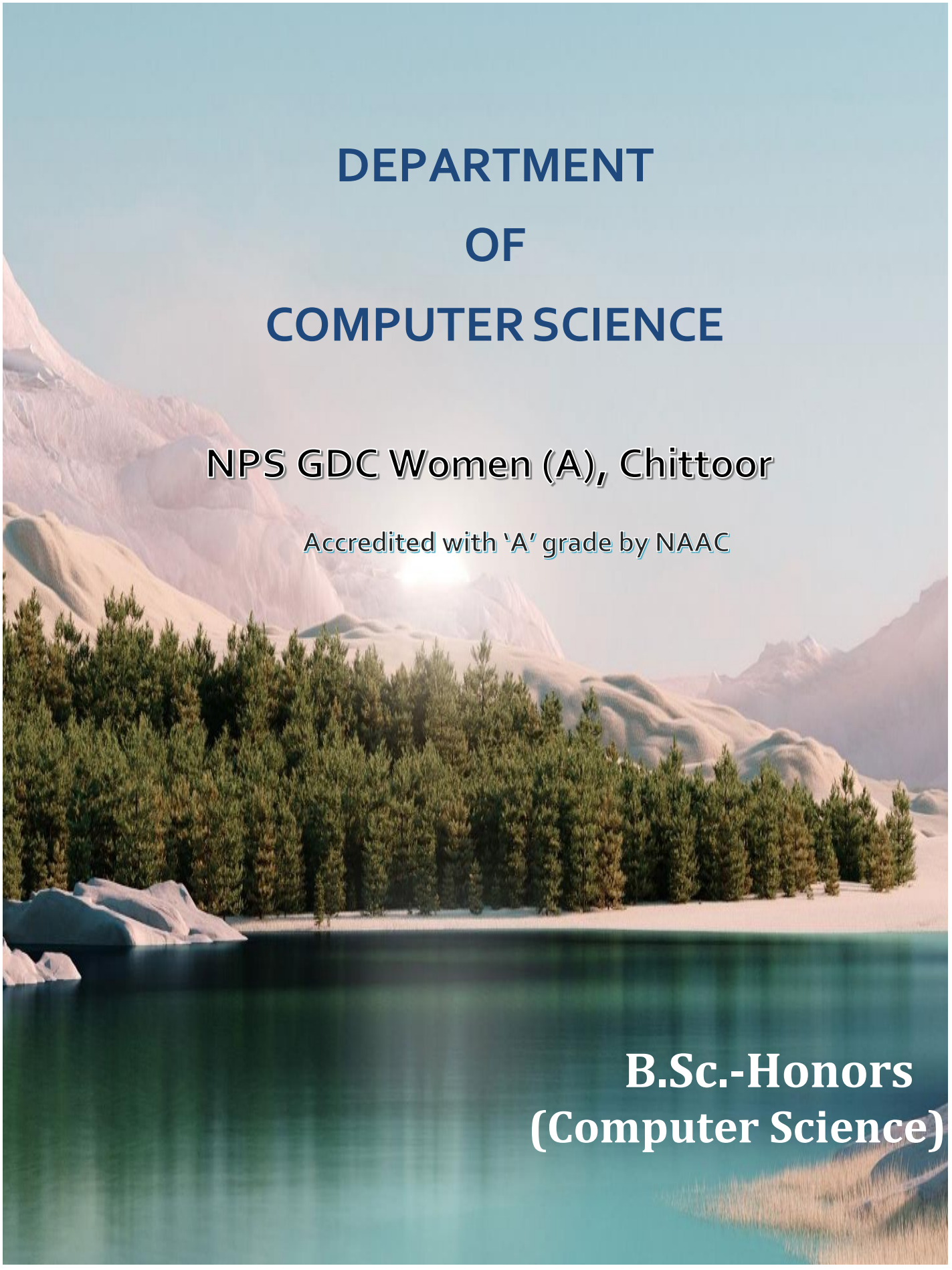

DEPARTMENT
OF
COMPUTER SCIENCE

NPS GDC Women (A), Chittoor

Accredited with 'A' grade by NAAC

B.Sc.-Honors
(Computer Science)

Proceedings of the Principal, NPS Govt. Degree College for Women(A), Chittoor
Present: Dr. K. Manohar

Rc.No.CS01 /NPSGDCW/UG-BoS/2025-26 dt. 22-09-2025

Subject: NPS GDC Women(A), Chittoor – UG Board of Studies (BoS) – Nomination of Members – Orders issued.

Ref.: 1. UGC Guidelines of for Autonomous Colleges – 2023.
2. Proc. Of the VC No: SVU/C-III (3)/BOS/Smt. NPS. Govt. Coll/Chi/2025 dt. 09-05-2025

***

Order

The Principal, NPS GDC Women(A), Chittoor, is pleased to nominate the following members to UG Board of Studies to frame the syllabus of **Computer Science** courses in all the semesters duly following the norms of the UGC regulations for the Autonomous Colleges 2023.

S.No.	Name	Designation
1	Smt. Y. Jnapika	Chairperson
2	Smt. M. Padmavathi	Member
3	Dr. G. Vijay Kumar	Subject Expert
4	Manoj Prabhakar Darsi	Subject Expert
5	Prof. M. Humera Khanam	University Nominee
6	Murali Mohan M	Expert from Industry
7	Shaik Munwar	Special Courses Expert
8	S.J Aayesha	Alumni Nominee

The above members are requested to attend the BoS meetings for the first Autonomous UG-Batch 2025-26 and share their valuable views, suggestions on the following functionaries.

a) Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stakeholders and National recruitment for consideration and approval of the IQAC and Academic Cell.
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 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 events whenever scheduled.

Principal

Principal
Smt. N.P.S.Govt. College for Women
CHITTOOR-517002.(A.P.).

DEPARTMENT OF COMPUTER SCIENCE

COMPOSITION OF BOARD OF STUDIES FOR THE YEAR 2025-26

Sl.No.	Category	Name & Designation	Chairperson/ Member
1	Chairman	**Smt. Y Jnapika** Head of the Department Dept. of Computer Science Smt. N.P.S GDC for Women(A) Chittoor.	**Chairperson** Mobile: 8341341943 Email: jnapikagdl@gmail.com
2	Members of the Department	**Smt. M. Padmavathi** Lecturer in Computer Applications Smt. N.P.S GDC for Women(A) Chittoor.	**Faculty** Mobile: 9985057603 Email: padma.manikyavelu@gmail.com
3.	Two Experts in the Subject from outside the Parent University to be nominated by Academic council	**1. Dr. G. Vijay Kumar** Lecturer in Computer Science SCIM Govt. Degree College(A), Tanuku, E. G. Dt. **2. Manoj Prabhakar Darsi** Lecturer in Computer Science DK Govt. College for Women(A) Nellore Vikram Simhapuri University**.**	**Subject experts outside parent University** **1.** Mobile: 9848141694 Email:gvjykumar@gmail.com **2.** Mobile: 9492441242 Email:manoj07573@gmail.com
4.	One expert from to be nominated by the Vice-Chancellor from the panel of six recommended by Autonomous College Principal	**Prof. M. Humera Khanam** Dept. of Computer Science Dept. of Computer Science and Engineering Tirupathi	**Subject experts by University** Mobile: 9490923045 Email: humera.svec@gmail.com
5.	One Representative from the Industry/ Corporate Sector	**Murali Mohan M** Principal Software Engineer CommScope, Bangalore	**Industry Expert** Mobile: 9739745424 Email: murali.mandala@commscope.com
6.	One Meritorious Alumni nominated by the Principal	**S.J Aayesha** Teacher Sri Chaitanya Techno Curriculum School	**Alumni Student** Mobile: 7330809150 Email id: ayeeshasj@gmail.com
7.	Experts from outside Autonomous College (Special Courses)	**Sri. Shaik. Munwar** Lecturer in Computer Science Dr. YSR GDC, Vedurukuppam S V University.	**Special Courses Expert** Mobile: 9396899875 Email id: munwar.it@gmail.com

Signature of the Members **Signature of the BOS Chairman**

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DEPARTMENT OF COMPUTER SCIENCE

Board of Studies Dated: 17-10-2025

Meeting of the Board of studies is held at NRC Room for the Department of Computer Science, NPS GDC Women (A), Chittoor with the following agenda.

Agenda

- Curriculum Design for all the I & II Semesters for B.Sc. (Honors)-Computer Science
- Designing of Course Outcomes and Course Objectives
- Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the curriculum
- Additional inputs into the curriculum
- Designing Model Question Papers and identifying potential paper setters
- Innovative Teaching – Learning Methodology (Learner Centric)
- Curriculum for the Certificate Courses
- Academic activities of the Department
- Any other proposal with the permission of the chair

(Smt. Y Jnapika)
CHAIRPERSON
BOARD OF STUDIES

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Minutes and Resolutions

The BOS Team have given the following inputs on the BOS Meeting-1:

- No changes required in the framed syllabus of the course-1 "Computer Fundamentals and Office Automation(25BCS101T)" in Semester-1
- In the Course-2 "Problem Solving using C (25BCS102T)" of semester-1, suggested to swap the topic "Dynamic Memory Management: Introduction, Functions-malloc, calloc, realloc, free" from unit -V to Unit -IV as it is interlinked with pointers.
- In the Course-2 "Problem Solving using C (25BCS102T)" of semester-1, suggested to include "Files operations: Working with text files - modes: opening, reading, writing and closing text files" in unit-V as required and emphasized in further courses later.
- In the Course-3 "Data Structures using C (25BCS203T)" of semester-2, suggested to specify clearly which notation in Asymptotic Notations will be covered in the syllabus – and finalized to include "Big -O Notation".
- In the Course-3 "Data Structures using C (25BCS203T)" of semester-2, suggested to remove Abstract Data Type (ADT)" from unit-1, to avoid ambiguity.
- In the Course-3 "Data Structures using C (25BCS203T)" of semester-2, suggested to include only Stack and Queue data structures and remove Stack ADT and Queue ADT" from unit-4, as it is good to study in advanced data structures.
- In the Course-3 "Data Structures using C (25BCS203T)" of semester-2, suggested to specify clearly which applications of Graphs is covered in the syllabus – and finalized to include "Finding Shortest Path using Dijkstra's algorithm".
- No changes required in the framed syllabus of the course-4 "Digital Logic Design (25BCS204T)" in Semester-2.
- Appropriate changes were made or incorporated in the skill courses "AI Fundamentals" in semester-I and "Applications of AI" in semester-II for the benefit of all groups of students.

The above suggestions are agreed by all the BOS members also incorporated while framing the UG syllabus for the B.Sc., Computer Science (Major) and AI related skills courses for all groups during first year. The approved syllabus is followed from A.Y.2025-26.

Signature of the Members **Signature of the BOS Chairman**

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CONSOLIDATED REPORT OF BOARD OF STUDIES FOR THE YEAR 2025-26

The Meeting Board of Studies of Computer Science & Applications department was convened on 17-Oct-2025 under the Chairmanship of Smt, Y Jnapika Head / Lecturer-in-charge of Department of Computer Science and Applications. The following members are present

S.No.	Name	Designation	Signature
1	Prof. M. Humera Khanam	University Nominee	
2	Dr. G. Vijay Kumar	Local Nominee	
3	Manoj Prabhakar Darsi	Local Nominee	
4	Murali Mohan M	Industrial Nominee	
5	Smt. M. Padmavathi	Faculty Member	
6	Sri. Shaik. Munwar	Subject/Special Course Expert	
7	S.J Aayesha	Alumni	
8	P. Vineetha	Student	

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Board of Studies Meeting-1 on 17-10-2025

DEPARTMENT OF COMPUTER SCIENCE

List of Paper Setters

S No	Name of the Paper Setter with Designation	Papers	Qualification	College - City
1	Prof. M. Humera Khanam Professor in Computer Science Department	ALL	Ph.D.	Dept of CSE, SVU College of Engineering, Tirupathi, SV University
2	Dr. G. Vijay Kumar Lecturer in Computer Science	ALL	Ph.D.	Dept of Computer Science, Tanuku, W.G. Dt, AKN University
3	Manoj Prabhakar Darsi Lecturer in Computer Science	ALL	M.Tech (Ph.D)	Dept of Computer Science, Nellore, Vikram Simhapuri University,
4	Dr. G. Dayanandam Lecturer in Computer Science	ALL	Ph.D.	Dept of Computer Science, Kodur (RS), Annamayya Dt, Yogi Vemana University
5	Sri. Shaik Munwar Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vedurukuppam, SV University
6	Sri. Ismail Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vedurukuppam, SV University
7	Sri. T Subramanyam Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vayalpad, SV University
8	Smt. A. Sumathi Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Srikalahasti, SV University
9	Smt. G. Satya Suneetha Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Kovvur, E.G. Dt, AKN University
10	Sri. E. Murali Mohan Reddy Lecturer in Computer Applications	ALL	MCA	Dept of Computer Applications, Puttur, SV University
11	Dr. A. Ravi Prasad Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, Srikalahasti, SV University
12	Dr. A. Sri Lakshmi Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, Nagiri, Autonomous
13	Sri. Y Srinivasulu Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Vedurukuppam, SV University
14	Smt. B. Durga Anuja Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Srikalahasti, SV University
15	Dr. S. Saravana Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, PVKN(A), Chittoor
16	Sri. T Narendra Babu Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Vedurukuppam, SV University

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Board of Studies Meeting-1 on 17-10-2025

DEPARTMENT OF COMPUTER SCIENCE

List of Paper Examiners

S No	Name of the Examiner with Designation	Papers	Qualification	College - City
1	Prof. M. Humera Khanam Professor in Computer Science Department	ALL	Ph.D.	Dept of CSE, SVU College of Engineering, Tirupathi, SV University
2	Sri. Shaik Munwar Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vedurukuppam, SV University
3	Sri. Ismail Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vedurukuppam, SV University
4	Sri. T Subramanyam Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Vayalpad, SV University
5	Smt. A. Sumathi Lecturer in Computer Science	ALL	M.Tech	Dept of Computer Science, Srikalahasti, SV University
6	Sri. E. Murali Mohan Reddy Lecturer in Computer Applications	ALL	MCA	Dept of Computer Applications, Puttur, SV University
7	Dr. A. Ravi Prasad Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, Srikalahasti, SV University
8	Dr. A. Sri Lakshmi Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, Nagiri, Autonomous
9	Sri. Y Srinivasulu Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Vedurukuppam, SV University
10	Smt. B. Durga Anuja Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Srikalahasti, SV University
11	Dr. S. Saravana Lecturer in Computer Applications	ALL	Ph.D.	Dept of Computer Applications, PVKN(A), Chittoor
12	Sri. T Narendra Babu Lecturer in Computer Applications	ALL	M.Tech	Dept of Computer Applications, Vedurukuppam, SV University

(**Smt. Y Jnapika**)
CHAIRPERSON BOARD OF STUDIES

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DEPARTMENT OF COMPUTER SCIENCE

SCHEME OF EVALUATION

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER
(THEORY)
(As Approved in the BOS meeting held on **17-10-2025**)

EVALUATION SCHEME

Standard Operating Procedure for Continuous Internal Assessment (Internal Marks – 30). The Internal marks in all the courses/subjects will be awarded based on continuous internal assessment made during the semester concerned. For each Courses/subject 30 marks are allotted for internal assessment and 70 marks are allotted for the End Semester Examination.

Continuous Internal Evaluation (CIA):

It has been decided to introduce Continuous Internal assessment marks for a total of 60 marks, which are to be distributed as follows:

S.No.	Component			Distribution of Marks
1	CIE I (after completion of 50% of syllabus)			20
2	CIE II (Online Exam)			20
3	ATTENDANCE	Above 95%	5	5
		91% to 95%	4	
		86% to 90%	3	
		81% to 85%	2	
		75% to 80%	1	
		Below 75%	0	
Pedagogical Strategies				
4	Assignment			5
5	Participation or Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey			5
6	Swatch Bharat (Clean & Green)			5
TOTAL				**60**

The total 60 Marks is scaled down to 30 Marks

Component I: CIE I & CIE II (20+20 = 40 Marks)

Two Internal Examinations, out of which one is Mandatorily Online examination, for each Course shall be conducted for assessment. These examinations will be conducted during August/September (CIE –I) and January/February (CIE-II). CIE-I carries 20 marks and CIE-II carries 20 marks. CIE- I will be conducted after completion of 50% of syllabus. The second internal examination, i.e., CIE – II, which will cover the remaining second half of the syllabus. The sum of both the CIEs will be considered for awarding marks for CIA.

Suggestive Question Paper Pattern for CIE I & CIE II (Based on Blooms Taxonomy):

Though the faculty concerned is empowered to adopt their own pattern for question paper, a general and suggestive model for question paper is given below based on Blooms Taxonomy.

Q No	Learning Objective	Marks
1	Memory based (Remember)	3
2	Understand (Comprehension)	4
3	Application	4
4	Analysis	3
5	Evaluation	3
6	Creativity	3
	TOTAL	20 marks

The active verbs used to frame the question based on Blooms Taxonomy is given below for the convenience.

Active verbs developed based on Bloom's Taxonomy

Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	Identify	Manipulate	survey	grade	produce
discover	indicate	Paint	advertise	measure	rearrange
duplicate	Infer	Prepare	appraise	predict	rewrite
enumerate	relate	produce	Break down	rank	role-play

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Important Note:

Students who absent themselves from any CIE will lose the marks for the respective test. However, if a student is not able to write the CIE I / II because of his/her participation in an important event related to NSS/NCC or Games/Sports representing the College/University/health grounds, the student has to get the prior permission of the Principal through the proper channel and submit the same to the Office of the Controller of Examinations. Deadline is 7 days after the CIE. Applications submitted after the deadline will not be considered for the retest.

Component III: Attendance (5 Marks)

Attendance mark will be awarded to the students based on their attendance percentage on a particular course. Faculty of each course has to award the attendance mark based on their subject attendance.

The marks split-up is given below

Above 95%	5
91% to 95%	4
86% to 90%	3
81% to 85%	2
75% to 80%	1
Below 75%	0

Component IV: Assignment (5 Marks)

One Assignment for each course must be submitted by a student in each semester. The marks allotted to this component will be awarded based on the performance of the student. The assignment topic may be assigned either individually or group. Assignment should be submitted by the student in the first half of the semester. Also maximum of 7 days should be given to students to submit the assignment. Assignments should be evaluated by the faculty concerned and the same to be verified by the student. The assignment should be kept in department for the Academic Audit by IQAC and also for external academic audit conducted by office of Commissionerate of Collegiate Education. The marks should be awarded by the faculty.

Component V (Pedagogical Strategies):

Participation /Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey (5 Marks)

For this component, the marks will be provided to student, if he/she participate/win in the external college technical events. To score marks, the student has to participate / present papers related to subject in the technical events organized in the other colleges/other departments in the college.

	Participation	Second Prize	First Prize / Best Paper
Workshop / Seminar / Technical Symposium	2	3	5
National / International Conference	3	4	5

In case of Classroom seminar, one seminar for each course must be presented by a student in each semester. Each student should be given individual topic for seminar; the student has to submit the seminar topic as assignment and the same will be presented minimum of 10 minutes in the class through ICT. The seminar presented by the student should be evaluated by the subject faculty and based on the performance of the presentation, the marks will be awarded.

Similarly, reports on field visits, educational tours, study projects in prescribed format will be considered for awarding marks in this component.
For a student who has not participated in any events in that semester, the student will be awarded "0" for this component. If a student participates more than one event and win prize, the best would be considered for the subject.

In case of Quiz, offline/online quiz, it should be conducted after the CIE II and well before the SEE. Faculty concerned has to announce the schedule for the quiz and conduct the quiz.

Semester End Examinations (SEE)

The question paper is of 2 ½ duration for 70 marks. The suggestive question paper model is given that may be used for framing the question. This kind of question paper will be helpful in CO-PO Mapping and thereby graduate attributes.

Curriculum 2025-26 Version: 1.0

DEPARTMENT OF COMPUTER SCIENCE

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

(As Approved in the BOS meeting held on **17-10-2025** for 2025-2026)

S.No.	Description	Marks
1	Procedure Explanation with Coding (including Algorithm & Flowchart if any)	15
2	Execution of Program	10
3	VIVA VOCE	10
4	RECORD	15
	****Total Internal Marks****	50
5	EXTERNAL PRACTICAL EXAM (At the end of II, IV& VI Semester)	50
6	EXTERNAL PRACTICAL EXAM (At the end of I, III & V Semester)	50
	GRAND TOTAL	**100**

** Award of marks for number of practicals recorded in the Record.

10 Practicals and Above	10
8 Practicals	8
6 Practicals	6
5 Practicals	5
Less than 5	0

B.Sc. (Honors) Computer Science

Program Specific Outcomes

After completion of the program, the student is able to

PSO1: Problem Solving Proficiency: Proficiently analyze intricate problems, identify requirements, and implement efficient algorithms using appropriate programming languages.

PSO2: Expert Software Development: Expertly design software, architect systems, and develop solutions with an emphasis on scalability, user experience, and best practices.

PSO3: Specialized Knowledge Application: Apply specialized knowledge in areas such as AI, data science, cyber security, contributing to practical problem-solving and innovative solutions.

PSO4: Effective Communication and Collaboration: Communicate technical concepts effectively and collaborate proficiently within multidisciplinary teams, demonstrating leadership and teamwork skills.

B.Sc. (Honors) Computer Science

Programme Outcomes

Sl. No.	Program Outcomes (POs) -A student will be able to:
PO1:	Learn the mathematics, statistics and computer science fundamentals to find the optimum solution of complex Computer Science problems.
PO2:	Identify, formulate, research literature, and analyse complex scientific problems using principles of mathematics, statistics and applied computer science
PO3:	Develop the skills to present ideas effectively and efficiently as a member and as a leader.
PO4:	Create, Solve and apply tools of programming, networking, database, Web design, AI and modern technology for solutions to significant problems.
PO5:	Design computer-based solutions for various technical problems.
PO6:	Ensure professional development growth through contextual, reflective and lifelong learning.
PO7:	Demonstrate knowledge, Design, and implement solutions to significant computational problems.
PO8:	Use research-based knowledge and methods design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO9:	Apply professional ethics, responsibilities and norms of the scientific practice
PO10:	Understand the impact of the software engineering solutions in social and environmental contexts, and demonstrate the knowledge and need for development.

R25 CIRRICULUM FRAMEWORK

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26								
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
4	Minor	0	0	0	0	0	0	0
5	AECC - English	I	4	0	4	3	0	3
6	AECC - MIL (Telugu/Hindi/Sanskrit)	I	4	0	4	3	0	3
7	Multidisciplinary Course	0	0	0	0	0	0	0
8	Skill Enhancement Course (SEC) Intro' to Artificial Intelligence	I	4	2 (Practice)	6	4	0	4
End of Semester I of 1st Year		**5**	**18**	**6**	**24**	**16**	**2**	**18**
1st Year - Semester II								
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	III	3	2	5	3	1	4
2	Major - Core	IV	3	2	5	3	1	4
4	Minor	0	0	0	0	0	0	0
5	English	II	4	0	4	3	0	3
6	MIL (Telugu/Hindi/Sanskrit)	II	4	0	4	3	0	3
	Multidisciplinary Course	I	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Application of Artificial Intelligence (Discipline Specific)	II	4	2 (Practice)	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**

R25 COURSE STRUCTURE

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Model Syllabus for 4-Year UG Honours in B.Sc. (Computer Science) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Computer Fundamentals and Office Automation	3	3
			Computer Fundamentals and Office Automation-Practical	2	1
		2	Problem Solving Using C	3	3
			Problem Solving Using C-Practical	2	1
	II	3	Data Structures using C	3	3
			Data Structures using C-Practical	2	1
		4	Digital Logic Design	3	3
			Digital Logic Design -Practical	2	1
II	III	5	OOPS Through JAVA	3	3
			OOPS Through JAVA-Practical	2	1
		6	Data Base Management	3	3
			Data Base Management -Practical	2	1
		7	Computer Organisation	3	3
			Computer Organisation-Practical	2	1
	IV	8	Operating Systems	3	3
			Operating Systems-Practical	2	1
		9	Computer Networks	3	3
			Computer Networks	2	1
		10	Python Programming	3	3
			Python Programming-Practical	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
III	V	11	Software Engineering	3	3
			Software Engineering-Practical	2	1
		12 A	Web Interface Design Technologies	3	3
			Web Interface Design Technologies-Practical	2	1
		OR			
		12 B	SEB1:Data Science with R	3	3
			SEB1:Data Science with R-Practical	2	1
		13 A	Web Application Development using PHP & MySQL	3	3
			Web Application Development using PHP & MySQL-Practical	2	1
		OR			
		13 B	Python for Data Science	3	3
			Python for Data Science Practical	2	1
	VI	14 A	Mobile Application Development	3	3
			Mobile Application Development-Practical	2	1
		OR			
		14 B	Data Visualization Tools	3	3
			Data Visualization Tools-Practical	2	1
		15 A	MERN Stack	3	3
			MERN Stack-Practical	2	1
		OR			
		15 B	Machine Learning	3	3
			Machine Learning-Practical	2	1

Note: In the III Year (during the V and VI Semesters), students are required to select a pair of electives from one of the **Two** specified domains. **For example: if set 'A' is chosen, courses 12 to 15 to be chosen as 12 A, 13 A, 14 A and 15 A.** To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.

SEMESTER-I

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Curriculum 2025-26 Version: 1.0

Course Code	Title of the Course	L	S/M	P	C
25BCS101T	**Computer Fundamentals and Office Automation**	3			3
Prerequisites	Basic Computer Knowledge				

COURSE OBJECTIVES	
1	To understand foundational computing concepts including number systems, evolution of computers, and architectural components.
2	To explore basic computer organization and network components.
3	To demonstrate proficiency in word processing, presentation tools, and spreadsheet operations.
4	To apply modern tools for analyzing and visualizing data efficiently.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Convert between binary, decimal, octal, and hexadecimal systems	Understanding
CO2	Demonstrate blocks of a computer and fundamental networking devices.	Understanding
CO3	Prepare visually appealing presentations	Applying
CO4	Produce accurate summaries and visualizations.	Applying
CO5	Analyze, organize, and represent data effectively	Analyzing

Syllabus

COURSE CONTENT	
UNIT I	**Number Systems**: Binary, Decimal, Octal, Hexadecimal; Conversions between number systems. **Block Diagram of a Computer**: Input Unit, Central Processing Unit, Memory Unit, Output Unit. **Generations of Computers**: First to Fifth Generation – Technologies, Characteristics, Examples.
	Activity: Create a digital poster or infographic comparing number systems and illustrating the timeline of computer generations with key innovations. **Evaluation Method:** Rubric-based assessment of the poster presentation on a 10-point scale based on Visual organization and creativity.
UNIT II	**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.
	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 based on correctness and completeness, structure of the map.
UNIT III	**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**
	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 based on presentation and communication skills
UNIT IV	**Spreadsheet Concepts**: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, Cell referencing- Relative, Absolute, Mixed. **Functions and Formulae**: SUM, AVERAGE, IF, COUNT. **Charts and Graphs:** Creating visual representations. **Data Handling**: Sorting, filtering **Text Functions:** LEFT, RIGHT, MID, LEN, TRIM, CONCAT, TEXTJOIN **Advanced Functions: Logical:** IF, AND, OR, IFERROR**, Lookup:** VLOOKUP, HLOOKUP, INDEX, MATCH

	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 Formulae and accuracy of data summaries
UNIT V	**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, Data Tables **Charts and Dashboards**: Creating Interactive Dashboards, Using slicers with Pivot Tables, Combo Charts and Sparklines.
	Activity: Prepare an interactive dashboard for a given data set using EXCEL. **Evaluation Method:** Evaluation of the dashboard on a 10-point scoring scale based on presentation and communication skills

TEXT BOOKS	
1.	**Thareja, R.** (Second Edition). *Fundamentals of Computers*. Oxford University Press.
2.	**Rajaraman, V.** (n.d.). *Fundamentals of Computers*. PHI Learning.
3.	**Norton, P.** (2017). *Introduction to Computers* (7th ed.). McGraw Hill Education.
4.	**Nordell, R., Stewart, K., Easton, A., Graves, P. R., & Triad Interactive, Inc.** (2022). ***Microsoft Office 365: In Practice*** **(1st ed.). New York: McGraw Hill Education.**
REFERENCE BOOKS	
1.	**Alexander, M., & Kusleika, R.** (2022). *Microsoft Excel 365 Bible* (2nd ed.). Wiley.
2.	**Lowe, D.** (2021). *Networking All-in-One for Dummies* (8th ed.). Wiley.
WEB RESOURCES	
1.	**Microsoft Official Docs and Training**: https://learn.microsoft.com
2.	**Google Workspace Learning Center**: https://support.google.com/a/users/

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	2	2	0	0	1	0	0	0	0	0	0	1	0	0
CO2	2	2	1	0	2	1	0	0	0	0	0	1	0	0
CO3	2	3	2	1	2	1	0	1	0	0	0	1	1	1
CO4	3	2	1	1	2	1	0	2	0	0	0	1	1	1
CO5	3	3	2	1	2	1	1	2	1	0	0	1	2	0

Model Blue print for the question paper setter

S.No.	UNIT-	Essay 10M	Short 4 M	Weightage
1	I	2	2	20%
2	II	2	2	20%
3	III	2	2	20%
4	IV	2	2	20%
5	V	2	2	20%
		100	**40**	**100%**

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I B.Sc. (Hons) Computer Science Semester-I

Recommended Format of Question Paper for all Courses

Time: 3 Hours **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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Computer Fundamentals and Office Automation

MODEL QUESTION PAPER (W.E.F 2025-2026)

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – B						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about Evolution of Computers.	4M	2	1		
2	Write down the steps to convert a decimal number to binary number with an example?	4M	2	1		
3	Explain about various kinds of computer memories.	4M	2	2		
4	Discuss about different types of Network Topologies.	4M	2	2		
5	Summarize different types of text formatting in MS-Word?	4M	2	3		
6	Explain about various Keyboard shortcuts?	4M	2	3		
7	Show the steps to insert rows and columns in MS-Excel?	4M	3	4		
8	Explain about different types of cell references in MS-Excel?	4M	2	4		
9	Define Data validation? Explain about Data validation using Drop-downs.	4M	2	5		
10	Explain about Combo Charts.	4M	4	5		

	SECTION – B					
	Answer All Questions	**5 X 10 = 50M**				
11	a). Explain the generations of computers and their characteristics. (OR) b). Explain the characteristics and applications of computers. c). Describe the components of a computer system in detail.	10M 5M 5M	2 2 1	1 1 1		
12	a). Discuss about Input and Output devices in the computer. (OR) b). Summarize different types of network topologies?	10M 10M	2 2	2 2		
13	a). Illustrate the concept of Mail Merge in MS-Word? (OR) c). What is MS Power Point? Explain about the creation of presentation using MS power Point.	10M 10M	3 2	3 3		
14	a). Explain different types of Text functions in MS-Excel? (OR) b). Explain different types of charts used in MS-Excel?	10M 10M	2 4	4 4		
15	a). What is What-If Analysis? Explain about primary tools for What-If Analysis in Excel? (OR) b). Write short notes on: a) Pivot Tables b) Pivot Charts	10M 5M 5M	2 2 2	5 5 5		

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Course Code	Title of the Course	L	S/M	P	C
25BCS101P	**Fundamentals of Information Technology & Office Automation**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Learn basics of computer hardware.
2. Learn how to work with MS-Office tools.

List of Experiments:

1. Demonstration of Assembling and Dissembling 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. 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.

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Curriculum 2025-26 Version: 1.0

Course Code	Title of the Course	L	S/M	P	C
25BCS102T	**Problem Solving using C**	3			3
Prerequisites	Basic Computer Knowledge				

COURSE OBJECTIVES	
1	To impart adequate knowledge on the need of programming languages and problem-solving techniques.
2	To develop programming skills using the fundamentals of C Language.
3	To enable effective usage of arrays, structures, functions, pointers and dynamic memory allocation.
4	To make use of file handling functions in programming.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Identify the fundamentals of C Programming for Problem solving.	Knowledge
CO2	Demonstrate the appropriate Decision statement and Loops for a given Problem.	Understanding
CO3	Make use of Arrays and Strings to solve the problems in C.	Applying
CO4	Apply the concepts of Functions and Pointers in Problem solving.	Applying
CO5	Discover solutions for problems using Structures, Unions and Files.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Introduction to computer and programming**: Introduction, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms **Fundamentals of C:** History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O.
	Activity: Quiz on computer hardware and software concepts **Evaluation Method:** Objective-based quiz assessing knowledge and understanding
UNIT II	**Control statements:** Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and goto.
	Ac**tivity:** Problem-solving using Decision-Making Statements **Evaluation Method:** Correctness of decision-making logic
UNIT III	**Derived data types in C:** Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. **Strings:** Declaring & Initializing string variables; String handling functions, Character handling functions.
	Activity: Pair Programming Exercise on Functions **Evaluation Method:** Collaboration and Code Quality
UNIT IV	**Functions:** Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. **Storage classes**: automatic, external, static and register. **Pointers:** Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions **Dynamic Memory Management:** Introduction, Functions-malloc, calloc, realloc, free
	Activity: Pair Programming Exercise on Functions **Evaluation Method:** Collaboration and Code Quality
UNIT V	**Structures:** Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. **Unions** - Union definition; difference between Structures and Unions. **Files operations:** Working with text files - modes: opening, reading, writing and closing text files.

	Activity: Structured Programming Assignment **Evaluation Method:** Appropriate use of structures and nested structures

TEXT BOOKS	
1.	Programming in C, Reema Thareja, 2nd Edition, Oxford University Press.
2.	The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education
REFERENCE BOOKS	
1.	Programming in C – Ashok N. Kamthane, Amit Ashok Kamthane, 3rd Edition, Pearson.
2.	C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
3.	Programming in C (A Practical Approach) – Ajay Mittal, First Edition, Pearson.
WEB RESOURCES	
1.	http://nptel.ac.in/courses/106104128/
2.	http://students.iitk.ac.in/programmingclub/course/#notes
3.	http://c-faq.com/~scs/cclass/cclass.html
4.	http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu
5.	http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	2	2	0	1	1	1	0	0	0	0	1	1	1	0
CO2	2	3	0	1	1	1	0	0	0	0	1	1	1	0
CO3	2	3	0	1	1	1	1	0	0	0	2	1	1	0
CO4	2	3	0	2	1	1	1	1	0	0	2	2	1	0
CO5	2	3	0	2	1	1	1	0	0	0	2	2	1	0

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Short 4 M	Weightage
1	I	2	2	20%
2	II	2	2	20%
3	III	2	2	20%
4	IV	2	2	20%
5	V	2	2	20%
		100	**40**	**100%**

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I B.Sc. (Hons) Computer Science Semester-I

Recommended Format of Question Paper for all Courses

Time: 3 Hours **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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Problem Solving using C

MODEL QUESTION PAPER (W.E.F 2025-2026)

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Define software? List different types of software.	4M	1	1		
2	Discuss about formatted and unformatted I/O.	4M	2	1		
3	Construct a program to find given number is even or odd.	4M	3	2		
4	Distinguish break and continue statements in C.	4M	2	2		
5	Explain two dimensional arrays in C.	4M	2	3		
6	Construct a C program that reads string input from the user and display its length.	4M	3	3		
7	Explain about recursion.	4M	2	4		
8	Interpret the concept of pointers and functions with an example.	4M	2	4		
9	Compare Structures and union in C.	4M	2	5		
10	Define Union? Explain about accessing union members	4M	2	5		

SECTION – B						
Answer All Questions		**5 X 10 = 50 M**				
11	a) Explain the basic block diagram of a computer system and explain the functions of its various components. (OR) b) Define flow chart? Explain various symbols in Flow chart. c) Construct a C program to compute simple interest.	10M 5M 5M	2 2 3	1 1 1		
12	a) Illustrate Iterative statements in C with syntax and examples. (OR) b) Explain Decision making statements in C Programming with example.	10 M 10M	3 2	2 2		
13	a) Describe the process of declaring and initializing a two-dimensional array in C programming. b) Explain different string manipulation library functions with example. (OR) b) Construct a C program to perform multiplication of two matrices.	5M 5M 10M	1 2 3	3 3 3		
14	a) Explain auto, extern, static, register storage classes in C with syntax. (OR) b) Define function? Discuss about various categories of functions. Illustrate with example.	10M 10M	2 2	4 4		
15	a) Describe about Dynamic memory allocation mechanism in C with syntax and example. (OR) b) Explain Structures in C programming with example.	10M 10M	2 2	5 5		

All the Best

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Course Code	Title of the Course	L	S/M	P	C
25BCS102P	**Problem Solving using C Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Learn how to solve common types of computing problems.
2. Learn to map problems to programming features of C.

List of Experiments/Syllabus:

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer.
3. Write a program to generate the first n terms of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values
5. Write a program to demonstrate change in parameter values while swapping two integer variables using Call by Value & Call by Address
6. Write a program to perform various string operations.
7. Write a program to search an element in a given list of values.
8. Write a program that uses functions to add two matrices.
9. Write a program to calculate factorial of given integer value using recursive functions
10. Write a program for multiplication of two N X N matrices.
11. Write a program to sort a given list of integers in ascending order.
12. Write a program to calculate the salaries of all employees using Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary) structure.
    a. DA is 30 % of Basic Pay
    b. HRA is 15% of Basic Pay
    c. Deduction is 10% of (Basic Pay + DA)
    d. Gross Salary = Basic Pay + DA+ HRA
    e. Net Salary = Gross Salary - Deduction
13. Write a program to read / write the data from / to a file.
14. Write a program to reverse the contents of a file and store in another file.

Reference Books:

1. Henry Mullish & Huubert L. Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.
2. Y Kanithkar, let us C BPB, 13th Edition-2013, ISBN:978-8183332430,656 pages.

SEMESTER-II

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Curriculum 2025-26 Version: 1.0

Course Code	Title of the Course	L	S/M	P	C
25BCS203T	**DATA STRUCTURES USING C**	3			3
Prerequisites	C Programming				

COURSE OBJECTIVES	
1	To assess how the choice of data structures and algorithm design methods impacts the performance of programs.
2	To choose the appropriate data structure and algorithm design method for a specified application.
3	To solve problems using data structures such as linear lists, stacks, queues, trees and graphs and writing programs for these solutions.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Understand various data structures and their applications	Understand
CO2	Apply concepts of linked lists.	Applying
CO3	Implement algorithms for stacks, queues.	Applying
CO4	Implement sorting and searching algorithms.	Applying
CO5	Illustrate algorithms on Trees and Graphs.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Basic Concepts:** Algorithm: Definition and characteristics, Complexity analysis: Space Complexity, Time Complexity, Asymptotic Notations-Big -O Notations. **Introduction to Data structures:** Definition, Types of Data structures, Introduction to Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array.
	Activity: Algorithm analysis exercises **Evaluation Method:** Programming Assignment and Correctness
UNIT II	**Searching:** Linear or Sequential Search, Binary Search **Sorting**: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort.
	Activity: Sorting algorithm analysis and comparison activities **Evaluation Method:** Performance analysis and presentation.
UNIT III	**Linked Lists:** Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Single Linked Lst ADT: Creating a List, traversing a linked list, searching in linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node).
	Activity: Presentations on real-life applications of linked lists **Evaluation Method:** Presentation skills or reports
UNIT IV	**Stacks:** Introduction to stack, Implementation of stacks using array and Linked List, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation. **Queues:** Introduction to Queue, Implementation of Queues using array and Linked List, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue.
	Activity: Role-playing activities for stack operations **Evaluation Method:** Problem-solving skills, communication and collaboration abilities
UNIT V	**Trees:** Tree Terminology, Binary Tree Representation, Traversal techniques, Binary Search Tree- Definition, Operations on a Binary Search Tree: Creation, Search, Insertion & deletion. **Graphs:** Introduction to Graphs, Terminology, Representation (Adjacency Matrix, Adjacency List), Traversal of Graphs (DFS, BFS), Applications of Graphs-Finding Shortest Path using Dijkstra's algorithm.
	Activity: Case Study on Applications of Graphs **Evaluation Method:** Critical thinking, problem-solving, and presentation skills

TEXT BOOKS	
1.	Data Structures Using C, Reema Thareja, 2nd Edition, Oxford University Press.
2.	Langsam, Augenstein and Tanenbaum, “Data Structures using C”, PHI.
3.	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education. Ltd.
REFERENCE BOOKS	
1.	G.A.V Pai, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume 1,1st Edition, Tata McGraw-Hill, 2008.
2.	Richard F. Gilberg and Behrouz A. Forouzan, “Data Structures, Pseudo code Approach with C”, 2nd Edition, Cengage Learning India Edition, 2007.
WEB RESOURCES	
1.	http://nptel.iitm.ac.in/video.php? subjectId=106105085
2.	http://cds.iisc.ac.in/courses/ds286/
3.	http://www.geeksforgeeks.org/data-structures

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	0	1	1	1	1	1	1	0	1	1	1	0
CO2	3	3	0	1	1	1	1	1	1	0	2	1	0	0
CO3	2	3	0	1	1	1	1	1	1	0	1	1	0	0
CO4	2	3	0	1	1	1	1	1	1	0	1	1	0	0
CO5	3	3	0	2	1	1	2	1	1	0	1	1	1	0

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Short 4 M	Weightage
1	I	2	2	20%
2	II	2	2	20%
3	III	2	2	20%
4	IV	2	2	20%
5	V	2	2	20%
		100	**40**	**100%**

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I B.Sc. (Hons) Computer Science Semester-II

Recommended Format of Question Paper for all Courses

Time: 3 Hours **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

*****

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DATA STRUCTURES USING C

MODEL QUESTION PAPER (W.E.F 2025-2026)

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
	SECTION – A					
Answer any Five of the Following		**5 X 4 = 20M**				
1	Write a short note on Asymptotic notation.	4M	2	1		
2	Discuss about space complexity and time complexities with examples.	4M	2	1		
3	Explain about Bubble sort with example.	4M	2	2		
4	Explain about Linear search with example.	4M	2	2		
5	Discuss about insertion at the beginning of a Doubly Linked List.	4M	2	3		
6	Define Circular Linked List with an example	4M	1	3		
7	Explain about applications of stack.	4M	2	4		
8	Define Priority Queue with an example.	4M	1	4		
9	List the Properties of Trees.	4M	1	5		
10	Explain about Graph representation.	4M	2	5		

SECTION – B						
Answer All Questions		**5 X 10 = 50 M**				
11	a) Explain about types of data structures with examples. (OR) b) Explain about operations of an Array with examples.	10M 10M	2 2	1 1		
12	a) Search a given element in the list using binary search: 25, 56, 98, 14, 73 (OR) b) Sort the given elements using Selection Sort: 25, 56, 98, 14, 73	10M 10M	3 3	2 2		
13	a) Illustrate Single Linked List and its operations (OR) b) Explain Circular Linked List with example.	10M 10M	3 2	3 3		
14	a) Convert the given expression into reverse polish notation: (A+B) * (C-D) + E/F b) Evaluate the given expression using Stacks: (A+B) * (C-D) + E/F (OR) c) Explain about Queue data structure and its operations.	5M 5M 10M	2 5 2	4 4 4		
15	a) Explain about Binary Tree Traversal algorithms. (OR) b) Differentiate Breadth First Search and Depth First Search Graph traversals.	10M 10M	2 2	5 5		

All the Best

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Course Code	Title of the Course	L	S/M	P	C
25BCS203P	**DATA STRUCTURES USING C**			2	1
Prerequisites	C Programming				

Objectives:

1. To provide hands on experience to implement basic linear and non-linear data structures. This course covers implementation of Stack, Queue, List, Sorting techniques, Binary Search Trees.

List of Experiments/Syllabus:

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
   a. Add an element at the beginning of an array
   b. Insert an element at given index of array
   c. Update an element using a values and index
   d. Delete an existing element
2. Write a program to search an item in a given list using the following Searching Algorithms
   a. Linear Search
   b. Binary Search.
3. Write a program for implementation of the following Sorting Algorithms
   a. Bubble Sort
   b. Insertion Sort
   c. Selection Sort
   d. Quick Sort
4. Write a program to implement Single Linked List with insertion, deletion and traversal operations
5. Write a program to implement Doubly Linked List with insertion, deletion and traversal operations
6. Write a program to implement the Stack operations using Arrays and Linked Lists.
7. Write a program to convert a given infix expression to a postfix expression using stacks.

8. Write a program to implement the Queue operations using Arrays and Linked Lists.

9. Write a program to implement the Circular Queue operations using Arrays.

10. Write a program for Binary Search Tree Traversals

Reference Books:

1. Data Structures Using C, Reema Thareja, 2nd Edition, Oxford University Press.
2. Langsam, Augenstein and Tanenbaum, “Data Structures using C”, PHI.

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Curriculum 2025-26 Version: 1.0

Course Code	Title of the Course	L	S/M	P	C
25BCS204T	**DIGITAL LOGIC DESIGN**	3			3
Prerequisites	Basics of Computers				

COURSE OBJECTIVES	
1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates, Boolean function simplification using Karnaugh maps
3	To understand concepts of combinational circuits and sequential circuits

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Classify different number systems and apply to generate various codes.	Understanding
CO2	Paraphrase the concept of Boolean algebra and K-map technique in minimization of switching functions.	Understanding
CO3	Implement different types of combinational logic circuits – Adders, Subtractors.	Analyzing
CO4	Apply knowledge of combinational logic circuits – Decoders, Multiplexers	Applying
CO5	Apply knowledge of Sequential logic for designing flip-flops, registers and counters.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Number Systems:** Conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.
	Activity: JAM (Just a Minute) Session: Explaining Radix Conversion **Evaluation Method:** Communication Skills and Knowledge Presentation
UNIT II	**Logic Gates and Boolean Algebra:** NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.
	Activity: Boolean Algebra Assignment **Evaluation Method:** Assignment Completion and Correctness
UNIT III	**Combinational Logic Circuits – 1:** Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.
	Activity: Hands-on Lab Activity: Building Adder and Subtractor Circuits **Evaluation Method:** Lab Performance and Correctness of Circuit Implementation
UNIT IV	**Combinational Logic Circuits – 2:** Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders.
	Activity: Group Discussion: Applications of Decoders, Encoders, Multiplexers **Evaluation Method:** Participation and Critical Thinking
UNIT V	**Sequential Logic Circuits:** Classification of sequential circuits, latch and flip-flop, RS-latch using NAND and NOR Gates, RS, JK, T and D flip-flops, truth tables and excitation tables. **Registers**- shift registers, bidirectional shift registers, universal shift register.
	Activity: Quiz on Flip-Flops and Register-Counter Design **Evaluation Method:** Quiz Performance and Knowledge Retention

TEXT BOOKS	
1.	Digital Design, M. Morris Mano, Michael D Ciletti,5th edition, Pearson.
2.	Switching Theory and Logic Design by A. Anand Kumar, PHI, 3rd Edition.
3.	Digital Logic Design, K.C. Rao, Ramana, Pen International Press.
REFERENCE BOOKS	
1.	Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition
2.	Digital electronics logic and design-Cherry Bhargava, BS Publications, 2019
3.	Modern Digital Electronics by RP Jain, TMH, 4th Edition.
WEB RESOURCES	
1.	https://www.youtube.com/watch?v=4fV47wABBj8
2.	Lecture series on Digital Circuits & Systems by Prof. S. Srinivasan, Department of Electrical Engineering, IIT Madras. For more details on NPTEL visit http://nptel.iitm.ac.in
3.	https://www.geeksforgeeks.org/digital-logic/digital-electronics-logic-design-tutorials/
4.	https://www.elprocus.com/tutorial-on-sequential-logic-circuits/
5.	http://web.ee.nchu.edu.tw/~cpfan/FY92b-digital/Chapter6.pdf
6.	https://www.electronics-tutorials.ws/combination/comb_1.html

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
CO2	1	0	0	0	1	0	1	0	0	0	0	0	1	0
CO3	1	1	0	0	1	0	1	1	0	0	1	1	1	0
CO4	1	1	0	1	1	0	1	1	0	0	1	1	1	0
CO5	1	1	0	0	1	0	1	1	0	0	1	1	1	0

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Short 4 M	Weightage
1	I	2	2	20%
2	II	2	2	20%
3	III	2	2	20%
4	IV	2	2	20%
5	V	2	2	20%
		100	40	100%

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I B.Sc. (Hons) Computer Science Semester-II

Recommended Format of Question Paper for all Courses

Time: 3 Hours **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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DIGITAL LOGIC DESIGN

MODEL QUESTION PAPER (W.E.F 2025-2026)

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Calculate the 10"s and 9's complement of the decimal number 7324.	4M	3	1		
2	List different number systems? Give examples for each.	4M	1	1		
3	Write a short note on canonical forms	4M	2	2		
4	Explain about minimizations of logic functions	4M	2	2		
5	Infer the truth table for half Subtractor	4M	2	3		
6	Infer the truth table for full adder	4M	2	3		
7	Write a short note on Demultiplexer.	4M	2	4		
8	Describe the working of an Encoder.	4M	2	4		
9	Explain about shift register.	4M	2	5		
10	Differentiate latches and flip flops	4M	2	5		

SECTION – B						
Answer All Questions		**5 X 10 = 50 M**				
11	a) Convert the following numbers i) $(163.789)_{10}$ to Octal number ii) $(11001101.0101)_2$ to base-16 iii) $(4567)_{10}$ to base 2 iv) $(4D.56)_{16}$ to Binary	5M	2	1		
	b) Subtract $(1110)_2$ from $(1010)_2$ using 2"s complement? (OR)	5M	2	1		
	c) Explain Weighted codes with examples.	5M	2	1		
	d) Represent the decimal number 3452 in i) BCD ii) Excess- 3.	5M	2	1		
12	a) a) Minimize the following expression in SOP form using K-Map $f(a,b,c,d) = \Sigma m(1,2,3,5,6,7,11,12,13,14,15)$	5M	3	2		
	b) Minimize the following using POS for using K-Map $f(x,y,z) = \pi M(1,2,4,5,7)$ (OR)	5M	3	2		
	c) Explain basic logic gates: AND, OR, NOT with truth tables.	5M	2	2		
13	a) Explain Half Subtractor and Full subtractor with truth tables and schematic diagram. (OR)	10M	2	3		
	b) Discuss about ripple adder/subtractor circuit capable of performing both addition and subtraction operations.	10M	2	3		
14	a) Illustrate the operation of 3 to 8 decoder with schematic diagram and truth table (OR)	10M	3	4		
	b) Describe the design and operation of multiplexers with schematic diagram.	10M	2	4		
15	a) Explain JK-Flip Flop and T-Flip Flop with schematic diagram and truth tables. (OR)	10M	2	5		
	b) Explain about Bi-Directional shift register with schematic diagram.	10M	2	5		

All the Best

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Course Code	Title of the Course	L	T	P	C
25BCS204P	**DIGITAL LOGIC DESIGN**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To provide hands on experience to implement basic logic circuits, combinational and sequential circuits.

List of Experiments/Syllabus:

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

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

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean functions using logic gates in both SOP and POS forms
3. Realization of basic gates using universal gates.
4. Design and implementation of half and full adder circuits using logic gates.
5. Design and implementation of half and full subtractor circuits using logic gates.
6. Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
7. Implementation and verification of Decoder and encoder using logic gates.
8. Implementation of 4X1 MUX and DeMUX using logic gates.
9. Implementation of 8X1 MUX using suitable lower order MUX.
10. Implementation of 7-segment decoder circuit.

Reference Books:

1. Digital Logic and Computer Design by M Morris Mano, PHI.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition.

Skill Courses

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Semester -1

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Curriculum 2025-26 Version: 1.0

Common to All Groups – Semester I

Course Code	Title of the Course	L	S/M	P	C
25BCS101S	**AI Fundamentals**		4		4
Prerequisites	Basics of Computers				

COURSE OBJECTIVES	
1	Understand the history and evolution of Artificial Intelligence and Identify major subfields of AI.
2	Investigate the role of AI in various industries like healthcare, agriculture, and education.
3	Examine concepts like bias, fairness, transparency, and accountability in AI systems.
4	Explore the integration of AI in scientific research and discuss future directions and evolving trends in AI.
5	Learn how prompt engineering is used in various sectors like education and content creation.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Describe the different subfields and their roles in AI applications.	Understanding
CO2	Summarize the benefits and limitations of AI in diverse domains.	Understanding
CO3	Operate AI systems in terms of inclusivity, privacy, and robustness.	Applying
CO4	Practice Generative AI and emerging technologies like ChatGPT.	Applying
CO5	Apply prompt engineering concepts to various real-world use cases.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Introduction to Artificial Intelligence**: History, Definition, Artificial General Intelligence, Challenges in AI. Knowledge Engineering, Machine Learning, Computer Vision, Natural Language Processing, Robotics.
UNIT II	**Applications of AI:** Healthcare, Finance, Retail, Agriculture, Education, Transportation.
UNIT III	**Bias and Fairness in AI Systems**: Ethics in AI, Bias and Fairness in AI Systems, Transparency in AI Systems, Accountability, Security, Privacy, Inclusivity, Sustainability, Robustness, Reliability.
UNIT IV	**AI in Research, Generative AI and prompt engineering:** AI in Experimentation and Multi-disciplinary research, Generative AI introduction, ChatGPT, Hugging Face, Gemini, Copilot, Perplexity.
UNIT V	**Prompt engineering:** Prompt engineering Definition and its importance, Role of Prompt Engineering in AI/ML Interaction. Applications of Prompt Engineering: Education, Business & Commerce, Content Creation: AI for Creative Writing, AI for creative design, writing AI scripts for video, generating slides and slidesGPT usage.

TEXT BOOKS	
1.	AI for Everyone: A Beginner's Handbook for Artificial Intelligence (AI) by Saptarsi Goswami, Amit Kumar Das, Amlan Chakrabarti
2.	Prompt Engineering for Beginners: by Kapila Arora, Geetu Garg, Gaurav Arora.
REFERENCE BOOKS	
1.	Let's Learn Artificial Intelligence: Base Module, Niti Ayog, Atal Innovation Mission.
2.	Prompt Engineering for Generative AI: Future-proof inputs for Reliable AI-outputs by James Phoenix & Mike Taylor.
3.	Generative AI 360°: Practical Guide to ChatGPT, Midjourney & AI Tools to Boost Productivity & Creativity, For Professionals, Marketers & Entrepreneurs by Hitesh Motwani, Zebra Learn, 2025.

WEB RESOURCES	
1.	Learn Generative AI Prompt Engineering for everyone. https://www.coursera.org/learn/generative-ai-prompt-engineering-for-everyone?action=enroll
2.	Generative AI Tutorial: https://www.w3schools.com/gen_ai/
3.	Free Artificial Intelligence (AI) Tutorial - Hands-On Prompt Engineering for AI Beginners & Business User | Udemy, https://www.udemy.com/course/prompt-engineering-for-ai-beginners-business-users

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Weightage
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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AI Fundamentals - Common to all Groups

Semester-I

Recommended Format of Question Paper for all Courses

Time: 3 Hours **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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AI FUNDAMENTALS

MODEL QUESTION PAPER (W.E.F 2025-2026): Common to All Groups

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
	SECTION – A					
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about Machine Learning.	4M	2	1		
2	Discuss about Robotics.	4M	2	1		
3	Illustrate the AI applications in Finance sector	4M	2	2		
4	Explain how AI can be applied in transportation.	4M	2	2		
5	What is ethics in AI?	4M	1	3		
6	Discuss about Accountability and Security in AI Systems.	4M	2	3		
7	How is Copilot used?	4M	2	4		
8	What is Hugging face?	4M	1	4		
9	Define prompt engineering.	4M	1	5		
10	What are the applications of Prompt engineering in Education?	4M	1	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Define AI? Describe its Applications and Challenges. (OR) b) Write short notes on: i) Computer Vision ii) Natural Language Processing	10M 10M	2 2	1 1		
2	a) Discuss how AI in applicable in healthcare sector. (OR) b) Summarize the applications of AI in Agriculture	10M 10M	2 2	2 2		
3	a) Explain about Bias and Fairness in AI Systems (OR) b) Illustrate about the Transparency in AI Systems	10M 10M	2 3	3 3		
4	a) Demonstrate Generative AI Tools. (OR) b) Explain about AI in Experimentation and Multi-disciplinary research.	10M 10M	3 2	4 4		
5	a) Explain about following Content Creation using AI i) Creative Design ii) AI scripts for Video (OR) b) Discuss about the Role of Prompt Engineering in AI/ML Interaction	10M 10M	2 2	5 5		

All the Best

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Common to All Groups – Semester I

Course Code	Title of the Course	L	T	P	C
25BCS101L	**AI FUNDAMENTALS**			2	0
Prerequisites	Basic Computer Knowledge				

Practice Session

1. Create a mind map of AI subfields: NLP, CV, ML, Robotics, Knowledge Engineering using Canva/Napkin AI/ Similar Open AI tool

2. Text Analysis with Open-Source NLP Tools: Tool: Voyant Tools (text analysis web app)
   - Input sample texts (e.g., news articles, speeches).
   - Explore word frequency, keywords, sentiment.
   - Understand how NLP extracts meaning from text.

3. Train a basic image classifier using webcam images. Observe how the model "learns." Using Google Teachable Machine
   - Train two image categories (e.g., “Smiling” vs. “Not Smiling”) using their own webcam images.
   - Observe how the model learns to classify.
   - Now try feeding images of people with different skin tones, facial features, etc.
   - Observe misclassifications or differences in confidence.

4. Simulate an AI chatbot helping a farmer or a student. You may use any GenAI tool of your choice. You may use the prompt below and also try your own.

   Prompt:

   “Act as an agriculture assistant. A farmer wants to know the best crop based on soil and season. Ask questions and suggest crops.”

5. Test Generative AI- Generate a poem or image from prompt “A futuristic green city.” using ChatGPT, Hugging Face (e.g., image or text generation)

6. Observe how generative AI models may show biased results when prompted with neutral profession descriptions. (Bing Image Creator / DALL·E on ChatGPT/ChatGPT). Generate images using the following neutral prompts:
   - “A doctor treating a patient”
   - “A teacher in a classroom”
   - “A CEO giving a speech”
   - “A software engineer working from home” Observe and discuss:
   - What gender/race/age are most commonly shown? ● Are the results stereotypical or diverse?

7. Check how language models may express bias depending on names, ethnicity, or location.

Use ChatGPT or Gemini

Prompts:

Prompt A:

"A person named Raj is applying for a bank loan. Will he be approved?"

Prompt B:

"A person named John is applying for a bank loan. Will he be approved?"

Change names, genders, and nationalities.

Observe the following and report your findings:

- Are the responses different?
- Is one version more positive or negative?
- Does the model express bias or hesitate?
- Should AI make such predictions?
- How do developers prevent this?

8. Exploring Text Generation and Summarization with Google AI Studio

Generate Creative Content

"Write a short story (150 words) about a robot who wants to become a chef."

- Submit and read the AI-generated story.
- Discuss how detailed and creative the output is.

Summarize a Paragraph

Prompt:

Summarize the following paragraph in 3 sentences:

"Artificial Intelligence is a branch of computer science that aims to create intelligent machines that can mimic human thinking. It includes various subfields like machine learning, natural language processing, and robotics. AI is widely used in industries such as healthcare, finance, and transportation to improve efficiency and decision-making."

- Submit and review the summary.
- Evaluate how well AI extracts key points.

Refine Your Prompt

Try changing the summary prompt to:

"Summarize the paragraph above in simple language for 10-year-olds."

- Compare this output to the previous one.
- Note how prompt wording changes results.

9. AI for Creative Writing

Prompt:

"Write a short motivational story for 10-year-old students in under 150 words."

10. Generate Slides: Tool: SlidesGPT/ Another Free AI tool

Prompt:

"Create a 5-slide presentation on 'AI in Smart Farming'."

11. YouTube Thumbnails / Branding: Tool: Canva + Magic Media AI

Design a thumbnail using Canva's AI tools with a prompt like:

"Design a YouTube thumbnail for a video titled 'Top 5 AI Tools for Students'."

Skill Courses
–
Semester -2

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Curriculum 2025-26 Version: 1.0

Applicable To Computer Science, Data Science, Artificial Intelligence, Cognitive Systems, Data Analytics, Cloud Computing, Cyber Security and Any Other Computer Science Allied Streams

Course Code	Title of the Course	L	S/M	P	C
25BCS202S	**Applications of Artificial Intelligence**		3		3
Prerequisites	Basics of Artificial Intelligence				

COURSE OBJECTIVES	
1	Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to Computer science.
2	Familiarize students with different types of datasets and public repositories used in AI research.
3	Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4	Expose students to no-code AI platforms, vibe coding, and workflow automation tools for rapid AI application development.
5	Introduce applications of AI in networking, cybersecurity, and digital forensics, highlighting both opportunities and challenges.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the role of AI hardware, edge devices, and cloud platforms in enabling applications in Computer Science.	Understanding
CO2	Differentiate data types and utilize public datasets relevant to AI.	Understanding
CO3	Implement a conceptual AI data pipeline for solving problems.	Applying
CO4	Apply no-code/low-code AI platforms, vibe coding tools, and workflow automation for simple AI-powered applications.	Applying
CO5	Discover the role of AI in networking, cybersecurity, and digital forensics, and discuss its challenges and future scope.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Infrastructure and Platforms for Building Applications using AI**: **Hardware used in building AI applications**: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD **Platforms for building applications using AI:** Online platforms (Example - Google AutoML, H2O.ai; Desktop (No-code/Low code) platforms (Orange Data Mining, KNIME. **Edge AI:** Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances.
UNIT II	**Foundations of Data - Types, Ethics and Utility in Building Applications using AI:** **Importance of data in building AI applications**: Data as the fuel for AI, Role of big data in training AI models. **Conceptual Foundations of Data:** Data vs. Information vs. Knowledge. **Structure of Data:** Structured, Semi-Structured, and Unstructured Data. **Modalities of Data:** Text, Image, Audio, Video, Tabular. **Formats of Data:** Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI). **Data Repositories:** Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights. **Ethics, Privacy in Data Usage**: Privacy concerns related to data usage; Ethical use of data, Responsible AI data practices.
UNIT III	**The AI Data Pipeline: From Collection to Model Readiness:** **The AI Data Pipeline:** Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models **Core Components**: Ingestion, Storage, Processing, Validation, Delivery **Data Collection Methods for AI:** Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms) **Data Annotation and Labelling:** Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; **Data Cleaning and Preprocessing**: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data. **Data Splitting:** Splitting data into training set and test set. **Data Transformation Techniques**: Normalization, Transformation.

UNIT IV	**AI-Powered No-Code Development: Vibe Coding and Workflow Automation** **Vibe Coding:** Concept & Workflow: What is Vibe Coding and how it works; Comparison: Vibe Coding vs. traditional programming; Tools Overview: Google AI Studio, Firebase Studio. Tool Selection: Choosing the right platform for your needs; Benefits & Challenges: Advantages and limitations of Vibe Coding; Paradigm Shift: From code-centric to prompt-driven development; Prompt Crafting: Structure and examples of effective app prompts**.** **Workflow Automation using AI:** Fundamentals: What is workflow automation and its relevance in the AI era; Real-world Applications: Auto-email responses, Feedback summarization, social media alerts & analytics; Toolset Overview: Zapier, n8n.
UNIT V	**AI in Networks, Cybersecurity, and Forensics:** **AI in Networking**: Need of AI in Network Management, How AI works in Traffic Prediction & Intrusion Detection, Uses of AI in Optimization, Fault Management, and Routing **AI in Cyber Security:** Need of AI in Cyber Security, How AI works in Cyber Security, Uses of AI in Cyber Security, Challenges and Considerations of AI in Cyber Security **AI in Digital Forensics**: How AI enhance digital forensic investigations, Role of AI in cyber forensic evidence acquisition and analysis, Overcoming challenges and limitations of AI in forensics, The future outlook for AI-powered forensic tools

TEXT BOOKS	
1.	Data Science for Beginners, Andrew Park (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2.	AI Basics for Non-Programmers, Tom Taulli (Clear explanations of AI data lifecycle and real-world use cases).
REFERENCE BOOKS	
1.	Data Preparation for Machine Learning, Jason Brownlee (Conceptual understanding of dataset quality, preprocessing, and pipelines).
2.	Hands-On Data Science for Non-Programmers, David Meerman Scott (Spreadsheet-based data exploration and visualization).
3.	You Look Like a Thing and I Love You – Janelle Shane
WEB RESOURCES	

1.	Vibe coding: https://cloud.google.com/discover/what-is-vibe-coding https://www.ibm.com/think/topics/vibe-coding https://firebase.google.com/docs/studio/prompting
2.	Workflow Automation: https://www.ibm.com/think/topics/workflow-automation https://www.ibm.com/think/topics/ai-workflow https://n8n.io/
3.	AI in Cyber Security: https://www.geeksforgeeks.org/ethical-hacking/ai-in-cybersecurity/
4.	AI in Networks: https://www.cisco.com/site/us/en/learn/topics/artificial-intelligence/what-is-ai-in networking.html
5.	AI in Digital Forensics: https://www.eccouncil.org/cybersecurity-exchange/cyber-talks/ai-and-ml-in-digital forensics-the-future-of-forensic-investigations/

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	**UNIT-**	**Essay 10M**	**Weightage**
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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Applicable To Computer Science, Data Science, Artificial Intelligence, Cognitive Systems, Data Analytics, Cloud Computing, Cyber Security and Any Other Computer Science Allied Streams -

Semester-II

Recommended Format of Question Paper

Time: 2 ½ Hrs **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

    OR

    B) From Contents of Unit-I
12. A) From Contents of Unit-II

    OR

    B) From Contents of Unit -II
13. A) From Contents of Unit -III

    OR

    B) From Contents of Unit -III
14. A) From Contents of Unit -IV

    OR

    B) From Contents of Unit -IV
15. A) From Contents of Unit -V

    OR

    B) From Contents of Unit –V

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Applications of AI – Semester -2

MODEL QUESTION PAPER (W.E.F 2025-2026): Applicable to Computer Science, Data Science, Artificial Intelligence, Cognitive Systems, Data Analytics, Cloud Computing, Cyber Security and Any Other Computer Science Allied Streams

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about any online platform to build AI application.	4M	2	1		
2	State about the Edge AI in smart Appliances.	4M	1	1		
3	Write a short note on “Structure of Data”.	4M	1	2		
4	Explain about Modalities of Data.	4M	2	2		
5	Define the process of Data Annotation and Labelling.	4M	2	3		
6	Discuss about various data collection methods for AI.	4M	2	3		
7	List the Advantages and limitations of Vibe Coding.	4M	1	4		
8	Describe about the Zapier tool.	4M	2	4		
9	Explain about how AI works in Cyber Security.	4M	2	5		
10	Quote the overcoming challenges and limitations of AI in forensics.	4M	1	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Explain the hardware components for building AI applications? (OR) b) Explain briefly about AI in applications in daily life appliances?	10M 10M	2 2	1 1		
2	a) Explain the importance of data in building AI applications? (OR) b) Discuss about data repositories and data licensing in AI?	10M 10M	2 2	2 2		
3	a) Summarize about Stages and Components AI Data Pipeline? (OR) b) Distinguish between Data Cleaning/Preprocessing and Data Splitting?	10M 10M	2 2	3 3		
4	a) Illustrate the concept of Vibe coding? (OR) b) Demonstrate the Workflow Automation using AI?	10M 10M	3 3	4 4		
5	a) Summarize the future outlook for AI-powered forensic tools? (OR) b) Classify the uses of AI in Optimization, Fault Management, and Routing?	10M 10M	2 2	5 5		

All the Best

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APPLICABLE TO COMPUTER SCIENCE, DATA SCIENCE, ARTIFICIAL INTELLIGENCE, COGNITIVE SYSTEMS, DATA ANALYTICS, CLOUD COMPUTING, CYBER SECURITY AND ANY OTHER COMPUTER SCIENCE ALLIED STREAMS

Course Code	Title of the Course	L	T	P	C
25BCS202L	**Applications of AI**			2	1
Prerequisites	Basic Knowledge in AI				

Practice Session

Suggested Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- Procedure:
    1. Open Orange → Add File widget → Load a CSV (e.g., Titanic dataset).
    2. Connect to Data Table → View rows/columns.
    3. Connect to Data Info → Check attributes, data types.
    4. View in Data Table and Distributions widget.
- Observation: Note numeric, categorical, missing values.
- Outcome: Students understand structured data format in CSV.

Lab 2 – Exploring Cybersecurity Datasets (Orange Data Mining)

- Dataset: Kaggle Cybersecurity dataset.
  https://www.kaggle.com/datasets/teamincribo/cyber-security attacks?select=cybersecurity_attacks.csv
- Procedure:
    1. Load dataset into Orange (File widget).
    2. View using Data Table and Distributions widgets.
    3. Identify numerical (packet size, duration) and categorical (protocol type, attack type) attributes.
- Observation: Note features that indicate “attack” vs. “normal traffic.”
- Outcome: Students understand the type of features used in intrusion detection.

Lab 3 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 4 - Data Annotation Exercise

- Use MakeSense.ai or VGG Image Annotator (VIA)
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 5 - Data Cleaning and Visualization (Orange Data Mining)

- Aim: To clean dirty data and visualize categorical and numeric attributes.
- Procedure:
    1. Load dataset.
    2. Connect File → Edit Domain (to change types) and Impute (to fill missing values).
    3. Compare cleaned vs. original in Data Table.
    4. Distributions widget.
    5. Check various features distribution.

    (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- Observation: Missing values filled with mean/median., Graphical representation of data.
- Outcome: Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 6: Train/Test Split in Orange

- Aim: To split dataset for AI training/testing.
- Procedure:
    1. Load Titanic dataset.
    2. Connect File → Data Sampler (70% train, 30% test).
    3. Connect outputs to Data Table widgets to view.
- Observation: Students see two different subsets.
- Outcome: Concept of model validation using split data.

Lab 7 – Writing a Detailed Prompt for a Simple Game App (Generative AI)

- Objective: Understand prompt engineering by designing a game idea.
- Activity:
    1. Open ChatGPT (or Gemini, Copilot).
    2. Write a detailed prompt like “Create a simple text-based treasure hunt game with levels, scoring, and random challenges.”
    3. Ask the AI to refine game rules, scoring, and characters.
    4. Document how prompt detail changes the AI’s response.
- Outcome: Students learn how detailed prompts shape AI outputs.

Lab 8 – Create a Portfolio Website using Vibe Coding Tool

- Objective: Learn how AI-assisted coding tools can automatically generate websites from simple instructions.
- Activity:
    1. Open Vibe Coding Tool (Windsurf/Cursor/Firebase Studio/Any other vibe coding tool).
    2. Give a natural language instruction:
    “Create a personal portfolio website for a Computer Science student. It should have sections: About Me, Education, Skills, Projects, and Contact.”
    3. Experiment with different prompts to change layout, theme, or color scheme (e.g., “Make it a modern dark theme with blue highlights.”).
    4. Preview the generated site and customize content.
- Outcome: Students experience how AI converts prompt into functional websites with minimal coding effort.

Lab 9 – Develop an Interactive Education Quiz App using Vibe Coding Tool

- Objective: Understand AI's role in creating educational applications.
- Activity:
    1. Open Vibe Coding Tool.
    2. Give prompt:
    "Build an interactive quiz app for students with multiple-choice questions on AI basics. Include features: Start Quiz, Show Score, Retry."
    3. Refine the app by asking AI to:

■ Add timer for each question.
■ Show correct/incorrect answers instantly.
■ Add a Leaderboard page.

4. Test the app by playing the quiz.

- Outcome: Students see how AI-generated apps can support e-learning and assessments.

Lab 10-Automating Feedback Summarization using n8n and AI

Objective: Automatically summarize student feedback responses using AI and email the summary to the teacher.

Steps:

1. Trigger Node: Google Sheets (watch new row for feedback).
2. AI Node: Send text to OpenAI/Gemini API for summarization.
(Get a free API from Open Router (https://openrouter.ai/) → Gives free trial credits + access to multiple models.)
3. Action Node: Gmail → email summarized feedback to teacher.
4. Test: Enter sample feedback in Google Sheet → receive AI summary via email.
5. Discussion: How AI reduced manual effort in reading every response.

Outcome: Students see how automation + AI can transform data into insights instantly.

Lab 11 – Using AI Functions in Google Sheets

Objective: Enable students to experience Google Sheets' built-in AI-powered features like summarizing, categorizing, sentiment analysis, and text generation through simple prompts within the spreadsheet environment.

Tools & Setup

Enable Google Sheets with Workspace Labs
https://workspace.google.com/labs-sign-up/u/1/
Follow the References and experiment with summarizing, categorizing, sentiment analysis, and text generation using =AI() function
https://support.google.com/docs/answer/15820999?visit_id=638919819014625788-1742465261&p=ai-function&rd=1
https://support.google.com/docs/answer/13447609?hl=en&sjid=9077695331310534831-NC
https://support.google.com/docs/answer/13635180?hl=en&ref_topic=13450085&sjid=9077695331310534831-NC

Outcome: Students will experience various AI functions within a spreadsheet-text generation, summarization, categorization, sentiment analysis.

Lab 12- Deep Fake Image Detection

Objective

Enable students to critically assess image authenticity using multiple free AI tools, understanding the strengths and limitations of each.

Tools:

Deepfake-O-Meter: https://zinc.cse.buffalo.edu/ubmdfl/deep-o-meter/landing_page

Decopy AI Image Detector: https://decopy.ai/ai-image-detector/

Procedure

1. Collect Images
    - 2 real images (e.g., faces from Unsplash or personal photos)
    - 2 AI-generated or manipulated images (e.g., from Midjourney, DALL·E, or Google AI studio)
2. Run through DeepFake-o-Meter
    - Visit the platform and upload an image.
    - Note the output: what algorithms flag or overall score for authenticity.
3. Use Decopy AI Image Detector
    - Upload the same images.
    - Check results indicating whether the image appears AI-generated.

Observation: How AI tools help in Digital Forensics.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

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Curriculum 2025-26 Version: 1.0

Applicable To Botany, Zoology, Bio-Technology, Miro Biology and Other Life Sciences – Semester II

Course Code	Title of the Course	L	S/M	P	C
25ZOO202S	**Applications of Artificial Intelligence**		3		3
Prerequisites	Basics of Artificial Intelligence				

COURSE OBJECTIVES	
1	Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to biological sciences.
2	Familiarize students with different types of datasets and public repositories used in AI research.
3	Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4	Explore the integration of AI in scientific research and discuss future directions and evolving trends in AI.
5	Introduce AI-driven approaches in biotechnology and chemistry, such as genome sequencing, protein structure prediction, and drug discovery.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the role of AI hardware, edge devices, and cloud platforms in enabling applications in biological sciences.	Understanding
CO2	Differentiate data types and utilize public datasets relevant to AI in life sciences.	Understanding
CO3	Implement a conceptual AI data pipeline for solving biological problems.	Applying
CO4	Apply AI techniques in case studies of agriculture, zoology, ecology, and environmental monitoring.	Applying
CO5	Discover the impact of AI in biotechnology and chemistry, particularly in genome sequencing, protein prediction, and drug discovery	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Infrastructure and Platforms for Building Applications using AI**: **Hardware used in building AI applications**: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD **Platforms for building applications using AI:** Online platforms (Example - Google AutoML, H2O.ai; Desktop (No-code/Low code) platforms (Orange Data Mining, KNIME. **Edge AI:** Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances.
UNIT II	**Foundations of Data - Types, Ethics and Utility in Building Applications using AI:** **Importance of data in building AI applications**: Data as the fuel for AI, Role of big data in training AI models. **Conceptual Foundations of Data:** Data vs. Information vs. Knowledge. **Structure of Data:** Structured, Semi-Structured, and Unstructured Data. **Modalities of Data:** Text, Image, Audio, Video, Tabular. **Formats of Data:** Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI). **Data Repositories:** Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights. **Ethics, Privacy in Data Usage**: Privacy concerns related to data usage; Ethical use of data, Responsible AI data practices.
UNIT III	**The AI Data Pipeline: From Collection to Model Readiness:** **The AI Data Pipeline:** Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models **Core Components**: Ingestion, Storage, Processing, Validation, Delivery **Data Collection Methods for AI:** Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms) **Data Annotation and Labelling:** Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; **Data Cleaning and Preprocessing**: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data. **Data Splitting:** Splitting data into training set and test set. **Data Transformation Techniques**: Normalization, Transformation.

UNIT IV	**AI in Biological Sciences:** **AI in Botany & Agriculture:** Plant disease detection via image recognition; Crop yield forecasting using climate and soil analytics; Precision agriculture: smart irrigation and fertilizer planning. **AI in Zoology, Ecology & Environmental Sciences:** Wildlife monitoring: species ID from camera trap data; Aquatic systems: fish recognition and water quality modeling; Livestock health and disease prediction; Environmental tracking: forest cover and pollution analysis
UNIT V	**AI in Bio-Technology and Bio-Chemistry:** Application of AI in Genome sequencing & gene function prediction; Using AI in Protein structure modeling (e.g., AlphaFold); AI for Drug discovery: virtual compound screening; Application of AI in Microbial classification & metagenomic profiling; Chemical reaction and material property prediction

TEXT BOOKS	
1.	Data Science for Beginners, Andrew Park (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2.	AI Basics for Non-Programmers, Tom Taulli (Clear explanations of AI data lifecycle and real-world use cases).
REFERENCE BOOKS	
1.	Data Preparation for Machine Learning, Jason Brownlee (Conceptual understanding of dataset quality, preprocessing, and pipelines).
2.	Hands-On Data Science for Non-Programmers, David Meerman Scott (Spreadsheet-based data exploration and visualization).
3.	Artificial Intelligence in Life Sciences – Elsevier.
4.	Artificial Intelligence in Agriculture – CRC Press (B. Prasad).
5.	AI for Ecology and Conservation – Springer.
6.	Bioinformatics and Drug Discovery using AI – Academic Press.
WEB RESOURCES	
1.	Kaggle Dataset Search, https://www.kaggle.com/datasets
2.	Google Dataset Search, https://datasetsearch.research.google.com
3.	UCI Machine Learning Repository, https://archive.ics.uci.edu
4.	Hugging Face Datasets, https://huggingface.co/datasets
5.	Open Government Data (India), https://data.gov.in

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Weightage
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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Applicable To Botany, Zoology, Bio-Technology, Miro Biology and Other Life Sciences

Semester-II

Recommended Format of Question Paper

Time: 2 ½ Hrs **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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Applications of AI

MODEL QUESTION PAPER (W.E.F 2025-2026): Applicable to Botany, Zoology, Bio-Technology, Miro Biology and Other Life Sciences

Time: 2 ½ Hrs. Max Marks: 70

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about any online platform to build AI application.	4M	2	1		
2	State about the Edge AI in smart Appliances.	4M	1	1		
3	Write a short note on “Structure of Data”.	4M	1	2		
4	Explain about Modalities of Data.	4M	2	2		
5	Define the process of Data Annotation and Labelling.	4M	2	3		
6	Discuss about various data collection methods for AI.	4M	2	3		
7	Write short note on Precision agriculture.	4M	1	4		
8	Discuss about the role of AI in Environmental tracking.	4M	2	4		
9	Explain the role of AI in Protein structure modeling?	4M	2	5		
10	Illustrate the application of AI in Microbial classification.	4M	2	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Explain the hardware components for building AI applications? (OR) b) Explain briefly about AI in applications in daily life appliances?	10M 10M	2 2	1 1		
2	a) Explain the importance of data in building AI applications? (OR) b) Discuss about data repositories and data licensing in AI?	10M 10M	2 2	2 2		
3	a) Summarize about Stages and Components AI Data Pipeline? (OR) b) Distinguish between Data Cleaning/Preprocessing and Data Splitting?	10M 10M	2 2	3 3		
4	a) Discuss the advantages of using AI for plant disease detection compared to traditional methods? (OR) b) Describe the techniques used by AI models for fish recognition in aquatic ecosystems?	10M 10M	2 2	4 4		
5	a) Explain the role of AI in Drug discovery. (OR) b) Compare and contrast traditional bioinformatics approaches with AI-driven methods for gene function prediction. What are the advantages and limitations?	10M 10M	2 2	5 5		

All the Best

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Applicable To Botany, Zoology, Bio-Technology, Miro Biology and Other Life Sciences

Course Code	Title of the Course	L	T	P	C
25ZOO202L	**Applications of AI**			2	1
Prerequisites	Basic Knowledge in AI				

Practice Session

Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- Procedure: 1. Open Orange → Add File widget → Load a CSV (e.g., Titanic dataset). 2. Connect to Data Table → View rows/columns. 3. Connect to Data Info → Check attributes, data types. 4. View in Data Table and Distributions widget.
- Observation: Note numeric, categorical, missing values.
- Outcome: Students understand structured data format in CSV.

Lab 2 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 3 - Data Annotation Exercise

- Use MakeSense.ai or VGG Image Annotator (VIA)
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 4 - Data Cleaning and Visualization (Orange Data Mining)

- Aim: To clean dirty data and visualize categorical and numeric attributes.
- Procedure: 1. Load dataset. 2. Connect File → Edit Domain (to change types) and Impute (to fill missing values). 3. Compare cleaned vs. original in Data Table. 4. Distributions widget. 5. Check various features distribution. (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- Observation: Missing values filled with mean/median., Graphical representation of data.
- Outcome: Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 5: Train/Test Split in Orange

- Aim: To split a dataset for AI training/testing.
- Procedure: 1. Load Titanic dataset. 2. Connect File → Data Sampler (70% train, 30% test). 3. Connect outputs to Data Table widgets to view.
- Observation: Students see two different subsets.
- Outcome: Concept of model validation using split data.

Lab 6: Plant Leaf Disease Detection

- Dataset: Plant leaf disease datasets (PlantVillage, Kaggle).
- Tool: Google Teachable Machine / Plantix app.
- Activity: Upload leaf images to classify healthy vs diseased leaves.

Lab 7: Crop Yield Prediction

- Dataset: FAO crop yield datasets.
- Tool: Orange Data Mining (drag-and-drop AI workflows).
- Activity: Predict yield for different crops based on soil & climate features.

Lab 8: Species Recognition

- Dataset: Camera trap image datasets (Snapshot Serengeti, LILA BC).
- Tool: iNaturalist / Wildbook AI platform.
- Activity: Upload wildlife images for species recognition & conservation mapping.

Lab 9: Predict and visualize 3D protein structures:

- Dataset: Genomic & protein sequence databases (NCBI, UniProt, AlphaFold DB).
- Tool: AlphaFold Protein Structure Viewer (online).
- Activity: Predict and visualize 3D protein structures.

Lab 10: Analyze chemical similarity and predict drug-likeness.

- Dataset: Drug compound datasets (ChEMBL).
- Tool: ChemMine Tools (web-based).
- Activity: Analyze chemical similarity and predict drug-likeness.

Lab 11: Identify microbial species from sequencing datasets.

- Dataset: Metagenomics datasets (MG-RAST).
- Tool: MG-RAST online platform.
- Activity: Identify microbial species from sequencing datasets.

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Curriculum 2025-26 Version: 1.0

Applicable To Commerce and Management – Semester II

Course Code	Title of the Course	L	S/M	P	C
25BCG202S 25BCC202S 25BBA202S 25BFS202S	**Applications of Artificial Intelligence**		3		3
Prerequisites	Basics of Artificial Intelligence				

COURSE OBJECTIVES	
1	Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to commerce and management.
2	Familiarize students with different types of datasets and public repositories used in AI research.
3	Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4	Understand how AI enhances retail and e-commerce and explore personalization, recommendation systems, and customer engagement.
5	Apply AI to streamline business processes and decision-making and explore AI in finance, HR, and supply chain management.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the AI ecosystem (hardware, cloud, and edge devices) and its relevance to commerce and management.	Understanding
CO2	Differentiate between structured and unstructured data, and utilize public datasets for business-oriented AI applications.	Understanding
CO3	Implement a conceptual AI data pipeline for solving real-world problems in commerce and management.	Applying
CO4	Understand and apply AI technologies to improve customer engagement and personalization in commerce.	Understanding
CO5	Use AI tools to streamline business operations, enhance decision-making, and detect patterns in data.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Infrastructure and Platforms for Building Applications using AI**: **Hardware used in building AI applications**: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD **Platforms for building applications using AI:** Online platforms (Example - Google AutoML, H2O.ai; Desktop (No-code/Low code) platforms (Orange Data Mining, KNIME. **Edge AI:** Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances.
UNIT II	**Foundations of Data - Types, Ethics and Utility in Building Applications using AI:** **Importance of data in building AI applications**: Data as the fuel for AI, Role of big data in training AI models. **Conceptual Foundations of Data:** Data vs. Information vs. Knowledge. **Structure of Data:** Structured, Semi-Structured, and Unstructured Data. **Modalities of Data:** Text, Image, Audio, Video, Tabular. **Formats of Data:** Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI). **Data Repositories:** Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights. **Ethics, Privacy in Data Usage**: Privacy concerns related to data usage; Ethical use of data, Responsible AI data practices.
UNIT III	**The AI Data Pipeline: From Collection to Model Readiness:** **The AI Data Pipeline:** Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models **Core Components**: Ingestion, Storage, Processing, Validation, Delivery **Data Collection Methods for AI:** Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms) **Data Annotation and Labelling:** Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; **Data Cleaning and Preprocessing**: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data. **Data Splitting:** Splitting data into training set and test set. **Data Transformation Techniques**: Normalization, Transformation.

UNIT IV	**AI in Commerce – Transforming the Consumer Experience** Introduction to AI in Commerce, Recommendation Engines (Collaborative & Content-Based), Chatbots and Virtual Assistants, Sentiment Analysis and Review Mining, Inventory Optimization and Demand Forecasting, Ethical Issues related to use of AI in Commerce and Business: Bias, Privacy, and Transparency.
UNIT V	**AI in Business Operations – Driving Efficiency and Insight:** AI in Business Intelligence and Predictive Analytics, Financial Applications: Fraud Detection, Risk Modelling, HR Applications: Resume Screening, Employee Analytics, Supply Chain Automation and Optimization, AI in Marketing: Customer Segmentation, Lead Scoring, Strategic Adoption of AI in Enterprises, Explainable AI in E-Commerce.

TEXT BOOKS	
1.	Data Science for Beginners, Andrew Park (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2.	AI Basics for Non-Programmers, Tom Taulli (Clear explanations of AI data lifecycle and real-world use cases).
REFERENCE BOOKS	
1.	Data Preparation for Machine Learning, Jason Brownlee (Conceptual understanding of dataset quality, preprocessing, and pipelines).
2.	Hands-On Data Science for Non-Programmers, David Meerman Scott (Spreadsheet-based data exploration and visualization).
3.	You Look Like a Thing and I Love You – Janelle Shane
WEB RESOURCES	
1.	Kaggle Dataset Search, https://www.kaggle.com/datasets
2.	Google Dataset Search, https://datasetsearch.research.google.com
3.	UCI Machine Learning Repository, https://archive.ics.uci.edu
4.	Hugging Face Datasets, https://huggingface.co/datasets
5.	Open Government Data (India), https://data.gov.in

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Weightage
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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Applicable To Commerce and Management-

Semester-II

Recommended Format of Question Paper

Time: 2 ½ Hrs **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

    OR

    B) From Contents of Unit-I
12. A) From Contents of Unit-II

    OR

    B) From Contents of Unit -II
13. A) From Contents of Unit -III

    OR

    B) From Contents of Unit -III
14. A) From Contents of Unit -IV

    OR

    B) From Contents of Unit -IV
15. A) From Contents of Unit -V

    OR

    B) From Contents of Unit –V

*****

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Applications of AI

MODEL QUESTION PAPER (W.E.F 2025-2026): Applicable to Commerce and Management

Time: 2 ½ Hrs. Max Marks: 50

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about any online platform to build AI application.	4M	2	1		
2	State about the Edge AI in smart Appliances.	4M	1	1		
3	Write a short note on “Structure of Data”.	4M	1	2		
4	Explain about Modalities of Data.	4M	2	2		
5	Define the process of Data Annotation and Labelling.	4M	2	3		
6	Discuss about various data collection methods for AI.	4M	2	3		
7	Write short note on Sentiment Analysis and Review Mining.	4M	1	4		
8	Discuss about the role of AI in Inventory Optimization and Demand Forecasting.	4M	2	4		
9	Explain the role of AI in HR Applications?	4M	2	5		
10	Illustrate the “Explainable AI in E-Commerce”.	4M	2	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Explain the hardware components for building AI applications? (OR) b) Explain briefly about AI in applications in daily life appliances?	10M 10M	2 2	1 1		
2	a) Explain the importance of data in building AI applications? (OR) b) Discuss about data repositories and data licensing in AI?	10M 10M	2 2	2 2		
3	a) Summarize about Stages and Components AI Data Pipeline? (OR) b) Distinguish between Data Cleaning/Preprocessing and Data Splitting?	10M 10M	2 2	3 3		
4	a) Describe the Ethical Issues in AI Commerce in detail? (OR) b) Classify the Chatbots and Virtual Assistants in AI?	10M 10M	3 2	4 4		
5	a) Explain the various applications of AI Business Intelligence? (OR) b) Explain about AI in Marketing?	10M 10M	2 2	5 5		

All the Best

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APPLICABLE TO COMMERCE AND MANAGEMENT

Course Code	Title of the Course	L	T	P	C
25BCG202L 25BCC202L 25BBA202L 25BFS202L	**Applications of AI**			2	1
Prerequisites	Basic Knowledge in AI				

Practice Session

Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- Procedure: 1. Open Orange → Add File widget → Load a CSV (e.g., Titanic dataset). 2. Connect to Data Table → View rows/columns. 3. Connect to Data Info → Check attributes, data types. 4. View in Data Table and Distributions widget.
- Observation: Note numeric, categorical, missing values.
- Outcome: Students understand structured data format in CSV.

Lab 2 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 3 - Data Annotation Exercise

- Use MakeSense.ai or VGG Image Annotator (VIA)
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 4 - Data Cleaning and Visualization (Orange Data Mining)

- Aim: To clean dirty data and visualize categorical and numeric attributes.
- Procedure: 1. Load dataset. 2. Connect File → Edit Domain (to change types) and Impute (to fill missing values). 3. Compare cleaned vs. original in Data Table. 4. Distributions widget. 5. Check various features distribution. (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- Observation: Missing values filled with mean/median., Graphical representation of data.
- Outcome: Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 5: Train/Test Split in Orange

- Aim: To split a dataset for AI training/testing.
- Procedure: 1. Load Titanic dataset. 2. Connect File → Data Sampler (70% train, 30% test). 3. Connect outputs to Data Table widgets to view.
- Observation: Students see two different subsets.

● Outcome: Concept of model validation using split data.

Lab 6: Introduction to AI in Commerce – Use Case Exploration

Prerequisite: Discuss conceptually about Clustering

Objective: Understand how AI is applied in commerce through data visualization and clustering. Orange Workflow: Use Orange Data Mining Tool

Widgets Used: File → Data Table → Scatter Plot → Hierarchical Clustering Dataset: Retail customer data (e.g., purchase frequency, amount spent)

Dataset Link: Retail Sales Data

Activities: · · · Load customer data and visualize spending patterns. Apply clustering to identify customer segments. Discuss how businesses can tailor services to each segment.

Outcome: Students grasp how AI helps businesses understand and target consumers more effectively.

Lab 7: Recommendation Engine Simulation

Prerequisite: Discuss conceptually about Clustering

Objective: Simulate collaborative filtering using similarity-based clustering.

Orange Workflow:

Widgets Used: File → Distance → Hierarchical Clustering → Data Table

Dataset: User-product ratings matrix

Dataset Link: Amazon Product Recommendation System

Activities:

● Calculate similarity between users.

● Group similar users and recommend products based on cluster behavior.

● Discuss differences between collaborative and content-based filtering.

Outcome: Students understand the logic behind recommendation systems and how they personalize user experience.

Lab 8: Chatbot Intent Classification

Prerequisite: Discuss conceptually about Linear Regression & Logistic Regression

Objective: Train a model to classify customer queries into intents.

Orange Workflow:

Widgets Used: File → Preprocess Text → Bag of Words → Logistic Regression → Test & Score

Dataset: Sample customer queries labeled with intents (e.g., “track order”, “return item”)

Dataset Link: Customer Intent Classification

Activities:

● Preprocess and vectorize text data.

● Train a classifier to predict query intent.

● Evaluate accuracy and discuss chatbot training.

Outcome: Students learn how AI understands and responds to customer queries.

Lab 9: Sentiment Analysis of Reviews

Prerequisite: Discuss conceptually about Naive Bayes

Objective: Classify customer reviews as positive or negative.

Orange Workflow:

Widgets Used: File → Preprocess Text → Bag of Words → Naive Bayes → Test & Score

Dataset: Product reviews with sentiment labels

Dataset Link: Amazon Product Reviews – Sentiment Analysis

Activities:

- Clean and tokenize review text.
- Train a sentiment classifier.
- Visualize word clouds for positive vs. negative reviews.

Outcome: Students analyze customer feedback and extract actionable insights.

Lab 10: Demand Forecasting with Regression

Prerequisite: Discuss conceptually about Linear Regression & Logistic Regression

Objective: Predict future sales using regression models.

Orange Workflow:

Widgets Used: File → Linear Regression → Scatter Plot → Test & Score

Dataset: Historical sales data (e.g., monthly sales, promotions)

Dataset Link: Comprehensive Retail Sales Data

Activities:

- Train a regression model to forecast sales.
- Visualize predictions vs. actuals.
- Discuss implications for inventory planning.

Outcome: Students understand how AI supports demand forecasting and inventory control.

Lab 11: Bias Detection in AI Models

Prerequisite: Discuss conceptually about Linear Regression, Logistic Regression & Confusion Matrix

Objective: Explore bias in predictive models and its impact.

Orange Workflow:

Widgets Used: File → Logistic Regression → Confusion Matrix → Distributions

Dataset: HR hiring data with gender or age attributes

Dataset Link: HR Data Analytics

Activities:

- Train a model to predict hiring decisions.
- Analyze performance across demographic groups.
- Discuss fairness, transparency, and ethical implications.

Outcome: Students critically assess bias and propose ethical safeguards.

Lab 12: Predictive Analytics for Business Intelligence

Prerequisite: Discuss conceptually about Random Forest

Objective: Use classification to predict customer churn.

Orange Workflow:

Widgets Used: File → Random Forest → Test & Score → ROC Analysis

Dataset: Telecom or subscription data with churn labels

Dataset Link: Telco Customer Churn – IBM Dataset

Activities:

- Train and evaluate a churn prediction model.
- Interpret ROC curves and accuracy.
- Discuss how businesses can act on predictions.

Outcome: Students apply predictive analytics to improve customer retention.

Lab 13: AI in HR and Marketing – Resume Screening & Segmentation

Prerequisite: Discuss conceptually about Clustering
Objective: Classify resumes and segment customers using clustering.
Orange Workflow:
HR Task: File → Preprocess Text → Bag of Words → Logistic Regression
Marketing Task: File → k-Means Clustering → Scatter Plot
Resume Screening Dataset: Employee Hiring Data
Customer Segmentation Dataset: Customer Segmentation Dataset
Activities:

- Screen resumes based on job fit.
- Segment customers by behavior or demographics.
- Discuss automation benefits and risks.

Outcome: Students explore how AI enhances HR and marketing efficiency.
Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

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Curriculum 2025-26 Version: 1.0

Applicable To History, Economics, Political Science, Linguistics, And Any Other Humanities– Semester II

Course Code	Title of the Course	L	S/M	P	C
25HIS202S 25ECO202S	**Applications of Artificial Intelligence**		3		3
Prerequisites	Basics of Artificial Intelligence				

COURSE OBJECTIVES	
1	Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms, in a non-technical way for Arts and Social Sciences students.
2	Familiarize students with data types, sources, and public repositories that fuel AI applications in society and humanities.
3	Explain the process of preparing and managing AI data pipelines through collection, annotation, and cleaning.
4	Explore real-world applications of AI in arts, culture, literature, linguistics, and languages.
5	Introduce applications of AI in social sciences such as economics, political science, psychology, history, and sociology, with an emphasis on ethics and responsible adoption.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the AI ecosystem (hardware, cloud, edge devices) and its societal relevance.	Understanding
CO2	Differentiate data types and identify public datasets relevant to social sciences, arts, and humanities.	Understanding
CO3	Describe the steps of an AI data pipeline (collection, annotation, cleaning, preparation) in simple terms.	Understanding
CO4	Illustrate the role of AI in arts, languages, and cultural heritage with practical, real-world examples.	Applying
CO5	Discover applications of AI in social sciences (economics, politics, psychology, history, and society) and evaluate ethical concerns.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Infrastructure and Platforms for Building Applications using AI**: **Hardware used in building AI applications**: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD **Platforms for building applications using AI:** Online platforms (Example - Google AutoML, H2O.ai; Desktop (No-code/Low code) platforms (Orange Data Mining, KNIME. **Edge AI:** Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances.
UNIT II	**Foundations of Data - Types, Ethics and Utility in Building Applications using AI:** **Importance of data in building AI applications**: Data as the fuel for AI, Role of big data in training AI models. **Conceptual Foundations of Data:** Data vs. Information vs. Knowledge. **Structure of Data:** Structured, Semi-Structured, and Unstructured Data. **Modalities of Data:** Text, Image, Audio, Video, Tabular. **Formats of Data:** Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI). **Data Repositories:** Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights. **Ethics, Privacy in Data Usage**: Privacy concerns related to data usage; Ethical use of data, Responsible AI data practices.
UNIT III	**The AI Data Pipeline: From Collection to Model Readiness:** **The AI Data Pipeline:** Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models **Core Components**: Ingestion, Storage, Processing, Validation, Delivery **Data Collection Methods for AI:** Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms) **Data Annotation and Labelling:** Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; **Data Cleaning and Preprocessing**: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data. **Data Splitting:** Splitting data into training set and test set. **Data Transformation Techniques**: Normalization, Transformation.

UNIT IV	**AI in Social Sciences and Society:** **AI in Economics:** Predicting market trends, consumer behavior, and economic forecasting. **AI in Political Science & Public Policy:** Social media analysis for political campaigns, Opinion mining & election trend prediction. **AI in Psychology & Sociology**: Emotion recognition from facial expressions and text, AI chatbots in mental health counseling (conceptual). **AI in History & Society**: Digital archives and historical document analysis, AI for preserving ancient languages and scripts, social impact of AI on jobs, privacy, and democracy.
UNIT V	**AI in Arts, Languages, and Cultural Studies:** **AI in Literature & Languages:** Machine translation (Google Translate, DeepL), Sentiment analysis in literature and media reviews, AI-assisted creative writing (chatbots, story generators, poetry) **AI in Arts & Culture**: AI in music composition & art generation (painting, film scripts), Digitization and preservation of cultural heritage using AI, Identifying fake art and forgeries.

TEXT BOOKS	
1.	Data Science for Beginners, Andrew Park (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2.	AI Basics for Non-Programmers, Tom Taulli (Clear explanations of AI data lifecycle and real-world use cases).
REFERENCE BOOKS	
1.	Data Preparation for Machine Learning, Jason Brownlee (Conceptual understanding of dataset quality, preprocessing, and pipelines).
2.	Hands-On Data Science for Non-Programmers, David Meerman Scott (Spreadsheet-based data exploration and visualization).
3.	You Look Like a Thing and I Love You – Janelle Shane
WEB RESOURCES	
1.	Kaggle Dataset Search, https://www.kaggle.com/datasets
2.	Google Dataset Search, https://datasetsearch.research.google.com
3.	UCI Machine Learning Repository, https://archive.ics.uci.edu
4.	Hugging Face Datasets, https://huggingface.co/datasets
5.	Open Government Data (India), https://data.gov.in

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Weightage
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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Applicable To History, Economics, Political Science, Linguistics, And Any Other Humanities -

Semester-II

Recommended Format of Question Paper

Time: 2 ½ Hrs **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions. **5X10=50**

11. A) From Contents of Unit-I

    OR

    B) From Contents of Unit-I
12. A) From Contents of Unit-II

    OR

    B) From Contents of Unit -II
13. A) From Contents of Unit -III

    OR

    B) From Contents of Unit -III
14. A) From Contents of Unit -IV

    OR

    B) From Contents of Unit -IV
15. A) From Contents of Unit -V

    OR

    B) From Contents of Unit –V

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Applications of AI

MODEL QUESTION PAPER (W.E.F 2025-2026): Applicable to History, Economics, Political Science, Linguistics, and Any Other Humanities

Time: 2 ½ Hrs. Max Marks: 50

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about any online platform to build AI application.	4M	2	1		
2	State about the Edge AI in smart Appliances.	4M	1	1		
3	Write a short note on “Structure of Data”.	4M	1	2		
4	Explain about Modalities of Data.	4M	2	2		
5	Define the process of Data Annotation and Labelling.	4M	2	3		
6	Discuss about various data collection methods for AI.	4M	2	3		
7	Write short note Chatbots and Virtual Assistants in AI in Psychology & Sociology.	4M	1	4		
8	Discuss about the Opinion mining & election trend prediction?	4M	2	4		
9	Explain the role of AI in Sentiment analysis in literature and media reviews?	4M	2	5		
10	Illustrate the application of AI in Identifying fake art and forgeries.	4M	2	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Explain the hardware components for building AI applications? (OR) b) Explain briefly about AI in applications in daily life appliances?	10M 10M	2 2	1 1		
2	a) Explain the importance of data in building AI applications? (OR) b) Discuss about data repositories and data licensing in AI?	10M 10M	2 2	2 2		
3	a) Summarize about Stages and Components AI Data Pipeline? (OR) b) Distinguish between Data Cleaning/Preprocessing and Data Splitting?	10M 10M	2 2	3 3		
4	a) Illustrate about the AI in History & Society (OR) b) Demonstrate about AI in Economics.	10M 10M	3 3	4 4		
5	a) Summarize the role of AI in Literature & Languages? (OR) b) Classify the uses of AI in Arts & Culture?	10M 10M	2 2	5 5		

All the Best

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APPLICABLE TO HISTORY, ECONOMICS, POLITICAL SCIENCE, LINGUISTICS, AND ANY OTHER HUMANITIES

Course Code	Title of the Course	L	T	P	C
25HIS202L 25ECO202L	**Applications of AI**			2	1
Prerequisites	Basic Knowledge in AI				

Practice Session

Lab Experiments:

Lab 1: Explore Open Data (Economics / Sociology)

- Tool: Our World in Data (https://data360.worldbank.org/en/search) or World Bank Data Explorer
- Task: Choose indicators (e.g., Literacy, GDP per capita, Poverty, Unemployment).
- Procedure:

1. Open World Bank / Our World in Data.
2. Select one country or compare multiple countries.
3. Use the interactive charts to see historical trends.

- Observation: How does education level impact income or health?
- Outcome: Understand correlations between socio-economic indicators.

Lab 2: Data Annotation (NER & Classification)

- Tool: Prodigy Demo (https://demo.prodi.gy/) -free online demo, no install
- Activity:

1. Try Named Entity Recognition (NER) demo.
2. Highlight organizations, people, and places in sample text.
3. Compare manual vs. automated annotation.

- Outcome: Students understand manual vs. automated annotation and why labeling is crucial.

Lab 3: Automatic Text Classification for Sociology

- Tool: Text2Data Sentiment Analysis Demo (https://text2data.com/Demo) -free online demo
- Task: Copy-paste 5 messages related to climate change, caste or gender.
- Observation: Tool classifies them as Positive, Neutral, or Negative.
- Outcome: Understand “annotation” and “classification labels.”

Lab 4: Word Clouds for Political Speeches (Languages / Political Science)

- Tool: WordArt Cloud Generator (https://wordart.com/create) - Free Online
- Procedure:

1. Copy a Prime Minister’s speech or Economic Budget highlights.
2. Paste into WordArt.
3. Generate a word cloud → biggest words = most repeated.

- Observation: Main themes in political communication.
- Outcome: Learn how text visualization shows political/economic priorities.

Lab 5: Bias in Job Advertisements (Sociology / Gender Studies)

- Tool: Gender Decoder for Job Ads (https://gender-decoder.katmatfield.com/) -Free Online or any other related tool
- Procedure:

1. Copy text from 5 job advertisements.
2. Paste into the gender bias detector.
3. Note masculine vs feminine coded words.

- Observation: How language influences gendered hiring.
- Outcome: Awareness of AI in analyzing workplace bias.

Lab 6: Language Detection & Translation (Languages / Linguistics)

- Tool: Google Translate (https://translate.google.co.in/)
- Task: Enter text in regional/foreign languages.
- Procedure:

1. Paste short paragraph in Telugu, Hindi, French, etc.
2. Translate into English.
3. Reverse-translate to see changes.

- Observation: Which meanings are lost in translation?
- Outcome: Students understand AI's strengths/limits in translation.

Lab 7: Text Summarization of Articles (Languages / Literature)

- Tool: SMMRY (https://smmry.com/) or Scholarcy Free Summarizer (https://www.scholarcy.com/article-summarizer)
- Task: Take a long article or essay.
- Procedure:

1. Paste article into tool.
2. Generate summary.
3. Compare AI summary vs. student's manual summary.

- Observation: AI captures main ideas but may miss nuances.
- Outcome: Learn how AI helps in academic reading & summarization.

Lab 8: Talk to a Free Chatbot

- Tool: ChatGPT Free or Poe or any other related tool
- Activity: Students ask questions like:
  - "Tell me a Telugu proverb and its meaning."
  - "Explain World War II in 5 simple lines."
- Outcome: Data delivery/output stage - AI as a dialogue system.

Lab 9: Story Generator (Creative Writing / Literature)

- Tool: AI Dungeon (https://play.aidungeon.com/) -free play or DeepAI Text Generator (https://deepai.org/chat/text-generator)
- Activity: Give a starting line (e.g., "Once upon a time in Amaravati…") → AI continues story
- Outcome: How training data influences creativity in AI.

Lab 10: AI Art Generator (Culture & Arts)

- Tool: DeepAI Text-to-Image (free) (https://deepai.org/machine-learning model/text2img) or any other related tool
- Activity: Ask students to generate:
  - "A painting of Bharat Mata in Picasso style."

○ “Hyderabad Charminar in futuristic design.”

● Outcome: Data pipeline applied to images.

Lab 11: AI Music Generation with Soundraw (Free Trial)

Tool: Soundraw.io

Steps:

Open the website → Click Create Music.

Select Mood (happy, sad, chill, dramatic).

Select Genre (pop, jazz, cinematic, lo-fi, etc.).

The AI will generate a full instrumental track.

You can adjust instruments, tempo, and structure.

Outcome: Students understand how AI composes music automatically based on mood/genre → linking to psychology, culture, and media studies.

Lab 12: Chatbot Roleplay (History / Social Science)

● Tool: Character.AI (free, no coding)- https://character.ai/

● Activity: Talk to AI characters like “Einstein” or “Shakespeare” and ask them questions.

You can try with other AI characters and experiment.

● Learning: How AI mimics personalities using training data.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

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Curriculum 2025-26 Version: 1.0

APPLICABLE TO MATHEMATICS, PHYSICS, CHEMISTRY AND ANY OTHER MATHEMATICAL SCIENCES

Course Code	Title of the Course	L	S/M	P	C
25CHE202S	**Applications of Artificial Intelligence**		3		3
Prerequisites	Basics of Artificial Intelligence				

COURSE OBJECTIVES	
1	Provide a foundational understanding of AI platforms, data pipelines, and their importance in the physical sciences.
2	Provide a foundational understanding of AI platforms, data pipelines, and their importance in the physical sciences.
3	Explain how AI is applied to solve scientific problems, discover patterns, and support research in physical sciences in a simple, non-coding manner.
4	Highlight ethical concerns, data challenges, and the future of AI-driven discoveries in physical sciences.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the AI ecosystem (hardware, cloud, and edge devices) in relation to physical sciences applications.	Understanding
CO2	Identify scientific data types and public repositories relevant to physics, chemistry, mathematics, and earth sciences.	Understanding
CO3	Describe the process of preparing and managing scientific data pipelines.	Understanding
CO4	Illustrate the role of AI in solving real-world scientific challenges in physics, chemistry, mathematics, and earth sciences.	Applying
CO5	Discover ethical, environmental, and societal impacts of AI-driven scientific applications.	Applying

Syllabus

COURSE CONTENT	
UNIT I	**Infrastructure and Platforms for Building Applications using AI**: **Hardware used in building AI applications**: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD **Platforms for building applications using AI:** Online platforms (Example - Google AutoML, H2O.ai; Desktop (No-code/Low code) platforms (Orange Data Mining, KNIME. **Edge AI:** Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances.
UNIT II	**Foundations of Data - Types, Ethics and Utility in Building Applications using AI:** **Importance of data in building AI applications**: Data as the fuel for AI, Role of big data in training AI models. **Conceptual Foundations of Data:** Data vs. Information vs. Knowledge. **Structure of Data:** Structured, Semi-Structured, and Unstructured Data. **Modalities of Data:** Text, Image, Audio, Video, Tabular. **Formats of Data:** Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI). **Data Repositories:** Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights. **Ethics, Privacy in Data Usage**: Privacy concerns related to data usage; Ethical use of data, Responsible AI data practices.
UNIT III	**The AI Data Pipeline: From Collection to Model Readiness:** **The AI Data Pipeline:** Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models **Core Components**: Ingestion, Storage, Processing, Validation, Delivery **Data Collection Methods for AI:** Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms) **Data Annotation and Labelling:** Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; **Data Cleaning and Preprocessing**: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data. **Data Splitting:** Splitting data into training set and test set. **Data Transformation Techniques**: Normalization, Transformation.

UNIT IV	**AI in Physical Sciences (Physics & Chemistry Applications)** **AI in Physics**: AI for analyzing astronomical images (identifying galaxies, stars, exoplanets). AI in material science: discovering new superconductors and quantum materials AI in energy: predicting power grid loads. **AI in Chemistry**: Protein structure prediction (AlphaFold). AI in drug discovery - virtual screening of compounds. AI in chemistry - reaction outcome & material property prediction.
UNIT V	**AI in Mathematics and Earth Sciences:** **AI in Mathematics:** Pattern recognition in large datasets (fractals, chaos systems, number theory) Automated theorem proving and symbolic mathematics AI in optimization problems (transport, logistics, resource allocation) (Explore the Wolfram Alpha Tool: https://www.wolframalpha.com/examples/mathematics) **AI in Earth Sciences Climate modeling:** AI predicting weather patterns, cyclones, and long-term climate change Remote sensing: AI analyzing satellite images for deforestation, urbanization, and natural resource mapping Earthquake and natural disaster prediction using sensor networks AI in geology: identifying mineral deposits, oil, and groundwater reserves

TEXT BOOKS	
1.	Data Science for Beginners, Andrew Park (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2.	AI Basics for Non-Programmers, Tom Taulli (Clear explanations of AI data lifecycle and real-world use cases).
REFERENCE BOOKS	
1.	Data Preparation for Machine Learning, Jason Brownlee (Conceptual understanding of dataset quality, preprocessing, and pipelines).
2.	Hands-On Data Science for Non-Programmers, David Meerman Scott (Spreadsheet-based data exploration and visualization).
3.	You Look Like a Thing and I Love You – Janelle Shane
WEB RESOURCES	
1.	AI in Astronomy: https://www.borntoengineer.com/how-is-artificial-intelligence-is-helping-us-learn-about the-universe https://primo.ai/index.php/Astronomy
2.	AI in Material Science: https://deepmind.google/discover/blog/millions-of-new-materials-discovered-with-deep learning/ https://www.temasek.com.sg/content/dam/temasek-corporate/news-and views/resources/reports/ai-meets-materials.pdf

3.	AI in Energy: https://www.xenonstack.com/blog/ai-renewable-energy-production https://www.sandtech.com/insight/how-ai-is-transforming-the-future-in-energy management/
4.	AI in Chemistry: https://chemintelligence.com/ai-for-chemistry https://deepmind.google/science/alphafold/ https://aimagazine.com/articles/alphafold-2-the-ai-system-that-won-google-a-nobel-prize
5.	AI in Drug Discovery: https://www.ddw-online.com/the-promise-of-ai-advancing-drug-discovery-with-ultra large-library-processing-29063-202403/
6.	AI in Optimization Problems: https://throughput.world/blog/ai-in-transportation-and-logistics/ https://codewave.com/insights/ai-transforming-transportation-logistics/
7.	AI in Remote Sensing: https://www.satimagingcorp.com/applications/artificial-intelligence-ai/

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO2	1	1	1	2	2	1	0	0	1	0	1	0	1	0
CO3	1	1	1	3	2	2	2	1	2	2	3	1	3	0
CO4	2	2	1	3	3	2	2	1	3	2	3	1	3	1
CO5	2	2	1	3	2	2	2	1	2	2	3	1	3	1

Model Blue print for the question paper setter

Sl. No.	UNIT-	Essay 10M	Weightage
1	I	2	20%
2	II	2	20%
3	III	2	20%
4	IV	2	20%
5	V	2	20%
		100	**100%**

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Applicable To Mathematics, Physics, Chemistry and Any Other Mathematical Sciences -

Semester-II

Recommended Format of Question Paper

Time: 2 ½ Hrs **Max. Marks: 70**

Section-A

Answer any FIVE of the following questions. **5X4=20**

1. From Contents of Unit-I
2. From Contents of Unit-I
3. From Contents of Unit -II
4. From Contents of Unit -II
5. From Contents of Unit -III
6. From Contents of Unit -III
7. From Contents of Unit -IV
8. From Contents of Unit -IV
9. From Contents of Unit -V
10. From Contents of Unit -V

Section-B

Answer FIVE questions.
5X10=50

11. A) From Contents of Unit-I

OR

B) From Contents of Unit-I

12. A) From Contents of Unit-II

OR

B) From Contents of Unit -II

13. A) From Contents of Unit -III

OR

B) From Contents of Unit -III

14. A) From Contents of Unit -IV

OR

B) From Contents of Unit -IV

15. A) From Contents of Unit -V

OR

B) From Contents of Unit –V

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Applications of AI

MODEL QUESTION PAPER (W.E.F 2025-2026): Applicable to Mathematics, Physics, Chemistry and Any Other Mathematical Sciences

Time: 2 ½ Hrs. Max Marks: 50

Q. No	Question	Marks	BL	CO	PO	PI
SECTION – A						
Answer any Five of the Following		**5 X 4 = 20M**				
1	Explain about any online platform to build AI application.	4M	2	1		
2	State about the Edge AI in smart Appliances.	4M	1	1		
3	Write a short note on “Structure of Data”.	4M	1	2		
4	Explain about Modalities of Data.	4M	2	2		
5	Define the process of Data Annotation and Labelling.	4M	2	3		
6	Discuss about various data collection methods for AI.	4M	2	3		
7	Write short note on AI for analyzing astronomical images	4M	1	4		
8	Discuss about AI role in Protein structure prediction (AlphaFold)	4M	2	4		
9	Explain about Pattern recognition in large datasets.	4M	2	5		
10	Identify the AI role in geology.	4M	2	5		

SECTION – B						
Answer Any five Questions		**5 X 10 = 50 M**				
1	a) Explain the hardware components for building AI applications? (OR) b) Explain briefly about AI in applications in daily life appliances?	10M 10M	2 2	1 1		
2	a) Explain the importance of data in building AI applications? (OR) b) Discuss about data repositories and data licensing in AI?	10M 10M	2 2	2 2		
3	a) Summarize about Stages and Components AI Data Pipeline? (OR) b) Distinguish between Data Cleaning/Preprocessing and Data Splitting?	10M 10M	2 2	3 3		
4	a) Show how AI plays its role in material science. (OR) b) Illustrate the role of AI in drug discovery.	10M 10M	3 3	4 4		
5	a) Discuss about AI in Automated theorem proving and symbolic mathematics? (OR) b) Explain about AI in Climate Modeling?	10M 10M	2 2	5 5		

All the Best

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APPLICABLE TO MATHEMATICS, PHYSICS, CHEMISTRY AND ANY OTHER MATHEMATICAL SCIENCES

Course Code	Title of the Course	L	T	P	C
25CHE202L	**Applications of AI**			2	1
Prerequisites	Basic Knowledge in AI				

Practice Session

Suggested Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- Procedure:

1. Open Orange → Add File widget → Load a CSV (e.g., Titanic dataset).
2. Connect to Data Table → View rows/columns.
3. Connect to Data Info → Check attributes, data types.
4. View in Data Table and Distributions widget.

- Observation: Note numeric, categorical, missing values.
- Outcome: Students understand structured data format in CSV.

Lab 2 - Exploring Scientific Datasets

Dataset: Earth datasets, Physics Particle Dataset

Tool: Orange Data Mining.

Activity:

- Load a CSV (e.g., earthquake dataset:

https://www.kaggle.com/datasets/warcoder/earthquake-dataset

Physics particle dataset: https://www.kaggle.com/datasets/dsfelix/physics-particles)

- Use Data Table + Distributions to view features.
- Compare categorical vs numerical attributes.

Outcome: Students understand how scientific datasets are structured and visualized.

Lab 3 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 4 - Data Annotation Exercise

- Use MakeSense.ai or VGG Image Annotator (VIA)
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 5 - Data Cleaning and Visualization (Orange Data Mining)

- Aim: To clean dirty data and visualize categorical and numeric attributes.
- Procedure:

1. Load dataset.
2. Connect File → Edit Domain (to change types) and Impute (to fill missing values).
3. Compare cleaned vs. original in Data Table.
4. Distributions widget.
5. Check various features distribution.

(Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)

- Observation: Missing values filled with mean/median., Graphical representation of data.
- Outcome: Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 6: Train/Test Split in Orange

- Aim: To split dataset for AI training/testing.
- Procedure:

1. Load Titanic dataset.
2. Connect File → Data Sampler (70% train, 30% test).
3. Connect outputs to Data Table widgets to view.

- Observation: Students see two different subsets.
- Outcome: Concept of model validation using split data.

Lab 7 – Material Science Data Exploration (Chemistry + Physics)

Dataset: Materials Project Database (https://next-gen.materialsproject.org/) OR Kaggle chemistry datasets

Activity:

(https://www.kaggle.com/competitions?tagIds=7402-Chemistry)

Orange Data

Load material/compound dataset (e.g., band gap, conductivity).

Visualize trends (scatter plots, bar charts).

Identify correlations between features.

Outcome: Students see how AI identifies

Lab 8 – Earthquake Prediction Data Analysis (Earth Sciences)

Dataset: USGS Earthquake Dataset (public):

https://www.kaggle.com/datasets/rupindersinghrana/usgs-earthquakes-2024

Tool: Orange Data Mining

Activity:

- Load earthquake data (time, magnitude, depth).
- Plot frequency over time & regions.
- Perform simple clustering (e.g., k-means in Orange).

Outcome: Understand how AI detects seismic patterns. Mining. new material properties.

Lab 9– Climate Data Visualization (Earth Sciences)

Dataset: NASA GISS climate dataset (https://data.giss.nasa.gov/gistemp/) / FAO rainfall data (https://www.fao.org/aquastat/en/geospatial-information/climate-information).

Tool: Google Looker Studio (free dashboard tool).

Activity:

- Import CSV of temperature/rainfall data.
- Build trend graphs and heat maps.

Outcome: Learn visualization of climate patterns & anomalies.

Lab 10 – Chemical Compound Classification (Chemistry)

Prerequisite: Discuss conceptually about Clustering

Dataset: PubChem/ChEMBL (https://pubchem.ncbi.nlm.nih.gov/source/ChEMBL)

Tool: ChemMine Tools (free web-based). (https://chemminetools.ucr.edu/)

Activity:

- Input chemical structures or SMILES notations.
- Predict chemical similarity clusters.
- Analyze "drug-likeness" properties.

Outcome: Understanding AI in drug discovery & reaction prediction.

Lab 11 – Symbolic Mathematics Solver (Mathematics)

Dataset: Wolfram Alpha examples / OpenMath datasets.

Tool: MathPix (OCR) + Symbolab / WolframAlpha (free tier)- https://www.wolframalpha.com/

Activity:

- Input handwritten/scanned math problems using MathPix.
- Use Wolfram Alpha to see symbolic solving.
- Compare AI vs manual solution steps.

Outcome: Understand automated theorem proving and symbolic AI.

Lab 11 – Explore the Mathematical AI tool

Tool: WolframAlpha (free tier)- https://www.wolframalpha.com/

Activity:

- Solve specific math problems or find information on Mathematical subjects and topics.

Outcome: Understand deep computational power of AI tools in solving Math Problems.

Lab 12 – Explore various Remote Sensing Datasets

Tool: https://developers.google.com/earth-engine/datasets/

Activity:

- Explore any Three Satellite Sensor Datasets
- Identify the Significance and the Period of Availability
- Study various bands available in the data

Outcome: Understand various Remote Sensing Datasets.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

*****

The Following are planned for this 2025-26 UG – Batch in the coming future.

- A certificate course would be conducted for the students in II Year.
- The multi-disciplinary and skill-courses would be conducted by various concerned departments and the syllabus is approved by concerned BOS members of those departments.