

GOVERNMENT COLLEGE (A) RAJAHMUDNRY

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES

B.Sc (Honours) Artificial Intelligence



2025-26

Preface

The **Board of Studies (BoS) meeting of the Department of Computer Science** is convened on **15 September 2025** to deliberate on the curriculum revamping of undergraduate single-major programs. This initiative is undertaken in response to **stakeholder feedback** and **emerging industry requirements**, and in alignment with the **Government of Andhra Pradesh's directives** and the **National Education Policy (NEP)-2020**, which emphasize the need for modern, skill-oriented, and industry-relevant curricula.

In preparation for this revision, the Department of Computer Science has carried out a **comprehensive review of the existing curriculum**. Valuable feedback was gathered from students, alumni, faculty, and industry experts, highlighting the need to:

- Update course content, Introduce **market-oriented courses**,
- Integrate **internship training**, and
- Offer advanced subjects such as **Data Science, Artificial Intelligence, Digital Forensics, and Full Stack Development**.

Based on these inputs, the Department has redesigned **restructured programs - B.Sc. Computer Science (Honors) and B.Sc. Artificial Intelligence (Honors)** - that balances **core Computer Science courses** with **applied skill-oriented tracks**. The Major programs span eight semesters with multiple entry and multiple exit options, beginning with a foundation in Computer Science and programming (C, Java, Python), backend technologies (DBMS, DoD), and progressing into advanced tracks:

- B.Sc. Computer Science (Honors)** - Skill Elective Tracks in V & VI semesters:
 - *Track A*: Full Stack Development
 - *Track B*: Data Science
- B.Sc. Artificial Intelligence (Honors)** - Skill Elective Tracks in V & VI semesters:
 - *Track A*: Natural Language Processing
 - *Track B*: Data Engineering
 - *Track C*: Automation & Robotics

In addition, the Department is offering **Minor Programs in Computer Science, Computer Applications, and Data Science** for students from other disciplines (spanning III to VI semesters). These programs provide non-major students with exposure to both fundamentals and applied aspects of Computer Science, enabling **vertical academic mobility** and

multi-disciplinary learning.

Further, the Department has taken the initiative to **inculcate Artificial Intelligence skills across the college** by introducing **mandatory Skill Enhancement Courses (SECs)** in the I and II semesters for all students, irrespective of stream:

- Fundamentals of Artificial Intelligence*
- Applications of Artificial Intelligence (Discipline-Specific)*

The revised curriculum is carefully designed to provide a strong theoretical foundation, hands-on practical skills, exposure to interdisciplinary applications, and pathways for higher studies, competitive examinations, and industry careers.

This meeting is intended to **present, deliberate, and seek approval** for the revised curriculum structure of both Major and Minor programs in Computer Science, ensuring that it meets academic standards, addresses industry requirements, and enhances future career prospects of students.

Suneel Kumar Duvvuri
Chairman-Board of Studies
Department of Computer Science

ACADEMIC CELL, GOVERNMENT COLLEGE
(AUTONOMOUS) RAJAHMUNDRY

Proceedings of the Principal, Government College (Autonomous), Rajahmundry
Present: Dr. Ramachandra R.K, M.Sc., Ph.D.

Rc. No. 24/GCRJY/UG-BoS/ 2025-26 dt. 04.09.2025

Sub: Government College (A), Rajamahendravaram- UG Boards of Studies (BoS)-
Nomination of Members – Orders issued.

Ref: 1. UGC Guidelines of for Autonomous Colleges-2023.

2. Proc.No.ANUR/DAA/2025, dated 30-08-2025 of the Vice-Chancellor, ANUR

Order

The Principal, Government College (Autonomous) Rajahmundry is pleased to nominate the following members to UG Board of Studies to frame the syllabus of **Computer Science and Applications subject** in all the semesters duly following the norms of the UGC regulations for the Autonomous colleges 2023.

S. No	Name	Designation
1	Dr. Suneel Kumar Duvvuri	Chairman
2	All Faculty members in the department	Member
3	Sri G. Vijayadeep, Lecturer in Computer Science, SRR & CVR Govt. College (A), Vijayawada	Subject Expert
4	Sri Kavuri Sridhar, Asst. Professor & TPO, Dept. of Computer Science, PB Siddhartha College of Arts & Science, Vijayawada	Subject Expert
5	Dr. V. Persis, ANUR	University Nominee
6	Sri Maddikonda Satya Sai Srinivasa Kishore, Cloud Analyst , WIPRO	Expert from Corporate Sector
7	Sri P. Bharat Kumar, Java Developer, Wipro	Alumnus

The above members are requested to attend the BoS meeting in September 2025 and share their valuable views, and suggestions on the following functionalities.

- a) Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council
- b) Suggest methodologies for innovative teaching and evaluation techniques
- c) Suggest the panel of names to the Academic Council for appointment of Examiners
- d) Coordinate research, teaching, extension and other activities in the department of the College.
- e) Suggest CLO, PLO, PI and subject experts to develop question bank in compliance with Bloom's Taxonomy.

The above said members are requested to bestow their services for the successful organization of the event.



PRINCIPAL

GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAHMUNDRY

Government College Autonomous, Rajahmundry
Department of Computer Science
Board of Studies for the Undergraduate Programs
Academic Year 2025-2026
Composition of Board of Studies

Chairman	Dr. Suneel Kumar Duvvuri, In-charge of the Department, Department of Computer Science Government College (A), Rajahmundry.
University Nominee	Dr. V Persis Associate Professor Department of Computer Science and Engineering University College of Engineering, Adikavi Nannaya University, Rajahmundry
Subject Expert	Sri G. Vijayadeep, Lecturer in Computer Science, SRR & CVR Govt. College (A), Vijayawada
Subject Expert	Sri Kavuri Sridhar, Asst. Professor & TPO, Dept. of Computer Science, PB Siddhartha College of Arts & Science, Vijayawada
Expert from Industry	Sri Maddikonda Satya Sai Srinivasa Kishore, Cloud Analyst , WIPRO Pvt Ltd.,
Alumnus	Sri P Bharat Kumar (Undergraduate Student of 2019-22) Java Developer, WIPRO Pvt Ltd.,
Members	
Smt U Sandhya Rani	Faculty Member
Mr Devaraju Hanumanthu	Faculty Member
Sri P. Narasinga Rao	Faculty Member
Sri. D. Seetha Ramulu	Faculty Member
Kum S.Jaya Lakshmi	Faculty Member
Smt Ch.Sujatha	Faculty Member
Smt B.BalaParameswari	Faculty Member

Government College Autonomous, Rajahmundry
Department of Computer Science
Board of Studies for the Undergraduate Programs
Academic Year 2025-2026

In pursuance of the Government of Andhra Pradesh's directions to revamp undergraduate single-major programs, and in alignment with the NEP-2020 guidelines, the Department of Computer Science has revised its curriculum framework.

In 2023-24, the department introduced **single-major programs** in place of three-major degree programs. Based on the feedback received from students, evaluators, and subject experts, the curricular framework has been further strengthened this year.

The present revision incorporates feedback from students, alumni, faculty, and industry experts, with a focus on:

Strengthening the Theoretical Foundation,

Promoting Skill Enhancement through Skill Enhancement Courses (SECs) on *Foundations of Artificial Intelligence* and *Applications of Artificial Intelligence* for all students across the college irrespective of stream,

Introducing Subject-Specific Skill Enhancement Course Tracks to deepen discipline knowledge and practical exposure.

Accordingly, the Department has restructured the **B.Sc. (Honors)-Computer Science (Major)** and **B.Sc.(Honors) Artificial Intelligence (Major)** programs, and designed **Minor programs** in **Computer Science, Computer Applications, and Data Science** for students of other disciplines.

The revised syllabi, course distribution, and elective options are placed before the Board of Studies for discussion and approval.

Agenda Items

1. Approval of the New Curricular Framework for the Academic Year 2025-26.
2. Curriculum design for B.Sc. (Honors) - Computer Science and B.Sc. (Honors)- Artificial Intelligence) as per revised curriculum framework effective from 2025-26.
3. Formulation of Course Objectives and Course Learning Outcomes (CLOs).
4. Approval of semester-wise curriculum for III, IV, V, VII, and VIII Semesters (B.Sc. Honors - CS, AI) effective from 2023-24.
5. Introduction of Minor Programs in Computer Science, Data Science, and Computer Applications as per revised curriculum framework effective from 2025-26 (for Non-Computer Science Students).

6. Pedagogical Approaches and Skill Orientation with emphasis on experiential learning, project-based learning, and ICT-enabled teaching.
7. Model Question Papers and Identification of Paper Setters.
8. Evaluation and Assessment Reforms in line with NEP-2020 guidelines.
9. Academic Activities of the Department planned for the Academic Year 2025-26.
10. Any Other Items with the Permission of the Chair.

Suneel Kumar Duvvuri
Chairman-Board of Studies
Department of Computer Science

Government College Autonomous, Rajahmundry
Department of Computer Science
Board of Studies for the Undergraduate Programs
Academic Year 2025-2026
Minutes and Resolutions of the Meeting

Chairperson: Dr. Suneel Kumar Duvvuri, Head of the Department of Computer Science

Members Present:

1. Dr. V. Persis – Associate Professor, Department of Computer Science and Engineering, Adikavi Nannaya University, Rajahmahendravaram – *University Nominee*
2. Sri G. Vijayadeep – Lecturer, Department of Computer Science, SRR & CVR Govt. College (A), Vijayawada – *Subject Expert*
3. Sri Kavuri Sridhar – Assistant Professor, Department of Computer Computer Science, PB Siddhardha College of Arts & Science, Vijayawada – *Subject Expert*
4. Sri Maddikonda Satya Sai Srinivasa Kishore – Cloud Analyst, WIPRO Pvt. Ltd – *Industrial Expert*
5. Smt U. Sandhya Rani – Lecturer, Department of Computer Science– *Faculty Member*
6. Sri Devaraju Hanumanthu – Lecturer, Department of Computer Science– *Faculty Member*
7. Sri P. Narasinga Rao – Lecturer, Department of Computer Science– *Faculty Member*
8. Sri D. Seetha Ramulu – Lecturer, Department of Computer Science– *Faculty Member*
9. Ms. S. Jaya Lakshmi – Lecturer, Department of Computer Science– *Faculty Member*
10. Smt Ch. Sujatha – Lecturer, Department of Computer Science– *Faculty Member*
11. Smt B. Bala Parameswari – Lecturer, Department of Computer Science– *Faculty Member*
12. Sri P. Bharat Kumar – Java Developer, WIPRO Pvt Ltd. – *Alumnus*

The members of the Board of Studies convened on 15 September 2025 at the Department of Computer Science & Applications under the Chairmanship of Suneel Kumar Duvvuri, Lecturer In-charge. The meeting commenced promptly at 10:00 AM, with the primary purpose of addressing the various items listed on the agenda for discussion.

1. Approval of the New Curricular Framework for the Academic Year 2025-26.
2. Curriculum design for B.Sc. (Honors) - Computer Science and B.Sc. (Honors)- Artificial Intelligence) as per revised curriculum framework effective from 2025-26.
3. Formulation of Course Objectives and Course Learning Outcomes (CLOs).
4. Approval of semester-wise curriculum for III, IV, V, VII, and VIII Semesters (B.Sc. Honors - Computer Science, Artificial Intelligence Programs) effective from 2023-24.

5. Introduction of Minor Programs in Computer Science, Data Science, and Computer Applications as per revised curriculum framework effective from 2025–26 (for Non-Computer Science Students).
6. Pedagogical Approaches and Skill Orientation with emphasis on experiential learning, project-based learning, and ICT-enabled teaching.
7. Model Question Papers and Identification of Paper Setters.
8. Evaluation and Assessment Reforms in line with NEP-2020 guidelines.
9. Academic Activities of the Department planned for the Academic Year 2025-26.
10. Any Other Items with the Permission of the Chair.

At the outset, Dr. Suneel Kumar Duvvuri, Chairman of the Board, extended a cordial welcome to all members and acknowledged their presence. He then introduced each member of the board, setting a collegial and collaborative tone for the meeting.

In his opening remarks, Dr. Suneel Kumar outlined the Undergraduate and Postgraduate programs currently offered by the Department of Computer Science under the single-major system. He highlighted the importance of the present curriculum revision, stressing the necessity of aligning the programs with the **National Education Policy (NEP)–2020** and the reform measures proposed by the Andhra Pradesh State Council of Higher Education (APSCHE). He further apprised the members that these reforms have been duly endorsed and adopted by the Affiliating University, Adikavi Nanayya University, Rajamahendravaram.

To formally commence the proceedings, Dr. Suneel Kuanr Duvvuri placed before the board the Draft Board of Studies (BoS) document, inviting deliberations and collective insights on the agenda items.

The following Members Attended the Meeting on **15 September 2025**

S.No.	Name	Designation	Signature
1	Dr. V. Persis	University Nominee	
2	Sri G. Vijayadeep	Subject Expert	
3	Sri Kavuri Sridhar	Subject Expert	
4	Sri Maddikonda Satya Sai Srinivasa Kishore	Industrial Expert	
5	Smt U Sandhya Rani	Faculty Member	
6	Sri. Devaraju Hanumanthu	Faculty Member	
7	Sri. P. Narasinga Rao	Faculty Member	
8	Sri. D. Seetha Ramulu	Faculty Member	
9	Ms. S.Jaya Lakshmi	Faculty Member	
10	Smt Ch.Sujatha	Faculty Member	
11	Smt B.BalaParameswari	Faculty Member	
12	Sri P. Bharat Kumar	Alumnus	

Suneel Kumar Duvvuri
Chairman-Board of Studies
Department of Computer Science

B.Sc. (Honors) 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.

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26								
(Major + Minor with CSP & VI Semester Internship)								
1st Year - Semester I								
Sl.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	I	3	2	5	3	1	4
2	Major - Core	II	3	2	5	3	1	4
3	Minor	0	0	0	0	0	0	0
4	AECC - English	I	4	0	4	3	0	3
5	AECC - MIL (Telugu/Hindi/ Sanskrit)	I	4	0	4	3	0	3
6	Multidisciplinary Course	0	0	0	0	0	0	0
7	Skill Enhancement Course (SEC) Fundamentals of Artificial Intelligence	I	4	2*	6	4	0	4
End of Semester I of 1st Year		5	18	6	24	16	2	18
1st Year - Semester II								
1	Major - Core	III	3	2	5	3	1	4
2	Major - Core	IV	3	2	5	3	1	4
3	Minor	0	0	0	0	0	0	0
4	English	II	4	0	4	3	0	3
5	MIL (Telugu/Hindi/ Sanskrit)	II	4	0	4	3	0	3
6	Multidisciplinary Course	I	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Application of Artificial Intelligence (Discipline Specific)	II	4	2*	6	4	0	4
8	Indian Knowledge System	I	2	0	2	0	0	0

9	Community Service Project (minimum of 80 hours with 1 Credit)						1	
End of Semester II of 1st Year		7	22	6	28	18	3	21
2nd Year - Semester III								
1	Major - Core	VI	3	2	5	3	1	4
2	Major - Core	VII	3	2	5	3	1	4
3	Major - Core	VIII	3	2	5	3	1	4
4	Minor	I	3	2	5	3	1	4
5	AECC (Creative Writing/Business Writing in English)	III	4	0	4	3	0	3
6	AECC (Creative Writing/Journalistic Writing in MIL - Telugu/Hindi/ Sanskrit)	III	4	0	4	3	0	3
7	Multidisciplinary Course	II	2	0	2	2	0	2
8	Skill Enhancement Course (SEC) Design Thinking/Problem Solving / Others	III	2	0	2	2	0	2
End of Semester III of 2nd Year		8	24	8	32	22	4	26
2nd Year - Semester IV								
1	Major - Core	IX	3	2	5	3	1	4
2	Major - Core	X	3	2	5	3	1	4
3	Major - Core	XI	3	2	5	3	1	4
4	Minor	II	3	2	5	3	1	4
5	Multidisciplinary Course	IV	2	0	2	2	0	2
6	Skill Enhancement Course (SEC) Design	IV	2	0	2	2	0	2

	Thinking/Problem Solving / Others							
End of Semester IV of 2nd Year		6	16	8	24	16	4	20
3rd Year - Semester V								
1	Major - Core	V	3	2	5	3	1	4
2	Major - Elective	XII	3	2	5	3	1	4
3	Major - Elective	XIII	3	2	5	3	1	4
4	Minor	III	3	2	5	3	1	4
5	Minor	IV	3	2	5	3	1	4
6	Environmental Education	I	2	0	2	2	0	2
End of Semester V of 3rd Year		6	17	10	27	17	5	22
3rd Year - Semester VI								
1	Major - Elective	XIV	3	2	5	3	1	4
2	Major - Elective	XV	3	2	5	3	1	4
3	Minor	VII	3	2	5	3	1	4
4	Minor	VIII	3	2	5	3	1	4
5	Semester Internship (minimum of 180 hours with 3 Credits)							3
End of Semester VI of 3rd Year		4	12	8	20	12	7	19

Courses - Credit Distribution

Component	Distribution	Credits
Major	11 Core Courses \times 4 Credits = 44 4 Skill Courses \times 4 Credits = 16	60
Minor	6 Courses \times 4 Credits	24
AECC (Languages)	English: 3 Courses \times 3 Credits = 9 MIL: 3 Courses \times 3 Credits = 9	18
Multidisciplinary Courses	3 Courses \times 2 Credits	6
Skill Enhancement Courses (SECs)	AI: 2 Courses \times 4 Credits = 8 Others: 2 Courses \times 2 Credits = 4	12
Value Added Course	Environmental Education = 2	2
CSP + Internship	–	4
Total	–	126

B.Sc. (Honors) Artificial Intelligence

Sl. No	Seme ster	Course Code & Course Title	CIA	SEE	Hours/week			
					L	T	P	C
1	I	AI-101: Computer Fundamentals and Office Automation	50	50	3	-	-	3
		AI-101P: Computer Fundamentals and Office Automation Lab	-	50	-	-	2	1
2		AI-102: Mathematical Foundations of AI	50	50	4	1	-	4
3	II	AI-201: Python Programming and Data Structures	50	50	3	-	-	3
		AI-201P: Python programming and Data Structure Lab	-	50	-	-	2	1
4		AI-202: Artificial & Computational Intelligence	50	50	3	-	-	3
		AI-202P: Artificial & Computational Intelligence	-	50	-	-	2	1
5		AI-301: Statistical Foundation of AI	50	50	3	-	-	3
		AI-301P: Statistical Foundation of AI Lab	-	50	-	-	2	1
6	III	AI-302: Database Management System	50	50	3	-	-	3
		AI-302P: Database Management System Lab	-	50	-	-	2	1
7		AI-303: Exploratory Data Analysis & Data Visualization	50	50	3	-	-	3
		AI-303P: Exploratory Data Analysis & Data Visualization Lab	-	50	-	-	2	1
8		AI-401: Data Science with R	50	50	3	-	-	3
		AI-401P: Data Science with R Lab	-	50	-	-	2	1
9	IV	AI-402: Foundation of ML & Supervised Learning	50	50	3	-	-	3
		AI-402P: Foundation of ML & Supervised Learning Lab	-	50	-	-	2	1
10		AI-403: Robotics Principles & Embedded systems	50	50	3	-	-	3

		AI-403P: Robotics Principles & Embedded systems Lab	-	50	-	-	2	1
11	V	AI-501: Unsupervised & Reinforcement Learning	50	50	3	-	-	3
		AI-501P: Unsupervised & Reinforcement Learning Lab	-	50	-	-	2	1
<i>SEA:Skill Elective Track A (Natural Language Processing)</i>								
12	V - Track A	*AI-502SEA1: Neural networks & Deep Learning	50	50	3	-	-	3
		*AI-502SEA1P: Neural networks & Deep Learning Lab	-	50	-	-	2	1
13	V - Track A	*AI-503SEA2: Natural Language Processing	50	50	3	-	-	3
		*AI-503SEA2P: Natural Language Processing Lab	-	50	-	-	2	1
14	VI- Track A	*AI-601SEA3: Conversational AI	50	50	3	-	-	3
		*AI-601SEA3P: Conversational AI Lab	-	50	-	-	2	1
15	VI- Track A	*AI-602SEA4: Applications of Natural Language Processing	50	50	3	-	-	3
		*AI-602:SEA4P: Applications of Natural Language Processing Lab	-	50	-	-	2	1
<i>SEB:Skill Elective Track B (Big Data and Data Engineering)</i>								
16	V - Track B	*AI-502SEB1: Big Data Technologies	50	50	3	-	-	3
		*AI-502SEB1P: Big Data Technologies Lab	-	50	-	-	2	1
17	V - Track B	*AI-503SEB2: Cloud computing for Data Science	50	50	3	-	-	3
		*AI-503SEB2P: Cloud computing for Data Science Lab	-	50	-	-	2	1
18	VI - Track B	*AI-601SEB3: TimeSeries Analysis & Forcecasting	50	50	3	-	-	3
		*AI-601SEB3P: TimeSeries Analysis & Forcecasting Lab	-	50	-	-	2	1
19	VI - Track B	*CS-602SEB4: Data Engineering & MLOps	50	50	3	-	-	3

		*AI-602SEB4P: Data Engineering & MLOps Lab	-	50	-	-	2	1
<i>SEC:Skill Elective Track C (Automation & Robotics)</i>								
20	V - Track C	*AI-502SEC1:Robotics Kinematics & Dynamics	50	50	3	-	-	3
		*AI-502SEC1P: Robotics Kinematics & Dynamics Lab	-	50	-	-	2	1
21		*AI-503SEC2:Additive Manufacturing & IoT	50	50	3	-	-	3
		*AI-503SEC2P: Additive Manufacturing & IoT Lab	-	50	-	-	2	1
22	VI - Track C	*AI-601SEC3:Robot Operating System	50	50	3	-	-	3
		*AI-601SEC3P:Robot Operating System Lab	-	50	-	-	2	1
23		*CS-602SEC4:AI Automation & Robotics	50	50	3	-	-	3
		*AI-602SEC4: AI Automation & Robotics Lab	-	50	-	-	2	1

C12, C13, C14, and C15 (2 courses in Semester V and 2 in Semester VI) must be selected from the same track.

The student must choose **only one track – either Track A or Track B or Track C – and continue with the same track** across both semesters.

Government College Autonomous, Rajahmundry
Department of Computer Science
Board of Studies for the Undergraduate Programs
Academic Year 2025-2026
Scheme of Valuation for Practical Examinations

S. No.	Description	Odd Semester (Internal Practical)	Even Semester (External Practical)
1	Record Maintenance*	10	10
2	Viva-Voce	10	10
3	Problem Solving / Programming / Experiment/ Procedure Explanation (Algorithm/Flowchart if Any)	15	15
4	Lab Performance / Execution & Output	15	15
Total		50 Marks	50 Marks

***Award of Marks for Record Maintenance**

S. No.	Number of Practicals Recorded	Marks Awarded
1	10 Practicals and Above	10
2	8 Practicals	8
3	6 Practicals	6
4	5 Practicals	5
5	Less than 5	0

- Odd Semesters (Internal): Conducted by the concerned faculty (course teacher).
One additional examiner will be nominated by the Department Incharge.
- Even Semesters (External): Conducted jointly by an External Examiner (from another college/university) and the concerned faculty (as Internal Examiner).

Government College Autonomous, Rajahmundry
Department of Computer Science
Board of Studies for the Undergraduate Programs
Academic Year 2025-2026
List of Examiners and Paper Setters

S. No	Name of the Lecturer/ Reader/ Professor	Papers	College	City
1	Prof P Suresh Varma	ALL	Dept of CSE, AKNU	Rajahmundry
2	Dr V Persis	ALL	Dept of CSE, AKNU	Rajahmundry
3	Dr M Kamala Kumari	ALL	Dept of CSE, AKNU	Rajahmundry
4	Dr P Venkateswara Rao	ALL	Dept of CSE, AKNU	Rajahmundry
5	Dr D. Latha	ALL	Dept of CSE, AKNU	Rajahmundry
6	Dr B. Kezia Rani	ALL	Dept of CSE, AKNU	Rajahmundry
7	R V Satyanarayana	ALL	GDC (P R) Kakinada	Kakinada
8	G Balavenkata Padmanadh	ALL	GDC Mummidivaram	Mummidivaram
9	Dr N Sridhar	ALL	GDC Srikakulam	Srikakulam
10	E Jyothikiranmayi	ALL	SCIM GDC Tanuku	Tanuku
11	Rebba Ashok Kumar	ALL	SCIM GDC Tanuku	Tanuku
12	Smt M Rajini	ALL	GDC Ravulapalem	Ravulapalem
13	Dr K Satya Rajesh	ALL	GDC Bantumalli	Bantumalli
14	Vijayadeep Gummadi	ALL	GDC (SRR & CVR)	Vijayawada
15	Bharat Kumar	ALL	GDC (SRR & CVR)	Vijayawada
16	M. Arun Kumar	ALL	GDC Kovvur	Kovvur
17	Smt N Swarnajyothi	ALL	GDC Kaikaluru	Kaikaluru
18	U Sarala	ALL	GDC Avanigadda A	Avanigadda
19	Dr A Sivaprasad	ALL	GDC Tekkali	Tekkali
20	I Srilakshmi	ALL	GDC (A) Tuni	Tuni
21	Sri B Raghuram	ALL	GDC Seethampeta	Seethampeta
22	Sri B Srinivas	ALL	GDC (M) Srikakulam	Srikakulam
23	Dr K V Sobha Rani	ALL	GDC Ramachandrapuram	Ramachandrapuram
24	R Venakata Phani Kumar	ALL	GDC Perumallapuram	Perumallapuram
25	G Satya Suneetha	ALL	GDC Kovvuru	Kovvuru
26	Dr. U Subhashini	ALL	GDC Ravulapalem	Ravulapalem
27	B Hemaraju	ALL	GDC Tekkali	Tekkali
28	P Jyothi	ALL	GDC Pathapatnam	Pathapatnam
29	S Vani Kumari	ALL	GDC (W) Srikakulam	Srikakulam
30	Simma Madhavi Latha	ALL	GDC (W) Srikakulam	Srikakulam

Semester-I

AI-101: Computer Fundamentals and Office Automation

Semester: I

L-T-P: 3-0-0

Credits:03

Course Objectives

1. **Understand foundational computing concepts**, including number systems, the evolution of computers, block diagrams, and generational progress.
2. **Develop knowledge of computer architecture**, focusing on system organization and networking fundamentals.
3. **Acquire practical skills in document creation**, formatting, and digital presentations using word processing tools.
4. **Gain proficiency in spreadsheet operations**, such as data entry, formulas, functions, and charting techniques.
5. **Introduce data visualization and basic modelling principles**, fostering analytical thinking in structuring and interpreting data sets.

Course Outcomes

1. At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.
2. Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge**.
3. Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.
4. Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations**.
5. Learners will apply data modelling techniques to **analyze, organize, and represent data effectively** in various scenarios.

Unit 1. Number Systems, Evolution , Block Diagram and Generations:

Number Systems: Binary, Decimal, Octal, Hexadecimal; conversions between number systems.

Evolution of Computers: History from early mechanical devices to modern-day systems.

Block Diagram of a Computer: Components like Input Unit, Output Unit, Memory, CPU (ALU + CU).

Generations of Computers: First to Fifth Generation – technologies, characteristics, examples.

Unit 2. Basic organization and N/W fundamentals:

Computer Organization: Functional components – Input/Output devices, Storage types, Memory hierarchy.

Types of Computers: Micro, Mini, Mainframe, and Supercomputers.

Networking Fundamentals: Definition, need for networks, types (LAN, WAN, MAN), topology (Star, Ring, Bus).

Internet Basics: IP Address, Domain Name, Web Browser, Email, WWW.

Unit 3. Word Processing and presentations:

Word Processing Basics: Using MS Word/Google Docs – formatting, styles, tables, mail merge.

Presentation Tools: Using PowerPoint/Google Slides – slide design, animations, transitions.

Applications: Creating resumes, reports, brochures, and presentations.

Keyboard Shortcuts

Unit 4. Spreadsheet Basics:

Spreadsheet Concepts: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, cell referencing.

Functions and Formulae: SUM, AVERAGE, IF, COUNT.

Charts and Graphs: Creating visual representations

Data Handling: Sorting, filtering, conditional formatting.

Text Functions: LEFT, RIGHT, MID, LEN, TRIM, CONCAT, TEXTJOIN

Advanced Functions: **Logical:** IF, AND, OR, IFERROR, **Lookup:** VLOOKUP, HLOOKUP, XLOOKUP, INDEX, MATCH

Unit 5. Data Analysis and Visualization:

Conditional Formatting: Custom rules, Color scales, Icon sets, Data bars

Data Analysis Tools: Pivot Tables and Pivot Charts, Data Validation (Drop-downs, Input Messages, Error Alerts), What-If Analysis: Goal Seek, Scenario Manager, Data Tables

Charts and Dashboards: Creating Interactive Dashboards, Using slicers with Pivot Tables, Combo Charts and Sparklines

Productivity Tips: Using Named Ranges, Freeze Panes, Split View

Textbooks:

1. **Fundamentals of Computers**, Reema Thareja, Oxford University Press, Second Edition
2. **Fundamentals of Computers**, V. Rajaraman – PHI Learning
3. **Introduction to Computers** by Peter Norton – McGraw Hill

4. **Microsoft Office 365 In Practice** by Randy Nordell – McGraw Hill Education

References:

1. **Excel 2021 Bible** by Michael Alexander, Richard Kusleika – Wiley
2. **Networking All-in-One For Dummies** by Doug Lowe – Wiley
3. **Microsoft Official Docs and Training:** <https://learn.microsoft.com>
4. **Google Workspace Learning Center:** <https://support.google.com/a/users/>

Activities:

Outcome: At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.

Activity: Create a digital poster or infographic comparing number systems (binary, decimal, octal, hexadecimal) and illustrating the timeline of computer generations with key innovations.

Evaluation Method: Rubric-based assessment of the poster presentation on a 10-point scale focusing on:

- Accuracy of number system conversions
- Correct identification of block diagram components
- Visual organization and creativity

Outcome: Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge**.

Activity: Design a concept map showing the internal architecture of a computer and types of networks (LAN, WAN, MAN), including devices and topologies.

Evaluation Method: Checklist-based peer review and instructor validation:

- Completeness of the map
- Correctness of networking concepts
- Use of appropriate terminology
- Logical flow and structure of the map

Outcome: Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.

Activity: Prepare a formal report (e.g., project proposal) in a word processor and present it using a slide deck with transitions, embedded media, and design elements.

Evaluation Method: Performance-based evaluation using a 10-point scoring scale:

- Formatting and structure of the document
- Presentation aesthetics and clarity
- Communication skills during presentation

Outcome: Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations.**

Activity: Analyze a dataset (e.g., student scores or sales data) using spreadsheet software. Apply formulas (SUM, AVERAGE, IF, VLOOKUP) and create relevant charts.

Evaluation Method: Practical test with a rubric:

- Correct use of formulas
- Accuracy of data summaries

Outcome: Learners will apply data modelling techniques to **analyze, organize, and represent data effectively** in various scenarios.

Activity: Prepare an interactive dashboard for a given data set using EXCEL.

Evaluation Method: Evaluation of the dashboard on a 10-point scoring scale:

- Presentation aesthetics and clarity
- Interactiveness
- Communication skills during presentation

AI-101P: Computer fundamentals and Office Automation Lab

Semester: I

L-T-P: 0-0-2

Credits:01

List of Experiments:

1. Demonstration of Assembling and Dessembling of Computer Systems.
2. Identify and prepare notes on the type of Network topology of your institution.
3. Prepare your resume in Word.
4. Using Word, write a letter to your higher official seeking 10-days leave.
5. Prepare a presentation that contains text, audio and video.
6. Using a spreadsheet, prepare your class Time Table.
7. Using a Spreadsheet, calculate the Gross and Net salary of employees(Min 5) considering all the allowances.
8. Generate the class-wise and subject-wise results for a class of 20 students. Also generate the highest and lowest marks in each subject.
9. Using IF, AND, OR, and IFERROR to Automate Grade Evaluation.
 - a. Create a table of student scores in different subjects.
 - b. Use IF to assign grades (A/B/C/Fail).
 - c. Use IFERROR to handle missing scores or invalid data.
10. *Employee Database Search Using VLOOKUP, HLOOKUP, XLOOKUP, INDEX, and MATCH*
 - a. Create a database of employees (Name, ID, Department, Salary).
 - b. Implement VLOOKUP to search by employee ID.
 - c. Use HLOOKUP to extract department heads by role.
 - d. Apply XLOOKUP for more flexible searches.
 - e. Use INDEX + MATCH as an alternative to VLOOKUP.
11. Sales Report Analysis Using Pivot Tables and Charts
 - a. Use a dataset of product sales (Product, Region, Date, Quantity, Revenue).
 - b. Create Pivot Tables to summarize data by region/product.
 - c. Insert Pivot Charts for visual analysis (e.g., bar, line).
 - d. Add slicers to make the dashboard interactive.
12. Designing a Data Entry Form with Drop-downs and Input Rules
 - a. Create a student registration form.
 - b. Add drop-down lists for course selection using Data Validation.
 - c. Add input messages to guide users.
 - d. Add error alerts for wrong entries.
13. Monthly Budget Planning using Goal Seek and Scenario Manager
 - a. Create a simple personal budget (income, expenses, savings).

- b. Use Goal Seek to determine income needed to save a desired amount.
- c. Use Scenario Manager to compare different budgeting scenarios (best/ worst/ realistic case).
- d. Create a one-variable Data Table to analyze how different expenses affect savings.

14. Dashboard Creation Using Combo Charts, Sparklines & Slicers

- a. Use existing sales or attendance data.
- b. Insert combo charts (e.g., column + line).
- c. Add sparklines to show trends.
- d. Use slicers with Pivot Tables to control dashboard elements.
- e. Finalize and format for interactivity.

CLO-PLO Mapping

CLO\PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CLO 1	3	1	-	-	-	-	-	-	1	-
CLO 2	3	-	-	1	-	-	-	-	1	-
CLO 3	2	-	-	3	-	-	3	-	-	-
CLO 4	3	2	1	3	-	-	2	-	-	-
CLO 5	3	3	2	3	-	-	1	-	1	-

(3 = High, 2 = Moderate, 1 = Low, 0 = Not mapped)

Blue Print of Question Paper

S.NO	QUESTIONS	UNITS OF THE SYLLABUS	MARKS
1	Question1 or Question2	UNIT-I	7
2	Question3 or Question4	UNIT-II	7
3	Question5 or Question6	UNIT-III	7
4	Question7 or Question8	UNIT-IV	7
4	Question9 or Question10	UNIT-V	7
5	Question 11, 12, 13, 14, 15,16, 17, 18 Short answers (Five out of Eight should be answered, each question is of 3 Marks)	Covers All Five Units of the Syllabus	5x3=15
Total			50

GOVERNMENT AUTONOMOUS COLLEGE, RAJAHMUNDRY
B.Sc.(Honours) Artificial Intelligence

Semester: I

AI-101: Computer Fundamentals and Office Automation

Model Question Paper

Time: 2 ½ Hours

Max. Marks: 50 M

Section - A				
Answer ALL Questions. Each Question Carries 7 Marks			5 X 7 = 35	
Question	BL	CLO	PLO	PI
1. Explain the block diagram of a computer with components. OR	2	1	1	1.1.2 / 1.1.3
2. Discuss the evolution of computers from 1st to 5th generation.				
3. Explain different network topologies with diagrams. OR	2 / 3	2	2	2.1.2 / 2.1.3
4. Discuss the role of IP addresses and domain names in Internet communication.				
5. Demonstrate the steps in creating a table in MS Word. OR	3	3	4	4.1.2 / 4.1.3
6. How do you design a professional presentation with transitions and animations?				
7. Explain different chart types in MS Excel with examples. OR	3	4	2	2.1.4 / 2.1.5
8. Illustrate the use of logical functions (IF, AND, OR) with examples.				
9. Explain the creation of dashboards using Pivot tables and slicers. OR	4	5	2 / 3	2.1.6 / 3.1.1
10. Describe the use of Goal Seek and Scenario Manager for data analysis.				
Section - B				
Answer any FIVE Questions. Each Question Carries 3 Marks			5 X 3 = 15	
11. Convert 456 (Decimal) into Binary and Hexadecimal.	1	1	1	1.1.1
12. Differentiate Microcomputers and Supercomputers.	2	2	1	1.1.3
13. Write short notes on LAN and WAN.	1	2	2	2.1.1
14. List any three features of MS Word for creating documents.	1	3	4	4.1.1
15. Explain the purpose of animations in presentations.	2	3	4	4.1.2
16. What is VLOOKUP? Give an example.	2	4	2	2.1.3
17. Define Pivot Table in spreadsheets.	1	5	2	2.1.4
18. What are conditional formatting rules in Excel? Give one example.	2	5	2	2.1.5

AI-102: Mathematical Foundation for AI

Semester: I

L-T-P: 4-1-0

Credits:04

Course Objectives

1. Develop a strong foundation in linear algebra, set theory, and functions essential for AI.
2. Understand and solve systems of linear equations using matrix methods.
3. Gain knowledge of eigenvalues, eigenvectors, and matrix diagonalization.
4. Learn fundamental concepts of probability and statistics for data analysis.
5. Explore functions and their applications relevant to AI problem-solving.

Course Outcomes

1. Solve complex linear algebra problems including matrix properties.
2. Apply set theory rigorously and compute eigenvalues/eigenvectors for intermediate examples.
3. Understand differentiation rules and solve constrained optimization problems.
4. Calculate probabilities in varied scenarios and explore discrete random variables.
5. Analyze data using comprehensive statistical measures and interpret visualizations.

Unit 1: Basic Linear Algebra and Systems of Linear Equations

Vectors and matrices: basics and operations (addition, multiplication, transpose, inverse)

Elementary row operations: row swapping, scalar multiplication, row addition

Row Echelon Form (REF), Reduced Row Echelon Form (RREF), Rank of matrix

System of linear equations: coefficient and augmented matrix representation

Types of solutions: unique, infinite, no solution

Gaussian elimination method using REF and back substitution

Unit 2: Set Theory and Eigen Concepts

Sets, subsets, set operations (union, intersection, difference, complement), Venn diagrams, Cartesian products

Relations and functions: definitions and properties, linear transformations, Eigenvalues, eigenvectors, characteristic polynomial, Diagonalization of matrices and symmetric matrices

Unit 3: Functions and their Properties

Definition, types of functions (polynomial, rational, exponential, logarithmic), Domain, range, and inverses of functions, Composition of functions, Continuity and basic limits, Graphical representation of functions, Maxima & Minima of functions.

Unit 4: Vector Differentiation

Vector differentiation –ordinary – derivatives of vectors – Differentiability – Gradient – Divergence - Curl operators - Directional derivatives of functions

Unit 5: Fundamentals of Probability & Basic Statistics

Probability: Concept of Uncertainty, Axioms and rules of probability, Conditional probability and independence, Law of total probability and Bayes' theorem

Measures of central tendency: Mean, Median, Mode

Measures of dispersion: range, interquartile range, variance, standard deviation

Introduction to correlation and covariance

Data representation: histograms, bar charts, scatter plots

Textbooks

1. Mathematics for Machine Learning, M. P. Deisenroth, A. A. Faisal, C. S. Ong, Cambridge University Press, 2020.
2. Introductory Linear Algebra, Howard Anton, Wiley.
3. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole, Wiley.

Reference Books:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, McGraw Hill.
2. Online Resources: Khan Academy, MIT OpenCourseWare (Linear Algebra, Probability, Statistics, Functions).

Activities:

Unit 1

Activity: Solve advanced linear equation systems using elementary row operations; explore matrix rank with concrete examples; interpret solutions graphically.

Evaluation Method: Assess problem-solving accuracy, clarity of solution process, and ability to classify solution types.

Unit 2

Activity: Practice set theory problems including Venn diagrams, unions, intersections; compute eigenvalues/eigenvectors for 3x3 matrices; perform matrix diagonalization exercises.

Evaluation Method: Evaluate completeness of set operations, correctness of eigen computations, and accuracy in diagonalization.

Unit 3

Activity: Plot and analyze various types of functions (polynomial, exponential, logarithmic); solve problems on function composition and inverses; perform simple graphical interpretations.

Evaluation Method: Assess quality of function plots, conceptual clarity of compositions and inverses, and accuracy of graphical analyses.

Unit 4

Activity: Calculate conditional probabilities; simulate discrete probability distributions; apply Bayes' theorem in practical scenarios (e.g., medical testing, reliability analysis).

Evaluation Method: Evaluate correct application of probability laws and rules, and logical use of Bayesian inference.

Unit 5

Activity: Analyze sample datasets to calculate central tendency measures and dispersion; compute correlation coefficients; create histograms and scatter plots; interpret data insights.

Evaluation Method: Assess accuracy of statistical calculations, clarity and correctness of visual data representation, and quality of interpretation.

CLO-PLO Mapping

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CLO 1	3	2	1	-	-	-	-	-	-	-
CLO 2	3	3	2	-	-	-	-	-	1	-
CLO 3	3	3	3	1	-	-	-	-	-	-
CLO 4	3	3	2	-	-	-	-	-	-	-
CLO 5	3	3	3	2	-	-	1	-	1	-

(3 = High, 2 = Moderate, 1 = Low, 0 = Not mapped)

Blue Print of Question Paper

S.NO	QUESTIONS	UNITS OF THE SYLLABUS	MARKS
1	Question1 or Question2	UNIT-I	7
2	Question3 or Question4	UNIT-II	7
3	Question5 or Question6	UNIT-III	7
4	Question7 or Question8	UNIT-IV	7
4	Question9 or Question10	UNIT-V	7
5	Question 11, 12, 13, 14, 15,16, 17, 18 Short answers (Five out of Eight should be answered, each question is of 3 Marks)	Covers All Five Units of the Syllabus	5x3=15
Total			50

GOVERNMENT AUTONOMOUS COLLEGE, RAJAHMUNDRY

B.Sc.(Honours) Artificial Intelligence

Semester: I

AI-102: Mathematical Foundations of AI

Model Question Paper

Time: 2 ½ Hours

Max. Marks: 50 M

Section - A				
Answer ALL Questions. Each Question Carries 7 Marks			5 X 7 = 35	
Question	BL	CLO	PLO	PI
<p>1. Find the rank of the matrix</p> $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{pmatrix}$ <p>by reducing it to Row Echelon Form.</p> <p align="center">OR</p> <p>2. Solve the following system of linear equations using the Gaussian elimination method:</p> $\begin{aligned} x + y + z &= 6 \\ x - y + z &= 2 \\ 2x + y - z &= 1 \end{aligned}$	3	1	2	2.1.1 / 2.1.3
<p>3. Let $A = \{1, 2, 3, 4\}$ and $B = \{a, b, c\}$. Define a function $f: A \rightarrow B$ and explain the concepts of injective, surjective, and bijective functions with examples related to A and B.</p> <p align="center">OR</p> <p>4. Find the eigenvalues and eigenvectors of the matrix</p> $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$	3/4	2	2	2.1.2 / 2.1.4
<p>5. Find the local maxima and minima of the function $f(x) = x^3 - 6x^2 + 5$.</p> <p align="center">OR</p> <p>6. Explain the concepts of domain, range, and inverse of a function. Find the inverse of the function $f(x) = 2x + 3$.</p>	3	3	3	3.1.1 / 3.1.2
<p>7. Find the gradient, divergence, and curl of the vector function $F = x^2y \mathbf{i} + 2yz \mathbf{j} + 3zx \mathbf{k}$ at the point (1, 1, 1).</p> <p align="center">OR</p> <p>8. Explain the concept of directional derivative. Find the directional derivative of $f(x, y, z) = xy^2 + yz^3$ at the point (2, -1, 1) in the direction of the vector $\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$.</p>	4	4	2	2.1.2 / 2.1.5
<p>9. State and prove Bayes' theorem. A bag contains 5 red and 3 black balls. Another bag contains 4 red and 6 black balls. If one ball is drawn from one of the bags at random, what is the probability that it is red?</p> <p align="center">OR</p>	4	5	3	3.1.1 / 3.1.4

10. Calculate the mean, variance, and standard deviation for the following set of data: 6, 7, 10, 12, 13, 4, 8, 12.				
Section - B				
Answer any FIVE Questions. Each Question Carries 3 Marks	5 X 3 = 15			
11. Define the transpose of a matrix and list its properties.	1	1	1	1.1.1
12. When is a system of linear equations said to be consistent?	1	1	1	1.1.3
13. Using a Venn diagram, show the set operation $A \cap (B \cup C)$.	2	2	1	1.1.2
14. Define eigenvalues and eigenvectors of a matrix.	1	2	1	1.1.1
15. Differentiate between a polynomial and an exponential function.	2	3	1	1.1.3
16. Define conditional probability.	1	4	1	1.1.1
17. What is the difference between correlation and covariance?	2	5	2	2.1.1
18. What is a scatter plot and what is it used for?	1	5	1	1.1.2

Semester-II

AI-201: Python Programming and Data Structures

Semester: II

L-T-P: 3-0-0

Credits:03

Course Objectives

1. To introduce the fundamentals of Python programming, including environment setup, syntax, and core concepts.
2. To develop problem-solving skills using control flow, functions, and modules.
3. To provide knowledge of Python data structures, file handling, and exception handling for effective programming.
4. To impart object-oriented programming concepts and GUI development skills for building applications.

Course Outcomes (COs)

After successful completion of the course, students will be able to:

1. Explain the basic features, syntax, data types, and operators of Python programming.
2. Apply control flow constructs, functions, and modules to develop structured Python programs.
3. Demonstrate the use of sequences, sets, and dictionaries for effective data handling and manipulation.
4. Implement file handling techniques and apply exception handling mechanisms for robust applications.
5. Develop object-oriented and GUI-based applications using Python.

Unit 1: Basics of Python Programming:

Introduction to Python, Features of Python, Programming Modes - Interactive Mode & Script Mode, Identifiers, Naming Conventions, Keywords (Reserved Words), Built-in Data Types, Literals - Integer, Float, Complex, Boolean, String, Variables, Operators, Expressions, Assignment Statements, Input/Output Statements, Python Syntax (Lines, Comments, Indentation), Operators & Operands, Classification of Operators - Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Assignment, Augmented Assignment, Identity Operators, Expressions & Precedence Rules

Unit 2: Control Flow, Functions & Modules:

Control Flow - if Statement, if-else, if-elif-else. Iterative Statements – while, for, Nested Loops, Loop Control Statements – break, continue, pass; else with loops

Need for Functions, Defining & Invoking User-defined Functions, Return Statement, Function Input/Output Cases, Scope of Variables - Local, Global, Nested Functions, Function Arguments - Required, Positional, Default, Variable-length, main() Function, Documentation Strings, Recursive Functions, Anonymous Functions (Lambda), Library Functions
Modules - Import, from..import, Creating & Using Modules, Namespaces

Unit 3: Core Data Types and Python Collections

Strings: Representation, Indexing, Slicing, Immutability, Operators, Methods, Formatting

Lists: Creation, Indexing, Slicing, Mutability, Common Methods, List Comprehension

Tuples: Immutability, Operations, Tuple Assignment

Sets and Frozensets: Methods, Mathematical Operations, Comprehension

Dictionaries: Key-Value Structure, Methods, Traversal, Nested Dictionaries

Unit 4: File Handling, Exception Management & Object-Oriented Programming

File Handling: Types, Opening, Reading, Writing, Closing, CSV Files, OS/Pathlib

Error Types, Exception Handling: try-except, raise, User-defined Exceptions, Assertions

OOP Concepts: Classes, Objects, Attributes, Methods, Constructor and Destructors

Encapsulation: Private and Public Members

Inheritance: Single, Multilevel, Multiple, Method Overriding

Unit 5: Abstract Data Structures and GUI Programming

Abstract Data Structures (ADTs): Concepts and Importance

Linked Lists: Definition, Types- Singly, Doubly, Circular; Node Structure, Insertion, Deletion, Traversal (Single Linked list implementation only)

Stacks: LIFO Principle, Implementation using List, Applications

Queues: FIFO Principle, Implementation using List, Priority Queues

GUI Programming with Tkinter: Widgets (Label, Button, Entry, Menu, Listbox, Canvas etc.), Event Handling, Building Simple GUI Apps

Textbooks:

1. Python Programming-An Object Oriented approach, Anita Goel, Universities Press
2. Python Programming using Problem Solving Approach Reema Thareja Oxford University Press 2020
3. Exploring Python, Budd T A, McGraw-Hill Education, 1st Edition, 2011.

Reference Book:

1. Python: The Complete Reference, Martin C. Brown, Mc Graw-Hill, 2018

2. Fundamentals of Python, Kenneth A. Lambert. (2019), First Programs, 2nd Edition, CENGAGE Publication.

Activities:

Outcome: Explain the basic features, syntax, data types, and operators of Python programming.

Activity: Conduct a "Python Basics Lab" where students write small programs to demonstrate literals, variables, data types, and operators (e.g., swapping numbers, simple calculator).

Evaluation Method:

- Lab performance checklist (execution of 3 mini tasks)
- Short quiz with multiple-choice and fill-in-the-blanks on syntax, data types, and operators

Outcome: Apply control flow constructs, functions, and modules to develop structured Python programs.

Activity: Group activity - "Python Problem Solving Challenge": Students solve real-life problems (e.g., finding prime numbers, grade calculator, menu-driven calculator) using control structures, functions, and importing standard modules.

Evaluation Method:

- Code submission with proper use of functions/modules (20%)
- Viva-voce to explain logic and flow of control (40%)
- Unit test with scenario-based programming questions (40%)

Outcome: Demonstrate the use of sequences, sets, and dictionaries for effective data handling and manipulation.

Activity: Hands-on mini project – "Student Data Manager": Students create a program using lists, tuples, sets, and dictionaries to store and manipulate student records (e.g., marks, courses, hobbies).

Evaluation Method:

- Practical demo of program with at least 5 data operations (add, search, delete, update, traverse)
- Evaluation rubric for correctness, efficiency, and use of appropriate data structure

Outcome: Implement file handling techniques and apply exception handling mechanisms for robust applications.

Activity: Individual assignment - "File-Based Address Book": Students create a program to store, update, and retrieve data from files, with exception handling for invalid inputs or missing files.

Evaluation Method:

- Assessment of program correctness (file read/write, append, delete, exception handling)
- Short quiz with error-tracing and debugging questions (given code with errors, students identify and correct)

Outcome: Develop object-oriented and GUI-based applications using Python.

Activity: Mini Project – "Student Information System with GUI": Students design a simple Tkinter-based application with classes/objects for handling student data, including basic GUI widgets (Entry, Button, Listbox).

Evaluation Method:

- Project demo and presentation (50%)
- Rubric-based evaluation for OOP concepts (classes, inheritance, encapsulation) and GUI design (widgets, event handling) (30%)
- Peer review/feedback on usability (20%)

AI-201P: Python Programming and Data Structures Lab

Semester: II

L-T-P: 0-0-2

Credits:01

1. Basic Python Programs:
 - a. Write a program to display basic details (name, roll number, department) using print() and demonstrate different literal types (int, float, string, boolean, complex).
 - b. Write a program to perform arithmetic, relational, logical, bitwise, and assignment operations on given inputs.
2. Control Flow Practice
 - a. Write a program to find the largest of three numbers using if-elif-else.
 - b. Write a program to check whether a number is prime or not using loops.
 - c. Write a program to illustrate the use of loop control statements (break, continue, pass).
3. Functions and Recursion
 - a. Write a program to define a function to calculate factorial of a number (using recursion).
 - b. Write a program to demonstrate different types of function arguments (default, positional, keyword, variable-length).
4. Write a program to illustrate string slicing, concatenation, repetition, and built-in methods.
5. Write a program to create a list of numbers, perform insertion, deletion, searching, sorting, and list comprehension.
6. Write a program to demonstrate tuple packing, unpacking, and immutability.
7. Write a program to implement set operations (union, intersection, difference, subset, superset).
8. Write a program to create a dictionary of student roll numbers and marks, and perform add, update, delete, and traversal operations.
9. Write a program to read and display count of vowels, consonants, digits, and spaces of a text file.
10. Write a program to copy the contents of one file into another file.
11. Write a program to read and process student marks from a CSV file (calculate average, highest, lowest).
12. Write a program to demonstrate exception handling using try-except-finally.
13. Write a program to create a class Student with attributes and methods to display details.
14. Write a program to demonstrate single and multilevel inheritance.
15. Implement stack (LIFO) and queue (FIFO) using lists.
16. Implement singly linked lists: node creation, insertion, deletion, traversal.

17. Write a Tkinter program with Label, Entry, and Button widgets to take user input and display it.
18. Write a Tkinter program to create a simple calculator application

CLO-PLO Mapping

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CLO 3	3	2	1	-	-	-	-	-	-	-
CLO 4	3	2	3	1	-	-	-	-	-	-
CLO 5	3	3	3	2	-	2	-	-	1	-

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GOVERNMENT AUTONOMOUS COLLEGE, RAJAHMUNDRY

B.Sc.(Honours) Artificial Intelligence

Semester: I

AI-201: Python Programming and Data Structures

Model Question Paper

Time: 2 ½ Hours

Max. Marks: 50 M

Section - A				
Answer ALL Questions. Each Question Carries 7 Marks				
5 X 7 = 35				
Question	BL	CLO	PLO	PI
1. Explain the key features of the Python programming language. Differentiate between interactive mode and script mode with suitable examples. <p style="text-align: center;">OR</p>	2	1	1	1.1.2 / 1.1.3
2. What are operators in Python? Explain arithmetic operators and logical operators with examples and discuss their precedence.				
3. Write a Python program to find the sum of all prime numbers up to a given number n using a for loop. <p style="text-align: center;">OR</p>	3	2	3	3.1.2 / 3.1.3
4. Explain the difference between required arguments and default arguments in Python functions with a suitable program.				
5. What is a list in Python? Write a Python program to demonstrate at least five different list methods <p style="text-align: center;">OR</p>	3	3	2	2.1.2 / 2.1.4
6. Explain dictionaries in Python. Write a program to create a nested dictionary to store student details (name, roll no, marks) and traverse it to display all the information.				
7. Explain the concept of inheritance in Object-Oriented Programming. Demonstrate single and multilevel inheritance with a Python program. <p style="text-align: center;">OR</p>	4	4	3	3.1.1 / 3.1.4
8. What is exception handling? Write a Python program that reads two numbers from the user and performs division, using a try-except block to handle ZeroDivisionError and ValueError.				
9. Explain the implementation of a stack using a Python list. Write the code for push, pop, and display operations. <p style="text-align: center;">OR</p>	4	5	3	3.1.2 / 3.1.4
10. What are widgets in Tkinter? Write a simple Python GUI program using Tkinter that includes a label, an entry box, and a button. When the button is clicked, a message should be displayed.				

Section - B**Answer any FIVE Questions. Each Question Carries 3 Marks****5 X 3 = 15**

11. List the naming conventions for identifiers in Python.	1	1	1	1.1.1
12. What is the use of the pass statement in Python?	2	2	1	1.1.3
13. Differentiate between break and continue statements.	2	2	2	2.1.1
14. What is the difference between a list and a tuple?	2	3	2	2.1.3
15. How do you open a file in write mode and add content to it?	2	4	1	1.1.2
16. What is the purpose of the <code>__init__</code> method in a class?	1	4	1	1.1.1
17. Define a singly linked list.	1	5	1	1.1.1
18. What is the difference between a stack and a queue?	2	5	2	2.1.1

AI-202: Artificial & Computational Intelligence

Semester: II

L-T-P: 3-0-0

Credits:03

Course Objectives

1. Introduce foundational concepts and history of Artificial Intelligence (AI).
2. Teach the PEAS framework and agent-based problem solving.
3. Develop understanding of uninformed and informed search methods.
4. Provide basic knowledge of machine learning concepts and computational intelligence.
5. Instill awareness of ethical considerations in AI.
6. Introduce logic programming fundamentals using Prolog as a practical tool.

Course Outcomes

On Completion of this Course, the Students will be able to:

1. Explain basic AI terminology, agent models, and the PEAS framework.
2. Formulate AI problems using search strategies and implement basic algorithms conceptually.
3. Understand core machine learning categories and their applications.
4. Describe computational intelligence approaches and their role in AI.
5. Analyze ethical issues related to AI technologies.

Unit 1. Introduction to Artificial Intelligence and PEAS Framework

Introduction to AI: Definition, history, applications, and scope

The PEAS framework: Performance Measure, Environment, Actuators, Sensors, Examples of PEAS in real-world AI systems

Intelligent agents: Intelligent agents and their environments, **Types of intelligent agents:** Simple reflex, model-based, goal-based, utility-based, Agent architectures and rationality

Unit 2. Expert Systems

Definition and components of Expert Systems (Knowledge Base, Inference Engine, User Interface), Rule-based systems and knowledge representation, Examples of expert systems: medical diagnosis, decision support, Limitations and comparison with AI agents, Role and significance of expert systems in AI evolution

Unit 3. Search Strategies in AI

Problem-solving as search: problem formulation, states, actions, goal test, Traveller's problem

Uninformed (Blind) Search: Breadth-first search, Depth-first search, Uniform-cost search

Informed (Heuristic) Search: Greedy best-first search, A* algorithm

Applications of search in AI problems

Unit 4. Introduction to Machine Learning

What is machine learning, definitions, Types of learning: Supervised, Unsupervised, Reinforcement learning (basic ideas), classification, Regression , clustering and Association, Basic learning algorithms overview and applications

Unit 5. Computational Intelligence and Ethics in AI

Overview of computational intelligence (Basics of fuzzy logic, neural networks), Role of computational intelligence in AI, Ethics and societal challenges in AI, Responsible AI, fairness, transparency, and safety concerns

Activities:

Unit 1: Introduction to AI, PEAS Framework & Intelligent Agents

Interactive lecture with real-world AI examples

Group discussion on PEAS framework for different environments

Case study analysis of intelligent agents in everyday AI applications

Quiz on AI fundamentals and agent types

Outcomes:

Students will explain AI basics and describe the PEAS components.

Students will identify types of intelligent agents and their roles.

Evaluation Method:

Quiz and participation: 10%

Assignment on PEAS and agent modeling: 10%

Unit 2: Expert Systems

Activities:

Lecture with multimedia explaining components of expert systems

Hands-on group activity designing rule-based systems for simple decision problems

Case study review of medical diagnosis expert systems

Class debate on limitations and advantages of expert systems

Outcomes:

Understand expert system architecture and knowledge representation.

Develop simple rule-based systems for decision making.

Analyze real-world expert system examples critically.

Evaluation Method:

Group assignment designing rule base: 15%

Written test on expert system concepts: 10%

Unit 3: Search Strategies in AI

Activities:

Demonstration of uninformed search algorithms

Interactive exercises formulating search problems

Simulation of heuristic search and A* algorithm

Problem-solving sessions applying search to puzzles

Outcomes:

Formulate search problems and apply uninformed and heuristic algorithms conceptually.

Explain the working and use cases of different search strategies.

Evaluation Method:

Problem formulation assignment: 10%

Class test on search algorithms: 10%

Unit 4: Basics of Machine Learning

Activities:

Video lectures on different machine learning paradigms

Simple data classification exercises/classification demos

Group presentations on various ML types and applications

Quiz on ML types and terminology

Outcomes:

Explain supervised, unsupervised, and reinforcement learning basics.

Identify sample use cases for machine learning.

Evaluation Method:

Quiz and presentation: 10%

Written assignment on ML overview: 5%

Unit 5: Computational Intelligence & Ethics

Activities:

Lecture introducing fuzzy logic, neural networks overview

Ethical dilemma discussions and case studies in AI technology

Role play on AI responsibility and fairness

Group project: Develop guidelines for responsible AI use

Outcomes:

Understand computational intelligence basics and ethical AI challenges.

Propose responsible AI practices for diverse scenarios.

Evaluation Method:

Participation in ethics discussions: 5%

Group project report and presentation: 15%

Textbooks

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition
2. Elaine Rich, Kevin Knight, Artificial Intelligence, 3rd Edition

Reference Books:

1. Michael Negnevitsky, Artificial Intelligence: A Guide to Intelligent Systems
2. Ivan Bratko, Prolog Programming for Artificial Intelligence, 4th Edition
3. Online resources: AI course materials from Coursera, NPTEL, GeeksforGeeks AI tutorials.

AI-202P: Artificial & Computational Intelligence Lab

Semester: II

L-T-P: 0-0-2

Credits:01

Note: Experiments have to be conducted using Prolog

1. Introduction to Prolog Environment and Syntax
 - Setting up Prolog, understanding facts, rules, and queries.
2. Defining Simple Facts and Queries
 - Write and test simple facts like family relationships, likes/dislikes.
3. Creating Rules in Prolog
 - Define logical rules with conditions and test queries.
4. List Handling in Prolog
 - Write programs to manipulate lists (head, tail, concatenation).
5. Recursion in Prolog
 - Implement recursive relations such as factorial and Fibonacci.
6. Search and Backtracking
 - Demonstrate Prolog's backtracking with sample queries and control cuts.
7. Family Relationship Programs
 - Model family trees and query relationships like siblings, ancestors.
8. Solve the Eight Queens Problem
 - Classic AI problem solved using backtracking.
9. Implement Simple Arithmetic Operations
 - Addition, subtraction, multiplication using Prolog predicates.
10. Monkey and Banana Problem
 - Logic problem modeling and solution.
11. Basic Expert System Prototype
 - Write rules for a simple medical diagnosis or recommendation system.
12. Implement Search Algorithms (Conceptual)
 - Demonstrate basic search algorithms like best-first search using Prolog rules.

CLO-PLO Mapping

CLO\PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CLO 1	3	1	-	-	-	-	-	-	-	-
CLO 2	3	3	3	1	-	-	-	-	-	-
CLO 3	3	2	1	-	-	-	-	-	1	-
CLO 4	3	2	1	-	-	-	-	-	1	-
CLO 5	2	2	1	-	-	-	1	3	-	2

(3 = High, 2 = Moderate, 1 = Low, 0 = Not mapped)

Blue Print of Question Paper

S.NO	QUESTIONS	UNITS OF THE SYLLABUS	MARKS
1	Question1 or Question2	UNIT-I	7
2	Question3 or Question4	UNIT-II	7
3	Question5 or Question6	UNIT-III	7
4	Question7 or Question8	UNIT-IV	7
4	Question9 or Question10	UNIT-V	7
5	Question 11, 12, 13, 14, 15,16, 17, 18 Short answers (Five out of Eight should be answered, each question is of 3 Marks)	Covers All Five Units of the Syllabus	5x3=15
Total			50

GOVERNMENT AUTONOMOUS COLLEGE, RAJAHMUNDRY

B.Sc.(Honours) Artificial Intelligence

Semester: I

AI-202: Artificial & Computational Intelligence

Model Question Paper

Time: 2 ½ Hours

Max. Marks: 50 M

Section - A				
Answer ALL Questions. Each Question Carries 7 Marks				
5 X 7 = 35				
Question	BL	CLO	PLO	PI
1. What is an intelligent agent? Explain the structure of a goal-based agent and a utility-based agent with suitable diagrams. <p style="text-align: center;">OR</p>	2	1	1	1.1.2 / 1.1.3
2. Define the PEAS framework for an AI agent. Describe the PEAS specification for a self-driving car and an automated taxi.				
3. What is an Expert System? Explain the main components of an expert system with a clear diagram. <p style="text-align: center;">OR</p>	3	2	2	2.1.1 / 2.1.3
4. Discuss the limitations of Expert Systems and compare their problem-solving approach with that of a utility-based intelligent agent.				
5. Differentiate between uninformed (blind) search and informed (heuristic) search strategies. Explain the Breadth-First Search (BFS) algorithm with an example. <p style="text-align: center;">OR</p>	4	2	3	3.1.2 / 3.1.4
6. Explain the A* search algorithm. Why is it considered both complete and optimal? Provide an example to illustrate its working.				
7. What is Machine Learning? Explain the three main types of machine learning with an example for each. <p style="text-align: center;">OR</p>	3	3	2	2.1.2 / 2.1.4
8. Explain the difference between Classification and Regression in supervised learning. Provide a real-world application for each.				
9. What is Computational Intelligence? Briefly explain the basic concepts of fuzzy logic and artificial neural networks. <p style="text-align: center;">OR</p>	4	4/5	1/8	1.1.2 / 8.1.1
10. Discuss the key ethical challenges in AI, focusing on fairness, transparency, and safety. Provide an example for each challenge.				

Section - B				
Answer any FIVE Questions. Each Question Carries 3 Marks	5 X 3 = 15			
11. Define Artificial Intelligence (AI).	1	1	1	1.1.1
12. What is the role of a "sensor" and an "actuator" in an AI agent?	2	2	1	1.1.3
13. What is a rule-based system?	2	2	2	2.1.1
14. Define "heuristic" in the context of search algorithms.	2	3	2	2.1.3
15. What is the difference between Depth-First Search (DFS) and Breadth-First Search (BFS)?	2	4	1	1.1.2
16. Define clustering in unsupervised learning.	1	4	1	1.1.1
17. What is reinforcement learning?	1	5	1	1.1.1
18. What is meant by "responsible AI"?	2	5	2	2.1.1