends in games in comparision to sleeping?

a)30% b)40% c)25% d)75% e)None

3. What is the ratio of time spend in sleeping to time spend in Home Work respectively?

a)9:5 b)7:4 c)5:2 d)8:3 e)None

4. If he spends 1/3rd of time for homework in Mathematics, then the number of hours he spends in rest of the subjects in homework is…

a)2hrs b)5hrs c)7hrs d)18hrs e)None

5. The ratio of time spend in sleeping and games together to time spend in others respectively

a)9:11 b)5:7 c)13:11 d)7:9 e)None

6. What is the value of 0.99999....in the form of p/q ?

a)1 b)1.2 c)2/3 d)7/9 e)None

7. (4x4x4x4x4)÷(4x4x4)+4=?

a)20 b)4 c)14 d)3/4 e)None

8. Find the square root of 3721

a)49 b)51 c)61 d)59 e)None

9. Difference of any two even numbers..

a)Odd b)Even c)Prime d)Composite e)None

10. Find the least value of '*' so that the number 12*25253 is divisible by 3

a)3 b)4 c)1 d)2 e)None

11. What is the units place in 2528^{2529}

a)7 b)1 c)8 d)9 e)None of These

12. Find the LCM of 28, 35, 56 and 84

a)840 b)140 c)255 d)250 e)None

13. LCM and HCF of two numbers is 180 and 20 respectively. One of the two numbers is 30. find the another number..

a)100 b)90 c)120 d)70 e)150

14. Find the total number of factors of 169 ?

a)1 b)2 c)3 d)9 e)None

Directions (Q.No:15 to 19): These questions are based on the data in the following table, study it carefully and answer the questions given below it.

Population (in Lakh) of various states over the years

Years	STATES									
	A	B	C	D	E	F	G	H	I	J
2000	56	37	62	48	63	53	71	69	53	73
2001	64	42	60	46	64	56	72	72	52	75
2002	70	39	63	45	61	52	69	73	55	76
2003	69	43	61	47	65	55	73	68	54	77
2004	73	40	65	49	62	54	71	67	57	79
2005	65	45	66	52	63	58	74	75	56	80
2006	72	47	69	51	60	57	72	74	58	81
2007	77	52	67	52	64	59	75	76	59	83
2008	76	50	68	53	66	60	76	78	60	84
2009	75	53	70	50	68	61	74	77	62	85

15. The population of which state was the highest in the year 2003?

a)A b)E c)I d)J e)None

16. The population of state C in 2007 was equal to the population of which state in 2004?

a)A b)H c)I d)J e)None

17. What was the difference between the population of state C in 2007 and state E in 2002

a)6 lakhs b)7 lakhs c)4 lakhs d)5 lakhs e)None

18. Which state had the lowest population in 2009?

a)C b)B c)D d)A e)None

19. The population of state 'I' was the lowest in which year?

a)2008 b)2009 c)2001 d)2000 e)None

20. If A:B=3:5 and B:C=5:3. Find A:B:C?

a)15:25:15 b)4:5:3 c)3:5:3 d)9:12:20 e)None

21. Rs.189 has been divided among A,B,C in the ratio 2:3:4. What is the share of A?

a)Rs.48 b)Rs.32 c)Rs.54 d)Rs.42 e)None

22. The salaries of A,B,C are in the ratio 3:5:7. If the increments of 15%,10% and 20% are allowed respectively in their salaries then what will be the new ratio of their salaries?

a)3:5:7 b)10:11:20 c)23:33:60 d)69:110:168 e)None

23. A/2=B/3=C/5 then find A:B:C?

a)2:3:5 b)5:4:3 c)3:4:5 d)4:5:3 e)None

24. A,B and C entered into a partnership. A contributes Rs.3600 for 4 months, B contributes Rs.1800 for 3 months. C contributes Rs.2700 for 5 months. Find the ratio of their profits share.

a) 16:6:15 b) 36:18:19 c) 3:1:2 d) 5:2:3 e) None

25. If the capitals of P & Q are in the ratio of 7:9 and the times of their investments are in the ratio 81:49.Then find their Profits Ratio?

a) 4:9 b) 7:9 c) 9:7 d)5:9 e) None

26. A, B and C together started a business and their capitals are in the ratio 5:3:2 the timing of their investments being in the ratio 4:5:6. In what ratio would their profits be distributed?

a) 20:15:12 b) 12:13:15 c)14:15:16 d) 12:5:5 e) None

27. In a business A,B and C invested Rs.8000, Rs,5000 & Rs.12000 respectively find the share of B in the total profit of 62500/-

a) Rs.12600 b) Rs. 12800 c) Rs. 12500 d) Rs. 12400 e) None

28. The difference between the ages of Rajesh and Vinod is 9yrs and they are in the ratio 2:3 then the ratio of their ages after 2 yrs is..

a)10:11 b)10:19 c)20:11 d)20:29 e)None

29. The ratio of the present ages of Father and His son is 4:3. Six years hence it will be 7:6. What is the present age of the son?

a)7yrs b)5yrs c)10yrs d)9yrs e)None

30. Before 6yrs, the ratio of ages of A & B was 4:5 and present their ages ratio is 6:7. What is the present age of A.?

a)6yrs b)17yrs c)7yrs d)5yrs e)None

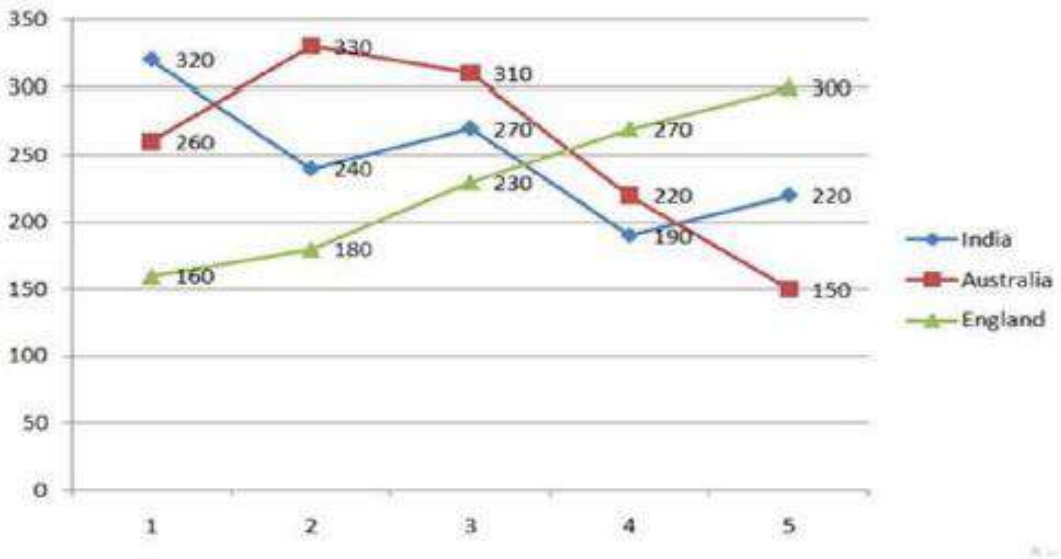
31. The ratio between the present ages of Ramesh and Jayesh is 3:2. 4yrs ago Ramesh's age was 12yrs more than by Jayesh. What is the present age of Ramesh..?

a)18yrs b)36yrs c)64yrs d)9yrs e)None

Directions(Q.no-32 to 36):

Study the following graph carefully and answer the questions that follow.

Runs scored by three different teams in five different cricket matches



32. Total runs scored by India and Australia in Match 4 together is approximately, what percentage of the total runs scored by England in all five matches together?

a) 42% b)18% c)36% d)24% e) 28%

33. In which match, is the difference between the runs scored by Australia and England second lowest?

a) 1 b)2 c)3 d) 4 e)5

34. In which match the total runs scored by India and England is the third highest/lowest?

a) 1 b)2 c) 3 d) 4 e) 5

35. What is the respective ratio between the runs scored by India in Match 5 Australia in Match 1 and England in Match 2 ?

a) 11 : 13 : 7 b) 11 : 7 : 13 c)11 : 3 : 9 d)11 : 13 : 9 e)NONE OF THESE

36. What was the average runs scored by all the three teams in Match 3 together?

a) 280 b)270 c) 275 d)285 e) NONE OF THESE

Directions(Q.No-37 to 41): Complete the Series

37. 64 125 216 343 __

a)512 b)513 c)514 d)625 e)None

38. 127 218 345 514 __

a)729 b)731 c)730 d)728 e)None

39. 9,27,31,155,161,1127 __

a)1144 b)1212 c)1692 d)1135 e)None

40. R U X A D __
a)H b)G c)X d)W e)None
41. ABCDEABCDABCA__
a)B b)C c)D d)A e)None
Directions(Q.No:42 to 47): Analyse the elements

42. 342:24::543:__
a)12 b)16 c)60 d)30 e)None
43. 9:18::6:__
a)24 b)12 c)18 d)21 e)None
44. EIGHTY:GIEYTH::OUTPUT:
a)TUOTUP b)OUTTUP c)TUOPUT d)PUTTUO e)None
45. A2C:D5F::G8H:__
a)J 11 L b)I 11 K c)I 10 K d)I 12 M e)None
46. Girl:Beautiful::Boy:__
a)Smart b)Heroic c)Courageous d)Handsome e)None
47. Train:Trail::Grain:__
a)Grial b)Grail c)Gairl d)Giarl e)None
Directions(Q.No-48 to 52): Find the odd thing in

48. a)127 b)53 c)63 d)111 e)89
49. a)8 b)12 c)15 d)20 e)24
50. a)A 4 C b)D 10 F c)I 20 K d)G 16 I e)W 25 Y
51. a)47 B144 C)169 d)49 e)64
52. a)51 b)85 c)119 d)102 e)76
53. What % is equivalent to 3/4?

(a)50% (b)60% (c)75 % (d)16.66% (e) None of these.

54. What fraction equivalent to 325%?

(a)19/4 (b) 13/4 (c) 7/4 (d) 9/4 (e) None of these.

55. 40% of a number is added to 42.The resultant is that number.Find the number?

(a) 150 (b) 200 (c) 100 (d) 300 (e) None of these.

56. The population of village is decreased from 4000 to 3500. Find the decreased percentage?

(a) 25% (b) 22.5% (c) 12.5% (d) 14.5% (e) None of these

57. The ratio between the cost price and selling price is 9:11. Find the profit percentage?

a)25% b)22.33% c)22.11% d)22.22% e)None

58. A dishonest dealer sold his goods at cost price but he uses 2 kg instead of 3kg. Then what is the profit percentage?

a)50% b)25% c)12% d)33.33% e)None

59. Rajesh sold a TV set for Rs.2500 at 25% profit then what is cost price of the TV set?

a)Rs.1000 b)Rs.2750 c)Rs.2220 d)Rs.2400 e)None

60. Arun sold an article for Rs.3200 at a loss of 20% find the cost price?

a)Rs.2000 b)Rs.1800 c)Rs.3200 d)Rs.4000 e)None

61.Pointing a photograph of Arshita, Rajesh said,"Her father is the only son of my father."How isArshita related to Rajesh?

a)mother b)sister c)niece d)daughter e)none

62.A and B are children of C.C is the father of A but B is not the son of C.how is A related to C?

a)daughter b)cousin c)son d)nephew e)none

63. What is my mother's husband's father-in-law's son's doughter to me ?

a)brother b)bother-in-law c)uncle d)cousin e)None of these

64.Pointing to a man in photograph ,Asha said."Hismather's only daughter is my mother."

How is Asha related to that man?

a)nephew b)sister c)wife d)niece e)none

65. April 16 th 2019 was tuesday. What day of the week will it be on january 26th 2020.

(a)Wednesday (b)Tuesday (c)sunday (d)Saturday (e)None of these.

66. The year next to 2019 having same calendar as that of 2019 is

(a)2020 (b)2025 (c)2030 (d)2031 (e)None of these.

67. Find the number of odd days on 226 days

(a)6 (b)3 (c)2 (d)5 (e) None of these.

68. Number of odd days in 1600 years?

(a)3 (b)1 (c)5 (d)0 (e)None of these.

69. Express 150mps in kmph.?

a)250kmph b)590kmph c)580kmph d)540kmph e)None

70. The speed of a car is 30kmph after completion every one hour the speed of the car is increased by 2kmph. How much distance travelled by the car in 10hrs?

a)390km b)200km c)210km d)305km e)None

71. Ram goes to city B from city A at 80kmph and returns to A from B at 30kmph. What is the average speed of the whole journey?

a)48kmph b)60kmph c)65kmph d)35kmph e)None

72. The speed of a train is 90kmph. What is the distance covered by it in 25seconds?

a)500m b)600m c)575m d)625m e)None

73. What is the mirror image of 12:30 AM

a)11:30am b)11:30pm c)12:30pm d)10:30pm e)None

74. Howmany times the hands of a clock be coincide in 24 hours

a)12 b)11 c)13 d)22 e)NoneOfThese

75. At what angle the hands of a clock are coincide when the time is 10:20PM

a)190^0 b)160^0 c)120^0 d)110^0 e)NoneOfThese

76. The hands of a correct clock coincide after every?

a)60min b)65 5/11min c)64 6/11min d)65min e)NoneOfThese

77. A person borrow Rs.5000 at 16 2/3% (mixed fraction) per annum after 3 years how much amount will he pay (if simple interest is calculated annually)

a)Rs.7000 b) Rs.8000 c) Rs 7500 d) Rs.8500 e) None of these

78. A person borrow Rs.4000 at 10% per annum after 2 years how much amount will he pay (if compound interest is calculated annually)

a) Rs.4440 b) Rs.4242 c) Rs.4700 d) Rs.4840 e) None of these

79. A person borrow Rs.10000 at 30% per annum after 2 years how much interest will he pay (if compound interest is calculated annually)

a) Rs.6500 b) Rs.6900 c) Rs.6000 d) Rs.7900 e) None of these

80. A lent Rs.1,20,000 to B. After 5yrs A received Rs.36,000 as interest. Find the rate of interest per annum (if simple interest is calculated annually)

a)42% b)14% c)4% d)8% e)6%

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

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

2022 - 2023

Course Code: **SECMAT501** Offered to: MPC, MPCs, MCCs
Domain Subject: **MATHEMATICS** Semester – **V**
Max. Marks: **100** (CCIA: 30 + SEE: 70) Theory Hrs./Week: **6**

Course 6B: MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

Type of the Course: (**Skill Enhancement Course** (Elective)), Credits: 05

I. Course Outcomes: Students at the successful completion of the course will be able to:

CO1: Students learn about Multiple Integrals, Change of Order of Integration in Double Integral, Area and Volume by Double Integration. Triple Integrals.
CO2: To set up and evaluate multiple integrals for regions in the plane. To find Area of the region bounded by curves and to find volume, surface area, Mass, C.G and M.I of solid geometric figures.
CO3: Recognize vector fields and vector calculus, and define Gradient, Divergence and Curl operators.
CO4: Compute the derivatives and line integrals, surface integrals and volume integrals of vector functions and learn their Applications.
CO5: Students learn Green's theorem, Gauss Divergence theorem, Stoke's theorem and applications to evaluating line integrals and finding areas.

II. Syllabus: **(Total Theory Hours: 75)**

UNIT-I: MULTIPLE INTEGRALS – I **(15 Periods)**

1.1 Introduction, Double integrals, Evaluation of double integrals, Properties of doubleintegrals.
1.2 Region of integration, double integration in Polar Co-ordinates,
1.3 Change of variables in double integrals, change of order of integration.

UNIT-II: MULTIPLE INTEGRALS – II **(15 Periods)**

2.1 Triple integral, region of integration, change of variables.
2.2 Plane areas by double integrals, surface area by double integral.
2.3 Volume as a double integral, volume as a triple integral.

UNIT-III: VECTOR DIFFERENTIATION **(15 Periods)**

3.1 Vector differentiation, ordinary derivatives of vectors.
3.2 Differentiability, Gradient, Divergence, Curl operators,
3.3 Formulae involving the separators.

UNIT-IV: VECTOR INTEGRATION (15 Periods)

4.1 Line Integrals with examples.
4.2 Surface Integral with examples.
4.3 Volume integral with examples.

UNIT-V: VECTOR INTEGRATION APPLICATIONS (15 Periods)

5.1 Gauss theorem and applications of Gauss theorem.
5.2 Green's theorem in plane and applications of Green's theorem.
5.3 Stokes's theorem and applications of Stokes theorem.

III References/ Text Book/ e-books/websites

1. Dr.M Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
2. Dr.M.Babu Prasad, Dr.K.Krishna Rao, D.Srinivasulu, Y.AdiNarayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S.Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar, NewDelhi-110055.
4. R.Gupta,Vector Calculus, Laxmi Publications.
5. P.C.Matthews, Vector Calculus, Springer Verlag publications.
6. Web resources suggested by the teacher and college librarian including reading material.

Reference Materials on the Web/web-links:
https://mate.unipv.it/moiola/ReaDG/VC2016/VectorCalculus_LectureNotes_2016.pdf

IV Co-Curricular Activities:

A) Mandatory:

For Teacher: Teacher shall train students in the following skills for 15 hours, by takingRelevant outside data (Field/Web).

1. The methods of evaluating double integrals and triple integrals in the class room and train to evaluate these integrals of different functions over different regions.
2. Applications of line integral, surface integral and volume integral.
3. Applications of Gauss divergence theorem, Green's theorem and Stokes's theorem.

For Student: Project work Each student individually shall undertake Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like thefollowing**,** by choosing any one of the following aspects.

1. Going through the web sources like Open Educational Resources to find the values of double and triple integrals of specific functions in a given region and make conclusions. (or)
2. Going through the web sources like Open Educational Resources to evaluate line integral, surface integral and volume integral and apply Gauss divergence theorem, Green's theorem and Stokes theorem and make conclusions.

Max. Marks for Project work Report: 5.

Suggested Format for Project work Report:
Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

Comprehensive Continuous Assessment Test (CCIA):
(2 tests will be conducted each carries 20 Marks, consider Average Mark: 20)

B) Suggested Co-Curricular Activities:

1. Assignments, Seminar, Quiz, Group discussions/Debates.
2. Visits to research organizations, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

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 SEMESTER (w.e.f 2022-23)

MATHEMATICS Paper VI SECMAT-501 MAX.MARKS: 70 TIME: 3 hrs

MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

Section – A (short answer questions)

Answer any Four of the following questions. 4x5 = 20M

1.

2.

3.

4.

5.

6.

7.

8.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

9.

10.

11.

12.

13.

14.

15.

16.

A.G & S.G SIDDHARTHA DEGREE COLLEGE, VUYYURU

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

Accredited with "A" Grade by NAAC, Bengaluru

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters V/VI Semester-End Exams: 2022-23

Time: 3 Hrs **SECMAT501** Max.Marks:70

Paper Title: MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

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
Section-A (Short Answer Questions)	1	1	2	2	2
Section-B (Essay Questions)	1	1	2	2	2

-The End -

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

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

2022 - 2023

Course Code: **SECMAT502** Offered to: MPC, MPCS, MCCs
Domain Subject: **MATHEMATICS** Semester – **V**
Max. Marks: **100** (CCIA: 30+ SEE: 70) Theory Hrs./Week: **6**

Course 7B: INTEGRAL TRANSFORMS WITH APPLICATIONS

Type of the Course: (**Skill Enhancement Course** (Elective)), Credits: 05

I. Course Outcomes: Students at the successful completion of the course will be able to:

CO1: Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and ofintegrals.
CO2: Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
CO3: Understand properties of inverse Laplace transforms, find inverse Laplace transforms ofderivatives and of integrals.
CO4: Solve ordinary differential equations with constant/ variable coefficients by using Laplace transforms method.
CO5: Comprehend the properties of Fourier transforms and solve problems related to finite Fouriertransforms.

II. Syllabus: **(Total Theory Hours: 75)**

UNIT-I: LAPLACE TRANSFORMS – I **(15 Periods)**

1.1 Definition of Laplace transform, linearity property-piecewise continuous function.
1.2 Existence of Laplace transform, functions of exponential order and of class A.
1.3 First shifting theorem, second shifting theorem and change of scale property.

UNIT-II: LAPLACE TRANSFORMS – II **(15 Periods)**

2.1 Laplace Transform of the derivatives, initial value theorem and final value theorem. Laplacetransforms of integrals.
2.2 Laplace transform of t^n. f (t), division by t, evolution of integrals by Laplace transforms.
2.3 Laplace transform of some special functions-namely Dirac delta function, error function,Bessel function and Laplace transform of periodic function.

UNIT-III: INVERSE LAPLACE TRANSFORMS (15 Periods)

3.1 Definition of Inverse Laplace transforms, linear property, first shifting theorem, secondshifting theorem, change of scale property, use of partial fractions**.**

3.2 Inverse Laplace transforms of derivatives, inverse, Laplace transforms of integrals, multiplication by powers of 'p', division by 'p'.

3.3 Convolution, convolution theorem proof and applications.

UNIT-IV: FOURIER SERIES (15 Periods)

4.1 Introduction, Euler's formulae for Fourier series expansion of a function f(x), Dirichlet's conditions for Fourier series, convergence of Fourier series.

4.2 Functions having arbitrary periods. Change of interval, half range series.

4.3 Parseval's theorem, illustrative examples based on Parseval's theorem, some particular series.

UNIT-V: FOURIER TRANSFORMS (15 Periods)

5.1 Integral transforms, Fourier integral theorem (without proof), Fourier sine and cosine integrals.

5.2 Properties of Fourier transforms, change of scale property, shifting property, modulation theorem.

5.3 Convolution, Convolution theorem for Fourier transforms, Parseval's Identify, finite Fourier transforms.

III References/ Text Book/ e-books/websites

1. Dr. S.Sreenadh, S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr. V.Ramesh Babu, Fourier series and Integral Transforms, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. A.R. Vasistha, Dr. R.K. Gupta, Laplace Transforms, Krishna Prakashan Media Pvt. Ltd.Meerut.
3. M.D.Raisinghania, H.C. Saxsena , H.K. Dass, Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. Dr. J.K. Goyal, K.P. Gupta, Laplace and Fourier Transforms, Pragathi Prakashan, Meerut.
5. Shanthi Narayana , P.K. Mittal, A Course of Mathematical Analysis, S. Chand & Company Pvt.Ltd. Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.

Reference Materials on the Web/web-links:

1. http://aurora.phys.utk.edu/~forrest/papers/fourier/index.html An introduction to the Fourier Transform, Fast Fourier Transform, and Discrete Fourier Transform.
2. http://risc1.numis.nwu.edu/fft/ Public Domain code related to Fast Fourier Transforms.

IV) Co-Curricular Activities:

A) Mandatory:

For Teacher: Teacher shall train students in the following skills for 15 hours, by takingRelevant outside data (Web).

1. Demonstrate on sufficient conditions for the existence of the Laplace transform of a function.
2. Evaluation of Laplace transforms and methods of finding Laplace transforms.
3. Evaluations of Inverse Laplace transforms and methods of finding Inverse Laplace transforms.
4. Fourier transforms and solutions of integral equations.

For Student: Project work: Each student individually shall undertake Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like thefollowing**,** by choosing any one of the aspects.

1. Going through the web sources like Open Educational Resources on Applications of Laplace transforms and Inverse Laplace transforms to find solutions of ordinary differential equations with constant /variable coefficients and make conclusions. (or)
2. Going through the web sources like Open Educational Resources on Applications of convolution theorem to solve integral equations and make conclusions. (or)
3. Going through the web source like Open Educational Resources on Applications of Fourier transforms to solve integral equations and make conclusions.

Max. Marks for Project work Report: 5.

Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Indexpage, Stepwise work-done, Findings, Conclusions and Acknowledgements.

Comprehensive Continuous Assessment Test (CCIA):

(2 tests will be conducted each carries 20 Marks, consider Average Mark: 20)

B) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

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 THE SEMESTER (w.e.f 2022-23)

MATHEMATICS Paper VII SECMAT-502 MAX.MARKS: 70 TIME: 3 hrs

INTEGRAL TRANSFORMS WITH APPLICATIONS

Section – A (short answer questions)

Answer any Four of the following questions. 4x5 = 20M

1.

2.

3.

4.

5.

6.

7.

8.

Section – B (long answer questions)

Answer any FIVE of the following questions. 5x10 = 50M

9.

10.

11.

12.

13.

14.

15.

16.

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Time: 3 Hrs **SECMAT502** Max.Marks:70

Paper Title: INTEGRAL TRANSFORMS WITH APPLICATIONS

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
Section-A (Short Answer Questions)	2	2	2	1	1
Section-B (Essay Questions)	2	2	2	1	1

-The End -