

**Department of
Computer Science**

**B. Sc.
Artificial Intelligence**

BOS-2024-25



B.Sc. (Hons) Artificial Intelligence

Program Specific Outcomes (PSOs)

After completion of the program, the student is able to

PSO1: AI Problem Solving Proficiency: Demonstrate proficiency in analyzing intricate problems, identifying AI-based solutions, and developing algorithms using machine learning and AI techniques.

PSO2: Advanced AI Modeling and Implementation: Excel in designing AI models, implementing machine learning algorithms, and deploying AI solutions for real-world applications.

PSO3: Expertise in Natural Language Processing and Computer Vision: Apply their expertise in natural language processing and computer vision to analyze text and images, and innovate AI-driven solutions in these specialized domains.

PSO4: Ethical AI and Human-AI Interaction: Critically evaluate AI systems for ethical implications, ensuring responsible development, and collaborate in designing AI systems that seamlessly interact with humans.



Credit Framework

| B.Sc (Honours) with Single Major | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|------|---------|--------------|-----|------------|-------------|---|------------------------------------|----------------------|---|----|---------------------------------|-----|----|------|---|----|-----------------|---|----|-------|----|-----|
| Semester | Major* (4 Cr) | | | Minor (4 Cr) | | | AECC (3 Cr) | | | Multi Disney' (2 Cr) | | | Skill Enhancement Courses (2Cr) | | | OOTC | | | Env. Edn (2 Cr) | | | Total | | |
| | C | H | Cr | C | H | Cr | C | H | Cr | C | H | Cr | C | H | Cr | C | H | Cr | C | H | Cr | C | H | Cr |
| Sem 1 | 2* | 10 | 8 | | | | 2 | 8 | 6 | 1 | 2 | 2 | 2 | 4 | 4 | | | | | | | 7 | 24 | 20 |
| Sem 2 | 2 | 6+4 | 8 | 1 | 3+2 | 4 | 2 | 8 | 6 | | | | 2 | 4 | 4 | | | | | | | 7 | 27 | 22 |
| Community Service Project of 180 hours with 4 Credits. Student is eligible for Exit Option-1 with the award of Certificate in respective discipline | | | | | | | | | | | | | | | | | | | | | | | | |
| Sem 3 | 4 | 12+8 | 16 | 1 | 3+2 | 4 | | | | 1 | 2 | 2 | 1 | 2 | 2 | | | | | | | 7 | 29 | 24 |
| Sem 4 | 3 | 9+6 | 12 | 2 | 6+4 | 8 | | | | 1 | 2 | 2 | 1 | 2 | 2 | | | | | | | 7 | 29 | 24 |
| Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits. Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor | | | | | | | | | | | | | | | | | | | | | | | | |
| Sem 5 | 4 | 12+8 | 16 | 2 | 6+4 | 8 | | | | | | | | | | | | | 1 | 2 | 2 | 7 | 32 | 26 |
| Sem 6 | Semester Internship/Apprenticeship/OJT with 12 Credits. Student is eligible for Exit Option-3 with the award of Degree in respective major | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| Sem 7 | 3 | 9+6 | 12 | | | | | | | | | | 2* | 6+4 | 8 | 1 | 2 | 2 | 1 | 2 | 0 | 6 | 29 | 22 |
| Sem 8 | 3 | 9+6 | 12 | | | | | | | | | | 2* | 6+4 | 8 | 1 | 2 | 2 | 1 | 2 | 0 | 6 | 29 | 22 |
| | 21 | | 84 | 6 | | 24 | 4 | | 12 | 3 | 6 | 6 | 10 | 32 | 28 | 2 | 4 | 4 | 2 | 4 | 0 | 47 | | 160 |
| 20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship | | | | | | | | | | | | | | | | | | | | | | | | |
| C Courses | | | H Hours | | | Cr Credits | | | OOTC Open Online Transdisciplinary | | | | | | | | | | | | | | | |
| IKS# Indian Knowledge Systems - Audit Course | | | | | | | | | | | | | | | | | | | | | | | | |

COURSE STRUCTURE

| Year | Semester | Course | Title of the Course | No. of Hrs /Week | No. of Credits |
|------|----------|--------|---|------------------|----------------|
| I | I | 1 | Essentials and Applications of Mathematical, Physical and Chemical Sciences | 3+2 | 4 |
| | | 2 | Advances in Mathematical, Physical and Chemical Sciences | 3+2 | 4 |
| | II | 3 | Python for Data Science | 3 | 3 |
| | | | Python for Data Science Lab | 2 | 1 |
| | | 4 | Statistical Methods and Probability Distribution | 3 | 3 |
| | | | Statistical Data Analysis Using SPSS - I Lab | 2 | 1 |
| II | III | 5 | Document Oriented Database | 3 | 3 |
| | | | Document Oriented Database Lab | 2 | 1 |
| | | 6 | Operating Systems | 3 | 3 |
| | | | Operating Systems Lab | 2 | 1 |
| | | 7 | Introduction to OOP using JAVA | 3 | 3 |
| | | | Introduction to OOP using JAVA Lab | 2 | 1 |
| | | 8 | Inferential Statistics | 3 | 3 |
| | | | Statistical Data Analysis Using SPSS - II Lab | 2 | 1 |
| | IV | 9 | Data Warehousing and Data Mining | 3 | 3 |
| | | | Data Warehousing and Data Mining Lab | 2 | 1 |
| | | 10 | Machine Learning using Python | 3 | 3 |
| | | | Machine Learning using Python Lab | 2 | 1 |
| | | 11 | Introduction to AI | 3 | 3 |
| | | | Introduction to AI Lab | 2 | 1 |
| III | V | 12 | Introduction to Predictive Analytics using Python | 3 | 3 |
| | | | Introduction to Predictive Analytics using Python Lab | 2 | 1 |
| | | 13 | Algorithms for Intelligent Systems | 3 | 3 |
| | | | Algorithms for Intelligent Systems Lab | 2 | 1 |
| | | 14 | Natural Language Processing | 3 | 3 |
| | | | Natural Language Processing Lab | 2 | 1 |
| | | 15 | Software Project Management | 3 | 3 |
| | | | Software Project Management Lab | 2 | 1 |

| Year | Semester | Course | Title of the Course | No. of Hrs /Week | No. of Credits |
|------|-----------------------------------|--|--------------------------------------|------------------|----------------|
| | VI | Semester Internship/Apprenticeship with 12 Credits | | | |
| IV | VII | 16 | Deep Learning | 3 | 3 |
| | | | Deep Learning Lab | 2 | 1 |
| | | 17 | Text Mining | 3 | 3 |
| | | | Text Mining Lab | 2 | 1 |
| | | 18 | Computer Networks | 3 | 3 |
| | | | Computer Networks Lab | 2 | 1 |
| | 19 | Mobile Application Development | 3 | 3 | |
| | | Mobile Application Development Lab | 2 | 1 | |
| | 20 | Big Data Analysis using R | 3 | 3 | |
| | | Big Data Analysis using R Lab | 2 | 1 | |
| | VIII | 21 | Neural Networks | 3 | 3 |
| | | | Neural Networks | 2 | 1 |
| | | 22 | Design Thinking | 3 | 3 |
| | | | Design Thinking | 2 | 1 |
| | | 23 | Robotics and Intelligent Systems | 3 | 3 |
| | | | Robotics and Intelligent Systems Lab | 2 | 1 |
| | | 24 | Cyber Security Essentials | 3 | 3 |
| | | | Cyber Security Essentials | 2 | 1 |
| 25 | Big Data Analysis using SPARK | 3 | 3 | | |
| | Big Data Analysis using SPARK Lab | 2 | 1 | | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM DEPARTMENT OF
COMPUTER SCIENCE

B.SC (HONORS) ARTIFICIAL INTELLEGEENCE COURSE

STRUCTURE

UNDER CBCS PATTERN

We have made significant changes to the following syllabus based on the feedback from learners and educators.

| S. No | Semester | Course Code | Title of the Course (Paper) | Changes in the Syllabus |
|--------------|-----------------|--------------------|--|--|
| 1 | III | AI106 | Operating Systems | 1. File I/O is shifted to UNIT V 2. Memory Management topic is shifted to UNIT-IV |
| 2 | III | AI107 | Introduction to OOP using JAVA | 1. Multithreading concept is moved to UNIT-IV 2. GUI and Event Handling concepts are placed in UNIT-V |
| 3 | IV | AI109 | Data Warehousing and Data Mining | 100% |
| 4 | IV | AI110 | Machine Learning using Python | 100% |

SEMESTER-I

| | | | | | |
|---|--|--|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester I B.Sc. AI(I Sem) | | | |
| Course Code AI101 | Essentials And Applications of Mathematical, Physical and Chemical Sciences | | | | |
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | | 5 | | - | 4 |

Course Objectives

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 intense areas, enabling them to apply scientific principles to real-world situations.

Course Outcomes:

| | |
|--|--|
| On Completion of the course, the students will be able to- | |
| CO1 | Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures. |
| 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 |
| 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. |
| 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. |
| CO5 | To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|---|---------------|---|------------------|---|
| Skill Development |  | Employability |  | Entrepreneurship |  |
|-------------------|---|---------------|---|------------------|---|

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

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

UNIT- II

ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and UNIT-s - 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.

Activity:

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 inter dependencies 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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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.

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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.

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

UNIT- V

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

Activity:

- 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. Structured Programming Assignment

Evaluation Method: Objective-based quiz assessing knowledge and understanding

Text Books:

1. Essentials And Applications of Mathematical, Physical and Chemical Sciences: *HK Dass, PS Hemne, RL Madan, Rama Verma, Rajnish Verma, Suneel K Duvvuri*. S.Chand Publications-2023
2. Functions of one complex variable by John.B.Conway, Springer- Verlag.
3. Elementary Trigonometry by H.S.Hall and S.R.Knight
4. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd. 4.Basic Statistics by B.L.Agarwal, New age international Publishers

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. (Honors) Artificial Intelligence

Semester-I

Essentials and Applications of Mathematical, Physical and Chemical Sciences

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|---|---------------------------|----------------------|---------------------|----|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | 5 X 7 = 35 M | | | |
| 1 | Q1 (OR) Q2 | 7M 7M | | | | |
| 2 | Q3 (OR) Q4 | 7M 7M | | | | |
| 3 | Q5 (OR) Q6 | 7M 7M | | | | |
| 4 | Q7 (OR) Q8 | 7M 7M | | | | |
| 5 | Q9 (OR) Q10 | 7M 7M | | | | |
| SECTION – B | | | | | | |
| Answer any Five of the Following | | | 5 X 2 = 10M | | | |
| 6 | Q11 | 2M | | | | |

| | | | | | | |
|-----------------------------|-----|-------------------|--|--|--|--|
| 7 | Q12 | 2M | | | | |
| 8 | Q13 | 2M | | | | |
| 9 | Q14 | 2M | | | | |
| 10 | Q15 | 2M | | | | |
| 11 | Q16 | 2M | | | | |
| 12 | Q17 | 2M | | | | |
| 13 | Q18 | 2M | | | | |
| SECTION – C | | | | | | |
| Answer ALL questions | | 5 X 1 = 5M | | | | |
| 14 | Q19 | 1M | | | | |
| 15 | Q20 | 1M | | | | |
| 16 | Q21 | 1M | | | | |
| 17 | Q22 | 1M | | | | |
| 18 | Q23 | 1M | | | | |

| | | | | | |
|---|---|--|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester I B.Sc. AI(I Sem) | | | |
| Course Code AI102 | Advances in Mathematical, Physical and Chemical Sciences | | | | |
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | | 5 | | - | 4 |

Course Objectives

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:

| | |
|--|---|
| On Completion of the course, the students will be able to- | |
| 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. |
| 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. |
| CO3 | 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. |
| 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 nano sensors. Explore the effects of chemical pollutants on ecosystems and human health. |
| 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 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) |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

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

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

UNIT- II

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.

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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

Activity:

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.

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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: Nano medicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neuro physics,

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

Activity:

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 modeling 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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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.

Activity:

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
2. Identify all the networking devices used in your college premises.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

Text Books:

1. Advances of Mathematical, Physical and Chemical Sciences: *HK Dass, PS Hemne, RL Madan, Rama Verma, Rajnish Verma, Suneel K Duvvuri*. S Chand Publications - 2023
2. Coordinate Geometry by S.L.Lony, Arihant 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

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. (honors) Artificial Intelligence

Semester-I

Advances in Mathematical, Physical and Chemical Sciences

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|---|---------------------------|----------------------|---------------------|----|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | 5 X 7 = 35 M | | | |
| 1 | Q1 (OR) Q2 | 7M 7M | | | | |
| 2 | Q3 (OR) Q4 | 7M 7M | | | | |
| 3 | Q5 (OR) Q6 | 7M 7M | | | | |
| 4 | Q7 (OR) Q8 | 7M 7M | | | | |
| 5 | Q9 (OR) Q10 | 7M 7M | | | | |
| SECTION – B | | | | | | |
| Answer any Five of the Following | | | 5 X 2 = 10M | | | |
| 7 | Q12 | 2M | | | | |

| | | | | | | |
|----|-----|----|--|--|--|--|
| 8 | Q13 | 2M | | | | |
| 9 | Q14 | 2M | | | | |
| 10 | Q15 | 2M | | | | |
| 11 | Q16 | 2M | | | | |
| 12 | Q17 | 2M | | | | |
| 13 | Q18 | 2M | | | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|-----|----|--|--|--|--|
| 14 | Q19 | 1M | | | | |
| 15 | Q20 | 1M | | | | |
| 16 | Q21 | 1M | | | | |
| 17 | Q22 | 1M | | | | |
| 18 | Q23 | 1M | | | | |

Semester-II

| | | | | | |
|---|--|---|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester I B.Sc. AI(II Sem) | | | |
| Course Code AI103 | PYTHON FOR DATA SCIENCE | | | | |
| Teaching | Hours Allocated: 45(Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | - | 3 |

Course Objectives:

The objective of this course is to study main elements of python programming and perform dataanalysis using data structures and tools in python.

Course Outcomes:

| | |
|--|--|
| On Completion of the course, the students will be able to- | |
| CO1 | To Understand Features and basic concepts of python. |
| CO2 | To learn control structures in python and apply them to real world problems. |
| CO3 | To implement functions and modules in python. |
| CO4 | To understand data structures in python. oops concepts |
| CO5 | To construct data and perform data analysis. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT--I

Basics of Python

Features of python, literal constants-numbers, variables, identifiers, data types, input operation, comments, operators, operations on strings, other data types, type conversion. Selection or conditional branching statements-if, if else, nested if, if elif else, loops or iterative statements-while, for, nested loops, break, continue, pass, else statement with loops.

Activity Proposed: Coding Challenge

Evaluation Method: Grading students based on their performance in the Python coding

challenge, assessing their understanding of variables, data types, conditionals, and loops

UNIT--II

Functions and Modules

Functions-Definition and call, return statements, anonymous function- LAMBDA, recursive functions.

Modules-Using existing modules, making own modules, packages in python, Names of standard library modules.

Activity Proposed: Code Debugging Olympics

- Organize a debugging competition where students are given faulty Python code and need to identify and fix the issues.

Evaluation Method: Evaluate their ability to identify and rectify coding errors.

UNIT--III

Data Structures

List-Accessing lists, updating lists, nested lists, basic list operations, list methods, loops in lists.

Tuples-Creation, Accessing, updating, deletion in tuples and basic tuple operations.

Sets-creation, set operations.

Dictionaries - creation, accessing, adding and modifying items, deleting items.

Activity Proposed: Data Structures Challenge

- Teams solve real-world problems using lists, tuples, sets, and dictionaries in Python, followed by code review, documentation, and presentations.

Evaluation Method: Code quality, problem-solving effectiveness, team collaboration, documentation, and presentation skills

UNIT--IV

Object Oriented Programming concepts

Oops concept- Introduction, Classes and Objects, Class method **Inheritance**- Introduction, Inheriting classes in python Types of Inheritance, Error and Exception Handling

Activity Proposed: OOPs Concept Role-Play and Showcase

- Role-Play: Divide students into groups, assign each group a real-world scenario (e.g.,

designing a virtual zoo) and ask them to create classes representing different objects.

- They present their role-play showcasing interactions between objects and methods.

Evaluation Method: Role-play assessment based on concept understanding, creativity, and effective communication;

UNIT--V

Data Analysis.

Data preparation using pandas and series: pandas data frame basics, Creating your own data, Series, Data frames, Making changes to series and data frames

Plotting: Matplotlib Introduction, Univariate plots-Histograms

Activity Proposed: Interactive Data Visualization Workshop

- **Data Preparation Challenge:** Provide students with a messy dataset. In groups, they clean, transform, and prepare the data using pandas. Then, they present their process and results, highlighting challenges faced and solutions applied.
- **Univariate Data Visualization:** Each student selects a real-world dataset and uses Matplotlib to create a histogram. They present their visualization, explaining insights gained and justifying their choice of bin sizes.

Evaluation Method: Data preparation challenge assessed on data handling accuracy and creativity; Univariate visualization evaluated on interpretation, data representation, and visualization quality

Textbooks:

1. **Python Programming Using Problem Solving Approach** Reema Thareja-Oxford University Press, ©2017
2. **Pandas for Everyone (Python data Analysis)**-Daniel Y.Chen, Pearson Addison WesleyData and Analytics series,©2018

Reference books:

1. **Python Programming Using Problem Solving Approach** Reema Tharej'a Oxford University Press, ©2017
2. **Pandas for Everyone (Python data Analysis)**-Daniel Y.Chen, Pearson Addison WesleyData and Analytics series,©2018

Web Links:

1. https://onlinecourses.nptel.ac.in/noc20_cs83/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc.(Hons) AI :: Semester-II

PYTHON FOR DATA SCIENCE

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50 M

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|--|--------------------------------|--------------------|---------------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | | 5 X 7 = 35 M | | |
| 1 | a) Discuss features of Python b) List out various Operators in Python (OR) c) Discuss Conditional/ Branching Control Statements in Python. | 3M 4M 7M | 2 3 | 1 1 | | |
| 2 | a) What is recursion? Write a program to find the factorial of a number using recursion. (OR) b) List and briefly explain the main components of a function in Python. | 7M 7M | 3 3 | 2 2 | | |
| 3 | a) What is List? Explain List operations in python with example. (OR) b) What is Tuple? Explain Tuple operations in python. | 7M 7M | 2 3 | 3 3 | | |
| 4 | a) Explain about Inheritance in python. (OR) b) Explain about Exception handling in python. | 7M 7M | 3 3 | 4 4 | | |
| 5 | a) Explain about dictionaries and it's operations in | 7M | 3 | 3 | | |

Government College (A), Rajahmundry



Curriculum 2023-24

Version 1.0

| | | | | | | |
|---|---|----|--------------------|---|--|--|
| | python. (OR) b) Explain how to create a simple histogram using Matplotlib. Include a brief description of the key parameters and their roles. | 7M | 2 | 5 | | |
| SECTION – B | | | | | | |
| Answer any Five of the Following | | | 5 X 2 = 10M | | | |
| 6 | What does the break statement do in a loop? Illustrate with example. | 2M | 2 | 1 | | |
| 7 | How do you write a single-line comment and multiline comment in Python? | 2M | 3 | 1 | | |
| 8 | What is a lambda function? Explain with example. | 2M | 2 | 2 | | |
| 9 | Explain packages in python. | 2M | 2 | 2 | | |
| 10 | Explain how to concatenate two tuples in Python? | 2M | 3 | 3 | | |
| 11 | Explain about set in python. | 2M | 3 | 3 | | |
| 12 | List rules for naming identifiers in Python. | 2M | 2 | 1 | | |
| 13 | What is the difference between mutable and immutable data types in Python | 2M | 2 | 3 | | |
| SECTION – C | | | | | | |
| Answer ALL questions | | | 5 X 1 = 5M | | | |
| 14 | Which function is used to take input from the user in Python? | 1M | 2 | 1 | | |
| 15 | Which keyword is used to define a function in Python? | 1M | 2 | 2 | | |
| 16 | What method adds an item to the end of a list? | 1M | 2 | 3 | | |
| 17 | What is the purpose of the __init__ method in a class? | 1M | 2 | 4 | | |
| 18 | How do you rename columns in a DataFrame? | 1M | 2 | 5 | | |

Government College (A), Rajahmundry



Curriculum 2023-24

Version 1.0

| | | | | | |
|------------------------------|--|---|---|---|---|
| | Government College (Autonomous) Rajahmundry | Program & Semester I B.Sc. AI(II Sem) | | | |
| Course Code AI103P | PYTHON FOR DATA SCIENCE LAB | | | | |
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Outcomes:

| | |
|--|--|
| On Completion of the course, the students will be able to- | |
| CO1 | Implement a given problem as a python program. |
| CO2 | To write loops and decision statements in Python |
| CO3 | To implement functions and modules in Python. |
| CO4 | To implement different data structures in python |
| CO5 | To implement data analysis using pandas and graphs |

Lab Experiments:

1. Write a program to read and print values of variables of different data types.
2. Write a program to find the roots of quadratic equations.
3. Write a program to find the largest of 3 numbers.
4. Write a program to check whether a given number is prime or not.
5. Write a program to generate Fibonacci series.
6. Write a program to find whether a given number is Armstrong or not.
7. Write a program using functions to swap two numbers.
8. Write a program to find factorial of a number using recursion.
9. Write a program to find square root of a given number using math module.
10. Write a program to generate 10 random numbers between 1 to 100 using random module.
11. Create a list and perform different operations on it.
12. Create a tuple and perform different operations on it.
13. Create a set and perform different operations on it.
14. Create a dictionary and perform different operations on it.

Government College (A), Rajahmundry



Curriculum 2023-24

Version 1.0

15. Import pandas and create a data frame and perform operations on it.
16. Generate histogram using Matplotlib.
17. Generate scatter plot using Matplotlib.
18. Generate box plot using Matplotlib.

@ @ @ @

| | | | | | |
|---|---|---|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester I B.Sc. AI(II Sem) | | | |
| Course Code AI104 | STATISTICAL METHODS AND PROBABILITY DISTRIBUTION | | | | |
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives:

The purpose is to familiarize the students about the basic concepts required for artificial intelligence and Machine learning.

Course Outcomes:

| On Completion of the course, the students will be able to- | |
|--|---|
| CO1 | Know about correlation and regression techniques, the two very powerful tools in statistics, |
| CO2 | Study concept of coefficient of determination and inference on partial and multiple correlation and regression coefficients. |
| CO3 | Knowledge of important discrete distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper geometric and their interrelations if any, |
| CO4 | Knowledge of important continuous distributions such as Uniform, Normal, Exponential and Gamma and relations with some other distributions, |
| CO5 | Basic knowledge of complete enumeration and sample, sampling frame, sampling distribution, sampling and non-sampling errors, principal steps in sample surveys, limitations of sampling etc., |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

Correlation Analysis:

Meaning Measures of Correlation- Scatter diagram, Karl Pearson's and Spearman's rank correlation. Calculation of the correlation coefficient for bi-variety frequency distribution Multiple and Partial correlation (3 variables only)

Activity Proposed: Problem Solving on Correlation

Evaluation Method: Critical Thinking, Application of Various correlation concepts on the real time messy data given to student

UNIT- II

Curve fitting and Regression Analysis:

Principle of least squares, fitting of straight line, second degree polynomial or parabola, power and exponential curves. Regression: Introduction, Linear Regression- Regression coefficients and its properties, Angle between two lines of regression. Standard error of estimate (residual variance), Explained and Unexplained variation, coefficient of determination. Multiple Linear Regression (3 variables only) and Logistic Regression.

Activity Proposed: Problem Solving on Regression

Evaluation Method: Critical Thinking, Application of regression and estimation of error on the real time messy data given to student

UNIT- III

Discrete Probability Distributions:

Uniform, Bernoulli, Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric distributions along with their characteristic properties, applications and limiting/approximation cases. Activity Proposed: Problem Solving on Bernoulli, Binomial, Poisson

Evaluation Method: Critical Thinking, Application of Discrete Probability Distributions concepts on the real time messy data given to student

UNIT- IV

Continuous probability distributions: Normal, Exponential, Uniform, Beta, Gamma, distributions along with their characteristic properties, applications and limiting/approximation cases. Activity Proposed: Problem solving on Normal, Uniform distributions

Evaluation Method: Critical Thinking, Application of Continuous probability distributions on real time messy data given to student

UNIT- V

Basic concepts: population and sample, census and sample survey, sampling frame, sampling distribution, standard error, sampling design, sampling and non-sampling errors, sample surveys, principles of sample survey, principal steps in sample survey, limitations of sampling, Sample survey versus complete enumeration survey. Types of sampling - Simple random sampling, stratified sampling, systematic sampling, and cluster sampling (only concept)

Activity Proposed: Conduct survey on any real-world problem and apply various sampling techniques.

Evaluation Method: Critical Thinking, Application of sampling techniques on sample survey.

Textbooks:

1. Fundamentals of Mathematical Statistics, 12th Edition, 10th September 2020, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi.
2. Fundamentals of Applied Statistics, 4th Edition 1st January 2014, (ISBN 108180547051) S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi.

Reference books:

1. Mathematical Statistics with Applications, 2009, K.M. Ramachandran and Chris P. Tsokos Academic Press (Elsevier), Haryana .
2. Probability and Statistics, Volume I, D. Biswas, New central book Agency (P) Ltd, New Delhi.
3. An outline of Statistical theory, Volume Two, 3rd Edition, 2010 (with corrections)
4. A.M. Goon, M.K. Gupta, B. Dasgupta, The World Press Pvt. Ltd., Kolakota.
5. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan, New Delhi.

Web Links:

1. <http://onlinestatbook.com/rvls/index.html>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

| | | | | | | |
|---|---|------------------------|---------------------|---------------------|--|--|
| | distribution. b) If the probability that an individual suffers a bad reaction from an injection of a given serum is 0.001, determine the probability that out of 500 individuals, exactly 3 individuals suffer from bad reaction. (OR) c) Explain characteristics, Applications of Negative binomial distribution with example. d) Find the probability that third head turns up in 5 tosses of an unbiased coin. | 3M 4M 3M | 3 2 3 | 3 3 3 | | |
| 4 | a) Explain Continuous Uniform distribution and its properties. b) Telephone calls arrive at a switchboard following an exponential distribution with parameter $\lambda = 12$ per hour. If we are at the switchboard, what is the probability that the waiting time for a call is at least 15 minutes (OR) c) Explain Exponential distribution and its applications with example.. | 4M 3M 7M | 2 3 3 | 4 4 4 | | |
| 5 | a) Explain types of sampling with illustration. (OR) b) Explain about steps involved in sampling design and characteristics of good sample design. | 7M 7M | 3 2 | 5 5 | | |

SECTION – B

Answer any Five of the Following

5 X 2 = 10M

| | | | | | | |
|----|--|----|---|---|--|--|
| 6 | How do you interpret a scatter diagram with a positive/negative correlation? | 2M | 2 | 1 | | |
| 7 | Explain about partial correlation | 2M | 3 | 1 | | |
| 8 | What is regression analysis and what is its primary objective? | 2M | 2 | 2 | | |
| 9 | Discuss the properties of regression coefficients. | 2M | 2 | 2 | | |
| 10 | Explain How is the expected value of a Bernoulli random variable calculated? | 2M | 3 | 3 | | |
| 11 | Explain the probability mass function of a hyper-geometric distribution. | 2M | 3 | 3 | | |

| | | | | | | |
|----|---|----|---|---|--|--|
| 12 | Explain about gamma distribution. | 2M | 2 | 4 | | |
| 13 | Discuss the limitations of sample surveys compared to complete enumeration surveys. | 2M | 2 | 5 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|--|----|---|---|--|--|
| 14 | Which correlation coefficient is used for ordinal data? | 1M | 3 | 1 | | |
| 15 | What is the angle between two lines of regression. | 1M | 2 | 2 | | |
| 16 | What distribution models a single trial with two possible outcomes, often labeled as success or failure? | 1M | 2 | 3 | | |
| 17 | What distribution is commonly used in finance to model stock prices and interest rates? | 1M | 2 | 4 | | |
| 18 | What is a list of all the elements in the population from which the sample is drawn? | 1M | 2 | 5 | | |



Government College (Autonomous) Rajahmundry

Program & Semester
I B.Sc. AI(II Sem)

Course Code
AI104P

**STATISTICAL METHODS AND PROBABILITY
DISTRIBUTION LAB**

| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives

This course enables students to gain hands-on practical experience of SPSS/PSPP for analysing data.

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|--|
| CO1 | Apply the various statistical methods for real life problems |
| CO2 | Analyze the uni-variate and bivariate data using statistical techniques. |

Lab Experiments:

1. Diagrams & Graphs- Bar, Pie , Histogram, frequency polygon, and Ogive curves
2. Computation of measures of central tendency- Arithmetic Mean, Geometric mean and Harmonic Mean Grouped Data.
3. Computation of measures of central tendency- Median, Mode and Partition Values - Grouped Data.
4. Computation of measures of Dispersion Quartile Deviation, Mean Deviation, Standard Deviation, Variance and Coefficient of Variation Grouped Data.
5. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
6. Computation of Karl Pearson's coefficients, Bowley's coefficients of Skewness and coefficients of Skewness based on moments Grouped Data
7. Computation of correlation coefficient and regression lines for (i) ungrouped data (ii) grouped bivariate data
8. Construction regression line equations for (i) ungrouped data (ii) grouped bi-variate data.

Note: Training shall be in SPSS/PSPP and derive the results. The SPSS/PSPP output shall be exported to MS word for writing inference.

Reference Manual: Practical Manual -Prepared by the Department Faculty Members

Websites of Interest: <http://www.statsci.org/datasets.html>

@ @ @ @

Semester-III

| | | | | | |
|---|--|---|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester II B.Sc. AI (III Sem) | | | |
| Course Code AI105 | DOCUMENT ORIENTED DATABASE | | | | |
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

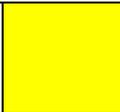
Course Objectives:

1. To educate student regarding databases and how to manage databases.
2. To handle the large amount of data handling demands of business.
3. To implement a data store that provides high performance, high availability, and automatic scaling
4. To Process an immense diversity of data that needs to be stored and processed.
5. To make use of features and functionalities to work on NO SQL Data Base
Mongo DB

Course Outcomes:

| | |
|--|--|
| On Completion of the course, the students will be able to- | |
| CO1 | Have knowledge Architecture about database and DBMS |
| CO2 | Able to know No SQL databases, various features of Mongo DB, the installation procedure, and how to interact with MongoDB. |
| CO3 | Able to work on Mongo DB's rich query language to support create, read, update, and delete (CRUD) operations. |
| CO4 | Analyses the aggregation framework to perform aggregation operations. |
| CO5 | Able to work on indexes, types of index, index properties, and the various indexing strategies to be considered. Indexes are used to improve the performance of a query. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|---|---------------|---|------------------|---|
| Skill Development |  | Employability |  | Entrepreneurship |  |
|-------------------|---|---------------|---|------------------|---|

Syllabus:

UNIT- I

Overview of Database Management Systems:

Introduction, Data and Information, Characteristics of the Database Approach - Self-Describing Nature of the a Database System, Insulation between Programs and Data, Data Abstraction, Support of Multiple Views of the data , Sharing of Data and multiuser Transaction Processing , Actors on the Scene - Database Administrators , Database Designers , End Users , System Analysts and Application Programmers , Advantages of using a DBMS - Controlling Redundancy ,Restricting unauthorized Access , Providing Persistent Storage for Program Objects and Data Structures, Permitting Inferencing and Actions Using Rules ,Providing Multiple User Interfaces , Representing Complex Relationships Among data , Enforcing Integrity Constraints , Providing Backup and Recovery, Database System Concepts and Architecture , DBMS Architecture and Data Independence - The Three-Schema Architecture , Data Independence , Database Languages and Interfaces.

Activity Proposed: Identify complex relation ships among database and enforce suitable integrity constraints on college database.

Evaluation Method: Critical Thinking, Application of Integrity constraints on college database.

UNIT- II

Mongo DB Features and Installation, The Need for No SQL Databases, What Are No SQL Databases? CAP Theorem, BASE Approach, Types of NoSQL Databases, MongoDB Features, Document Database MongoDB Is Schema less MongoDB Uses BSON , Rich Query Language, Terms Used in MongoDB, Data Types in MongoDB, Working with Database Commands, Create Database, Drop Database.

Activity Proposed: Retrieve data from College database using any query language.

Evaluation Method: Critical Thinking, Application of Query retrieving methods on college database.

UNIT- III

MongoDB CRUD Operations, Collections, Create a Collection, Create Capped Collections, Create Operations, Insert Documents, Read Operations, Query Documents, Update Operations, Update Documents, Delete Operations, Delete Documents, Working with Arrays.

Activity Proposed: CRUD operations on college database.

Evaluation Method: Critical Thinking, Application of Query retrieving methods on college database.

UNIT- IV

Data Modelling and Aggregation, Data Models, Embedded Data Models, Normalized Data Models
Data Model Relationship Between Documents, Data Model Using an Embedded Document, Data
Model Using Document References.

Activity Proposed: Normalize College database using Normal forms.

Evaluation Method: Critical Thinking, Application of Normal forms on college database.

UNIT- V

Indexes and Working with Indexes, Index Types, Index Properties, Indexing Strategies.

Activity Proposed: Apply indexing techniques on database.

Evaluation Method: Critical Thinking, Application of Indexing Strategies on college database.

Text books:

1. “Fundamentals of Database Systems” by R.Elmasri and S.Navathe
2. “Database System Concepts” by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, 2010.
3. MongoDB Recipes: With Data Modeling and Query Building Strategies By Subhashini Chellappan, Dharanitharan Ganesan, Publisher: Apress

Reference books:

1. “Database Management Systems” by Raghu Ramakrishnan, McGrawhill, 2002
2. “Principles of Database Systems” by J.D.Ullman
3. MongoDB Basics 1st ed. Edition, by Peter Membrey (Author) Publisher: Apress

Web Links:

1. <https://docs.mongodb.com/manual/tutorial/getting-started>
2. <https://www.tutorialspoint.com/mongodb/index.htm>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc (Hons) Artificial Intelligence

Semester-III

Document Oriented Data Base

MODEL QUESTION PAPER

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|--|---------------------|------------|------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | 5 X 7 = 35 M | | | | |
| 1 | Characteristics of the Database Approach? (OR) Explain about DBMS Architecture. | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain about CAP Theorem. (OR) Explain about MongoDB Features. | 7M 7M | 3 3 | 2 2 | | |
| 3 | Explain about MongoDB CRUD Operations. (OR) Explain about Working with Arrays. | 4M 3M | 3 3 | 3 3 | | |
| 4 | Implementing aggregation operations in mongo db. (OR) Explain about Data Model Using an Embedded Document. | 4M 3M | 2 3 | 4 4 | | |
| 5 | Explain about Index Types in MongoDB (OR) Explain about Index Properties. | 7M 7M | 3 2 | 5 5 | | |
| SECTION – B | | | | | | |

| Answer any Five of the Following | | 5 X 2 = 10M | | | | |
|---|---|--------------------|---|---|--|--|
| 6 | Difference between Data and Information. | 2M | 2 | 1 | | |
| 7 | Insulation between Programs and Data. | 2M | 3 | 1 | | |
| 8 | Write a short note on Rich Query Language. | 2M | 2 | 2 | | |
| 9 | What are the Data Types present in MongoDB. | 2M | 2 | 2 | | |
| 10 | How do you delete documents in MongoDB? | 2M | 3 | 3 | | |
| 11 | Explain Collections in MongoDB. | 2M | 3 | 3 | | |
| 12 | Explain about Data Modelling. | 2M | 2 | 4 | | |
| 13 | Explain about Indexes. | 2M | 2 | 5 | | |

SECTION – C

| Answer ALL questions | | 5 X 1 = 5M | | | | |
|-----------------------------|--|-------------------|---|---|--|--|
| 14 | What concept allows different perspectives of the same data? | 1M | 3 | 1 | | |
| 15 | What type of data structure is BSON in MongoDB similar to? | 1M | 2 | 2 | | |
| 16 | Which field is automatically created as a unique identifier for documents? | 1M | 2 | 3 | | |
| 17 | What are the different structures that hold data in MongoDB? | 1M | 2 | 4 | | |
| 18 | What type of indexes store data in ascending or descending order? | 1M | 2 | 5 | | |

| | | | | | |
|---|--|---|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester II B.Sc. AI (III Sem) | | | |
| Course Code AI105P | DOCUMENT ORIENTED DATABASE | | | | |
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

The objective of this course is to enable student to implement database related queries using Mongo DB.

Course Outcomes:

| On Completion of the course, the students will be able to- | |
|--|---|
| CO1 | Installation of mongodb, configuring, running mongodb |
| CO2 | Implementation of crud operations |
| CO3 | Implementing index methods, aggregation methods |
| CO4 | To study and implement DDL, DML commands usingMYSQL |
| CO5 | Implementing MySQL Programs using Control Structures and functions. |

Lab Experiments:

WEEK 1: Installing configuring running of Mongo db

Week 2: Working with data base commands in mongo db

Week 3: Working with crud operations in mongo db

Week 4: Implementing aggregation operations in mongo db

Week 5: Implementing index operations

Week 6: Working with create, alter, drop, rename and Truncate tables using MYSQL

Week 7: Working with insert, update, delete, select statements using MYSQL

Week 8: Write an MYSQL Program to retrieve the data from two tables using joins.

Week 9: Write a MYSQL program to retrieve and display the names of the top5 students with highest marks in a specified course.

Week 10: Write an MYSQL Program to calculate the average marks of all students and display it along with their name.

@ @ @ @



Government College (Autonomous) Rajahmundry

Program & Semester

II B.Sc. AI

(III Sem)

Course Code
AI106

OPERATING SYSTEMS

| | | | | | |
|-----------------|--------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives

1. To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|--|
| CO1 | Demonstrate knowledge and comprehension of operating system functions. |
| CO2 | Analyze different process scheduling algorithms and apply them to manage processes and threads effectively |
| CO3 | Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems. |
| CO4 | Compare and contrast different memory allocation strategies and evaluate their effectiveness |
| CO5 | Evaluate disk scheduling algorithms while implementing OS security measures |

Syllabus:

UNIT –I

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

Activity: Case Study on a specific Operating System: highlighting its functions and key features.

Evaluation Method: Case study presentation, depth of understanding of operating system functions, and ability to articulate key concepts.

UNIT –II

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling- Non-Preemptive and Preemptive Scheduling Algorithms.

Activity: Comparison Poster on Scheduling Algorithms

Evaluation Method: Assessment of posters based on content accuracy, clarity of information, visual presentation, and ability to convey key insights.

UNIT –III

Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

Activity: Assignment on Dead Lock prevention techniques

Evaluation Method: Understanding, Completion and report.

UNIT –IV

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies–Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

Activity: Debate on various Memory allocation schemes

Evaluation Method: Debate arguments, ability to counter opposing viewpoints, logical reasoning, and presentation skills.

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence

Semester-III

Operating Systems

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|--|---------------------|--------|--------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | 5 X 7 = 35 M | | | | |
| 1 | Discuss about types of Operating Systems. (OR) Explain about functions of operating systems. | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain about preemptive scheduling algorithms. Illustrate with example. (OR) Explain about non preemptive scheduling algorithms. | 7M 7M | 3 3 | 2 2 | | |
| 3 | Explain Dead lock avoidance algorithm. (OR) Discuss methods of Inter process communication. | 7M 7M | 3 3 | 3 3 | | |
| 4 | Explain about paging and segmentation techniques with examples. (OR) Explain virtual memory concept with examples. | 7M 7M | 3 3 | 4 4 | | |
| 5 | Explain about disk scheduling algorithms. (OR) Explain File allocation methods with example. | 7M 7M | 3 3 | 5 5 | | |
| SECTION – B | | | | | | |

| Answer any Five of the Following | | 5 X 2 = 10M | | | | |
|---|---|--------------------|---|---|--|--|
| 6 | Write a short note on work station and hand held devices. | 2M | 3 | 1 | | |
| 7 | Write a short note on history of Operating System. | 2M | 3 | 1 | | |
| 8 | Write a short note on system calls. | 2M | 2 | 2 | | |
| 9 | Write a short note on thread libraries. | 2M | 2 | 2 | | |
| 10 | Write a short note on semaphores. | 2M | 3 | 3 | | |
| 11 | Write a short note on necessary conditions for deadlock. | 2M | 3 | 3 | | |
| 12 | Write a short note on Physical and Virtual address space. | 2M | 2 | 4 | | |
| 13 | Write a short note pipes. | 2M | 2 | 5 | | |

SECTION – C

| Answer ALL questions | | 5 X 1 = 5M | | | | |
|-----------------------------|--|-------------------|---|---|--|--|
| 14 | What type of system allows multiple programs to run concurrently on a computer? | 1M | 3 | 1 | | |
| 15 | What scheduling algorithm allocates CPU to processes without forcibly interrupting them? | 1M | 2 | 2 | | |
| 16 | What is a variable used to control access to shared resources among processes? | 1M | 2 | 3 | | |
| 17 | What concept allows processes to use more memory than physically available? | 1M | 2 | 4 | | |
| 18 | What mechanism allows inter-process communication using a temporary storage area? | 1M | 2 | 5 | | |

| Course Code | Title of the Course | L | T | P | C |
|---------------|------------------------------|---|---|---|---|
| 325704P | Operating Systems Lab | | | 2 | 1 |
| Prerequisites | C Programming | | | | |

Objectives:

1. Simulates various functions of an operating system like memory management, process management, device management, etc.

List of Experiments:

1. Illustrate the LINUX commands
 - a) pwd
 - b) mkdir
 - c) rmdir
 - d) grep
 - e) chmod
 - f) ls
 - g) rm
 - h) cp
2. Write a Program to calculate average waiting time and turnaround time of each process using the following CPU Scheduling algorithm for the given process schedules.
 - a) FCFS
 - b) SJF
 - c) Priority
 - d) Round Robin
2. Simulate MVT and MFT memory management techniques
3. Write a Program for Bankers Algorithm for Dead Lock Avoidance
4. Implement Bankers Algorithm Dead Lock Prevention.
5. Write a Program to simulate Producer-Consumer problem.
6. Simulate all Page replacement algorithms.
 - e) FIFO
 - f) LRU

- g) LFU
- h) Optimal
- 7. Simulate Paging Techniques of memory management
- 8. Simulate the following disk scheduling algorithms
 - a) FCFS
 - b) SSTF
 - c) SCAN
 - d) CSCAN

Reference Books:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition.

Virtual Lab Links:

1. <https://naim30.github.io/OS-virtual-lab/>





Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI
(III Sem)

Course Code
AI106P

OPERATING SYSTEMS LAB

| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

This course enables students to develop OS scheduling logics and also to gain hands-on experience of UNIX OS

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|--|
| CO1 | To implement CPU scheduling algorithms in c programming language |
| CO2 | To implement file/directory handling commands in UNIX. |
| CO3 | To display list of currently logged users in UNIX shell script |
| CO4 | To implement binary search using shell script |
| CO5 | To implement Fibonacci series using shell script |

Lab Experiments:

1. Write the program to implement CPU scheduling algorithm for first come first serve
2. Scheduling
3. Write the program to implement CPU scheduling algorithm for first come first serve
4. Scheduling
5. Write a program to implement CPU scheduling algorithm for shortest job first scheduling.
6. write a program to implement CPU scheduling algorithm for shortest job first scheduling.
7. Write a 'C' program to perform priority scheduling.
8. Write a 'C' program to perform priority scheduling.
9. Write a program to implement CPU scheduling for Round Robin Scheduling.
10. Execute various file/directory handling commands in UNIX.
11. Execute various file/directory handling commands in UNIX.
12. Write a Simple shell script for basic arithmetic and logical calculations.
13. Write a shell script to display list of users currently logged in.
14. Write a shell script to delete all the temporary files.

15. Write a shell script to search an element from an array using binary searching.
16. Write a shell script to determine whether a given number is a prime number or not
17. Write a shell script to print the first n Fibonacci numbers.
18. Execute various system administrative commands

@ @ @ @

**Government College (Autonomous) Rajahmundry****Program & Semester**
II B.Sc. AI
(III Sem)**Course Code**
AI107**Introduction to OOP using JAVA**

| | | | | | |
|-----------------|--------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives

1. To introduce the fundamental concepts of Object-Oriented programming and to design & implement object-oriented programming concepts in Java.

Course Outcomes

On Completion of the course, the students will be able to-

| | |
|-----|--|
| CO1 | Understand the basic concepts of Object-Oriented Programming and Java Program Constructs |
| CO2 | Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch |
| CO3 | Demonstrate various classes in different packages and can design own packages |
| CO4 | Manage Exceptions and Apply Threads |
| CO5 | Create GUI screens along with event handling |

Syllabus:**UNIT -I**

OOPs Concepts and Java Programming: Introduction to Object-Oriented concepts, procedural and object-oriented programming paradigm

Java programming: An Overview of Java, Java Environment, Data types, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(), Control Statements

Activity: Quiz on Object-Oriented Programming Concepts and Java Constructs

Evaluation Method: Quiz Performance and Knowledge Retention

UNIT –II

Arrays, Command Line Arguments, Strings-String Class Methods

Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static fields and methods, Constructors, and ‘this’ keyword, overloading methods and access

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, ‘super’ keyword, preventing inheritance: final classes and methods, the object class and its methods;

Polymorphism: Dynamic binding, method overriding, abstract classes and methods;

Activity: Object-Oriented Programming Assignment: Class Implementation

Evaluation Method: Assignment Completion and Correctness

UNIT –III

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface;

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Activity: Hands-on Lab Activity: Creating and Using Custom Java Packages

Evaluation Method: Lab Performance and Correctness of Code Implementation

UNIT –IV

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, The Console class, Serialization

Activity: Case Study Discussion on where multi-threading is crucial

Evaluation Method: Critical thinking, problem-solving, and presentation skills.

UNIT –V

GUI Programming with Swing- Introduction, MVC architecture, components, containers. Understanding Layout Managers - Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

Activity: GUI design contest using Java Swings

Evaluation Method: GUI design, Visual appearance and user friendliness, usability, and adherence to event handling principles.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books

1. Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11 th Edition, Prentice Hall, 2018.
2. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence

Semester-III

Introduction to OOP using JAVA

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|---|---------------------|------------|------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | 5 X 7 = 35 M | | | | |
| 1 | Explain about Object Oriented concepts in Java. (OR) Explain about data types and operators in Java. | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain about Method overloading and method overriding in Java. (OR) Explain Inheritance and types of Inheritance with example. | 7M 7M | 3 3 | 2 2 | | |
| 3 | Explain about Interfaces in Java. (OR) Explain about exception handling techniques in Java. | 7M 7M | 3 3 | 3 3 | | |
| 4 | Explain about Inter thread communication in Java. (OR) Explain about byte streams and character streams in Java. | 7M 7M | 3 3 | 4 4 | | |
| 5 | Explain about Layout managers in Java. (OR) Explain about Keyboard event handling technique in Java | 7M 7M | 3 3 | 5 5 | | |

| | | | | | | |
|--|-----------------------|--|--|--|--|--|
| | with example program. | | | | | |
|--|-----------------------|--|--|--|--|--|

SECTION – B

Answer any Five of the Following

5 X 2 = 10M

| | | | | | | |
|----|---|----|---|---|--|--|
| 6 | Explain a short note on type conversion and type casting. | 2M | 3 | 1 | | |
| 7 | Write a short note on scope and lift time of a variables in Java. | 2M | 3 | 1 | | |
| 8 | Write a short note “this” and “super” keyword in Java. | 2M | 2 | 2 | | |
| 9 | Explain a short note on command online arguments in Java. | 2M | 2 | 2 | | |
| 10 | Explain about Array declaration and initialization with example. | 2M | 3 | 3 | | |
| 11 | Explain any three character handling functions. | 2M | 3 | 3 | | |
| 12 | Explain about recursive functions. | 2M | 2 | 4 | | |
| 13 | Explain about differences between structures and unions. | 2M | 2 | 5 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|---|----|---|---|--|--|
| 14 | Wrapping of data and functions into a single unit is called _____ | 1M | 3 | 1 | | |
| 15 | What is constructor? | 1M | 2 | 2 | | |
| 16 | What is package? | 1M | 2 | 3 | | |
| 17 | What keyword is used to prevent concurrent access to a block of code? | 1M | 2 | 4 | | |
| 18 | What layout manager divides the container into five regions? | 1M | 2 | 5 | | |

| Course Code | Title of the Course | L | T | P | C |
|---------------|---|---|---|---|---|
| 325701P | Object Oriented Programming using Java Lab | | | 2 | 1 |
| Prerequisites | C Programming | | | | |

Objectives

1. Design & implement object-oriented programming concepts in Java.

List of Experiments

1. Write a Java program to print Fibonacci series using for loop.
2. Write a Java program to calculate multiplication of 2 matrices.
3. Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.
4. Write a Java program that implements method overloading.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program to implement various types of inheritance
8. i. Single ii. Multi-Level iii. Hierarchical iv. Hybrid
9. Write a java program to implement runtime polymorphism.
10. Write a Java program which accepts withdraw amount from the user and throws an exception “In Sufficient Funds” when withdraw amount more than available amount.
11. Write a Java program to create three threads and that displays “good morning”, for every one second, “hello” for every 2 seconds and “welcome” for every 3 seconds by using extending Thread class.
12. Write a Java program that creates three threads. First thread displays “OOPS”, the second thread displays “Through” and the third thread Displays “JAVA” by using Runnable interface.
13. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.

14. Implement a Java program for handling key events when the key board is pressed, released, typed.
15. Write a Java swing program that reads two numbers from two separate text fields and display sum of two numbers in third text field when button “add” is pressed.
16. Write a Java program to design student registration form using Swing Controls. The form which having the following fields and button SAVE
17. Form Fields are: Name, RNO, Mailid, Gender, Branch, Address.

Reference Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.

Virtual Lab Links:

1. <https://java-iitd.vlabs.ac.in/>





Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI (III Sem)

Course Code
AI108

TITLE OF THE COURSE
INFERENCEAL STATISTICS

| | | | | | |
|-----------------|--------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives:

This course enables students to gain knowledge in sampling, hypothesis testing and non-parametric methods.

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|---|
| CO1 | Fundamental understanding of Parametric models for developing relevant inferences on associated parameters, |
| CO2 | knowledge of point and interval estimation procedures and different methods of point estimation |
| CO3 | using Neyman Pearson Lemma and finding Uniformly Most Powerful Test, |
| CO4 | various basic concepts on sampling distributions and large sample tests based on normal distribution |
| CO5 | small sample tests based on chi-square, Student's and Snedecor's F distributions |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

Theory of Estimation: Parameter, Statistic, Standard Error of the statistic, concept of bias and mean square error of an estimate, Criteria of good estimator - unbiasedness, consistency, efficiency, and sufficiency. Methods of estimation- Maximum Likelihood estimator(MLE) and Method of Moments(MME). Concepts of confidence interval and confidence coefficient, confidence intervals for the parameters of univariate normal,

Activity Proposed: Applying various methods of estimation on Real time data.

Evaluation Method: Correctness of Estimation methods.

UNIT- II

Testing of Hypothesis: Statistical hypotheses, critical region, size and power of a test, most powerful test, two types of errors. Neyman Pearson lemma (WITHOUT PROOF) and its applications, uniformly most powerful unbiased test . One and two tailed tests. Procedure for testing of hypothesis, Tests of significance of large samples - Single proportion and difference of proportions, single mean and difference of means.

Activity Proposed: Testing of Hypothesis on Real time data.

Evaluation Method: Correctness of Inferences on Data.

UNIT- III

Exact Sampling distributions: Student's t-distribution, Chi-square distribution, Snedecor's F-distribution definitions, properties and applications. Tests of significance for small samples: Student's t-distribution - single mean, difference of means and paired t-test. Chi-square distribution- test for goodness of fit and independence of attributes.

Activity Proposed: Problem solving on various sampling distributions.

Evaluation Method: Correctness of Sampling distribution.

UNIT- IV

F-distribution definition, properties and applications F-test for equality of two population variances. ANOVA one way and two-way classifications

Activity Proposed: Applying ANOVA one way and two-way classification of data.

Evaluation Method: Correctness of Classification of Data.

UNIT- V

Non-parametric methods- definition, advantages and disadvantages. One sample test- Sign test, Run test, Wilcoxon-signed rank test. Two independent sample tests: Median test, Wilcoxon- Mann Whitney U - test, Kreskas Wallis test - Simple Problems Note: Without proofs of named theorems and more importance to applications.

Activity Proposed: Assignment on Non-parametric methods.

Evaluation Method: Assignment Completeness and correctness.

Textbooks:

1. S.C. Gupta, (2019), Seventh Edition, Fundamentals of Statistics, Mumbai: Himalaya PublishingHouse.
2. Sharma, J. K. (2013), Business statistics, New Delhi: Pearson Education

Reference books:

1. Levine, D.M., Berenson, M. L. & Stephan, D. (2012), Statistics for managers using Microsoft Excel, New Delhi: Prentice Hall India Pvt.
2. Aczel, A. D. & Sounderpandian, J. (2011), Complete Business Statistics, New Delhi: Tata McGrawHill.
3. Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013), Statistics for Business and Economics, New Delhi: Cengage Learning.
4. Davis, G., & Pecar, B. (2014), Business Statistics using Excel, New Delhi: Oxford University Press.

Web Links:

1. <http://onlinestatbook.com/rvls/index.html>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence

Semester-III

**INFERENTIAL STATISTICS
MODEL QUESTION PAPER (W.E.F 2024-2025)**

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|---|--------------|------------|---------------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | | 5 X 7 = 35 M | | |
| 1 | Identify the parameters of the underlying population distribution and the corresponding statistics you will use to estimate them. (OR) Calculate the sample mean and sample variance of the given data. | 7M 7M | 3 | | | |
| 2 | Explain the concept of the critical region in hypothesis testing. (OR) Explain the tests of significance for large samples. | 7M 7M | 2 3 | | | |
| 3 | Explain student’s t-Distribution. (OR) Explain Snedecor’s F-Distribution. | 7M 7M | 3 3 | | | |
| 4 | Define the F-distribution. Discuss its properties, including degrees of freedom and shape. (OR) Explain the steps involved in conducting one-way ANOVA. | 7M 7M | 3 3 | | | |
| 5 | Define and discuss Median test, Wilcoxon-Mann-Whitney U test, and Kruskal-Wallis test. (OR) | 7M | 3 | | | |

| | | | | | | |
|--|--|----|---|--|--|--|
| | Explain non parametric methods advantages and disadvantages. | 7M | 3 | | | |
|--|--|----|---|--|--|--|

SECTION – B

Answer any Five of the Following

5 X 2 = 10M

| | | | | | | |
|----|---|----|---|---|--|--|
| 6 | Calculate the sample mean of the given data: {4.5,5.2,6.1,5.8,5.9,6.3,5.7,4.9,6.0,5.5} | 2M | 3 | | | |
| 7 | What is the mean square error (MSE), and how does it relate to bias and variance? | 2M | 2 | | | |
| 8 | Differentiate between the null hypothesis and the alternative hypothesis. | 2M | 4 | | | |
| 9 | What is the difference between a one-tailed test and a two-tailed test? | 2M | 4 | | | |
| 10 | Provide an example of a real-world study where the F-test for equality of variances would be applied. | 2M | 3 | | | |
| 11 | In what situations would you choose to use ANOVA over non-parametric alternatives? | 2M | 3 | | | |
| 12 | What is a limitation of the Median test compared to parametric tests? | 2M | 2 | 4 | | |
| 13 | Describe the basic procedure of conducting a Sign test. | 2M | 2 | 4 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|--|----|---|---|--|--|
| 14 | What represents a characteristic of a population? | 1M | 3 | 1 | | |
| 15 | What is the probability of type I error? | 1M | 2 | 2 | | |
| 16 | What distribution is used for comparing variances of two populations? | 1M | 2 | 3 | | |
| 17 | What distribution describes the ratio of two independent chi-square variables divided by their degrees of freedom? | 1M | 2 | 4 | | |
| 18 | What test examines patterns in sequential data? | 1M | 2 | 5 | | |



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI
(III Sem)

Course Code
AI108P

TITLE OF THE COURSE
INFERENCEAL STATISTICS

| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

This course enables students to gain hands-on practical experience of SPSS for analysing data by implementing sample tests, ANOVA and nonparametric tests..

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|--|
| CO1 | Apply the various statistical methods for real life problems PO2 |
| CO2 | Apply the SPSS techniques and give the interpretations. PO2 |

Lab Experiments:

1. Large Sample Tests: Test of significance of (a) Single Mean (b) Difference of means
2. Large Sample Tests: Test of significance of (a) Single Proportion (b) Difference of Proportions
3. Small Sample Tests: t-Test for significance of (a) Single mean (b) Difference of means-samples are independent (c) Difference of means- samples are dependent
4. Chi square Test of (a) Independence 2x2 Cross tabulation, (b) Goodness of fit
5. Test for several means ANOVA (a) One-way (b) Two-way classification,
6. Non Parametric Tests (a) Mann Whitney U test, (b) Wilcoxon Signed ranks test, (c) Kruskal Wallis Test, (d) Friedman test

Note: Training shall be in SPSS and derive the results. The SPSS output shall be exported to MS word for writing inference.

Reference Manual: Practical Manual -Prepared by the Department

Faculty Members Websites of Interest:

<http://www.statsci.org/datasets.html>

SEMESTER-IV



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI(IV Sem)

Course Code
AI109

TITLE OF THE COURSE
DATA WAREHOUSING AND DATA MINING

| | | | | | |
|-----------------|--------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 45 (Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives:

1. The course should enable the students to learn principles of Data warehousing and data mining with its architecture and understand data preprocessing methods to perform classification and prediction of data
2. Technical knowledge is helpful to implement Data Mining principles and techniques for real time applications.

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|---|
| CO1 | Explain different data types and data preprocessing techniques |
| CO2 | Apply data warehouse models for any given data sets. |
| CO3 | Identify associations and correlations on any given data sets |
| CO4 | Apply classification techniques on any given data sets. |
| CO5 | Identify clusters using clustering techniques on any given data sets. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

Data mining-On what kinds of Data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, major issues in Data Mining.

DATA PREPROCESSING: An Overview, Data Cleaning, Data Integration, Data Reduction, Data

Transformation and Data discretization.

UNIT- II

DATA WAREHOUSE AND OLAP TECHNOLOGY: Data Warehouse: Basic concepts, Differences between OLAP and OLTP systems, Data Warehousing Architecture, Data Warehouse Modeling: Data Cube, Star, Snowflakes and Fact Constellations, Concept Hierarchies, Measures, OLAP Operations,

Data Warehouse Implementation, Data cube computation method- Multi way array aggregation for full cube computation.

DATA GENERALISATION: Data generalization by Attribute-Oriented Induction.

UNIT- III

MINING FREQUENT PATTERNS, ASSOCIATION AND CORRELATIONS:

Basic Concepts- Market Basket Analysis, Frequent Itemsets, Closed Itemsets, Associations Rules, Frequent Item set Mining Methods-Apriori Algorithm, Improving the Efficiency of Apriori, A pattern growth approach for Mining Frequent Item sets, Which patterns Are interesting?-Pattern Evaluation methods.

UNIT- IV

Classification by Decision Tree Induction, Bayesian Classification, RuleBased Classification, Classification by Back propagation

Model Evaluation and Selection-Metrics for Evaluating Classifier performance, Holdout Method and Random Subsampling, Cross-Validation, Bootstrap.

UNIT- V

CLUSTER ANALYSIS: BASIC CONCEPTS: Cluster analysis, Partitioning Methods (k- Means, k-Medoids) Hierarchical Methods: Agglomerative Vs Divisive, (BIRCH), DensityBased Methods: DBSCAN, Grid-Based Methods (STING).

Textbooks:

1. Jiawei Han & Micheline Kamber, “Data Mining – Concepts and Techniques”, 3rd Edition, Morgan Kaufmann Publishers, 2011
2. Margaret H Dunham, “Data Mining Introductory and advanced topics”, 6th Edition, Pearson

Education, 2009.

Reference books:

1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, TataMcGraw Hill Edition, Tenth Reprint 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory andPractice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter EconomyEdition, Prentice Hall of India, 2006.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc20_cs12/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium];3: Substantial[High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence.

Semester-IV

DATA WAREHOUSING AND DATA MINING
MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|---|---|--------------|------------|---------------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | | 5 X 7 = 35 M | | |
| 1 | What is Data Mining? Explain What kind of data can be mined. (OR) Explain Data cleaning and Data Integration process with illustrative examples | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain Data Warehouse architecture. (OR) Discuss the differences between OLAP and OLTP processing. | 7M 7M | 2 3 | 2 2 | | |
| 3 | Explain Apriori algorithm with example. (OR) Explain Pattern-growth approach for mining frequent patterns. | 7M 7M | 3 3 | 3 3 | | |
| 4 | Explain Decision tree induction algorithm. (OR) Explain Bayesian Classification with an illustrative example. | 7M 7M | 3 3 | 4 4 | | |
| 5 | Explain K-Means, K-Medoids clustering algorithm. (OR) Explain DBScan algorithm with an illustrative example. | 7M 7M | 3 3 | 5 5 | | |
| SECTION – B | | | | | | |
| Answer any Five of the Following | | | | 5 X 2 = 10M | | |

| | | | | | | |
|----|--|----|---|---|--|--|
| 6 | Write a short note on issues in Data Mining. | 2M | 2 | 1 | | |
| 7 | Illustrate Data reduction process with an example. | 2M | 3 | 1 | | |
| 8 | Write a short note on star schema. | 2M | 2 | 2 | | |
| 9 | Illustrate Rollup and Drill Down operations. | 2M | 3 | 2 | | |
| 10 | Write a short Note on Support and Confidence. | 2M | 3 | 3 | | |
| 11 | Write short note pattern evaluation methods. | 2M | 3 | 3 | | |
| 12 | Write a short note on Random subsampling. | 2M | 3 | 4 | | |
| 13 | Write a short note on Hierarchical clustering algorithm. | 2M | 2 | 5 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|--|----|---|---|--|--|
| 14 | What is meta data. | 1M | 3 | 1 | | |
| 15 | What is the process of removing noise and correcting inconsistencies in data? | 1M | 2 | 2 | | |
| 16 | What is the technique for predicting a continuous value? | 1M | 2 | 3 | | |
| 17 | What method builds a tree of clusters? | 1M | 2 | 4 | | |
| 18 | What type of data mining involves extracting information from geographical data? | 1M | 2 | 5 | | |



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI(IV Sem)

Course Code
AI109P

TITLE OF THE COURSE
DATA WAREHOUSING AND DATA MINING

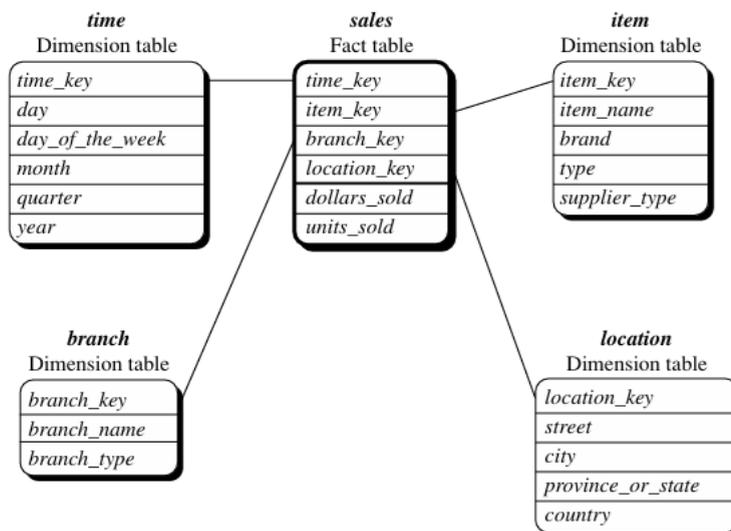
| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

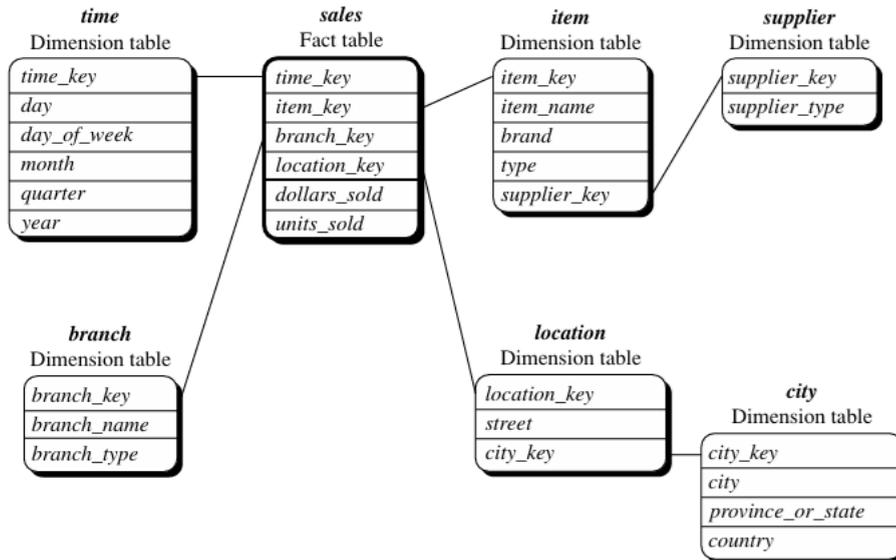
This course enables students to practically implement various data mining techniques.

Lab Experiments:

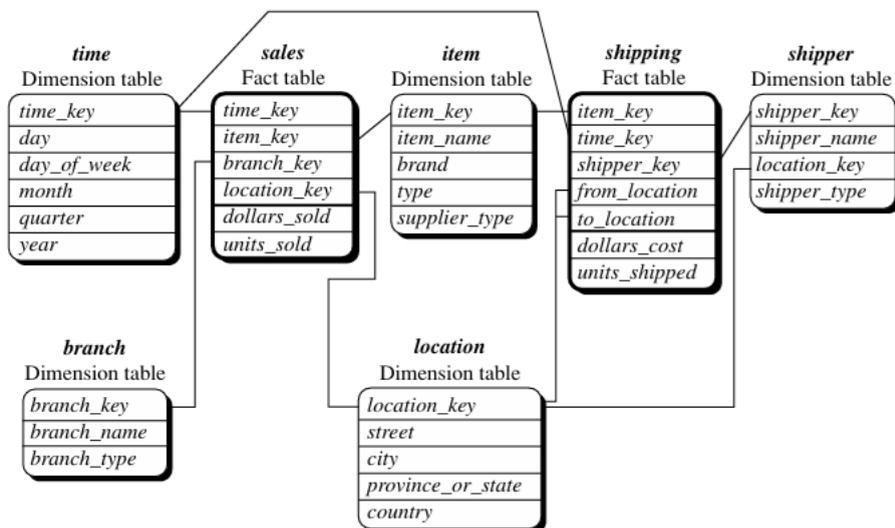
1. Creating Star schema for the following diagram



2. Create Snowflake schema for the following diagram.



3. Create fact Constellation schema for the following diagram.



4. Demonstrate OLAP operations.

5. Pre-process a given dataset based on Attribute selection.

| TID | ITEMS |
|-----|---------|
| 100 | 1,3,4 |
| 200 | 2,3,5 |
| 300 | 1,2,3,5 |
| 400 | 2,5 |

6. Generate Association Rules using the Apriori Algorithm.

| TID | ITEMS |
|-----|---------|
| 100 | 1,3,4 |
| 200 | 2,3,5 |
| 300 | 1,2,3,5 |
| 400 | 2,5 |

7. Generating Association Rules Using FP Growth Algorithm

| TID | ITEMS |
|-----|---------|
| 100 | 1,3,4 |
| 200 | 2,3,5 |
| 300 | 1,2,3,5 |
| 400 | 2,5 |

8. Generate a Decision Tree by using ID3 algorithm.

9. To apply naïve bayes classifier on a given data set.

| AGE | INCOME | STUDENT | CREDIT_RATING | BUYS_COMPUTER |
|-------|--------|---------|---------------|---------------|
| <30 | High | No | Fair | No |
| <30 | High | No | Excellent | No |
| 31-40 | High | No | Fair | Yes |
| >40 | Medium | No | Fair | Yes |
| >40 | Low | Yes | Fair | Yes |
| >40 | Low | Yes | Excellent | No |
| 31-40 | Medium | Yes | Excellent | Yes |
| <=30 | Low | No | Fair | No |
| <=30 | Medium | Yes | Fair | Yes |
| >40 | Medium | Yes | Fair | Yes |
| <30 | Medium | Yes | Excellent | Yes |
| 31-40 | Medium | No | Excellent | Yes |
| 31-40 | High | Yes | Fair | Yes |
| >40 | Medium | No | Excellent | No |

10. Calculating information gain measures.

11. Apply k-means clustering on a given dataset.

12. Perform Hierarchical clustering algorithm



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI(IV Sem)

Course Code
AI110

TITLE OF THE COURSE
MACHINE LEARNING USING PYTHON

| | | | | | |
|-----------------|--------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 45(Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives:

1. To understand the basic concepts of machine learning.
2. To understand and build supervised learning models.
3. To understand and build unsupervised learning models.
4. To evaluate the algorithms based on corresponding metrics identified

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|---|
| CO1 | Explain the basic concepts of machine learning. |
| CO2 | Understand Model performance evaluation. |
| CO3 | Illustrates Supervised Machine Learning – Regression, Classification. |
| CO4 | Understands Unsupervised Machine Learning. |
| CO5 | Understand Artificial Neural Networks, Deep Learning. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

INTRODUCTION TO MACHINE LEARNING

Introduction to Machine Learning: Types of human learning, What is machine learning?, Types of machine learning– supervised, unsupervised, semi-supervised and reinforcement learning, machine learning activities, applications of machine learning.

Model Preparation, Evaluation and feature engineering: Types of data in machine learning, Exploring

structure of data,

Activity: Case Study of real-world applications of Machine Learning

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

UNIT- II

Data pre-processing, Model selection and training (for supervised learning), Model representation and interpretability, Evaluating machine learning algorithms and performance enhancement of models. What is feature engineering?, Feature transformation, Feature subset selection. Principal component analysis.

Activity: Seminar on Types of data in machine Machine Learning.

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

UNIT- III

Supervised Learning - Regression: Introduction of regression, Regression algorithms: Simple linear regression, Multiple linear regression, Polynomial regression model, Logistic regression, Maximum likelihood estimation.

Supervised Learning - Classification: Introduction of supervised learning, Classification model and learning steps, Classification algorithms: Naïve Bayes classifier, k-Nearest Neighbour (kNN), Decision tree, Support vector machines, Random Forest.

Activity: Seminar on Supervised Machine Learning Algorithms

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

UNIT- IV

Unsupervised Learning: Introduction of unsupervised learning, Unsupervised vs supervised learning, Application of unsupervised learning, Clustering and its types, Partitioning method: k-Means and K-Medoids, Hierarchical clustering, Density-based methods – DBSCAN.

Activity: Analyze data set using Naïve Bayes classifier.

Evaluation Method: Hands-on activity, evaluating the understanding and analysis of Naïve Bayes classifier.

UNIT- V

| | | | | | | | | | | | | | |
|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| CO5 | | | | | | | | | | | | | |
|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence.

Semester-IV

MACHINE LEARNING USING PYTHON
MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|---|--|----------|---------------------|--------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | 5 X 7 = 35 M | | | |
| 1 | Explain about types of Machine Learning? (OR) Explain Model preparation and Model evaluation. | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain Data preprocessing. (OR) Explain Principal Component Analysis. | 7M 7M | 2 3 | 2 2 | | |
| 3 | Discuss the differences between Linear and Logistic regression. (OR) Explain Support Vector Machine with illustrative example. | 7M 7M | 4 3 | 3 3 | | |
| 4 | Explain K-Means clustering algorithm with illustrative example. (OR) Explain Hierarchical clustering algorithm. | 7M 7M | 3 3 | 4 4 | | |
| 5 | Explain about Architecture of Neural Networks. (OR) Explain Re-enforcement learning. | 7M 7M | 3 3 | 5 5 | | |
| SECTION – B | | | | | | |
| Answer any Five of the Following | | | 5 X 2 = 10M | | | |
| 6 | Write a short note on applications of Machine Learning. | 2M | 2 | 1 | | |
| 7 | Write a short note on structure of Data. | 2M | 2 | 1 | | |
| 8 | Explain about Model selection and training. | 2M | 2 | 2 | | |
| 9 | Explain about Feature Transformation. | 2M | 2 | 2 | | |
| 10 | Write a short note on Maximum Likelihood Estimations | 2M | 2 | 3 | | |

| | | | | | | |
|----|--|----|---|---|--|--|
| 11 | Write a short note on Random Forest. | 2M | 2 | 3 | | |
| 12 | Write a short note on Clustering and it's types. | 2M | 2 | 4 | | |
| 13 | Write a short note on Spam filtering. | 2M | 2 | 5 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|--|----|---|---|--|--|
| 14 | What type of learning is supervised by labeled data? | 1M | 2 | 1 | | |
| 15 | Name One dimensionality reduction technique | 1M | 2 | 2 | | |
| 16 | Which algorithm predicts continuous values? | 1M | 2 | 3 | | |
| 17 | What type of learning does not use labeled data? | 1M | 2 | 4 | | |
| 18 | What is the smallest computational unit in a neural network? | 1M | 2 | 5 | | |



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI(IV Sem)

Course Code
AI110P

TITLE OF THE COURSE
MACHINE LEARNING USING PYTHON

| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

1. To understand the basic concepts of machine learning.
2. To understand and build supervised learning models.
3. To understand and build unsupervised learning models.
4. To evaluate the algorithms based on corresponding metrics identified

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|---|
| CO1 | Explain the basic concepts of machine learning. |
| CO2 | Construct supervised learning models. |
| CO3 | Construct unsupervised learning algorithms. |
| CO4 | Evaluate and compare different models |

Lab Experiments:

1. Write a python program to import and export data using Pandas library functions.
2. Demonstrate various data pre-processing techniques for a given dataset
3. Implement Dimensionality reduction using Principle Component Analysis (PCA) method.
4. Write a Python program to demonstrate various Data Visualization Techniques.
5. Implement Simple and Multiple Linear Regression Models.
6. Develop Logistic Regression Model for a given dataset.
7. Develop Decision Tree Classification model for a given dataset and use it to classify anew sample.
8. Implement Naïve Bayes Classification in Python.
9. Build KNN Classification model for a given dataset.
10. Build Artificial Neural Network model with back propagation on a given dataset.

- a. Implement Random forest ensemble method on a given dataset.
 - b. Implement Boosting ensemble method on a given dataset.
11. Write a python program to implement K-Means clustering Algorithm.

| | | | | | |
|---|--|--|---|---|---|
|  | Government College (Autonomous) Rajahmundry | Program & Semester II B.Sc. AI(IV Sem) | | | |
| Course Code AI111 | TITLE OF THE COURSE INTRODUCTION TO AI | | | | |
| Teaching | Hours Allocated: 45(Theory) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | 3 | | | 3 |

Course Objectives:

1. The objective of this course is to educate students in basic Artificial Intelligence concepts and provide insights of solving problems using AI
2. This course also aims to educate students in basics of practical natural language processing and robotics.

Course Outcomes:

| | |
|--|--|
| On Completion of the course, the students will be able to- | |
| CO1 | Understand the need of AI and Intelligent Agents. |
| CO2 | Understand knowledge based agents and propositional logic. |
| CO3 | Gain knowledge about learning agents and decision trees. |
| CO4 | Gain knowledge about practical applications of NLP. |
| CO5 | Understand parts, tasks and architecture of Robotics. |

Course with focus on employability / entrepreneurship / Skill Development modules

| | | | | | |
|-------------------|--|---------------|--|------------------|--|
| Skill Development | | Employability | | Entrepreneurship | |
|-------------------|--|---------------|--|------------------|--|

Syllabus

UNIT- I

Introduction to AI: What is AI? AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT-II

Searching: Searching for solutions, uniformed search strategies Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT--III

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.

UNIT--IV

First order logic: Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT--V

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, knowledge engineering, scope of knowledge, difficulties in knowledge acquisition methods of machine learning, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds

Textbooks:

1. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
2. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers
3. Stuart Russell, Peter Norvig: "Artificial Intelligence: A Modern Approach",2nd Edition, Pearson Education, 2007

Reference books:

1. Artificial Neural Networks B. Yagna Narayana, PHI
2. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).
3. Artificial Intelligence and Expert Systems Patterson PHI.
4. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
5. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition Pearson Education.
6. Neural Networks Simon Haykin PHI

Web Links:

1. <https://www.javatpoint.com/artificial-intelligence-ai>
2. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.html
3. https://www.academia.edu/32098490/Introduction_to_artificial_intelligence

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium];3: Substantial[High], '-' : No Correlation)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

Model Blue print for the question paper setter

| Blue Print | | | | | |
|------------|-------|----------|-----------|-------------|-----------|
| S.No. | UNIT- | Essay 7M | Short 2 M | One word 1M | Weightage |
| 1 | I | 2 | 2 | 1 | 21.74% |
| 2 | II | 2 | 2 | 1 | 21.74% |
| 3 | III | 2 | 2 | 1 | 21.74% |
| 4 | IV | 2 | 1 | 1 | 17.39% |
| 5 | V | 2 | 1 | 1 | 17.39% |
| | | 70 | 16 | 5 | |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hons) Artificial Intelligence.

Semester-IV

INTRODUCTION TO AI

MODEL QUESTION PAPER (W.E.F 2024-2025)

Time: 2 ½ Hrs.

Max Marks: 50

| Q.No | Question | Marks | BL | CO | PO | PI |
|-----------------------------|--|--------------|---------------------|------------|----|----|
| SECTION – A | | | | | | |
| Answer All Questions | | | 5 X 7 = 35 M | | | |
| 1 | Explain about problem solving agents? (OR) What is AI? Explain about AI Problems? | 7M 7M | 2 2 | 1 1 | | |
| 2 | Explain A* algorithm in detail with a suitable example. (OR) Explain heuristic search technique applied to a hill-climbing problem with an example ? | 7M 7M | 2 3 | 2 2 | | |
| 3 | Explain in brief about the issues in representation of knowledge? (OR) Explain about semantic nets? | 7M 7M | 3 3 | 3 3 | | |
| 4 | Explain about Backward chaining? (OR) Explain about Inference in first order logic | 7M 7M | 3 3 | 4 4 | | |
| 5 | What is Expert system? Explain different types of Expert system? (OR) | 7M 7M | 4 3 | 5 5 | | |

| | | | | | | |
|--|---|--|--|--|--|--|
| | Explain the following i) Model based reasoning ii) Case based reasoning | | | | | |
|--|---|--|--|--|--|--|

SECTION – B

Answer any Five of the Following

5 X 2 = 10M

| | | | | | | |
|----|---|----|---|---|--|--|
| 6 | Write a short note on rationality? | 2M | 2 | 1 | | |
| 7 | Explain about structure of agents? | 2M | 2 | 1 | | |
| 8 | Write about Alpha-Beta pruning? | 2M | 2 | 2 | | |
| 9 | Explain about hill climbing? | 2M | 2 | 2 | | |
| 10 | Explain about Dempstershafer theory? | 2M | 2 | 3 | | |
| 11 | Write a short note on Reinforcement Learning? | 2M | 2 | 3 | | |
| 12 | What are the applications of expert system? | 2M | 2 | 4 | | |
| 13 | What is predicate logic with example? | 2M | 2 | 5 | | |

SECTION – C

Answer ALL questions

5 X 1 = 5M

| | | | | | | |
|----|--|----|---|---|--|--|
| 14 | Which term refers to the surroundings an agent operates in? | 1M | 3 | 1 | | |
| 15 | Which search strategy explores all nodes level by level? | 1M | 2 | 2 | | |
| 16 | Which theorem provides a way to update probabilities based on new evidence | 1M | 2 | 3 | | |
| 17 | What is the basic unit of logic, involving true or false statements? | 1M | 2 | 4 | | |
| 18 | What type of reasoning relies on predefined structures like frames? | 1M | 2 | 5 | | |



Government College (Autonomous) Rajahmundry

Program & Semester
II B.Sc. AI(IV Sem)

Course Code
AI111P

TITLE OF THE COURSE
INTRODUCTION TO AI

| | | | | | |
|-----------------|---------------------------------|---|---|---|---|
| Teaching | Hours Allocated: 30 (Practical) | L | T | P | C |
| Pre-requisites: | Should have computer knowledge | | | 2 | 1 |

Course Objectives:

The objective of this course is to enable students to analyse various AI related problems and develop a solution using Python programming language.

Course Outcomes:

On Completion of the course, the students will be able to-

| | |
|-----|---|
| CO1 | Develop various basic python programs. |
| CO2 | Analyze and develop solutions for various problems like water jug, Tic Tack Toe, etc. |
| CO3 | Develop programs using DFS, BFS, A* and hill climbing algorithms. |
| CO4 | Develop python programs for analyzing given data set. |
| CO5 | Develop python programs for implementing Bayes Classification. |

Lab Experiments:

1. A) Basic programs in python.
B) Programs demonstrating list, Vector, Matrix and Array
2. Solving water jug problem using Python.
3. Implementing DFS and BFS using Python.
4. Solve 8 puzzle problem using A* algorithm.
5. Solve 8 puzzle problem using hill climbing Algorithm.
6. Implement Tic Tac Toe game using Python.
7. Develop Python code for mini max algorithm.
8. Develop Python code for Hangman game.
9. A) Develop Python code for removing punctuation marks from the given string.
B) Develop Python code for sorting the sentence in alphabetical order.
10. A) Using Pylog programming, display first order logic.

- B) Using Pylog programming, display unification process.
- 11. A) Find mean and mode for given data set.
B) Calculate variance and standard deviation for given data set.
- 12. A) Determining probability of a prime number appearing when a 20 sided die is rolled.
B) Time series analysis to predict rain fall information base on record.
- 13. Predict the class of testing sample using Bayes Classification.

@ @ @ @

