AKKINENI NAGESWARA RAO COLLEGE (AUTONOMOUS)
GUDIVADA-521301

(Affiliated to Krishna University Machilipatnam-Re-Accredited by NAAC with 'A' Grade)

Department of Mathematics

2023 (Regulation Syllabus)

AKKINENI NAGESWARA RAO COLLEGE:: GUDIVADA

(An Autonomous college under the jurisdiction of Krishna University, Machilipatnam)

<u>PAPER-I</u>

<u>ESSENTIALS AND APPLICATIONS OF MATHEMATICAL,PHYSICAL AND CHEMICAL SCIENCES</u>

Objectives

- To Provide students with a comprehensive understanding of the essential concepts of mathematical, physical, and chemical sciences.
- To impart students with a comprehensive understanding of the essential applications of mathematical, physical, and chemical sciences.
- To Extend the students' critical thinking in mathematical,physical,and chemical sciences
- To Develop problem-solving skills in mathematical, physical and chemical sciences
- To expand analytical skills in mathematical, physical and chemical sciences.
- Enable students to apply scientific principles to real-world situations.

COURSE OUTCOME NNUMBER	Upon successful completion of this course, students will have the knowledge and skills to:	PROGRAM OUTCOME NUMBER
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	PO1
CO2	Summarize the basic principles and concepts underlying a broad range of fundamental areas of physics and to bridge their ,Knowledge of physics to every day situations	PO2
CO3	Recall the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to link their knowledge of chemistry to daily life.	PO3
CO4	Analyze the interplay and connections between mathematics, physics, and chemistry in various applications.	PO4
CO5	Explain how the mathematical models and physical and chemical Principles can be used to predict phenomen a in different contexts.	PO5,PO2

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I B. Sc, I-Semester MATHEMATICS Syllabus Paper: I	Paper Code: **23EAMPC1**	Admitted Batch: 2023-24	No. of Teaching Hours/week:5 No. of Credits : 4
Year of Introduction:2023-24	Year of Offering: 2023-24	Year of Revision: 2023-24	Percentage of Revision:100%
Course Delivery Method: Class Room/Blended Mode-Both	C.I.A:30 MARKS	S.E.E: 70 Marks	Total:100 MARKS

PAPER-I

ESSENTIALS AND APPLICATIONS OF MATHEMATICAL,PHYSICAL AND CHEMICAL SCIENCES

UNIT-I :
ESSENTIALS OF MATHEMATICS

Complex Numbers: Introduction of the new symbol–General form of a complex number-Modulus-Amplitude form and conversions
Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles
Vectors   : Definition of vector addition – Cartesian form – Scalar and vector product and problems
Statistical Measures : Mean, Median, Mode of a data and problems

UNIT II
ESSENTIALS OF PHYSICS

Definition and Scope of Physics-Measurements and Units - Motion of objects-Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.

UNIT III
ESSENTIALS OF CHEMISTRY

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Bio-molecules- carbohydrates, proteins, fats and vitamins.

UNIT IV
APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Applications of Mathematics in Physics & Chemistry: Calculus , Differential Equations & Complex Analysis

Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics an Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry

UNIT V: ESSENTIALS OF COMPUTER SCIENCE

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

Ethical and social implications: Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric & Asymmetric, Malware, Firewalls,Fraud Techniques-Privacy & Data Protection

Recommended books:

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.

2. Elementary Trigonometry by H.S.Hall and S.R.Knight

3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.

4.Basic Statistics by B.L.Agarwal, New age international Publishers

5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman

6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker

7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.

8. Physics for Technology and Engineering" by John Bird

9. Chemistry in daily life by Kirpal Singh

10. Chemistry of bio molecules by S. P. Bhutan

11. Fundamentals of Computers by V. Raja Raman

12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

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PAPER-II

ADVANCES IN MATHEMATICAL,PHYSICAL AND CHEMICAL SCIENCES

Objectives

- To Provide students with a with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences.

- To impart students with knowledge beyond the foundational concepts.

- To expose the students to the latest developments in mathematical, physical, and chemical sciences.

- To promote critical thinking and research skills in the students

- To develop the ability to contribute towards the scientific advancements.

COURSE OUTCOME NNUMBER	Upon successful completion of this course, students will have the knowledge and skills to:	PROGRAM OUTCOME NUMBER
CO1	Recall the basic principles and concepts underlying a broad range of fundamental areas of physics and bridge their knowledge of physics to everyday situations.	PO1
CO2	Summarize the principles and techniques used in computer-aided drug design and drug delivery systems, the fabrication techniques and working principles of nano sensors, the effects of chemical pollutant son ecosystems and human health.	PO2
CO3	Identify the different sources of renewable energy and their generation processes and advances in nano materials, their properties, with a focus on quantum dots, quantum communication, applications. and the principle so bio physics in studying biological systems their properties and applications of shape memory materials.	PO3

CO4	Analyze the interplay and connections between mathematics, physics, and chemistry in various advanced applications and phenomena in different contexts.	PO4
CO5	Explain Understand and convert between different number systems such as binary, octal, decimal, hexa decimal. differentiate between analog and digital signals and their characterstics.Gain knowledge of different types of transmission media.	PO5,PO2

Annexure-I

AKKINENI NAGESWARA RAO COLLEGE :: GUDIVADA

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I B. Sc, I-Semester MATHEMATICS Syllabus Paper: II	Paper Code: **23AMPC1**	Admitted Batch: 2023-24	No. of Teaching Hours/week:5 No. of Credits : 4
Year of Introduction:2023-24	Year of Offering: 2023-24	Year of Revision: 2023-24	Percentage of Revision:100%
Course Delivery Method: Class Room/Blended Mode-Both	C.I.A:30 MARKS	S.E.E: 70 Marks	Total:100 MARKS

PAPER-II

ADVANCES IN MATHEMATICAL,PHYSICAL AND CHEMICAL SCIENCES

UNIT-I

ADVANCES IN BASICS MATHEMATICS

Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines

Limits and Differentiation: Standard limits – Derivative of a function –Problems on product rule and quotient rule

Integration: Integration as a reverse process of differentiation – Basic methods of integration

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants

UNIT II

ADVANCES IN PHYSICS

Renewable energy: Generation, energy storage, and energy-efficient materials and devices. Recent advances in the field of nanotechnology: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT III

ADVANCES IN CHEMISTRY

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

UNIT IV

ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Mathematical Modeling applications in physics and chemistry

Application of Renewable energy: Grid Integration and Smart Grids,

Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics,

Application of medical physics: Radiation Therapy, Nuclear medicine, Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V

ADVANCED APPLICATIONS OF COMPUTER SCIENCE

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway

Recommended books:

1. Coordinate Geometry by S.L.Lony, Arihant Publications
2. Calculus by Thomas and Finny, Pearson Publications

3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.

4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle

5. "Energy Storage: A Nontechnical Guide" by Richard Baxter

6. Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara

7. "Biophysics: An Introduction" by Rodney Cotterill

8. "Medical Physics: Imaging" by James G. Webster

9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas

10. Nano materials and applications by M.N.Borah

11. Environmental Chemistry by Anil.K.D.E.

12. Digital Logic Design by Morris Mano

13. Data Communication & Networking by Bahrouz Forouzan.

DEPARTMENT OF UG MATHEMATICS

COMMON FOR - B.Sc, B.Com , B.A

I SEMESTER

W.E.F 2023-24 (R23 Regulations)

Title of the Paper: ANALYTICAL SKILLS

I B.A/B.Com/B.Sc. I-Semester	Paper Code: 23ASK1	Admitted Batch: 2023-24	No. of Teaching Hours/week:2 No. of Credits : 2
Year of Introduction:2023-24	Year of Offering: 2023-24	Year of Revision: 2023-24	Percentage of Revision:100%
Course Delivery Method: Class Room/Blended Mode-Both		Total:50 MARKS	

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

S.No	COURSE OUTCOMES	PO`S
	After completion of the 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	1,3,4
2	Acquire competency in the use of verbal reasoning	1,3
3	Apply the Skills and competencies acquired in the related areas	1,4
4	Solve problems Pertaining to Quantitative ability , Logical reasoning and verbal ability inside and out-side the campus	1,2

SYLLABUS

Units	Learning units	Lecture hours
I	**Arithgmetic Ability:** Algebraic operations BODMAS, Fractions , Divisibility Rules, LCM and HCF **Verbal Reasoning:** Number series, Coding and Decoding , Calendars .	10
II	**Quantitative Aptitude:** Averages, Ratios and Proportions , Time , Distance and Speed. **Business Computation:** Percentages, Profit & Loss, Partnership, Simple Interest and Compound Interest.	10
III	**Data Interpretation:** Tabulation, Bar Graphs, Pie Charts, Line Graphs , Venn Diagrams .	10

REFERENCE BOOKS:

1. Analytical skills by KSR Publishers

2. Analytical skills by Kalyani Publishers

SEMESTER-II	I B.Sc.	MATHEMATICS	CODE:23MAT3	2023-2024
No.Teaching Hours per week-6		No. of Credits-4(Theory-3,Practical-1)		Paper –II

DIFFERENTIAL EQUATIONS(MINOR)

Course Outcomes

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

1. solve first order first degree linear differential equations.
2. convert a non-exact homogeneous equation to exact differential equation by using anintegrating factor.
3. know the methods of finding solution of a differential equation of first order but not of firstdegree.
4. solve higher-order linear differential equations for both homogeneous and non-homogeneous,with constant coefficients.
5. understand and apply the appropriate methods for solving higher order differential equations.

Course: Differential Equations(code 23MAT3)		
S .No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Classify differential equations based on their order and degree and solve them analytically	1,3
2	Apply appropriate method to solve differential equations of first order and first degree	1,3
3	Apply the acquired knowledge to solve first order and higher degree differential equations	1,3
4	Identify family of orthogonal trajectories for a family of curves	1,3
5	Apply suitable method to solve higher order differential equations with constant and variable coefficients	1,3

DIFFERENTIAL EQUATIONS(MINOR)

UNIT – I

Differential Equations of first order and first degree

Linear Differential Equations-Bernoulli's Equations-Exact Differential Equations- Integrating Factors- Equations reducible to Exact Equations By Integrating Factors -

i) Inspection Method   ii) $\dfrac{1}{Mx + Ny}$ iii) $\dfrac{1}{Mx - Ny}$

UNIT – II

Differential Equations of first order but not of first degree

Equations solvable for p, Equations solvable for y, Equations solvable for x,

Clairaut's Equation-Orthogonal Trajectories -Cartesian and Polar forms.

UNIT – III

Higher order linear differential equations

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

i) Q(x)= e^{ax} ii) Q(x)=sin ax (or) cos ax

UNIT – IV

Higher order linear differential equations(continued)

Solution to a non-homogeneous linear differential equation with constant coefficients.

P.I. of $f(D)y=Q$ when $Q=bx^k$

P.I. of $f(D)y=Q$ when $Q=e^{ax}V$, where V is a function of x

P.I. of $f(D)y=Q$ when $Q= xV$, where V is a function of x

UNIT –V

Higher order linear differential equations with non-constant coefficients

Linear differential equations with non-constant coefficients; Cauchy-Euler Equation; Legendre Equation; Method of variation of parameters.

Text Book:

Differential Equations and their applications by Zafar Ahsan, published by prentice- hall of India Pvt.Ltd , New Delhi- second edition.

Reference Books :

1. Ordinary and partial differential equations by Dr.M.D.Raisinghania, published by s.chand & company , new delhi.

2. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha- universities press.

3. Differential Equations – Srinivas Vangala & Madhu Rajesh , Published By Spectrum University press.

Activities :

Seminar/ Quiz/ Assignments/Applications of Differential Equations to Real life Problem /Problem Solving Sessions.

SEMESTER-II	I B.Sc.	MATHEMATICS	CODE:23MAT3	2023-2024
No.Teaching Hours per week-6		No. of Credits-4(Theory-3,Practical-1)		Paper –II

DIFFERENTIAL EQUATIONS(MAJOR)

Course Outcomes
After successful completion of this course, the student will be able to
1. solve first order first degree linear differential equations.
2. convert a non-exact homogeneous equation to exact differential equation by using anintegrating factor.
3. know the methods of finding solution of a differential equation of first order but not of firstdegree.
4. solve higher-order linear differential equations for both homogeneous and non-homogeneous,with constant coefficients.
5. understand and apply the appropriate methods for solving higher order differential equations.

Course: Differential Equations(code 23MAT3)		
S .No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Classify differential equations based on their order and degree and solve them analytically	1,3
2	Apply appropriate method to solve differential equations of first order and first degree	1,3
3	Apply the acquired knowledge to solve first order and higher degree differential equations	1,3
4	Identify family of orthogonal trajectories for a family of curves	1,3
5	Apply suitable method to solve higher order differential equations with constant and variable coefficients	1,3

DIFFERENTIAL EQUATIONS(MAJOR)

UNIT – I

Differential Equations of first order and first degree

Linear Differential Equations-Bernoulli's Equations-Exact Differential Equations- Integrating Factors- Equations reducible to Exact Equations By Integrating Factors -

i) Inspection Method   ii) $\dfrac{1}{Mx + Ny}$ iii) $\dfrac{1}{Mx - Ny}$

UNIT – II

Differential Equations of first order but not of first degree

Equations solvable for p, Equations solvable for y, Equations solvable for x,

Clairaut's Equation-Orthogonal Trajectories -Cartesian and Polar forms.

UNIT – III

Higher order linear differential equations

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

i) $Q(x)= e^{ax}$ ii) $Q(x)=\sin ax$ (or) $\cos ax$

UNIT – IV

Higher order linear differential equations(continued)

Solution to a non-homogeneous linear differential equation with constant coefficients.

P.I. of $f(D)y=Q$ when $Q=bx^k$

P.I. of $f(D)y=Q$ when $Q=e^{ax}V$, where V is a function of x

P.I. of $f(D)y=Q$ when $Q= xV$, where V is a function of x

UNIT –V

Higher order linear differential equations with non-constant coefficients

Linear differential equations with non-constant coefficients; Cauchy-Euler Equation; Legendre Equation; Method of variation of parameters.

Text Book:

Differential Equations and their applications by Zafar Ahsan, published by prentice- hall of India Pvt.Ltd , New Delhi- second edition.

Reference Books :

1. Ordinary and partial differential equations by Dr.M.D.Raisinghania, published by s.chand & company , new delhi.

2. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha- universities press.

3. Differential Equations – Srinivas Vangala & Madhu Rajesh , Published By Spectrum University press.

Activities :

Seminar/ Quiz/ Assignments/Applications of Differential Equations to Real life Problem /Problem Solving Sessions.

<u>PAPER-IV</u>

<u>ANALYTICAL SOLID GEOMETRY(MAJOR)</u>

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

1. understand planes and system of planes
2. know the detailed idea of lines
3. understand spheres and their properties
4. know system of spheres and coaxial system of spheres
5. understand various types of cones

Course: Three Dimensional Analytical Solid Geometry (code 23MAT4)		
S .No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Distinguish the geometry of planes, lines, spheres ,cones and cylinders and describe their properties	1,3
2	Explain properties and concepts in 3D solid geometry and use them in real life situations	1,3
3	Solve problems on planes, lines, spheres ,cones, cylinders and coincides by the acquired knowledge	1,3
4	Apply vector methods to solve certain problems on planes and lines	1,3
5	Analyze methods of solving problems on planes, lines and spheres and apply related method to solve them	1,3

SEMESTER-II	IB.Sc	Mathematics	CODE:23MAT4	2023-2024
No. Teaching Hours per week-5		No. of Credits-4(Theory-3,Practical-1)		Paper – II

Three Dimensional Analytical Solid Geometry

UNIT – I (12 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 equation of straight 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)

The Sphere

Definition and equation of the sphere, Equation of the sphere through four given points, Plane sections of a sphere, Intersection of two spheres, Equation of a circle, Sphere through a given circle, Intersection of a sphere and a line , power of a point,Tangent plane, Polar plane, Pole of a Plane,Conjugate points, Conjugate planes.

UNIT –IV (12 hrs)

The Spheres (continued)

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

UNIT –V (12 hrs)

Cones:

Definitions of a cone, vertex, guiding curve, generators, Equation of the cone with a given vertex and guiding curve, equations of cones with vertex at origin are homogeneous, condition that the general equation of the second degree should represent a cone.

Enveloping cone of a sphere, Right circular cone, Equation of the right circular cone with a given vertex, axis and semi-vertical angle,

TEXT BOOK:

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

Reference Books :

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.
3. 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.