S. V. K. P. & Dr. K. S. Raju Arts & Science College(A), Penugonda

I B.Sc., I –SEMESTER COURSE-I SYLLABUS
W.e.f. 2023-24 Admitted Batch
PAPER TITLE: Essentials and Applications of Mathematical, Physical and Chemical Sciences
PAPER CODE: 23MSC11

Hours: 5hrs/week **Credits: 4**

Course Objective:

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Learning outcomes:

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
2. To explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
3. To explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to connect their knowledge of chemistry to daily life.
4. Understand the interplay and connections between mathematics, physics, and chemistryin various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
5. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

UNIT I: ESSENTIALS OF MATHEMATICS: 9hrs

Complex Numbers: Introduction of the new symbol i – 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: 9hrs

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: : 9hrs

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, Bimolecular- carbohydrates, proteins, fats and vitamins.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY: 9hrs

Applications of Mathematics in Physics & Chemistry: Calculus, Differential Equations & Complex Analysis, Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and 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 and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and 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 byB.L.Agarwal, New age international Publishers
4. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
5. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
6. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway andJohn W. Jewett Jr.
7. Physics for Technology and Engineering" by John Bird
8. Chemistry in daily life by Kirpal Singh
9. Chemistry of bio molecules by S. P. Bhutan
10. Fundamentals of Computers by V. Raja Raman
11. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

S. V. K. P. & Dr. K. S. Raju Arts & Science College(A), Penugonda

I B.Sc., I –SEMESTER COURSE-II SYLLABUS

W.e.f. 2023-24 Admitted Batch

Paper Title: Advances in Mathematical, Physical and Chemical Sciences

Paper Code : 23MSC12

Hours: 5 hrs/week Credits: 4

Course Objective:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. Thecourse aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and theability to contribute to scientific advancements.

Learning outcomes:

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
2. To explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.
3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
6. Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)..

UNIT I: ADVANCES IN BASICS MATHEMATICS 9hrs

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: 9hrs

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: 9hrs

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: 9hrs

Mathematical Modelling 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: 9hrs

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 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.

S. V. K. P. &Dr K. S. Raju Arts & Science College(A), Penugonda

B.Sc. MATHEMATICS

SEMESTER-II SYLLABUS

DIFFERENTIAL EQUATIONS (23MAT21)

(Common for B.Sc. honors Mathematics Major 1/ Mathematics Minor)

w. e. f. 2023-24 admitted batch

60 Hrs

UNIT – I (12 Hours): Differential Equations of first order and first degree:

Linear Differential Equations; Bernoulli's equations- Exact Differential Equations - Integrating Factors - Differential Equations Reducible to Exact equations by Integrating Factors. i) Inspection method ii) 1/ Mx+Ny iii) 1/ Mx-Ny

***UNIT – II (12 Hours)*: Differential Equations of first order but not of the 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 (12 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.

i) $Q(x) = e^{ax}$

ii) Q(x)= sin ax or cos ax.

UNIT – IV (12 Hours), Higher order linear differential equations-(continued):

Solution to a 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 $Q= e^{ax}V$, 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 (12 Hours), Linear differential equations with non-constant coefficients:

, Linear differential equations with non-constant coefficients , Cauchy-Euler Equation, Legender's Equations,Method of variation of parameters.

Prescribed Text Book :

1. A text book of Mathematics for BA/BSc Vol 1 published by S. Chand & Company, New Delhi.

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.

S. V. K. P. &Dr K. S. Raju Arts & Science College(A), Penugonda

B.Sc. MATHEMATICS

SEMESTER-II SYLLABUS

ANALYTICAL SOLID GEOMETRY (23MAT22)

(Common for B.Sc. honors Mathematics Major 2)

w. e. f. 2023-24 admitted batch

60 Hrs

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 equations of straight line- set 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 sphere- equation of a circle - sphere through a given circle - intersection of a sphere and a line – power of point - tangent plane - plane of contact; polar plane - pole of a plane – conjugate points - conjugate planes.

UNIT-IV*(12 hrs)*: Spheres(continued)

Angle of intersection of two spheres - conditions for two spheres to be orthogonal – radical plane; coaxal system of spheres Simplified form of the equations of two spheres

UNIT-V*(12 hrs)*: Cones.

Definitions of a cone – vertex - guiding curve and 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 given vertex, axis and semi vertical angle

Text Book:

Analyticl solid geometry by Shanti Narayana P.K Mittal published by S. Chand and company

Ltd 7th Edition

Reference Books:

- A text book of Anlytical geometry of three Dimensionals,by P.K jain and Khaleel Ahmed published by Wiley Eastern Ltd 1999
- Co ordinate geometry of two and three dimensions by P. Balasubrahmanyam , K.Y subrahmanyam ,G.R Venkata ramana published by TataMcGraw –Hill publishers.
- Solid geometry by B.Rama Bhupal Reddy ,published by Spectrum University Press