

Dr.V.S.KRISHNA GOVT.DEGREE COLLEGE (A), VISAKHAPATNAM.

CBCS/ SEMESTER SYSTEM

B.A./B.Sc. Hons. MATHEMATICS

COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

(w.e.f. 2023-24)

Course Code: 23MATM11

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.

Course outcomes – Mapping with Blooms Taxonomy levels	
CO1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	Level-3 , Level-6
CO2. 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	Level-1 , Level-2
CO3. 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	Level-1 , Level-2
CO4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.	Level-1 , Level-2
CO5. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.	Level-4, Level-5

CO-PO Mapping	
1-	Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	-	1	-	-	-	3	1	3
CO 2	2	-	2	2	-	2	3	1	3
CO 3	2	-	2	2	-	2	3	1	3
CO 4	2	1	2	2	-	2	3	1	3
CO 5	1	1	3	2	3	2	3	2	3

CO-PSO Mapping	
1-	Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	2	3	2
CO 2	3	2	3	3	2
CO 3	3	2	3	3	2
CO 4	3	2	3	3	2
CO 5	1	2	3	3	2

Course Content:

Unit-1: ESSENTIALS OF MATHEMATICS:

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-2: 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-3: 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, Biomolecules- carbohydrates, proteins, fats and vitamins.



Unit-4: 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 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-5: 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 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

STUDENT ACTIVITIES

Unit-1: ESSENTIALS OF MATHEMATICS:

1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms. They will plot the complex numbers on the complex plane and identify their properties.

2: Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors. They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis

Give students a data set containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation).

They will interpret the results and analyze the central tendencies and distribution of the data.

Unit-2: ESSENTIALS OF PHYSICS:

1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields.

Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.

Students will work in small groups to carry out the experiment, collect data, and analyze the results. After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

Unit-3: ESSENTIALS OF CHEMISTRY

1: Chemistry in Daily Life Presentation

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine, or environmental issues.

Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.

2: Periodic Table Exploration

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties.

They will identify and analyze trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

3: Chemical Changes and Classification of Matter

Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction.

Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.

4: Biomolecules Investigation

Assign each student or group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins.

Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body.

They can create informative posters or presentations to present their findings to the class.

Unit-4: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.

Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.

3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications of mathematics, physics, and chemistry.


Examples include investigating the relationship between concentration and reaction rate, analyzing the behavior of electrical circuits, or measuring the properties of materials.

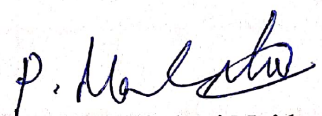
.4: Mathematical Modeling Present students with real-world problems that require mathematical modeling and analysis.

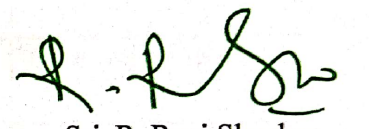
Unit-5: ESSENTIALS OF COMPUTER SCIENCE:

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.
2. Identify the types of malwares and required firewalls to provide security.
3. Latest Fraud techniques used by hackers.

Signed and approved by


Prof. N. Ramakrishna,
Subject Expert
(University Nominee)


Sri. P. Mahalakshmi Naidu,
Subject Experts
(from outside the parent
university)


Sri. R. Ravi Shankar
Subject Experts
(from outside the parent
university)

Recommended Question Paper Patterns and Models :

BLUE PRINT FOR SEMESTER END EXAMINATIONS PAPER SETTING

Learning level wise Weightage				
Bloom's Taxonomy level	Weightage	marks	Essay type	Short answer type
Knowledge/ Remember	33%	20	2	1(one out of two)
Understanding/ Comprehension	27%	16	2	
Application/	20%	12	1	1(one out of two)
Analysis	13%	8		2(two out of four)
Synthesis/ Evaluate	7%	4		1(one out of two)
Total	100	60		5 out of 10 questions

Chapter wise Weightage				
Sl. No.	Module/ Chapter	Name of the chapter	8 Marks	4 Marks
1	Unit-I	Essentials of Mathematics	2(one out of two)	2
2	Unit -II	Essentials of Physics	2(one out of two)	2
3	Unit -III	Essentials of Chemistry	2(one out of two)	2
4	Unit -IV	Applications of Mathematics, Physics and Chemistry	2(one out of two)	2
5	Unit -V	Essentials of Computer Science	2(one out of two)	2

**SEMESTER END EXAMINATIONS
MODEL PAPER
SEMESTER- I**

B.Sc Hons Mathematics

**COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND
CHEMICAL SCIENCES
(w.e.f. 2023-24)**

Course Code : 23MATM11

Time: 3 hours

Maximum Marks: 60

PART- A

Answer any **five** of the following questions. Each question carries **Four** marks. $5 \times 4 = 20$ Marks

1. Find the square root of $-5 + 12i$ [**Synthesis/ Evaluate**]
2. Find the Mean, Mode and Median of the following data
1, 5, 10, -8, 6, 11, 10 [**Synthesis/ Evaluate**]
3. What is F.P.S system and explain about it [**Analysis**]
4. Write a short note on Electric field [**Knowledge/Remember**]
5. What are sources of Carbohydrates [**Knowledge/Remember**]
6. What is the role of fat in the human body [**Analysis**]
7. Write the differential equation that describe the motion of the Pendulum [**Application**]
8. What is that formula that describe the radioactive decay [**Application**]
9. Write a short note on URL [**Analysis**]
10. What is anti-virus. Give some examples it. [**Analysis**]

PART- B

Answer **all** the following questions. Each carries **Eight** marks

5 X 8 = 40 Marks

11. (a) Prove that (1) $\sin 18 = \frac{\sqrt{5}-1}{4}$ (2) $\cos 36 = \frac{\sqrt{5}+1}{4}$ [**Knowledge/Remember**]

(Or)

(b) Find the locus of P satisfying the equation
 $|z + 4i| + |z - 4i| = 10$ [**Knowledge/Remember**]



12. (a) What are applications of acoustic waves [**Understanding/ Comprehension**]

(Or)

(b) What is the first law of thermodynamics. Explain its significance [**Understanding/ Comprehension**]

13. (a). What are proteins and explain their role in the human body [**Knowledge/Remember**]

(Or)

(b) Write a note on Vitamins [**Knowledge/Remember**]

14. (a). Write a note on applications of calculus in Physics [**Application**]

(Or)

(b) Write a note on applications of differential equations in Chemistry [**Application**]

15. (a) Discuss about the evolution of computers [**Understanding/ Comprehension**]

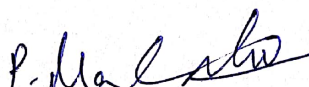
(Or)

(b) What are various types of networks and explain about them [**Understanding/ Comprehension**]

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B.A./B.Sc. Hons. MATHEMATICS

COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

(w.e.f. 2023-24)

Course Code: 23MATM12

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. The course 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 the ability to contribute to scientific advancements.

Course outcomes – Mapping with Blooms Taxonomy levels	
CO1. 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.	Level-3 , Level-6
CO2. 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.	Level-1 , Level-2
CO3. 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.	Level-1 , Level-2
CO4. 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.	Level-1 , Level-2
CO5. 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	Level-4, Level-5

to explain and predict phenomena in different contexts.	
CO6. 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)..	Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	-	1	-	-	-	3	1	3
CO 2	2	-	2	2	-	2	3	1	3
CO 3	2	-	2	2	-	2	3	1	3
CO 4	2	1	2	2	-	2	3	1	3
CO 5	1	1	3	2	3	2	3	2	3
CO 6	2	-	1	-	-	-	3	1	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	2	3	2
CO 2	3	2	3	3	2
CO 3	3	2	3	3	2
CO 4	3	2	3	3	2
CO 5	1	2	3	3	2
CO 6	1	2	2	3	2

Course Content :

Unit-1: 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-2: 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-3: 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-4: Advanced applications of mathematics, physics & chemistry

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-5: 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.

STUDENT ACTIVITIES

Unit-1: ADVANCES IN BASIC MATHEMATICS

1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes, intercepts, and point of intersection.

2: Limits and Differentiation Problem Solving

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications such as analyzing rates of change or optimizing functions.

3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

Unit-2: ADVANCES IN PHYSICS:

1: Case Studies

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.

Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design an experiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on their findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and

environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

Unit-3: ADVANCES IN CHEMISTRY:

1. Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity of nano sensors in detecting specific analytes.

Chemical biology-related activities could involve designing experiments to study enzyme-substrate interactions or molecular interactions in biological systems.

Students will perform their experiments or simulations, collect data, analyze the results, and draw conclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and human health.

Students will analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing with chemical pollutants.

For the dye removal using the catalysis method, students can explore case studies where catalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of the catalysis method, and its applications in environmental remediation.

3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing a nano sensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems.

Students will develop a detailed project plan, conduct experiments or simulations, analyze data, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

Unit-4: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm.

Students will work in teams to design and conduct the experiment, collect data, and analyze the results using mathematical models and statistical techniques.

They will discuss the accuracy and limitations of their model, propose improvements, and interpret the implications of their findings in the context of renewable energy or the specific application area.

2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modelling in nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

Students will discuss the mathematical models and computational methods used in the case studies, analyze the outcomes, and evaluate the effectiveness of the modelling approach.

Encourage group discussions on the challenges, ethical considerations, and potential advancements in the field.

Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical modelling in solving complex problems in these areas.

3. Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize wastemanagement practices.

Students will plan and execute their project, apply mathematical modelling techniques, analyze the results, and present their findings and recommendations.

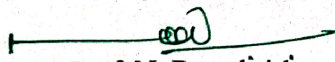
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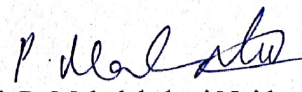
Unit-5: Advanced Applications of computer Science

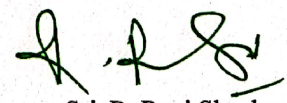
Students must be able to convert numbers from other number system to binary number systems

1. Identify the networking media used for your college network Identify all the networking devices used in your college premises.

Signed and approved by


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Subject Expert
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BLUE PRINT FOR SEMESTER END EXAMINATIONS PAPER SETTING

Learning level wise Weightage				
Bloom's Taxonomy level	Weightage	marks	Essay type	Short answer type
Knowledge/ Remember	33%	20	2	1(one out of two)
Understanding/ Comprehension	27%	16	2	
Application/	20%	12	1	1(one out of two)
Analysis	13%	8		2(two out of four)
Synthesis/ Evaluate	7%	4		1(one out of two)
Total	100	60		5 out of 10 questions

Chapter wise Weightage				
Sl. No.	Module/ Chapter	Name of the chapter	8 Marks	4 Marks
1	Unit-I	Advances in Basic Mathematics	2(one out of two)	2
2	Unit -II	Advances in Physics	2(one out of two)	2
3	Unit -III	Advances in Chemistry	2(one out of two)	2
4	Unit -IV	Advanced applications of Mathematics, Physics and Chemistry	2(one out of two)	2
5	Unit -V	Advanced applications of Computer Science	2(one out of two)	2

**SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- I**

B.Sc Hons Mathematics

**COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES
(w.e.f. 2023-24)**

Course code : 23MATM12

Time: 3 hours

Maximum Marks: 60

PART- A

Answer any **five** of the following questions. Each question carries **Four** marks. $5 \times 4 = 20$ Marks

1. Convert $2x+5y = 5$ into intercept form. Find the points of intersection of this line with coordinate axes

2. Calculate the value of $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$
3. What are the technologies that are used to obtain energy from tides
4. What are the advantages of renewable energy
5. What are applications of nano-sensors
6. What is computer aided drug design
7. What are sources of solid wastes
8. What is biomechanics
9. Explain Hexadecimal system with examples
10. Convert binary number 11101 into decimal system

PART- B

Answer **all the following** questions. Each carries **Eight** marks

5 X 8 = 40 Marks

11. (a) Find $\int e^{ax} \sin bxdx$ [Knowledge/Remember]

(Or)

(b) If A, B are invertible matrices then show that $(AB)^{-1} = B^{-1}A^{-1}$

[Knowledge/Remember]

12. (a) Explain different modes of energy storage [Knowledge/Remember]

(Or)

(b) What are quantum dots and give applications [Knowledge/Remember]

13. (a). Explain dye removal using catalysis methods [Understanding/ Comprehension]

(Or)

(b) Explain impact of chemical pollutants on ecosystem [Understanding/

Comprehension]



14. (a). What is green technology? How does it work and give types, adoption and examples of green technology [**Understanding/ Comprehension**]

(Or)

(b) Write a note on nuclear medicine [**Understanding/ Comprehension**]


15. (a) What is the difference between analogue and digital signal. Describe differences between them [**Application**]

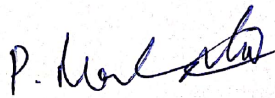
(Or)


(b) Convert the following decimal numbers into binary form

(1) 243, (2) 45, (3) 77, (4) 89 [**Application**]

Signed and approved by


Prof. N. Ramakrishna,
Subject Expert
(University Nominee)


Sri. P. Mahalakshmi Naidu,
Subject Experts
(from outside the parent
university)


Sri. R. Ravi Shankar
Subject Experts
(from outside the parent
university)