Department of
Computer Science

B. Sc.
Artificial Intelligence

BOS-2023-24

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.

:

Government College (A), Rajahmundry

Credit Framework

B.Sc (Honours) with Single Major																							
Semester	**Major* (4 Cr)**			**Minor (4 Cr)**			**AECC (3 Cr)**			**Multi Disny' (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 respetive major**																							
																				IKS#				
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 ProbabilityDistribution	3	3
			Statistical Data Analysis Using SPSS - ILab	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 - IILab	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 usingPython	3	3
			Introduction to Predictive Analytics usingPython 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

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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

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SEMESTER-I

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	Government College (Autonomous) Rajahmundry	**Program & Semester** I B.Sc. AI(II 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 fundamentalareas 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 fundamentalareas 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.

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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 theinterdisciplinary 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
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker

Reference Books

1. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway andJohn W. Jewett Jr.
2. Physics for Technology and Engineering" by John Bird
3. Chemistry in daily life by Kirpal Singh
4. Chemistry of bio molecules by S. P. Bhutan
5. Fundamentals of Computers by V. Raja Raman
6. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Web Links:

1. https://archive.nptel.ac.in/courses/111/105/111105121/

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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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

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GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
(Accredited by NAAC "A+" Grade)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
I B.Sc. Semester-I
Essentials and Applications of Mathematical, Physical and Chemical Sciences
MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Q1
2. Q2
3. Q3
4. Q4
5. Q5
6. Q6
7. Q7
8. Q8

SECTION - II

Answer following question **5 X 7 = 35M**

9. Q9

(OR)

10. Q10
11. Q11

(OR)

12. Q12
13. Q13

(OR)

14. Q14

15. Q15

(OR)

16. Q16

17. Q17

(OR)

18. Q18

Government College (A), Rajahmundry

Curriculum 2023-24 **Version 1.0**

	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 advancesand cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broadenstudents' 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 areasof 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.

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Curriculum 2023-24 **Version 1.0**

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 onproduct 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 ofintersection.

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 pollutantson 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

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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

Reference Books

1. Environmental Chemistry by Anil.K.D.E.
2. Digital Logic Design by Morris Mano
3. Data Communication & Networking by Bahrouz Forouzan.
4. Functions of one complex variable by John.B.Conway, Springer- Verlag.
5. Elementary Trigonometry by H.S.Hall and S.R.Knight
6. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd. 4.Basic Statistics by B.L.Agarwal, New age international Publishers
7. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
8. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker

Web Links:

1. https://archive.nptel.ac.in/courses/111/105/111105121/

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													

Government College (A), Rajahmundry

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Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

Government College (A), Rajahmundry

Curriculum 2023-24 **Version 1.0**

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
(Accredited by NAAC "A+" Grade)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
I B.Sc. Semester-I
Advances in Mathematical, Physical and ChemicalSciences
MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Q1
2. Q2
3. Q3
4. Q4
5. Q5
6. Q6
7. Q7
8. Q8

SECTION - II

Answer following question **5 X 7 = 35M**

9. Q9

(OR)

10. Q10

11. Q11

(OR)

12. Q12

13. Q13

(OR)

14. Q14

15. Q15

(OR)

16. Q16

17. Q17

(OR)

18. Q18

Semester-II

Government College (A), Rajahmundry

Curriculum 2023-24 **Version 1.0**

	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 toreal 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.

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

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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 Wesley Data and Analytics series,©2018

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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 Wesley Data 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-	Short 3 M	Essay 7 M	Weightage
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4	IV	1	2	18.75%
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		24	70	

Government College (A), Rajahmundry

Curriculum 2023-24 **Version 1.0**

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 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - A

Answer any FIVE Questions **5 X 3= 15M**

1. Write a program using continue.
2. Write a short note on type conversion.
3. Write a short note on the return statement.
4. How to make your own modules.
5. Explain set operations.
6. Explain any three-character handling functions.
7. What are the objects in pandas?
8. How to get Series values in pandas?

SECTION - B

Answer following question **5 X 7 = 35M**

9. Explain about Operators in Python with examples.

(OR)

10. Explain about conditional branching statements in python.
11. Write a program to find factorial of a number using recursion

(OR)

12. Explain about packages in python.
13. Explain about basic list operations.

(OR)

14. What is tuple? Explain various tuple operations.
15. Explain about Types of Inheritance in Python.

(OR)

16. Explain about Different types of exceptions in python
17. Explain about Pandas data frame.

(OR)

18. What is a Univariate plot? Explain the Python histogram plotting?

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.
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 forartificial 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 correlationand regression coefficients.
CO3	Knowledge of important discrete distributions such as Binomial, Poisson, Geometric, NegativeBinomial and Hyper geometric and their interrelations if any,
CO4	Knowledge of important continuous distributions such as Uniform, Normal, Exponential andGamma 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.,

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, 10thSeptember 2020, S. C. Gupta and V. K. Kapoor, Sultan Chand& Sons, New Delhi.

2. Fundamentals of Applied Statistics, 4tEdition1stJanuary2014,(ISBN108180547051)S. C. Gupta an dV. K. Kapoor, Sultan Chand & Sons, New Delhi.

Reference books:

1. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and ChrisP.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				
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		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Semester-IV

STATISTICAL METHODS AND PROBABILITY DISTRIBUTION

MODEL QUESTION PAPER

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - A

Answer any FIVE Questions **5 X 3= 15M**

1. What is the difference between Karl Pearson's and Spearman's rank correlation?
2. Write about frequency distribution?
3. Write about exponential curves?
4. Write a short note on Regression?
5. What is binomial distribution and its properties?
6. Write about uniform distribution?
7. What is Gamma Distribution?
8. Write a short note on sample survey?

SECTION - B

Answer following question **5 X 7 = 35M**

9. Explain about Karl Pearson's correlation coefficient?

(OR)

10. Explain about multiple and partial correlation?
11. Explain the following

    i) Method of least squares,

    ii) Fitting of straight line

(OR)

12. Explain about Logistic Regression?
13. What are the characteristic properties and applications of Geometric distribution?

(OR)

14. Explain about Poisson distribution with example?
15. Explain about Normal distribution?

(OR)

16. Explain about Exponential distribution?

17. What is sampling? Explain different types of sampling?

(OR)

18. Explain about sampling and non-sampling errors?

	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 statisticaltechniques.

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

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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 automaticscaling
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 performaggregation 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.

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, NcGrawhill,2002
2. "Prinicples 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)

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CO1													
CO2													
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Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
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		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. (Hon)-AI :: Semester-III

Document Oriented Database

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Difference between Data and Information.
2. Insulation between Programs and Data.
3. Write a short note on Rich Query Language.
4. What are the Data Types present in MongoDB.
5. How do you delete documents in MongoDB?
6. Explain Collections in MongoDB.
7. Explain about Data Modelling.
8. Explain about Indexes.

SECTION - II

Answer following question **5 X 7 = 35M**

9. Characteristics of the Database Approach?

(OR)

10. Explain about DBMS Architecture.
11. Explain about CAP Theorem.

(OR)

12. Explain about MongoDB Features.
13. Explain about MongoDB CRUD Operations.

(OR)

14. Explain about Working with Arrays.
15. Implementing aggregation operations in mongo db.

(OR)

16. Explain about Data Model Using an Embedded Document.
17. Explain about Index Types in MongoDB

(OR)

18. Explain about Index Properties.

	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 Structuresand 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 ina specified course.

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

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	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 understand the services provided by and the design of an operating system.
2. To understand what a process is and how processes are synchronized and scheduled.
3. To understand different approaches to memory management.
4. To understand the structure and commands in UNIX
5. Students should be able to understand shell programming

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Analyse the services and functions of operatingsystems
CO2	Analyse the concepts of processes in operating system and illustration of the scheduling of processor for a givenproblem instance.
CO3	Analyse memory management techniques, concepts ofvirtual memory
CO4	To understand Introduction to UNIX:- Architecture of UNIX,Features of UNIX , UNIX Commands
CO5	To understand Introduction to UNIX:- Architecture of UNIX,Features of UNIX , UNIX Commands
CO6	To understand **Shell programming and** Simple shellprogram examples

Syllabus

UNIT- I

Operating System:
Introduction, Operating Systems Objectives and functions, Computer System Architecture, OS Structure, OS Operations. Evolution of Operating Systems, types of operating system, Simple ,Batch, Multi programmed, time shared, Parallel, Distributed Systems, Real-Time Systems, Operating System services.

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

Process and CPU Scheduling Process concepts The Process, Process State, Process Control Block, Process communication. Threads. Process Scheduling, Queues, Schedulers, Context Switch, Pre-emptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Process Synchronization, The Critical section Problem, Semaphores, Classic Problems of Synchronization,

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

Memory Management and Virtual Memory Logical & physical Address Space, Swapping, Contiguous Allocation, Paging-Structure of Page Table Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging Page Replacement Page Replacement Algorithms, Allocation of Frames

Activity: Debate on various Memory allocation schemes

Evaluation Method: Debate arguments, ability to counter opposing viewpoints, logical

UNIT- IV

Introduction to UNIX Architecture of UNIX, Features of UNIX , UNIX Commands PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

Activity: Seminar on UNIX architecture and UNIX commands.

Evaluation Method: presentation of findings and conclusions on UNIX commands.

UNIT- V

Shell programming: Ordinary and environment variables. The profile. Read and read only commands. Command line arguments. exit and exit status of a command. Logical operators for conditional execution. The test command and its shortcut. The if, while, for and case control statements. The set and shift commands and handling positional parameters. The here (<<) document and trap command. Simple shell program examples.

Activity Proposed: Problem solving using Decision making statements in Shell programming

Evaluation Method: Correctness of Decision making logic.

Textbooks:

1. "Operating System Concepts"-Silberschatz, Galvin, Gagne-eight Edition-John Willey & Sons INC 1,2,3 UNIT-s
2. Sumitabha Das., UNIX Concepts and Applications., 4thEdition., Tata McGraw Hill(4,5)

Reference books:

UNIT-s

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.

Web Links:

2. Principles of Operating Systems by Naresh Chauhan, OXFORD University Press

1. https://onlinecourses.nptel.ac.in/noc21_cs88/preview

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CO-PO Mapping:

	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				
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GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Operating Systems

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - A

Answer any FIVE Questions **5 X 3= 15M**

1. Write about Distributed Operating systems.
2. Write a short note on Operating System services.
3. Explain about different types of Schedulers.
4. Write about Synchronization with an example.
5. Explain about Virtual Memory.
6. Discuss about swapping.
7. how to run basic UNIX commands.
8. Explain about Command line arguments.

SECTION - B

Answer following questions **5 X 7 = 35M**

9. What is an Operating system?Write the functions of the OS.

(OR)

10. Write any 5 types of Operating systems..
11. Explain about the Critical section problem.

(OR)

12. What is Process? Explain about the Process Control Block.
13. Explain about FIFO with an example.

(OR)

14. Explain briefly about Paging.
15. Explain about Features of UNIX.

(OR)

16. Explain about UNIX Commands.
17. Explain about Logical operators for conditional execution in Shell Programming.

(OR)

18. Explain about if, while, for and case control statements in Shell Programming.

	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 programminglanguage
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

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	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. AI (III Sem)			
Course Code AI107	**OBJECT ORIENTED PROGRAMMING**				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

The Objective of the course is to assist the student in understanding the concepts of Object OrientedProgramming using Java language.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Overview of java programming, history and its features
CO2	Understand fundamentals of programming such as variables, conditional and iterativeexecution, statements, etc.
CO3	Understand the principles of arrays, inheritance, package and multi-threading.
CO4	Understand the Fundamental features of Managing Errors, Exceptions and Applet Programming.
CO5	Understand the Files concept in java

Syllabus

UNIT- -I

JAVA Evolution:

History Features, Overview of Java Language: Introduction - Simple Java program- Structure - Java tokens - Statements - Java virtual Machine. Constants - Variables - Data types - Operators and expressions.

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

Evaluation Method: Quiz Performance and Knowledge Retention

UNIT- -II

Decision making and Branching:

Simple If Statement, the IF…Else statement, The Else... If ladder, The Switch Statement, The? : Operator, Decision making and looping: The While statement, The do Statement - The for Statement - Jumps in loops - labelled loops - Classes, Objects and Methods. Arrays, Strings

Activity Proposed: Problem solving on Decision making using Java.

Evaluation Method: Correctness of decision-making logic.

UNIT- -III

Vectors Interfaces- Multiple Inheritance Packages:
Putting classes together Threaded Programming - Thread life cycle, Multi threads, Deadlocks. Managing Errors and Exceptions, I/O Exceptions.

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

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

UNIT- -IV

Applet Programming advantages and disadvantages of Applets, Applet life cycle - Event Handling in Applet, Applet Parameters and Communications; Graphics programming: The Graphics class- Lines and rectangles- Circles and ellipses-Drawing arcs -Line graphs -Drawing Bar charts.

Activity: GUI design contest using Java Applets.

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

UNIT- -V

Files: Introduction concept of streams Stream classes Using stream I/O classes File class creation of files Reading / Writing characters/ Bytes.

Activity Proposed: Assignment on File manipulation in JAVA

Evaluation Method: Correctness and Completion of Assignment.

Textbooks:

1. E.Balaguruswamy, Programming with JAVA A Primer,2015,McGraw Hill Professional

Reference books:

1. Sachin Malhotra- Programming in Java- OXFORD University Press.
2. John R.Hubbard- Programming with Java, Second Edition- Schaum's outlineSeries, TATA McGraw-Hill Company.
3. Deitel&Deitel.- Java TM: How to Program 2007- PHI
4. D.S Mallik- Java Programming: From Problem Analysis toProgram Design
5. P.RadhaKrishna- Object Oriented Programming Through Java,2008- Universities Press

Web Links:

1. **https://onlinecourses.nptel.ac.in/noc22_cs47/preview**
2.

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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Introduction to OOP using JAVA

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - A

Answer any FIVE Questions **5 X 3= 15M**

1. Explain about JVM.
2. Write a short note on Datatypes in JAVA.
3. Write a short note on labeled loops.
4. What is an object in Java? with an example.
5. What are vectors in Java with an example?
6. Explain I/O Exceptions.
7. Advantages of Applet Programming.
8. How to create a class file in Java?.

SECTION - B

Answer following question **5 X 7 = 35M**

9. What are the features of JAVA?

(OR)

10. Explain about Operators in JAVA.
11. Explain about Decision making statements with examples.

(OR)

12. Explain about Strings concept in JAVA.
13. Explain about the Thread life cycle with a neat diagram.

(OR)

14. Explain types of Inheritance.
15. Explain about the Applet life cycle.

(OR)

16. Write an Applet program to draw Line graphs and Bar charts..
17. Explain the concept of streams.

(OR)

18. Explain file handling concept in JAVA.

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. AI (III Sem)			
Course Code AI107P	**TITLE OF THE COURSE** OBJECT ORIENTED PROGRAMMING				
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 apply programming skills in java.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Overview of java programming**.**
CO2	Understand fundamentals of programming such as variables, conditional and iterative execution, statements, etc**.**
CO3	Understand the principles of arrays, inheritance, packages and multi-threading**.**
CO4	Understand the Fundamental features of Exceptions and Applet Programming**.**
CO5	Understand the Files concept in java**.**

Lab Experiments:

1. Write a java program to print Hello World.
2. Write a java program on Variables.
3. Write a java program to use various Data types.
4. Write a java program to implement main method inside and outside of a class.
5. Write a java program on Operators.
6. Write a java program on Looping.
7. Write a java program to display Fibonacci series.
8. Write a java program to find out the given number is palindrome or not.
9. Write a java program on single and Multi-dimensional array.
10. Write a java program on Strings.
11. Write a java program on interface.
12. Write java programs on various types of Inheritance.
13. Write java programs on Packages.

14. Write a java program on Multi-Threading.
15. Write java programs on various types Exceptions.
16. Write an Applet program to draw a Line, Rectangle, Circle, Ellipse, Arcs a.
17. Write an Applet program to draw Line graphs and Bar charts.
18. Write a java program to create a file.
19. Write a java program to perform read data from a file.
20. Write a java program to perform write data from a file.

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	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. AI (III Sem)			
Course Code AI108	**TITLE OF THE COURSE** INFERENTIAL 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 cmethods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	a fundamental understanding of Parametric models for developing relevant inferences onassociated 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 normaldistribution
CO5	small sample tests based on chi-square, Student's and Snedecor's F distributions

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.

Reference books:

2. Sharma, J. K. (2013), Business statistics, New Delhi: Pearson Education

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 Businessand 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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Inferential Statistics

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Explain about the consistency.
2. Write a short note on confidence coefficient.
3. Write a short note on a critical region.
4. Single mean with example.
5. Explain about paired t-test..
6. Explain Student's t-distribution.
7. Properties of F-distribution.
8. Write a short note on the Sign test..

SECTION - II

Answer following question **5 X 7 = 35M**

9. Explain about Maximum Likelihood estimator (MLE).

(OR)

10. Explain about the Criteria of a good estimator.
11. Explain about Tests of significance of large samples.

(OR)

12. Explain about Neyman Pearson lemma (WITHOUT PROOF) and its applications.
13. Explain applications of Snedecor's F Distribution

(OR)

14. Explain Chi-square distribution-.
15. Explain ANOVA two-way classification.

(OR)

16. Explain about the F-test for equality of two population variances.
17. Explain about the Wilcoxon-signed rank test.

(OR)

18. Explain about about the Kruskal Wallis test

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. AI (III Sem)			
Course Code AI108P	**TITLE OF THE COURSE** INFERENTIAL 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 byimplementing 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 areindependent (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 MembersWebsites 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 methodsto 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	To understand the principles of Data warehousing and DataMining.
CO2	To be familiar with the Data warehouse architecture and itsImplementation.
CO3	To know the Architecture of a Data Mining system.
CO4	To understand the various Data preprocessing Methods.
CO5	To perform classification and prediction of data.

Syllabus

UNIT- I

Data Warehousing and Business Analysis:
Data warehousing Components Building a Data warehouse Data Warehouse Architecture DBMS Schemas for Decision Support Data Extraction, Cleanup, and Transformation Tools Metadata reporting Query tools and Applications Online Analytical Processing (OLAP) OLAP and Multidimensional Data Analysis.

Activity Proposed: Assignment on OLAP and Multidimensional analysis.

Evaluation Method: Assignment completeness and correctness.

UNIT- II
Data Mining:

Data Mining Functionalities Data Preprocessing Data Cleaning Data Integration and Transformation Data Reduction Data Discretization and Concept Hierarchy Generation- Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems.
Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods Mining Various Kinds of Association Rules Association Mining to Correlation Analysis Constraint-Based Association Mining.

Activity Proposed: Data cleaning and Data transformation techniques on real time data.

Evaluation Method: Accuracy of Data cleaning and Transformation techniques on real time data.

UNIT- III
Classification and Prediction:
Issues Regarding Classification and Prediction Classification by Decision Tree Introduction Bayesian Classification Rule Based Classification Classification by Backpropagation Support Vector Machines Associative Classification Lazy Learners Other Classification Methods Prediction Accuracy and Error Measures Evaluating the Accuracy of a Classifier or Predictor Ensemble Methods Model Section.

Activity Proposed: Apply Support Vector Machines, Backpropagation to classify any real time data.

Evaluation Method: Results and Accuracy of Classification methods.

UNIT- IV
Cluster Analysis:
Types of Data in Cluster Analysis A Categorization of Major Clustering Methods Partitioning Methods Hierarchical methods Density-Based Methods Grid-Based Methods Model- Based Clustering Methods Clustering High-Dimensional Data Constraint-Based Cluster Analysis Outlier Analysis.

Activity Proposed: Assignment on Various Clustering techniques.

Evaluation Method: Assignment Completeness and Correctness.

UNIT- V
Mining Object, Spatial, Multimedia, Text and Web Data:
Multidimensional Analysis and Descriptive Mining of Complex Data Objects Spatial Data Mining Multimedia Data Mining Text Mining Mining the World Wide Web.

Activity Proposed: Seminar on Multimedia, Text Data Mining.

Evaluation Method: Depth of research, clarity of explanations, ability to address questions and engage the audience.

Textbooks:

1. Jiawei Han, Micheline Kamber and Jian Pei“Data Mining Concepts and Techniques”, Third Edition

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-**	**Short 3 M**	**Essay 7 M**	**Weightage**
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Semester-IV

DATA WAREHOUSING AND DATA MINING

MODEL QUESTION PAPER

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. What are the advantages of data warehouse?
2. Explain about Data Discretization.
3. Write a short note on star schema.
4. What is an association? Write a short note about association rule mining.
5. Write about Support Vector Machines.
6. Explain about cluster Analysis.
7. Discuss about the Grid-Based Methods.
8. Write a short note on Spatial Data Mining.

SECTION - II

Answer Following Questions **5 X 7 = 35M**

9. Draw and explain the three tier data warehouse architecture?

(OR)

10. Explain about OLAP.

11. Explain different data pre- processing techniques.

(OR)

12.Write and explain the APRIORI algorithm with an example?

13.Discuss in detail about the decision tree induction algorithm.

(OR)

14.Explain the following

i) Bayesian Classification

ii)Rule Based Classification.

15.Explain in detail about the categories of major clustering methods.

(OR)

16.Explain about the Outlier Analysis

17.Explain about Text mining.

(OR)

18.Explain about Multimedia Data mining.

	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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Implement data files conversions and can train, test data sets for an application.
CO2	Generate accurate models, and demonstrate data pre - processing.
CO3	Demonstrate text mining and web mining techniques.

Lab Experiments:

1. List applications for mining
2. File format for data mining
3. Conversion of various data files
4. Training the given dataset for an application
5. Testing the given dataset for an application
6. Generating accurate models
7. Data pre-processing data filters
8. Feature selection
9. Web mining
10. Text mining
11. Design of fact & dimension tables
12. Generating graphs for star schema

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	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	Construct supervised learning models
CO3	Construct unsupervised learning algorithms
CO4	Evaluate and compare different models

Syllabus

UNIT- I

INTRODUCTION TO MACHINE LEARNING

Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik- Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning, Hypothesis spaces, Inductive bias, Generalization, Bias variance trade-off.

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

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

UNIT- II

SUPERVISED LEARNING

Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function Perceptron algorithm, Probabilistic discriminative model - Logistic regression, Probabilistic generative model Naive Bayes, Maximum margin

classifier Support vector machine, Decision Tree, Random Forests

Activity: Seminar on Supervised Machine Learning Algorithms

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

UNIT- III

ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

Activity: Seminar on Unupervised Machine Learning Algorithms

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

UNIT- IV

NEURAL NETWORKS

Multi layer perceptron, activation functions, network training gradient descent optimization stochastic gradient descent, error back propagation, from shallow networks to deep networks UNIT- saturation (aka the vanishing gradient problem) ReLU, hyper parameter tuning, batch normalization, regularization, dropout.

Activity: Neural Network Activation Function Exploration

Evaluation Method: Hands-on activity, evaluating the understanding and analysis of linear and non-linear activation functions

UNIT- V

DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS

Guidelines for machine learning experiments, Cross Validation (CV) and resampling K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms t test, McNemar's test, K-fold CV paired t test

Activity Proposed: Analyze machine learning experiments using Cross Validation (CV) and resampling, K-fold CV, bootstrapping.

Evaluation Method: Accuracy of Classifiers.

Textbooks:

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition,2020.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective,"Second Edition", CRC

Reference books:

Press, 2014.

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer,2006.
2. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997.

3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, “Foundations of Machine Learning”, Second Edition, MIT Press,~~2012~~, 2018.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press,2016
5. Sebastain Raschka, Vahid Mirjalili , “Python Machine Learning”, Packt publishing 3rd Edition, 2019.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc19_cs52/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-I	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Semester-IV

MACHINE LEARNING USING PYTHON

MODEL QUESTION PAPER

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. What are the applications of VC Dimension?
2. Explain about Inductive bias.
3. Explain the concept of a Perceptron with a neat diagram.
4. Write about Decision Tree.
5. Write about K-means.
6. Explain about error backpropagation.
7. What are the Guidelines for machine learning experiments.
8. What is the difference between CV and K-Fold CV?

SECTION - II

Answer following question **5 X 7 = 35M**

9. **Explain about machine learning applications with examples?**

(OR)

10. Explain the following

    i) Vapnik-Chervonenkis (VC) dimension.

    ii) Probably Approximately Correct (PAC)learning

11. Explain about Bayesian linear regression.

(OR)

12. Explain about Linear Classification Models
13. Discuss in detail about K-means in unsupervised learning.

(OR)

14. Explain about Instance Based Learning with example .

15. Explain in detail about gradient descentoptimization

(OR)

16. Explain about ReLU activation function

17. Explain about resampling methods.

(OR)

18. Explain about t test and K-fold CV paired *t* test

	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.

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	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 provideinsights 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 prepositional 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.

Syllabus

UNIT- I (12Hrs)

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
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. 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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Semester-IV: **INTRODUCTION TO AI**

MODEL QUESTION PAPER

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

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

SECTION - II

Answer following question **5 X 7 = 35M**

9. Explain about problem solving agents?

(OR)

10. What is AI? Explain about AI Problems?
11. Explain A* algorithm in detail with a suitable example.

(OR)

12. Describe the heuristic search technique applied to a hill-climbing problem with an example ?
13. Explain in brief about the issues in representation of knowledge?

(OR)

14. Explain about semantic nets?

15. Explain about Backward chaining?

(OR)

16. Explain about Inference in first order logic

17. What is Expert system? Explain different types of Expert system?

(OR)

18. Explain the following

i) Model based reasoning

ii) Case based reasoning

	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 asolution 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 climbingalgorithms.
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.

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Semester-V

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI112	**TITLE OF THE COURSE** PREDICTIVE ANALYTICS USING PYTHON				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

The course serves to advance and refine expertise on theories, approaches and techniques related toprediction and forecasting.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand prediction-related principles, theories and approaches.
CO2	Learn model assessment and validation.
CO3	Understand the basics of predictive techniques and statistical approaches.
CO4	Understand basics of neural networks
CO5	Analyse supervised and unsupervised algorithms.

Syllabus

UNIT- - I

Introduction to Linear Regression

Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression Lasso regression, Linear Discriminant Analysis, Logistic regression, Perceptron learning algorithm.

UNIT- - II

Model Assessment and Selection

Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Bootstrap methods, conditional or expected test error.

UNIT- - III

Additive Models, Trees and Boosting

Additive Models, Trees, and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting, Examples (Spam data, California housing, New Zealand fish, Demographic data).

UNIT- IV

Introduction to NN

Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest Neighbour classifiers (Image Scene Classification).

UNIT- - V

Unsupervised and Supervised Learning

Unsupervised Learning and Random forests: Association rules, Cluster analysis, Principal Components, Random forests and analysis.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman,
2. The Elements of Statistical Learning-Data Mining, Inference, and Prediction, Second Edition,

Reference books:

Springer Verlag, 2009.

1. C.M.Bishop Pattern Recognition and Machine Learning, Springer, 2006.
2. Wasserman-All of statistics.Gareth James. Daniela Witten.
3. Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in

Web Links:

R.

1. https://archive.nptel.ac.in/courses/106/107/106107220/

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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(AccreditedbyNAAC"A+"Grade)

DEPARTMENT OF COMPUTERSCIENCE&APPLICATIONS

Semester-V

PREDICTIVE ANALYTICS USING PYTHON

MODEL QUESTION PAPER

Time: 2½Hrs. **MaxMarks:50**

SECTION - I

Answer any **FIVE** Questions **5 X 3=15M**

1. Write a short note on Ridge regression?
2. Explain about Linear Discriminant Analysis?
3. Write about Bias and Variance?
4. Explain about Cross-validation?
5. What is the AdaBoost boosting method?
6. Write about Neural Networks (NN)?
7. What are the properties of Reproducing Kernels?
8. Difference between supervised and unsupervised learning?

SECTION - II

Answer **ALL** Questions **5 X 7 = 35M**

9. Explain about Linear regression models?

(OR)

10. What are linear methods of regression?
11. Explain about Additive Models?

(OR)

12. Explain about Boosting Methods?
13. Explain about Classification and Regression trees CART ?

(OR)

14. Explain about Bootstrapmethods?
15. Explain about Support Vector Machines (SVM)?

(OR)

16. Explain about K-nearestNeighbourclassifiers?
17. What is cluster analysis and explain types of cluster analysis?

(OR)

18. What is Random forest? What are the advantages and disadvantages of Random forest?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI112P	**TITLE OF THE COURSE** **PREDICTIVE ANALYTICS USING PYTHON**				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3		2	1

Course Objectives:

The course serves to advance and refine expertise on practical approaches and techniques related toprediction and forecasting.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Implement various logistics regression algorithms
CO2	Implement numerical optimization and test errors
CO3	Implement K - Nearest algorithms
CO4	Implement Random forests analysis

Lab Experiments:

1. Demonstrating logistic regression.
2. Demonstrating perceptron learning algorithm.
3. Demonstrating Bayesian model.
4. Demonstrating numerical optimization.
5. Demonstrating classification trees.
6. Demonstrating regression analysis.
7. Demonstrating L - nearest neighbour.
8. Demonstrating back propagation.
9. Demonstrating SVM for regression analysis.
10. Demonstrating random forests and analysis.

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	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI113	**TITLE OF THE COURSE** ALGORITHMS FOR INTELLIGENT SYSTEMS				
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 focus on developing machine that can think which leads to gain fundamental knowledge for understanding AI. these topics are closely related with each other.
2. For example, the knowledge acquired through learning can be used both for problem solving and for reasoning. In fact, the skill for problem solving itself should be acquired through learning. Also, methods for problem solving are useful both for reasoning and planning. Further, both natural language understanding and computer vision can be solved using methods developed in the field of pattern recognition.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understanding the foundations of Artificial Intelligence
CO2	Representing a problem as a search solving problem.
CO3	Searching a space of answers for a solution to a problem inpractical time.
CO4	Representing problems in terms of logic and deduction.
CO5	Representing intelligent behavior in terms of agent.

Syllabus

UNIT--I

Introduction and History of AI: What is AI ? A brief history ? The state of the art

UNIT--II

Intelligent Agents: Agents and environments, Rationality, PEAS (Performance measure,Environment, Actuators, Sensors), Environment types, Agent types

UNIT--III

Solving Problem by Searching: Problem-solving agents, Problem types, Problem formulation, Example problems, Basic search algorithms

UNIT--IV

Informed search algorithms: Best-first search, A*_ search, Heuristics

UNIT--V

Adversial Search: Games, Perfect play, minimax decisions, pruning, Resource limits and approximate evaluation, Games of chance, Games of imperfect information

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Artificial Intelligence: A Modern Approach, Author(s):Stuart Russell and Peter Norvig, Edition:3rd Edition, Publisher:Prentice-Hall.

Reference books:

1. Artificial Intelligence: A Modern Approach, Author(s):Stuart Russell and Peter Norvig, Edition:3rd Edition, Publisher:Prentice-Hall.

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106126/

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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE(AUTONOMOUS),RAJAHMUNDRY

(AccreditedbyNAAC"A+"Grade)

DEPARTMENTOFCOMPUTERSCIENCE&APPLICATIONS

Semester-V

ALGORITHMS FOR INTELLIGENT SYSTEMS

MODEL QUESTION PAPER

Time: 2½Hrs. **MaxMarks:50**

SECTION - I

Answer any FIVE Questions **5 X 3=15M**

1. What is AI?
2. Write about learning Agents?
3. Explain about Rationality?
4. Explain about N-Queen problem?
5. Write about Pruning?
6. Write a short note on informedsearchalgorithms?
7. What is Heuristics search?
8. Explain about Reinforcement learning?
9. Explain about AI Applications?

SECTION - II

Answer following question **5 X 7 = 35M**

9. Explain about AI Applications?

(OR)

10. Explain about State of art ?
11. Explain the Structure of intelligent Agents?

(OR)

12. What are the different types of environment in AI?
13. Explain the Following

    i) Travelling Salesman Problem

    ii)Water-Jug Problem.

(OR)

14.Explain main Problem types in AI?

15. Explain about Best-firstsearch Algorithm with example?

(OR)

16. Explain about A*_search with example?
17. Explain in detail minimaxdecisions with example?

(OR)

18. Explain about Game Playing in AI?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI113P	**TITLE OF THE COURSE** ALGORITHMS FOR INTELLIGENT SYSTEMS				
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 develop and implement algorithms for problemsolving using AI.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	understand PROLOG (PO5, PO7)
CO2	Develop algorithms for solving logical problems. (PO5, PO7)

Lab Experiments:

1. Study of PROLOG
2. Write the following programs using PROLOG:
3. Write a program to solve 8-queens problem.
4. Solve any problem using depth first search.
5. Solve any problem using best first search.
6. Solve 8-puzzle problem using best first search
7. Solve Robot (traversal) problem using means End Analysis.
8. Solve the Traveling Salesman problem.

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	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI114	**TITLE OF THE COURSE** NATURAL LANGUAGE PROCESSING				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

A Given text with basic Language features and to design an innovative application using NLP components to implement a rule-based system to tackle morphology/syntax of a language

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To understand the use of CFG and PCFG in NLP
CO2	To learn control structures in python and apply them toreal world problems.
CO3	To understand the role of semantics of sentences andpragmatics
CO4	To apply the NLP techniques to IR applications
CO5	To construct data and perform data analysis.

Syllabus

UNIT- I

INTRODUCTION

Origins and challenges of NLP Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT- II

WORD LEVEL ANALYSIS

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging Hidden Markov and Maximum Entropy models.

UNIT- III

SYNTACTIC ANALYSIS

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar Dependency Grammar Syntactic Parsing, Ambiguity, Dynamic Programming parsing Shallow parsing Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT- IV

SEMANTICS AND PRAGMATICS

Requirements for representation, First-Order Logic, Description Logics Syntax-Driven Semantic analysis, Semantic attachments Word Senses, Relations between Senses, Thematic Roles, selectional restrictions Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods Word Similarity using Thesaurus and Distributional methods.

UNIT- V

DISCOURSE ANALYSIS AND LEXICAL RESOURCES

Discourse segmentation, Coherence Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm Coreference Resolution Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to NaturalLanguage Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python‖,

Reference books:

FirstEdition, O_Reilly Media, 2009.

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher,2015.
1. Richard M Reese, —Natural Language Processing with Java‖, O_Reilly Media, 2015.
2. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
3. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval‖, OxfordUniversity Press, 2008

Web Links:

1. https://onlinecourses.nptel.ac.in/noc23_cs45/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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
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		24	70	

GOVERNMENT COLLEGE(AUTONOMOUS),RAJAHMUNDRY

(AccreditedbyNAAC"A+"Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Semester-V

NATURAL LANGUAGE PROCESSING

MODEL QUESTION PAPER

Time: 2½Hrs. **MaxMarks:50**

SECTION - I

Answer any FIVE Questions **5 X 3=15M**

1. What are the challenges of NLP?
2. Write about Tokenization?
3. What are the issues in PoS tagging?
4. Write a short note on SyntacticParsing?
5. Write about DependencyGrammar?
6. What is First-Order Logic?
7. What is lemmatization?
8. Explain about Frame net?

SECTION - II

Answer following question **5 X 7 = 35M**

9. Explain about Grammar-based LM and Statistical LM?

(OR)

10.How does NLP detect and correct spelling errors?

11. Explain about Hidden Markov model?

(OR)

12. Explain about Stochastic and Transformation-based tagging?
13. What is Normal form? Explain different types of Normal forms in CFG?

(OR)

14.Explain about Dynamic Programming parsing?

15. Explain about Bootstrapping methods?

(OR)

16. Explain about Word Sense Disambiguation?
17. Explain about Discourse segmentation?

(OR)

18. Explain about Coreference Resolution?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI114P	**TITLE OF THE COURSE** NATURAL LANGUAGE PROCESSING				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			2	1

Course Objectives:

The main objective of this course is to enable students to enhance their Knowledge on basic Languageprocessing features, design an innovative application using NLP components

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply basic principles of AI in solutions that requireproblem solving, knowledge representation,
CO2	Show sensitivity to linguistic phenomena and an ability tomodel them with formal grammars.
CO3	Understand and carry out proper experimental methodologyfor training and evaluating empirical NLP systems
CO4	Able to design, implement
CO5	Analyze NLP algorithm

Experiments List

1) Write a program in prolog to implement simple facts and Queries
2) Write a program in prolog to implement simple arithmetic
3) Write a program in prolog to solve Monkey banana problem
4) Write a program in prolog to solve Tower of Hanoi
5) Write a program in prolog to solve 8 Puzzle problems
6) Write a program in prolog to solve 4-Queens problem
7) Write a program in prolog to solve Traveling salesman problem
8) Write a program in prolog for Water jug problem List of Experiments (NLP) 1. Word Analysis 2. Word Generation 3. Morphology 4. N-Grams 5. N-Grams Smoothing

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	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI115	**TITLE OF THE COURSE** SOFTWARE PROJECT MANAGEMENT				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

1. To understand the fundamental principles of software project management.
2. To have a good knowledge of responsibilities of project manager.
3. To be familiar with the different methods and techniques used for project management.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Evaluate** and decide the software project management. (PO5, PO7)
CO2	**Determine and classify** the project life cycle and estimate the effort of Agile methods.(PO5, PO7)
CO3	**Formulate** the project activity plan and project risk management (PO5, PO7)
CO4	**Organize** and **manage** the project contracts. (PO5, PO7)
CO5	**Establishing** the staffing pattern and Document the organizational behavior. (PO5, PO7)

Syllabus

UNIT- - I

PROJECT EVALUATION AND PROJECT PLANNING

Importance of Software Project Management Activities Methodologies Categorization of Software Projects Setting objectives Management Principles Management Control Project portfolio Management Cost-benefit evaluation technology Risk evaluation Strategic program Management Stepwise Project Planning.

UNIT- - II

PROJECT LIFE CYCLE AND EFFORT ESTIMATION:

Software process and Process Models Choice of Process models - mental delivery RapidApplication development Agile methods Extreme Programming SCRUM Managing interactive processes Basics of Software estimation Effort and Cost estimation techniques

COSMIC Full function points - COCOMO II A Parametric Productivity Model - StaffingPattern.

UNIT- - III

ACTIVITY PLANNING AND RISK MANAGEMENT:

Objectives of Activity planning Project schedules Activities Sequencing and scheduling Network Planning models Forward Pass & Backward Pass techniques Critical path (CRM) method Risk identification Assessment Monitoring PERT technique Monte Carlo simulation Resource Allocation Creation of critical patterns Cost schedules.

UNIT- - IV

PROJECT MANAGEMENT AND CONTROL:

Framework for Management and control Collection of data Project termination Visualizing progress Cost monitoring Earned Value Analysis- Project tracking Change control, Software Configuration Management Managing contracts Contract Management.

UNIT- - V

STAFFING IN SOFTWARE PROJECTS:

Managing people Organizational behaviour Best methods of staff selection Motivation The Oldham-Hackman job characteristic model Ethical and Programmed concerns Working in teams Decision making Team structures Virtual teams Communications genres Communication plans

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

Reference books:

1. Robert K. Wysocki “Effective Software Project Management” Wiley Publication,2011.
2. Walker Royce: “Software Project Management”- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, “Managing Global Software Projects” McGraw Hill Education(India), Fourteenth Reprint 2013

Web Links:

1. https://onlinecourses.nptel.ac.in/noc19_cs70/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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(AccreditedbyNAAC"A+"Grade)

DEPARTMENTOFCOMPUTERSCIENCE&APPLICATIONS

Semester-V

SOFTWARE PROJECT MANAGEMENT

MODEL QUESTION PAPER

Time: 2½Hrs. **MaxMarks:50**

SECTION - I

AnsweranyFIVE Questions **5 X 3=15M**

1. Explain about Virtual teams
2. What is the main purpose of risk evaluation?
3. Write about Earned Value Analysis
4. Explain about Waterfall Model
5. Explain about project tracking
6. Write about Rapid Application Development
7. Write a short note on critical path method CRM?
8. Explain different types of software projects?

SECTION - II

Answerfollowingquestion **5 X 7 = 35M**

9. What are the Management Principles in Software Project Management?

(OR)

10. Explain different types of Project Management methodologies?
11. Explain about Software Process Models?

(OR)

12. Explain about Cost estimation techniques?
13. Explain about Network Planning models?

(OR)

14. Explain about Project Scheduling Techniques?
15. Discuss in detail about Software Configuration Management SCM?

(OR)

16. Explain about Framework for Management and control?

17. Explain the Oldham-Hackman job characteristic model?

(OR)

18. Explain about effective Staff Selection Methods?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(V Sem)			
Course Code AI115P	**TITLE OF THE COURSE** SOFTWARE PROJECT MANAGEMENT				
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 practically implement various methods andtechniques for software project management using python.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Implement function point analysis and modelslike flexi and SEL.
CO2	Implement basic, intermediate and detailedCOCOMO.

Lab Experiments:

1. Demonstrate function point analysis.
2. Demonstrate flexi model.
3. Demonstrate SEL model.
4. Demonstrate basic COCOMO.
5. Demonstrate intermediate COCOMO.
6. Demonstrate detailed COCOMO.
7. Demonstrate early design model and calculate effort for development of project.

Ref: Software Project Management -Lab file - LABORATORY FILE
Software Project Management(SE-405) 2021 - Studocu

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Semester VI

Internship/Apprenticeship with 12 credits

Semester -VII

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI116	**TITLE OF THE COURSE** DEEP LEARNING				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

1. To understand the basic ideas and principles of Neural Networks
2. To understand the basic concepts of Big Data and Statistical Data Analysis
3. To familiarize the student with The Image Processing facilities like Tensorflow andKeras
4. To appreciate the use of Deep Learning Applications
5. To understand and implement Deep Learning Architectures

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the role of Deep learning in Machine Learning Applications.
CO2	To get familiar with the use of TensorFlow/Keras in Deep LearningApplications.
CO3	To design and implement Deep Learning Applications.
CO4	Critically Analyse Different Deep Learning Models in Image RelatedProjects.
CO5	To design and implement Convolutional Neural Networks

Syllabus

UNIT- I

BASICS OF NEURAL NETWORKS

Basic concept of Neurons Perceptron Algorithm Feed Forward and Back PropagationNetworks.

UNIT- II

INTRODUCTION TO DEEP LEARNING

Feed Forward Neural Networks Gradient Descent Back Propagation Algorithm Vanishing Gradient problem Mitigation RelU Heuristics for Avoiding Bad Local Minima Heuristics for Faster Training Nestors Accelerated Gradient Descent Regularization Dropout.

UNIT- III

CONVOLUTIONAL NEURAL NETWORKS

CNN Architectures Convolution Pooling Layers Transfer Learning Image Classification using Transfer Learning

UNIT- IV

MORE DEEP LEARNING ARCHITECTURES

LSTM, GRU, Encoder/Decoder Architectures Autoencoders Standard- Sparse Denoising Contractive- Variational Auto encoders Adversarial Generative Networks

Autoencoder and DBM

UNIT- V

APPLICATIONS OF DEEP LEARNING

Image Segmentation Object Detection Automatic Image Captioning Image generation with Generative Adversarial Networks Video to Text with LSTM Models Attention Models for Computer Vision Case Study: Named Entity Recognition Opinion Mining using Recurrent Neural Networks Parsing and Sentiment Analysis using Recursive Neural Networks Sentence Classification using Convolutional Neural Networks Dialogue Generation with LSTMs.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

Reference books:

1. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networksand Artificial

Intelligence", Apress , 2017.

3. Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in VisualComputing", CRC Press, 2018.
4. Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress,2018.
5. Joshua F. Wiley, "R Deep Learning Essentials", Packt Publications, 2016.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc20_cs62/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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
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3	III	2	2	20.8%
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5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
(Accredited by NAAC "A+" Grade)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. **Semester-VII**

DEEP LEARNING

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. Max Marks: 50

SECTION - I

Answer any FIVE Questions 5 X 3= 15M

1. What do you mean by Perceptron?
2. What is Artificial Neural Network?
3. Derive the Gradient Descent Rule?
4. Introduction to Convolution Neural Network
5. Explain Transfer Learning?
6. What is GRU?
7. What is named Entity Recognition?
8. Write about LSTM Models?

SECTION - II

Answer following question 5 X 7 = 35M

9. Write the Perception Algorithm?

(OR)

10. What Is the Difference Between a Feedforward Neural Network and Recurrent Neural Network?

11. Explain Back propagation with its algorithm.

(OR)

12. Explain the operation of deep learning feed forward neural networks
13. Explain the architecture of pre trained CNN Models

(OR)

14. Illustrate the operation of pooling layer in CNN with simple example

15. Justify the advantage of auto encoder over principal component analysis for dimensionality reduction.

(OR)

16. Compare and contrast LSTM and gated recurrent UNIT-s

17. What is Automatic image Captioning?

(OR)

18. Write about Parsing and Sentiment Analysis using Recursive Neural Networks

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI116P	**TITLE OF THE COURSE** DEEP LEARNING				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			2	1

Course Objectives:

1. To understand the basic ideas and principles of Neural Networks
2. To understand the basic concepts of Big Data and Statistical Data Analysis
3. To familiarize the student with The Image Processing facilities like Tensor flow andKeras
4. To appreciate the use of Deep Learning Applications
5. To understand and implement Deep Learning Architectures

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the role of Deep learning in Machine Learning Applications.
CO2	To get familiar with the use of TensorFlow/Keras in Deep LearningApplications.
CO3	To design and implement Deep Learning Applications.
CO4	Critically Analyse Different Deep Learning Models in Image RelatedProjects.
CO5	To design and implement Convolutional Neural Networks.

Lab Experiments:

Week-1 : Perceptron Learning Implementation

Week-2 : Multilayer Perceptron and its Hyperparameter Tuning

Week-3 : Hyperparameter Tuning

Week-4 : Implementation of Multilayer Neural Network using Keras and Data Augmentation onMNIST dataset.

Week-5 : CNN Implementation on MNIST Dataset.

Week-6 : Transfer Learning of pretrained models on MNIST dataset

Week-7 : Transfer Learning on Plant Village dataset for Plant Disease DetectionWeek-8 : Sentiment Analysis using Recurrent Neural Networks(RNN)

Week-9 : Text Generation using LSTM

Week-10 : Denoising and Dimensionality Reduction for Medical MNIST dataset using Autoencoders

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	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI117	**TITLE OF THE COURSE** TEXT MINING				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

1. To understand the principles, issues with text mining.
2. To understand techniques and solutions connected with text mining,
3. To understand the Fundamentals of natural language processing.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To Understand the enhancing user experience of information Provision and seeking, the business case for text mining.
CO2	To Understand The text mining pipeline
CO3	To Understand Approaches to text mining
CO4	To Understand Dealing with real text and Informationextraction
CO5	To Understand Evaluation of text mining systems

Syllabus

UNIT- -I

Introduction: background, motivation, dealing with information overload and information overlook, unstructured vs. (semi-)structured data, evolving information needs and knowledge management issues, enhancing user experience of information provision and seeking the business case for text mining.

UNIT- -II

The text mining pipeline: information retrieval, information extraction and data mining. Fundamentals of natural language processing: linguistic foundations, levels of linguistic analysis.

UNIT--I I I

Approaches to text mining: rule-based vs. machine learning based vs. hybrid; generic vs. domain specific; domain adaptation.

UNIT- -IV

Dealing with real text: text types, document formats and conversion, character encodings, markup, low-level processes (sentence splitting, tokenisation, part of speech tagging, chunking)

Information extraction: term extraction, named entity recognition, relation extraction, fact and event extraction; partial analysis vs. full analysis.

Data mining and visualisation of results from text mining.

UNIT- -V

Evaluation of text mining systems: evaluation measures, role of evaluation challenges, usability evaluation.

Resources for text mining: annotated corpora, computational lexica, ontologies, computational grammars; design, construction and use issues.

Issues in large scale processing of text: distributed text mining, scalable text mining systems.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. The text mining handbook : BY advanced approaches in analyzingunstructured data BY
2. Linked lexical knowledge bases :foundations and applications BY
3. Speech and language processing : an introduction to natural languageprocessing,

Reference books:

computational linguistics, and speech recognition

1. Feldman,Ronen, 1962- PUBLISHER Cambridge University Press
2.

Web Links:

1.
2.

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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-VII

TEXT MINING

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. Max Marks: 50

SECTION - I

Answer any FIVE Questions 5 X 3= 15M

1. What is Text Mining?
2. Define the terms Background and Motivation?
3. What are the levels of linguistic analysis?
4. What is domain adaption?
5. What is Data mining?
6. What are the Low level processes?
7. Write short notes on Evaluation of text mining system?
8. What are the Resources for Text mining?

SECTION - II

Answer following question 5 X 7 = 35M

9. What is the difference between unstructured vs. (semi-)structured data ?

(OR)

10. Write about Evolving information needs and knowledge management issues?
11. What is information retrieval, information extraction and data mining?

(OR)

12. What is Fundamentals of natural language processing?
13. What is the difference between generic vs. domain specific?

(OR)

14. What are the approaches to text mining?
15. What is Information extraction in detail?

(OR)

16. Write about Data mining and visualization of results from text mining?

17. What is the Role of evaluation challenges and Usability evaluation?

(OR)

18. What is the difference between distributed text mining and scalable text mining systems?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI117P	**TITLE OF THE COURSE** TEXT MINING				
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	To extract tokens, Vocabular and , Punctuation
CO2	To extract Part of speech Root of a word
CO3	To exract Base of a word stop words using distributions
CO4	To demonstate Operations on Text
CO5	To implement parts of speech tagging Searching strings

Lab Experiments:

Programs for various elements of textual data and see how we can extract these using the NLTKlibrary.

Hierarchy of Text

1. Tokens
2. Vocabulary
3. Punctuation
4. Part of speech
5. Root of a word
6. Base of a word
7. Stop words using distributions
8. Operations on Text
9. Parts of speech tagging
10. Searching strings

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	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI118	**TITLE OF THE COURSE** COMPUTER NETWORKS				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

It explores the architecture, components and protocols, of computer networks. Students learn how various network protocols run concurrently and interoperate together in the protocol stack to enable the transfer of data in the Internet.

1. To educate students on fundamental concepts of data communication and the design of computernetworks.
2. To educate student on basic aspects of data link layer.
3. To educate student on datagram routing algorithm and shortest path routing algorithm.
4. To educatestudent on elements of transport layer protocol.
5. To educate student on fundamental concepts of application layer.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain knowledge in the need of OSI reference model and various types of transmission media,switching techniques.
CO2	Gain knowledge in data link protocols, error detection and correction
CO3	Gain knowledge regarding design issues of network layer and can implement shortest path algorithm.
CO4	knowledge in elements of transport layer protocols
CO5	Gain knowledge in domain name system, WWW architecture and Email architecture andservices.PO5, PO7).

Syllabus

UNIT- I

Introduction to Networking

Uses of computer networks, Types of computer networks, ISO OSI reference model, Multiplexing - Frequency Division Multiplexing, Wave Length Division Multiplexing, Time Division Multiplexing; Guided media - Twisted pair cable, Coaxial cable, Fibre optics; Unguided media - Radio waves, Micro waves, Satellites; Switching - Circuit switching, Packet switching, Message switching.

UNIT- II

Data Link Layer

Design issues of data link layer, Data link protocols - unrestricted simplex protocol, simplex stop and wait protocol, one bit sliding window protocol; Bluetooth, Error detection and correction

UNIT- III

Network Layer

Introduction, Design issues of network layer, Virtual vs Datagram routing algorithms, Shortest pathrouting algorithm, Flooding, Distance vector routing algorithm, Congestion control algorithms.

UNIT- IV

Transport Layer

Introduction, Design issues of Transport Layer, Elements of Transport Protocols, Addressing - Connection Establishment, Connection Release, Flow control and Buffering, Multiplexing, Crash Recovery;Remote Procedure Call, User Datagram Protocol, Transmission Control Protocol

UNIT- V

Application Layer

Domain Name system, Email architecture and services, User agent sending and receiving Email, WWW Architectural Overview, Client side Server side URL, Cookies, Cryptography

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Reference books:

1.

Textbooks:

1. Computer Networks-Andrew.S.Tanenbaum, Pearson Edu Asia Fourth edition.
2. Introduction to Data Communications and Networking-Behrouz Forouzan,Tata McGraw Hill Edition

Web Links:

1. https://www.javatpoint.com/java-tutorial
2. https://www.w3schools.com/java/
3. https://www.tutorialspoint.com/jdbc/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-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-VII

COMPUTER NETWORKS

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. Max Marks: 50

SECTION - I

Answer any FIVE Questions 5 X 3= 15M

1. Explain different types of networks?
2. Difference Between Circuit and Packet Switching?
3. Define Bluetooth?
4. Design issues in Data Link layer?
5. What is Flooding in Network Layer?
6. Explain the header format of TCP?
7. Write the services provided by session layer?
8. Write a short note on DNS(Domain Name System)?

SECTION - II

Answer following question 5 X 7 = 35M

9. What are the 7 layers of the OSI model in computer network?

(OR)

10. What are the different types of guided and unguided media?

11. What protocols are used in the data link layer?

(OR)

12. What is the need of Error Detection and Correction in Data Link Layer?
13. What is network layer? Explain Dijkstra algorithm?

(OR)

14. What is routing algorithm? Explain adaptive and non-adaptive routing algorithm.

15. What is transport layer? Explain in brief

(OR)

16. What is the different between TCP and UDP

(OR)

17. What is Application Layer? Explain.

(OR)

18. Explain the email architecture and services?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. AI(VII Sem)			
Course Code AI118P	**TITLE OF THE COURSE** COMPUTER NETWORKS				
Teaching	Hours Allocated: 30 (practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			2	2

Course Objectives:

To enable students to implement various computer network protocols using the Java programming language

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Implement various protocols like stop and wait, sliding window and ARP protocols.
CO2	Implement PING, TRACE OUT commands and create HTTP sockets
CO3	Implement TCP and UDP sockets.

Lab Experiments:

1. Implementation of Stop and Wait Protocol
2. Implementation of Sliding Window Protocol
3. Study of Socket Programming and Client Server model
4. Write a code simulating ARP /RARP protocols.
5. Write a code simulating PING and TRACEROUTE commands
6. Create a socket for HTTP for web page upload and download.
7. Write a program to implement RPC (Remote Procedure Call).
8. Implementation of Subnetting.
9. Applications using TCP and UDP Sockets like DNS, SNMP and File Transfer
10. Applications using TCP Sockets like

A) Echo client and echo server B) Chat C) File T

SEMESTER-VIII

	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI(VIII Sem)			
Course Code AI119	**TITLE OF THE COURSE** NEURAL NETWORKS				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

The main objective of this course is to provide the student with the basic understanding of neural networks fundamentals, Program the related algorithms and Design the required and related systems

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Demonstrate ANN structure and activation Functions
CO2	Define foundations and learning mechanisms and state-spaceconcepts
CO3	Identify structure and learning of perceptions.
CO4	Explain Feed forward, multi-layer feed forward networks andBack propagation algorithms
CO5	Analyze Radial Basis Function Networks, Theory Regularization and RBF networks fuzzy systems.

Syllabus

UNIT- I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical

UNIT- II

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian

Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT- III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT- IV

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

UNIT- V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models Hopfield Models, restricted boltzmen machine.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

Reference books:

1 Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

Web Links:

1.
2.

CO-PO Mapping:

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

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CO1													
CO2													
CO3													
CO4													
CO5													

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

NEURAL NETWORKS

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. What are the features of neural networks?
2. Give the terminology of Artificial Neural Networks.
3. Define perceptron and its structure
4. Write about various notations used in back propagation algorithm derivation.
5. List any three applications of Back Propagation network.
6. What is Self-Organization?
7. Draw the architecture of SOM and explain in detail.
8. List some applications of RBF network...

SECTION - II

Answer following question **5 X 7 = 35M**

9. Explain the taxonomy of artificial neural network architectures.

(OR)

10. List the important learning laws in ANN. Discuss briefly Hebbian learning.

11. Write and explain initialization, activation, computation of actual response adaptation of weight vector and continuation operations of perceptron convergence theorem

(OR)

12. What kind of operations can be implemented with perceptron? Show that it cannot implement Exclusive OR function.

13. Write the flowchart of error back-propagation training algorithm.

(OR)

14. What is cross-validation? Give its significance in feed forward n/w design

15. What are Self-organizing neural networks? Explain briefly.

(OR)

16. What is Support Vector Machine? Explain how it separates non-separable patterns.

17. Draw the architecture of RBF network and explain in detail.

(OR)

18. Explain about Neuro Dynamical Models

	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI(VIII Sem)			
Course Code AI119P	**TITLE OF THE COURSE** NEURAL NETWORKS				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			2	1

Course Objectives:

To gain knowledge in various fundamental concepts of Artificial Neural Networks which will helpstudents to get sufficient knowledge to Analyze and design the various intelligent control systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the characteristics and types of artificial neural network and remember working of biological Neuron andArtificial Neural Network
CO2	Apply learning algorithms on perceptron and apply backpropagation learning on Neural Network.
CO3	Apply Back propagation algorithms application.
CO4	Design Convolutional Neural Network and classificationusing Convolutional Neural Network.
CO5	Solve sequence learning problem and implement long shortterm memory and gated recurrent.

Lab Experiments:

Week 1: Write a program to implement Perceptron

Week 2: Write a program to implement AND gates

Week 3: Write a program to implement OR gates

Week 4: Implement Crab Classification using pattern net.

Week 5: Write a program to implement Wine Classification using Back propagation.

Week 6: Write a Script Addition function.

Week 7: Write a Script Subtraction function.

Week 8: Write a Script Multiply function.

Week 9: Write a Script Divide function.

Week 10: Write a program to implement classification of linearly separable Data with a perceptron.

Week 11: Implement single layer neural network classification.

Week 12: Implement multi-layer neural network classification

Week 13: Implement Regression.

Week 14: To study Convolutional Neural Network and Recurrent Neural Network.

Week 15: To study ImageNet, GoogleNet, ResNet convolutional Neural Networks.

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	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI (VIII Sem)			
Course Code AI120	**TITLE OF THE COURSE** DESIGN THINKING				
Teaching	Hours Allocated:45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

To solve problems using Design Thinking and to radically increase likelihood of successby using Design Thinking.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Learn what is design thinking and when to use it.
CO2	Understand principles of Design Thinking.
CO3	Understand process of Design thinking.
CO4	Develop application using design thinking .
CO5	Apply Design thinking to real world scenarios.

Syllabus

UNIT- I:

Introduction to Design thinking: History of design thinking, where design thinking is used, why design thinking is effective, how it works, What is design thinking ?, thinking vs doing, how design thinking supports delivering products?, the roots of design thinking, myth busting design thinking.

UNIT- II:

Core Principles of Design Thinking: Principle1-users over stake holders-user research basics-observations, interviews, co-creation, concept reviews, existing research, known problems, how might we statements, acceptance criteria. Principle 2-practical creativity-getting people to be impractical, getting from impractical to practical. Principle 3-making through learning.

UNIT- III:

Design thinking process: Think about content to be included, state the need being solved, the process that led to defining the problem, the ideation phase, getting feedback from your coworkers, presenting the prototype and testing results. Empathize, define, ideate, prototype , Test.

UNIT- IV:

Applying design thinking process:

ACNE breakfast center use case:who are users, what are their pain points, developing how might wesolve statements, developing acceptance criteria.putting users in context-busy professionals,picky and particulars, frenetic families.Identifying user needs, key behavior , their problems and framing new solutions or ideas.Ideas evaluation, ranking of ideas, identifying best idea to solve the problem.

UNIT- V:

Application of Design Thinking to real world scnearios:

Case 1:Developers creating a banking app with an easier to navigate UI than current competitors,

Case2:teachers releasing new online course based on previous student experiences.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. What is Design Thinking? By Julie Stanford, Ellen Siminoff & Mia Silverman, O'Reilly
   Design thinking 101 by Gretchen Anderson ,O'Reilly(course)

Reference books:

1. What is Design Thinking? By Julie Stanford, Ellen Siminoff & Mia Silverman, O'Reilly
   Design thinking 101 by Gretchen Anderson ,O'Reilly(course)

Web Links:

1. https://slidemodel.com/how-to-present-design-thinking-process/#header-4

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-	Short 3 M	Essay 7 M	Weightage
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GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

DESIGN THINKING

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Why design thinking is important?
2. What is the design thinking role by using in industry and organization?
3. What is search field determination?
4. What is the principal and creative process of design thinking?
5. How does design thinking help in retail?
6. Differentiate between Observation and Interview
7. Create a mind map for new app development in education sector
8. Compare problem solving approach vs human-centered design

SECTION - II

Answer following question **5 X 7 = 35M**

9. What is a design thinking? How to we apply it?

OR

10. Briefy explain about the process of design thinking?
11. Briefy discuss about the problem clarification of understanding of the problem?

OR

12. Briefy discuss about the empathetic design?
13. Discuss about the principles of design thinking?

OR

14. Explain about visualization and presentation techniques?
15. Explain about the test phase?

OR

16. Explain the agility for design thinking?

17. How do organizations use design thinking?

OR

18. How can design thinking be applied to different industries challenges

	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI (VIII Sem)			
Course Code AI120P	**TITLE OF THE COURSE** DESIGN THINKING				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			1	1

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand process of Design thinking.
CO2	Develop application using design thinking
CO3	Apply Design thinking to real world scenarios.

Lab Experiments:

1. Developers creating a banking app with an easier-to-navigate UI than current competitors
2. Teachers releasing a new online course based on previous student experiences
3. To improve business of start up company Air bed and breakfast.
4. Redesigning the Customer Contact Center at Toyota
5. GE Adventure MRI

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	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI (VIII Sem)			
Course Code AI121	**TITLE OF THE COURSE** ROBOTICS AND INTELLIGENT SYSTEMS				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites:	Should have computer knowledge	3			3

Course Objectives:

The course should enable the students to learn The fundamental concepts of various configurations of the robot manipulators and their working principles used in the industries along with The performanceof various feedback components like sensors and actuators and how they can be used according to the specifications of the manipulator.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Outline the relationship between mechanical structures of industrial robotsand their operational workspace characteristics.
CO2	Demonstrate an ability to apply spatial transformation to obtain forward kinematics equations of robot manipulators and develop the mechanism forsolving forward and inverse kinematics of simple robot manipulators.
CO3	Develop an ability to obtain the Jacobian matrix and use it to identifysingularities.
CO4	Outline the various motions of the manipulator and use it for trajectory and also explain an ability to generate the trajectory for given application of robotmanipulator and Identify the knowledge of robot controllers and actuators used in the manipulators.
CO5	Recall the applications of robots in manufacturing, material handling, assembly and inspections and Illustrate the considerations of workspace for agiven robot application.

Syllabus

UNIT- -I
INTRODUCTION TO ROBOTICS

Introduction: Automation and robotics, an overview of robotics, classification by coordinate system and control systems, components of the industrial robotics: Degrees of freedom, end effectors: mechanical gripper, magnetic vacuum cup and other types of grippers, general consideration on gripper selection and design.

UNIT- -II
MOTION ANALYSIS AND KINEMATICS

Motion analysis: Basic rotation matrices, composite rotation matrices, equivalent angle and axis homogeneous transformation, problems; Manipulator kinematics: D-H notations, joint coordinates and world coordinates, forward and inverse kinematics, problems.

UNIT- -III
KINEMATICS AND DYNAMICS

Differential kinematics: Differential kinematics of planar and spherical manipulators, Jacobians problems. Robot dynamics: Lagrange, Euler formulations, Newton-Euler formulations, problems on planar two link manipulators.

UNIT- IV

TRAJECTORY PLANNING AND ACTUATORS

Trajectory planning: Joint space scheme, cubic polynomial fit, avoidance of obstacles, types of motion: Slew motion, joint interpolated motion, straight line motion, problems, robot actuators and feedback components; actuators: pneumatic and hydraulic actuators.

UNIT- -V
ELECTRIC ACTUATORS AND ROBOTIC APPLICATIONS

Electric actuators: DC servo motors, stepper motors, feedback components: position sensors, potentiometers, resolvers and encoders, velocity sensors, tactile sensors; Robot application in manufacturing: Material handling, assembly and inspection.

Suggested Co-Curricular Activities:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

Textbooks:

1. Groover M. P, “Industrial Robotics”, Tata McGraw-Hill, 1st Edition, 2013.
2. J.J Criag, “Introduction to Robotic Mechanics and Control”, Pearson, 3rd Edition, 2013.

Reference books:

1. K.S Fu, “Robotics”, McGraw-Hill, 1st Edition, 2013
2. Richard, D. Klafter, “Robotic Engineering”, Prentice Hall, 1st Edition, 2013

Web Links:

1. http://www.robot.bmstu.ru/
2. http://opencourses.emu.edu.tr/course/view.php?id=32
3. https://www.researchgate.net/publication/277712686_Introduction_to_Robotics_class_notes_UG_level

E-Book:

1. http://www.robot.bmstu.ru/
2. http://www.robotee.com/index.php/download-free-robotic-e-books/

CO-PO Mapping:

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

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GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
IV B.Sc. Semester-VIII
ROBOTICS AND INTELLIGENT SYSTEMS
MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions 5 X 3= 15M

1 Architecture of robotic systems.

2 Define the concept of Agent based Intelligence representation

3 List four applications where machine vision would be useful in robotic

4 What is planning?

5 What is Hydraulic Actuator?

6 What is Actuators

7 Explain force sensors

8 Explain point to point control

SECTION - II

Answer following question 5 X 7 = 35M

9. Explain classification by coordinate system and control systems

OR

10. Explain general consideration on gripper selection and design.

11. Write short notes on Jacobian Work Envelope

OR

12. Write short notes on (i) Hydraulic Drives (ii) Machine vision (iii) Tactile Sensors

13. Sketch and explain the functions basic building blocks of automation.

OR

14. Explain various industrial robot control schemes

15. Explain different types of sensors and their implications for robot design

OR

16. Explain Forward and Inverse Kinematics

17. What is the use of K nearest neighbors algorithm explain

OR

18. Explain about Intelligent Robots

	Government College (Autonomous) Rajahmundry	Program & Semester IV B.Sc. AI (VIII Sem)			
Course Code AI121P	**TITLE OF THE COURSE** ROBOTICS AND INTELLIGENT SYSTEMS				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Should have computer knowledge			2	1

Course Objectives:

The course serves to practically implement fundamental robotic concepts like manipulators, sensors,etc.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Demonstrate Rhino robot arm configurations.
CO2	Implement numerical optimization and test errors
CO3	Implement K - Nearest algorithms
CO4	Implement Random forests analysis

Lab Experiments:

1. Develop a CPP programme to demonstrate classes and constructors.
2. Develop a CPP programme to demonstrate user defined functions.
3. Develop a Rhino robotic arm and perform following operations:
   A) Move the Rhino using the teach pendant.
   B) Send the Rhino to the hard home and soft home configurations.
   C) Store sequences of encoders count as “programs” .
   D) Demonstrate a sequence of motions that, at minimum,places one block on top of another.
4. Demonstrate Rhino robot arm in CPP to solve towers of Hanoi.
5. Demonstrate forward kinematics problem with a physical implementation on the Rhion robot.
6. Demonstrate inverse kinematics problem for Rhino robot arm and use CPP function to movethe arm to space specified by the user.

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