AKKINENI NAGESWARA RAO COLLEGE:: GUDIVADA

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

B.Sc. Honours in Computer Science MAJOR

(For the batch of students admitted from 2023-24)

I YEAR I SEMESTER

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

Course 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	% of Revision: 100%
Course Delivery Method: Class Room/Blended Mode/Both	C.I.A: 30 Marks	S.E.E: 70 Marks	Total: 100 Marks

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 Learning Outcomes:

Upon successful completion of the course, a student will be able to:

- Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
- 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
- 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.
- 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.
- To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

SYLLABUS

UNIT I: 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 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- Behavior 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, Biomolecules- 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 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 by B.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 and John 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

STUDENT ACTIVITIES:

UNIT I: 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 dataset 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 II: ESSENTIALS OF PHYSICS:

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.
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 III: 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 IV: 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 V: ESSENTIALS OF COMPUTER SCIENCE:

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

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I YEAR I SEMESTER

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

Course Code: 23EAMPC1

BLUE PRINT

Section A (Multiple Choice Questions) **(40 x 1 = 40 marks)**

- 40 Multiple choice questions to be answered.
- 10 questions shall be given from **Computer Science (Unit-V). (Q.Nos.31 to 40)**

Section B (Fill in the Blanks) **(14 x 1 = 14 marks)**

- 14 Fill in the blank questions to be answered.
- 3 questions shall be given from **Computer Science (Unit-V). (Q.Nos.52 to 54)**

Section C (Match the Following) **(4 x 4 = 16 marks)**

- 4 Matching questions to be answered.
- 1 matching question shall be given from **Computer Science (Unit-V). (Q.No.58)**.

An illustration is given below. Unit wise distribution can be interchanged between units.

	Section A	Section B	Section C	Total Marks
Mathematics	10	5	4	19
Physics	10	3	4	17
Chemistry	10	3	4	17
Computer Science	10	3	4	17
	40	**14**	**16**	**70**

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I YEAR I SEMESTER

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

Course Code: 23EAMPC1

UNIT V: ESSENTIALS OF COMPUTER SCIENCE

Model Paper

Time: 3 hrs **Total: 70 M**

Section – A

Answer all the multiple choice questions **10 X 1 = 10 M**

31. Which component of a computer is often referred to as the "main" of the system?
    a) Input device b) Memory
    c) Central Processing Unit (CPU) d) Output device

32. Who laid the foundation for computation and numerical calculations in the evolution of computers?
    a) Vacuum tubes b) Integrated circuits
    c) Mechanical calculators d) Transistors

33. In the early 1970s, which individual introduced email as a means of electronic communication?
    a) Tim Berners-Lee b) Ray Tomlinson
    c) Vint Cerf d) Paul Baran

34. Which of the following is NOT a type of ISP connection?
    a) DSL b) Fiber-optic c) Bluetooth d) Satellite

35. Which type of network covers a larger area than a Local Area Network (LAN) but smaller than a Wide Area Network (WAN)?
    a) PAN b) MAN c) WLAN d) SAN

36. Which IP address version is introduced to accommodate the growing number of devices on the internet and consists of 128 bits?
    a) IPv4 b) IPv6 c) IPv5 d) IPv7

37. What is the primary function of a firewall in network security?

a) Data Encryption b) Network segmentation

c) Monitoring and controlling network traffic d) Intrusion detection

38. What is the primary purpose of cryptography?

a) Data compression b) Data storage

c) Data Encryption and security d) Data transmission

39. Which fraudulent activity involves using funds from new investors to pay returns to earlier investors?

a) Identity theft b) Malware attack

c) Ponzi scheme d) False advertising

40. What does data protection primarily involve?

a) Controlling personal information b) Deleting personal information

c) Collecting personal information d) Sharing personal information

Section – B

Fill in the blanks with appropriate answer **3 X 1 = 3 M**

52. The ability of computers to be easily upgraded and expanded is known as _____.
53. DNS resolves domain names to _____, allowing users to access websites.
54. The process of converting cipher text back into plaintext is called _____.

Section – C

58. Match the following: **1 X 4 = 4 M**

Malware Type	Description
a) Ransom ware [ ]	1. Captures keystrokes and steals information.
b) Worm [ ]	2. Encrypts or locks files and demands a ransom.
c) Spyware [ ]	3.Rapidly spreads through networks
d) Virus [ ]	4.Constantly changes appearance to evade detection a ransom

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I YEAR I SEMESTER

COURSE-2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Course 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	% of Revision: 100%
Course Delivery Method: Class Room/Blended Mode/Both	C.I.A: 30 Marks	S.E.E: 70 Marks	Total: 100 Marks

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 Learning Outcomes:

Upon successful completion of the course, a student will be able to:

- 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.
- 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.
- Understand the different sources of renewable energy and their generation processes and advances in nano-materials 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.
- Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.
- 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.

- 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).

SYLLABUS

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 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:

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 I: 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 II: 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.

2: 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 III: ADVANCES IN CHEMISTRY:

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.

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 IV: 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.
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 waste management practices.
Students will plan and execute their project, apply mathematical modelling techniques, analyze the results, and present their findings and recommendations.
Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT V: ADVANCED APPLICATIONS OF COMPUTER SCIENCE

Students must be able to convert numbers from other number system to binary number systems
Identify the networking media used for your college network
Identify all the networking devices used in your college premises.

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I YEAR I SEMESTER

COURSE-2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Course Code: 23AMPC1

BLUE PRINT

Section A (Multiple Choice Questions) **(40 x 1 = 40 marks)**

- 40 Multiple choice questions to be answered.
- 10 questions shall be given from **Computer Science (Unit-V).** **(Q.Nos.31 to 40)**

Section B (Fill in the Blanks) **(14 x 1 = 14 marks)**

- 14 Fill in the blank questions to be answered.
- 3 questions shall be given from **Computer Science (Unit-V).** **(Q.Nos.52 to 54)**

Section C (Match the Following) **(4 x 4 = 16 marks)**

- 4 Matching questions to be answered.
- 1 matching question shall be given from **Computer Science (Unit-V).** **(Q.No.58)**.

An illustration is given below. Unit wise distribution can be interchanged between units.

	Section A	Section B	Section C	Total Marks
Mathematics	10	5	4	19
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Chemistry	10	3	4	17
Computer Science	10	3	4	17
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I YEAR I SEMESTER

COURSE-2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Course Code: 23AMPC1

Unit V: ADVANCED APPLICATIONS OF COMPUTER SCIENCE

Model Paper

Time: 3 hrs **Total: 70 M**

Section – A

Answer all the multiple choice questions **10 X 1 = 10 M**

31. What is the term for the rightmost digit in an octal number, representing 8^0 (1)?
    i. Most significant digit
    b) Least significant digit
    c) Leading digit
    d) Trailing digit

32. What does the term "modem" stand for?
    a) Modern Device
    b) Modulator-Demodulator
    c) Mobile Device
    d) Multiplexing Device

33. In hexadecimal, what symbol represents the decimal value 11?
    a) 9 b) A c) B d) 14

34. Which codec is commonly used for lossless audio compression?
    a) H.264 b) MP3 c) FLAC d) H.265

35. Which layer of the OSI model does a modem operate at?
    a) Layer 2 (Data Link)
    b) Layer 3 (Network)
    c) Layer 4 (Transport)
    d) Layers 1 (Physical)

36. Which multiplexing technique allocates different frequency bands to different data streams within the same communication channel?

    a) Time Division Multiplexing (TDM)
    b) Code Division Multiplexing (CDM)
    c) Frequency Division Multiplexing (FDM)
    d) Space Division Multiplexing (SDM)

37. Unguided media is also known as _____.

a) Copper media b) Wireless media

c) Coaxial media d) Optical media

38. Which error detection technique involves adding an extra bit to the data to detect single-bit errors?

a) Checksum b) Cyclic Redundancy Check (CRC)

c) Forward Error Correction (FEC) d) Parity Check

39. Which network device is used to regenerate and amplify digital signals over long distances in a network?

a) Router b) Switch c) Repeater d) Hub

40. Which device is capable of making intelligent forwarding decisions based on MAC address tables?

a) Bridge b) Repeater c) Hub d) Switch

Section – B

Fill in the blanks with appropriate answer **3 X 1 = 3 M**

52. In octal counting, the next number after 777 is _____.
53. _____media includes radio waves and microwaves used in wireless communication systems.
54. Gateways commonly operate at the _____ layer of the OSI model.

Section – C

58. Match the following: **1 X 4= 4 M**

Terms	Characteristics
a) Analog [ ]	1. Represented using binary digits (bits)
b) Digital [ ]	2. Preserves the original quality without loss.
c) Cable Modem [ ]	3. Varies smoothly and continuously
d) Lossless codec [ ]	4. Provides internet access through cable TV infrastructure.

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I YEAR II SEMESTER

COURSE-3: PROBLEM SOLVING USING C

Course Code: 23CMP2A	Admitted Batch: 2023-24	No. of Teaching Hours/week : 3	No. of Credits : 3
Year of Introduction: 2023-24	Year of offering: 2023-24	Year of Revision: 2023-24	% of Revision: 100%
Course Delivery Method: Class Room/Blended Mode/Both	C.I.A: 30 Marks	S.E.E: 70 Marks	Total: 100 Marks

Course Objective:

1. To explore basic knowledge on computers
2. Learn how to solve common types of computing problems.
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the working of a digital computer and Fundamental constructs of Programming
2. Analyze and develop a solution to a given problem with suitable control structures
3. Apply the derived data types in program solutions
4. Use the 'C' language constructs in the right way
5. Apply the Dynamic Memory Management for effective memory utilization

SYLLABUS

UNIT-I

INTRODUCTION TO COMPUTER AND PROGRAMMING: Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms

FUNDAMENTALS OF C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O

UNIT-II CONTROL STATEMENTS:

Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and goto.

UNIT-III

DERIVED DATA TYPES IN C: ARRAYS: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation.

STRINGS: Declaring & Initializing string variables; String handling functions, Character handling functions

UNIT-IV

FUNCTIONS: Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. **Storage classes**: automatic, external, static and register.

POINTERS: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

UNIT-V

DYNAMIC MEMORY MANAGEMENT: Introduction, Functions-malloc, calloc, realloc, free

STRUCTURES: Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. **Unions** - Union definition; difference between Structures and Unions.

TEXT BOOKS:

1. E. Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, 6th Edn, ISBN-13: 978- 1-25- 90046-2
2. Herbert Schildt, Complete Reference with C, Tata McGraw Hill, 4th Edn., ISBN- 13: 9780070411838, 2000
3. Computer fundamentals and programming in C, Reema Thareja, Oxford University Press

REFERENCE BOOKS:

1. E Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

2. Ashok N Kamthane, Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.

3. Henry Mullish & Huubert L.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.

4. Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183331630,656 pages.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz on computer hardware and software concepts

Evaluation Method: Objective-based quiz assessing knowledge and understanding

Unit 2: Activity: Problem-solving using Decision-Making Statements

Evaluation Method: Correctness of decision-making logic

Unit 3: Activity: Array and String Program Debugging

Evaluation Method: Identification and correction of errors in code

Unit 4: Activity: Pair Programming Exercise on Functions

Evaluation Method: Collaboration and Code Quality

Unit 5: Activity: Structured Programming Assignment

Evaluation Method: Appropriate use of structures and nested structures

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B.Sc. Honours in Computer Science MAJOR

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I YEAR II SEMESTER

COURSE-3: PROBLEM SOLVING USING C

Course Code: 23CMP2A

BLUE PRINT

Section A (5 x 4 = 20 marks)

- 5 questions to be answered out of 8 questions
- At least 1 question must be given from each unit.

Section B (5 x 10 = 50 marks)

- Answer ALL questions must be given from each unit.

	Section A	Section B	Total Marks
Unit I	2	2	28
Unit II	1	2	24
Unit III	1	2	24
Unit IV	2	2	28
Unit V	2	2	28
	8	**10**	**132**

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I YEAR II SEMESTER

COURSE-3: PROBLEM SOLVING USING C

Course Code: 23CMP2A

Model Paper

Time: 3 hrs **Total: 70 M**

Section – A

Answer any **FIVE** of the following questions **5 X 4 = 20 M**

1. What is an Algorithm? Explain about control structures used in algorithm.
2. Write about variables in C.
3. Explain about break and continue statements with example.
4. Write short notes on Arrays.
5. Write about local and global variables in C.
6. Define Pointer. How to declare and initialize a pointer?
7. Explain about nested structures in C.
8. Write the differences between structures and unions in C.

Section – B

Answer the following questions **5 X 10 = 50 M**

9. a) Explain about the concepts of Hardware and Software

   (OR)

   b) What is an operator? What are the various operators available in C?

10. a) Explain different types of conditional branching statements in C.

    (OR)

    b) What is looping? Explain various iterative statements with syntax & flowchart.

11. a) Explain about one and two dimensional arrays in C.

    (OR)

    b) Explain about various string handling functions in C.

12. a) Explain about Call by value and Call by reference in C with examples.

    (OR)

    b) Explain about pointers and arrays.

13. a) Explain about dynamic memory allocation in C.

    (OR)

    b) What is structure? How to declare, initialize and access structure members?

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I YEAR II SEMESTER

COURSE-3: PROBLEM SOLVING USING C

Credits: 1

Course Code: 23CMP2A(P)

LAB LIST

List of Experiments

1. A. Write a program to calculate simple & compound interest

   B. Write a C program to interchange two numbers.

2. Find the biggest of three numbers using C.

3. Write a c program to find the sum of individual digits of a positive integer.

4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.

5. Write a c program to check whether a number is Armstrong or not.

6. Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

7. Write a c program that implements searching of given item in given list

8. Write a c program that uses functions to perform the following: Addition of two matrices. Multiplication of two matrices.

9. Write a program for concatenation of two strings.

10. Write a program for length of a string with and without String Handling functions

11. Write a program to demonstrate Call by Value and Call by Reference mechanism

12. Write a Program to find GCD of Two numbers using Recursion

13. Write a c program to perform various operations using pointers.

14. Write a c program to read data of 10 employees with a structure of 1.employee id 2.aadar no, 3.title, 4.joined date, 5.salary, 6.date of birth, 7.gender, 8.department.

15. Write a Program to demonstrate dynamic arrays using Dynamic Memory Management functions

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I YEAR II SEMESTER

COURSE-4: DIGITAL LOGIC DESIGN

Course Code: 23CMP2B	Admitted Batch: 2023-24	No. of Teaching Hours/week : 3	No. of Credits : 3
Year of Introduction: 2023-24	Year of offering: 2023-24	Year of Revision: 2023-24	% of Revision: 100%
Course Delivery Method: Class Room/Blended Mode/Both	C.I.A: 30 Marks	S.E.E: 70 Marks	Total: 100 Marks

Course Objective:

To familiarize with the concepts of designing digital circuits.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.
2. Simplify Boolean functions using Boolean algebra and k- maps
3. Design Adders and Subtractors circuits
4. Design combinational logic circuits such as decoders, encoders, multiplexers and de-multiplexers.
5. Use flip flops to design registers and counters.

SYLLABUS

UNIT – I: NUMBER SYSTEMS

Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.

UNIT – II: LOGIC GATES AND BOOLEAN ALGEBRA

NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of

logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

UNIT – III: COMBINATIONAL LOGIC CIRCUITS – 1

Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.

UNIT – IV: COMBINATIONAL LOGIC CIRCUITS – 2

Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

UNIT – V: SEQUENTIAL LOGIC CIRCUITS

Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear).

Design of registers, shift registers, bidirectional shift registers, universal shift register, design of ripple counters, synchronous counters and variable modulus counters.

TEXT BOOKS:

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.

REFERENCE BOOKS:

1. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.

2. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.

3. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: JAM (Just a Minute) Session: Explaining Radix Conversion

Evaluation Method: Communication Skills and Knowledge Presentation

Unit 2: Activity: Boolean Algebra Assignment

Evaluation Method: Assignment Completion and Correctness

Unit 3: Activity: Hands-on Lab Activity: Building Adder and Subtractor Circuits

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

Unit 4: Activity: Group Discussion: Applications of Decoders, Encoders, Multiplexers

Evaluation Method: Participation and Critical Thinking

Unit 5: Activity: Quiz on Flip-Flops and Register-Counter Design

Evaluation Method: Quiz Performance and Knowledge Retention

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COURSE-4: DIGITAL LOGIC DESIGN

Course Code: 23CMP2B

BLUE PRINT

Section A (5 x 4 = 20 marks)

- 5 questions to be answered out of 8 questions
- At least 1 question must be given from each unit.

Section B (5 x 10 = 50 marks)

- Answer ALL questions must be given from each unit.

	Section A	Section B	Total Marks
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Unit II	2	2	28
Unit III	1	2	24
Unit IV	1	2	24
Unit V	2	2	28
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I YEAR II SEMESTER

COURSE-4: DIGITAL LOGIC DESIGN

Course Code: 23CMP2B

Model Paper

Time: 3 hrs **Total: 70 M**

Section – A

Answer any **FIVE** of the following questions **5 X 4 = 20 M**

1. Write about r's and (r-1)'s complements.
2. What are weighted and un-weighted codes?
3. What are universal gates? Explain.
4. State and explain De-Morgan's Laws.
5. Write short note on design of Half Subtractor.
6. What is de-multiplexer? Explain its design.
7. Explain the following: (a) Latch (b) Flip-flop.
8. What is shift register? Explain.

Section – B

Answer the following questions **5 X 10 = 50 M**

9. a) Explain about the following Number Systems-
   1. Decimal 2.Binary 3.Octal 4.Hexadecimal

   (OR)

   b) Explain about addition and subtraction of unsigned and signed numbers.

10. a) What are canonical and standard forms? Explain with suitable example.

    (OR)

    b) What is K-Map? Explain about K-Maps up to 4 variables.

11. a) What is combinational logic circuit? Explain about Half adder and Full adder.

    (OR)

    b) Explain about ripple Adders and Subtractors.

12. a) What is an encoder? Explain the design of an encoder.

    (OR)

    b) Explain about the design of Multiplexer.

13. a) Explain about SR, JK, T and D flip-flops in detail.

    (OR)

    b) Explain about synchronous counters.

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I YEAR II SEMESTER

COURSE-4: DIGITAL LOGIC DESIGN

Course Code: 23CMP2B (P)

LAB LIST

List of Experiments

The laboratory work can be done by using physical gates and necessary equipment or simulators.

Simulators: https://sourceforge.net/projects/gatesim/ or https://circuitverse.org/ or any free open-source simulator.

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean functions using logic gates in both SOP and POS forms
3. Realization of basic gates using universal gates.
4. Design and implementation of half and full adder circuits using logic gates.
5. Design and implementation of half and full subtractor circuits using logic gates.
6. Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
7. Verification of stable tables of RS, JK, T and D flip-flops using NOR gates.
8. Implementation and verification of Decoder and encoder using logic gates.
9. Implementation of 4X1 MUX and De-MUX using logic gates.
10. Implementation of 8X1 MUX using suitable lower order MUX.
11. Implementation of 7-segment decoder circuit.
12. Implementation of 4-bit parallel adder.
13. Design and verification of 4-bit synchronous counter.
14. Design and verification of 4-bit asynchronous counter.