

**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
(N.V.Srinivasa Rao) AG & SG S Degree College.
- 2).....*K. Pandu Ranga Rao 11/4/18*..... University Department of Mathematics
(Prof K. Pandu Ranga Rao) Nominee Acharya Nagarjuna University
Guntur
- 3).....*K. Naveen Kumar 11/4/18*..... Subject Lecturer in Mathematics
(Dr.K.Naveen Kumar) Expert K.B.N Degree College,
Vijayawada
- 4).....*P. Babu Rao 11/04/2018*..... Subject Lecturer in Mathematics
(P.Babu Rao) Expert P.B.Siddhartha Degree College,
Vijayawada
- 5).....*D. Sunitha*..... Member Lecturer in Mathematics
(D.Sunitha) AG & SG S Degree College.
- 6).....*A. Bhargavi*..... Member Lecturer in Mathematics
(A.Bhargavi) AG & SG S Degree College.
- 7).....*Noor Mohammad*..... Member Lecturer in Mathematics
(Noor Mohammad) 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 no 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. Pillai
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 <u>DIFFERENTIAL EQUATIONS</u> 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 $b \cos ax$.

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.

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 Raisinghanian, 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

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 $y + px = p^2 x^4$
4. Solve $x^2(y - px) = p^2 y$
5. Solve $(D^2 - 5D + 6)y = e^{4x}$
6. Solve $(D^2 + 4)y = \cos 2x$
7. Solve $(D^2 - 5D + 6)y = xe^{4x}$
8. Solve $(D^2 + 1)y = \operatorname{Cosec} x$ by the method of Variation of Parameters.

SECTION - BAnswer any FIVE questions.

5x10 = 50M

9. Solve $x^2 y dx - (x^3 + y^3) dy = 0$
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

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 carries 10 marks. (5x10=50 Marks)

Questions to be set as follows:

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

---The End---

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MATHEMATICS	MAT-201	I B.Sc	w.e.f 2018-2019
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SEMESTER-IIPAPER-II	Max.Marks: 100
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Hours/Week: 6	<u>SOLID GEOMETRY</u> No.of Credits: 5
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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 form 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; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle. 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)

5 x 5 = 25 M

Answer any FIVE questions

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

SECTION - B

Answer any FIVE questions

5 x 10 = 50 M

- Show that the equation $x^2+4y^2+9z^2-12yz-6zx+4xy+5x+10y-15z+6=0$ represents a pair of parallel planes and find the distance between them.
- Find the length and equation to the line of S. D between the lines $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-1}{2}$, $\frac{x-4}{4} = \frac{y-5}{5} = \frac{z-2}{3}$
- 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.

12. Find the limiting points of the coaxial 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 elementary properties 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’s Theorem.

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 existence of 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 – Cauchy’s general principle of convergence theorem.

UNIT –5 (14hrs) : 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.

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 by S.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: 70 Pass 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 $a, b \in G$, $(a b)^2 = a^2 b^2 \Leftrightarrow G$ is abelian.
2. If H, K is two sub groups of a group G , then show that $H \cap K$ 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 $x \in G$.

Part - II

5. Every convergent sequence is bounded? Is the converse true?
6. Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \dots + \frac{1}{n+n}$ 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 $a, b \in Q^+$.
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 $a, b \in H \implies ab^{-1} \in H$ 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) $H_2 \subseteq H_1$.
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
<u>Section-A</u> (Short answer questions)	1	2	1	2	2
<u>Section-B</u> (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 carries 10 marks. (5x10=50 Marks)

Questions to be set as follows:

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

---The End---

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 homomorphism – 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 THEOREMS :

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, Cauchy’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: 70 Pass Mark: 28 Time: 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 $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = 1$ if $x \in \mathbb{Q}$ and $f(x) = -1$ if $x \in \mathbb{R} - \mathbb{Q}$ is discontinuous for all $x \in \mathbb{R}$

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 $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{n}{n^2+r^2} = \frac{\pi}{4}$

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 $f: G \rightarrow G^1$ 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 $f: [a, b] \rightarrow \mathbb{R}$ 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 $0 < a < b$

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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Accredited with "A" Grade by NAAC, Bengaluru

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
<u>Section-A</u> (Short answer questions)	1	2	1	2	2
<u>Section-B</u> (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
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SEMESTER-V	PAPER-V	Max.Marks:70
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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 – Homomorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism

Maximal Ideals – Prime Ideals.

Reference Books:-

1. Abstract Algebra by J. Fraleigh, 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

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

-The End -

(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 $r = a \cos t i + a \sin t j + at \tan \theta k$ 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 $\text{div } f$ and $\text{curl } f$ 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 $Z_m = \{0, 1, 2, 3, \dots, m-1\}$ 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 $\text{ker } f$ 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 $\mathbb{Q}(\sqrt{2}) = \{a + b\sqrt{2} / a, b \in \mathbb{Q}\}$ is a ring with respect to ordinary addition and multiplication.
- 16) State and prove fundamental theorem of ring homomorphism.

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

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MATHEMATICS	MAT-502	III B.Sc	w.e.f 2018-19
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SEMESTER-V	PAPER-VI	Max.Marks:70
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Hours/ Week: 5	<u>LINEAR ALGEBRA</u>	No. of Credits: 5
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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
<u>Section-A</u> (Short Answer Questions)	2	1	1	2	2
<u>Section-B</u> (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)w1 (ii)w2 (iii) $w_1 \cap w_2$

and hence find the $dim(w_1 + w_2)$

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 $T: V_3(\mathbb{R}) \rightarrow V_2(\mathbb{R})$ 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 $W \subseteq V$. The necessary and sufficient condition for W to be a subspace of V is $a, b \in F$ and $\alpha, \beta \in V \Rightarrow a\alpha + b\beta \in W$
- 12) Let W be a subspace of a finite dimensional vector space $V(F)$ then
- $$\dim V/W = \dim V - \dim W.$$

Part - II

- 13) Find the linear Transformation $T(x, y, z)$ where $T: \mathbb{R}^3 \rightarrow \mathbb{R}$ is defined by
- $$T(1, 1, 1) = 3, T(0, 1, -2) = 1 \text{ and } T(0, 0, 1) = -2.$$
- 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 $\mathbb{R}^4(\mathbb{R})$ use Gram-Schmidt process to obtain an orthonormal basis.

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MATHEMATICS	MAT-601GE	w.e.f.2018-19	III B.Sc
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SEMESTER-VI	PAPER-VII	Max.Marks:70
Hours/ Week: 5		No.of Credits: 5

ELECTIVE-VII-(B); NUMERICAL ANALYSIS

UNIT- I: **10 hours**

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 $e^x = \left(\frac{\Delta^2}{E}\right) e^x \frac{Ee^x}{\Delta^2 e^x}$ the interval of differencing being unity.

PART - II

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

Section – B (long answer questions)

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

5x10 = 50M

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

PART - I

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

PART - II

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

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

No.of Students: 25 35 22 11 7

How many students got more than 55 marks.

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

Year : 1931 1941 1951 1961 1971

Population : 15 20 27 39 52
(in thousand)

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

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MATHEMATICS	MAT-602CE	w.e.f.2018-19	III B.Sc
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SEMESTER-VI

PAPER-VIII

Max.Marks:70

Hours/ Week: 5

No.of Credits: 5

Cluster Elective- VIII-A-1: INTEGRAL TRANSFORMS

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

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

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

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

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

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

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

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

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

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

Finte Fourier Transforms : -

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

Reference Books :-

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

Suggested Activities:

Seminar/ Quiz/ Assignments

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

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MATHEMATICS	MAT-603CE	w.e.f.2018-19	III B.Sc
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SEMESTER-VI	PAPER-VIII	Max.Marks:70
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Hours/ Week: 5	No.of Credits: 5
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ELECTIVE – VIII-A-2: ADVANCED NUMERICAL ANALYSIS

Unit – I Curve Fitting:	10 Hours
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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
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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
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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
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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
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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

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

Section – B (long answer questions)

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

5x10 = 50M

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

PART – I

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

PART – II

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

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

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

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

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

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EXAMINATION AT THE END OF SIXTH SEMESTER (w.e.f 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 $y' = -y$ with $y(0) = 1$ for $x = 0.04$ in four steps

Section – B (long answer questions)

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

5x10 = 50M

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

PART – I

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

PART – II

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

**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
<u>Section-A</u> (Short Answer Questions)	1	2	2	2	1
<u>Section-B</u> (Essay Questions)	1	2	2	2	1

-The End -

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 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
<u>Section-A</u> (Short Answer Questions)	2	2	2	1	1
<u>Section-B</u> (Essay Questions)	2	2	2	1	1

-The End -

DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters VI Semester-End Exams: 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
<u>Section-A</u> (Short Answer Questions)	1	1	2	2	2
<u>Section-B</u> (Essay Questions)	1	1	2	2	2

-The End -