

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus VII & VIII Semester

**Outcome Based Education
(Academic Year 2026-2027)
Department of Computer Science and Engineering (Artificial Intelligence)
7th & 8th Semester B.E**

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.

Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.

Developing necessary infrastructure to cater to the changing needs of Business and Society.

Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.

Adopting learning beyond curriculum through outbound activities and creative assignments.

Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.

Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.

Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.

Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

- To strive at creating the institution a Centre of highest caliber of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenges.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

Computer Science and Engineering (Artificial Intelligence) is a CSE allied branch. Artificial intelligence (AI) is intelligence—perceiving, synthesizing, and inferring information demonstrated by machines, as opposed to intelligence displayed by animals and humans. Example tasks in which this is done include speech recognition, computer vision, translation between (natural) languages, as well as other mappings of inputs.

The course covers a wide range of topics, including programming languages, data structures, algorithms, computer architecture, software engineering, machine learning, natural language processing, computer vision, robotics, and more.

The curriculum is designed to provide students with a strong foundation in computer science and engineering, while also exploring the latest advancements in artificial intelligence. Students will learn to design and develop intelligent systems and algorithms in Center of Excellence set-up by Microsoft in the Department of AI. The Students can analyze, understand, interact, participate in lab sessions, group projects, and carryout individual research work in the department. Upon completion of the course, students can pursue careers as software engineers, AI developers, data scientists, machine learning engineers, or AI researchers, among other roles.

VISION OF THE DEPARTMENT

To create an enriching learning environment that imparts creative, learning and research skills to students in the domain of artificial intelligence.

MISSION OF THE DEPARTMENT

M1: To Impart Strong foundation of statistics for understanding Artificial Intelligence.

M2: To develop skilled and knowledgeable professionals in the field of Artificial Intelligence.

M3: To contribute towards advanced AI technologies that provide increased and better performance.

M4: To collaborate with renowned companies for multidisciplinary research and development.

M5: To guide the students in learning and creative for developing intelligent technology based solutions to societal problems.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: The Graduates of CSE(AI) acquire a comprehensive understanding of the fundamentals of Artificial Intelligence (AI) and its applications.

PEO2:To apply AI techniques and tools to solve real-world problems and create innovative solutions.

PEO3:To develop skills in data analysis, Cloud Computing, Full Stack development and Machine learning for AI implementation.

PEO4:To develop the ability to design, analyse, and evaluate the CSE(AI) systems.

PEO5:To foster creativity, innovative thinking, entrepreneurial Skills and a commitment to lifelong learning in the field of CSE(AI) to contribute towards DIGIWORLD.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: To Apply Analytical Skills for Problem Solving in Engineering, Business and Societal Applications using CSE (AI) Approaches safely and securely.

PSO 2: Ability to Enrich the Critical Thinking Skills and Decision making in Emerging Technologies such as Natural Language Processing, Machine Learning, Deep Learning, Data Analysis, Robotics and Computer Vision .



Dayananda Sagar Academy of Technology & Management

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Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl.No	Semester	No. of Credits
1	1st Semester	20
2	2nd Semester	20
3	3rd Semester	21
4	4th Semester	21
5	5th Semester	22
6	6th Semester	22
7	7th Semester	20
8	8th Semester	14
Total		160

PROPOSEDUG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week				Credits	
				Lecture	Tutorial	Practical	Project		Total (Hrs/week)
				L	T	P	S		
1	IPCC1	CSE(AI)	CSE(AI)	3	0	2	0	5	4
2	PCC	CSE(AI)	CSE(AI)	3	0	0	0	3	4
3	PCC	CSE(AI)	CSE(AI)	3	0	0	0	3	4
4	PEC-1	CSE(AI)	CSE(AI)	3	0	0	0	3	3
5	Min-Project	CSE(AI)	CSE(AI)	0	0	2	2	4	2
6	PCCL	CSE(AI)	CSE(AI)	0	0	2	0	2	2
7	HSMS	Conacred Dept	Conacred Dept	1	0	0	0	1	1
8	AEC	CSE(AI)	CSE(AI)	0	0	2	0	2	2
9	NCMC	NSS / YOGA / PED							
10	AICTE Activity Points								
Total									22

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 5thSem &6thSem

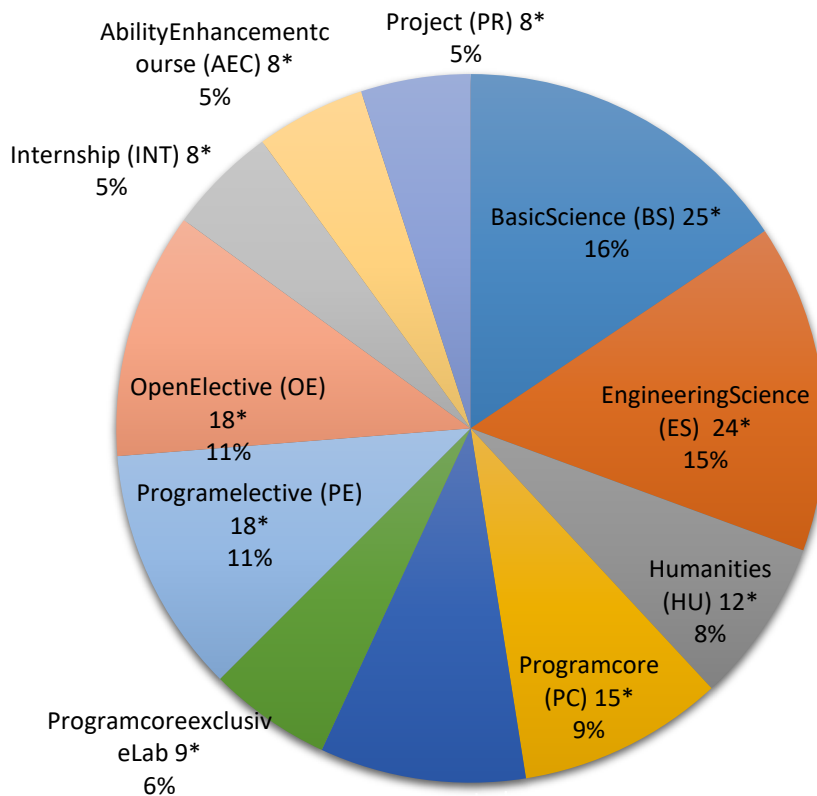
5thSem &6th Sem

Sl. No	CourseCategory	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	IPCC1	40%	60%	--	--
2	PCC	60%	40%	--	--
3	PCC	60%	40%	--	--
4	PEC-1	100%	--	--	--
5	Min-Project	100%	--	--	--
6	PCCL	--	100%	--	--
7	HSMS	100%		--	--
8	AEC	--	100%	--	--
9	NCMC	--	--	--	100%
Total Percentage		53%	47%	--	13%

Scheme Distribution

Department of Computer Science and Engineering (Artificial Intelligence)

Course Component	Credits	% of Credits
Basic Science (BS)	25*	15.6
Engineering Science (ES)	24*	15
Humanities (HU)	12*	7.5
Program core (PC)	15*	9.4
Program core Integrated (PCI)	15*	9.4
Program core exclusive Lab	9*	5.6
Program elective (PE)	18*	11.25
Open Elective (OE)	18*	11.25
Internship (INT)	8*	5
Ability Enhancement course (AEC)	8*	5
Project (PR)	8*	5
Total	160	100



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM
BATCH 2023-2027

Course Category	Semester								Total Credits
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
Basic Sciences (BSC)	8	8							16
Engineering Sciences (ESC)	3	6	3	3					15
Humanities, Social Sciences and Management (HSMC)	1	2							03
Ability Enhancement Course (AEC)	2	1	1	1	1	1	1	1	09
Universal Human Values (UHV)	0	0	1	1					02
Professional Core Courses (PCC)	6	3	6	6	6	6	3		36
Integrated Professional core Course (IPCC)	0	0	8	8	6	6	3		31
Professional Elective Course (PEC)	0	0			6	6	6	6	24
Institutional Open Elective Courses (IOE)	0	0					3		03
Internship (INT)	0	0			1	1	2	3	07
Mini Project / Project Work (PW)	0	0	2	2	2	2	2	4	14
Non-credit Mandatory Courses (NCMC)	0	0							
Total Credits	20	20	21	21	22	22	20	14	160



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Scheme of Teaching and Examinations – 2026-2027
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

7th SEMESTER: CSE(AI)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCA701	Deep Learning with AI	IPCC	CSE (AI)	CSE (AI)	3	0	2	0	5	4	03	50	50	100
2	BCA702	Explainable AI	PCC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
3	BCA703A	Cryptography and Quantum Computing with AI	PEC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
4	BCA786	Major Project Phase-II	PROJ	CSE (AI)	CSE (AI)	0	0	7	7	12	7	03	100	100	200
5	BCA706A	Open Elective Course	OEC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	01	50	50	100
6	BIKS707	Indian Knowledge System	MC	Con-dept	Con-dept	1	0	0	0	1	0	0	100	0	100
Total						13	0	9	0	27	20	13	400	300	800

Ability Enhancement Course / Skill Enhancement Course-V

BCA704A	Cryptography and Quantum Computing with AI (PEC)
BCA704B	Social Network Analysis
BCA704C	AI for Project Management
BCA704D	Federated Learning in AI

8th SEMESTER: CSE(AI)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCA801	Capstone Project Phase - III (Publication and Patent)	Proj	CSE (AI)		0	0	0	4	4	4	03	50	50	100
2	BCA802	Internship (Industry/Research) (14 - 20 weeks)	INT	CSE (AI)	CSE (AI)	0	0	10	0	10	10	03	100	100	200
Total						6	0	10	4	16	14	06	150	150	300

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PEC-1: Professional Elective Course

PCCL: Professional Core Course Laboratory

HSMC: Humanity and Social Science & Management Course

OEC: Open Elective Course

AEC: Ability Enhancement Course

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory Integrated with practicals of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L : T : P) can be considered as (3:0: 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non Credit Mandatory Course (NCMC) - National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Newly introduced subjects in the syllabus

		7thSemester	8thSemester
1.	List of Existing Elective Courses		
2.	List of New Existing Elective Courses		
3.	List of New Industry Aligned Courses		

Percentage of Change in the Syllabus

5thSemester						
Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1						
2						
3						
4						
5						
6						
7						
8						
6th Semester						
Sl. No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1						
2						
3						
4						
5						
6						
7						
8						

7th SEMESTER

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC1)**

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment (CCA) methods.
- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills (HOTS).

Continuous Internal Evaluation (CIE) for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks** for preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.

- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks**.
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce. Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The **duration of SEE is 03 hours**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for 50 Marks. Total Marks scored will be $(CCA1+CCA2)/2$ and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
 - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
 - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50	----	----	20	
CIE	Theory	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50)/2	15	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50)/2	10	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives/ Activity based learning		50				
Total CIE Theory						25	10	Scale down Marks of IAT and CCA to 25
CIE	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
		Observation book	05					
		Write up	15					

Practical	Practical Test	Execution	25	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
		Viva-voce	10					
	Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20marks. 20 marks reduced to 05 marks
		Execution	10					
		Viva-voce	05					
	Total CIE Practical						25	10
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed



Dayananda Sagar Academy of Technology & Management (Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Deep Learning with AI			
Course Code	:	BCA 701			
Course Type (Theory/ Practical/ Project/ Integrated)	:	Integrated			
Category	:	IPCC2			
Stream	:	CSE(AI)	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	:	50
Total Hours	:	60 Hrs	SEE Duration	:	03 Hrs
Credits	:	4			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamentals of deep learning.
2	Understanding the working of Convolutional Neural Networks and RNN in decision making.
3	Illustrate the strength and weaknesses of many popular deep learning approaches.
4	Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems
5	Understand the fundamentals of Recurrent Neural Network

Teaching-Learning Process

Pedagogical Initiatives:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

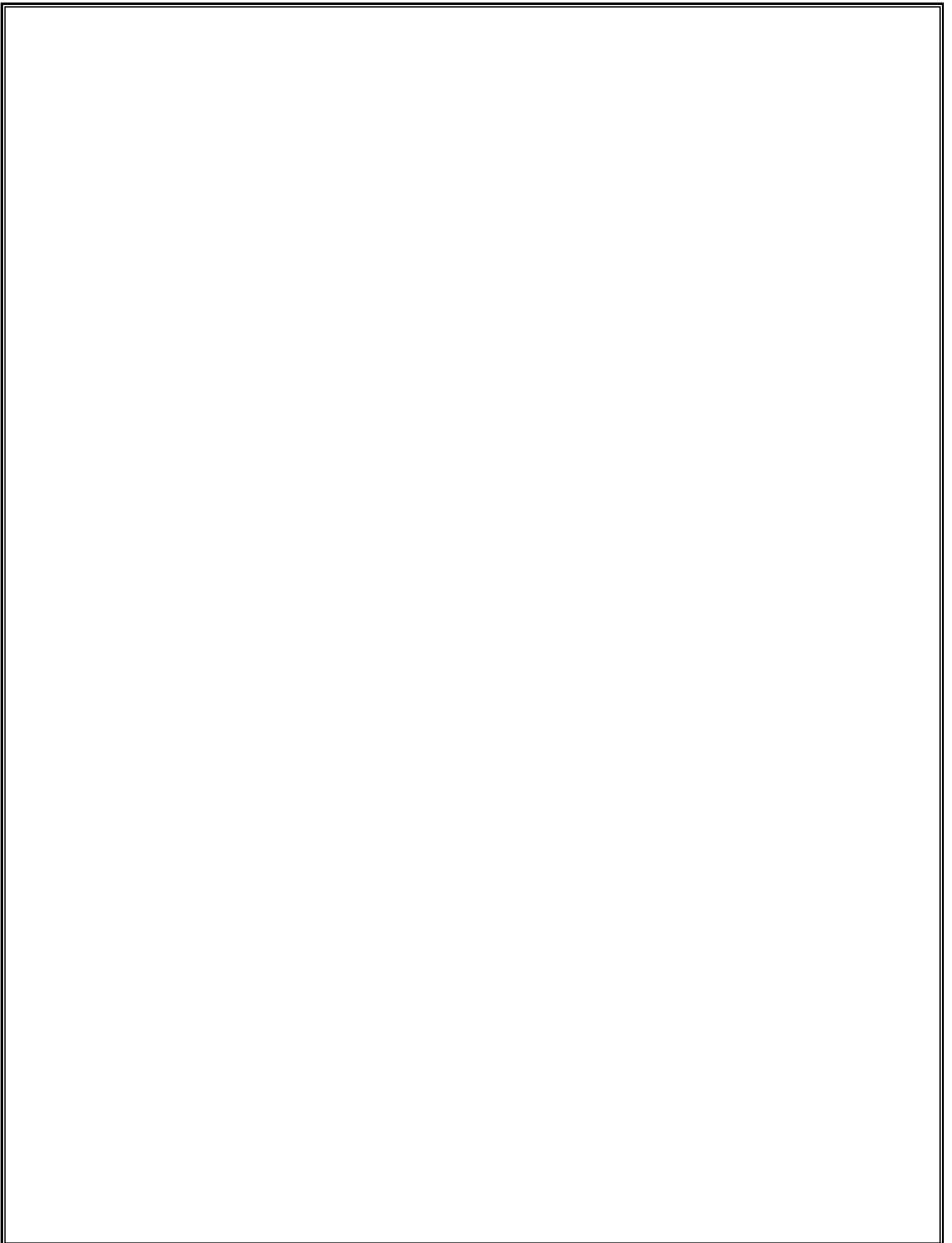
1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



Scheme of Teaching and Examinations for BE Programme -2025-26
Outcome Based Education and Choice Based Credit System (CBCS)
 (Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1.	Introduction: What is a Neural Network?, The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Feedback, Network Architectures, Rosenblatt's Perceptron: Introduction, Perceptron, The Perceptron Convergence Theorem, Relation Between the Perceptron and Bayes Classifier for a Gaussian Environment.	8Hours
Pedagogy	Quiz	
2.	Multilayer Perceptrons: Introduction, Batch Learning and On-Line Learning, The Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back- Propagation Algorithm Perform Better, Back Propagation and Differentiation. Regularization for Deep Learning: Parameter Norm Penalties - L2 Parameter Regularization, Dataset Augmentation, Semi-Supervised Learning. Optimization for Training Deep Models: Challenges in Neural Network Optimization – Ill Conditioning, Local Minima, Plateaus, Saddle Points and Other Flat Regions.	8Hours
Pedagogy	Demonstration	
3.	Convolution neural networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Convolutional Networks and the History of Deep Learning.	8Hours
Pedagogy	Presentation	
4.	Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to- Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Long Short-Term Memory and Other Gated RNNs	8Hours
Pedagogy	Case Study	
5.	The Foundation Layer - Understanding GPT-4o, o1-preview, and the evolution of Reasoning Models - The Logic of the Assistants API – Thread management, persistent state, and managed retrieval - Mastering OpenAI AgentKit – Building autonomous agents - Real-time Multimodal Streams – Architecting low-latency voice and vision with the Realtime API - The Model Context Protocol (MCP) – Gemini Ecosystem	8Hours
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications Demonstration: exhibits the implementation process	



List of Programs:

SI. No.	Experiments/Programs	COs
1.	Design and implement a neural based network for generating word embedding for words in a document corpus.	CO1
2.	Write a program to demonstrate the working of a deep neural network for classification task.	CO2
3.	Design and implement a Convolutional Neural Network (CNN) for classification of image dataset	CO3
4.	Build and demonstrate an autoencoder network using neural layers for data compression on image dataset.	CO3
5.	Design and implement a deep learning network for classification of textual documents.	CO4
6.	Design and implement a deep learning network for forecasting time series data.	CO4
7.	Write a program to enable pre-train models to classify a given image dataset.	CO5
8.	Write a program to read a dataset of text reviews. Classify the reviews as positive or negative.	CO5

Text Books

SI. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1.	Simon Haykin, Neural networks and Learning Machines, Third Edition, Pearson, 2016
2.	Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.

Reference Books

1.	https://www.youtube.com/watch?v=VyWAvY2CF9c https://www.youtube.com/watch?v=7sB052Pz0sQ https://www.youtube.com/watch?v=Mubj_fqiAv8 https://www.coursera.org/learn/neural-networks-deep-learning https://onlinecourses.nptel.ac.in/noc20_cs62/preview
2.	Huyen, "Building Applications with Foundation Models", O'Reilly Media, 1st Edition, 2025

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the concepts of neural networks relating to artificial intelligence.	Understand	L2
CO2	Apply the learning processes and their statistical properties in Neural network	Apply	L3
CO3	Apply deep learning models using regularization and convolutional operations.	Apply	L3
CO4	Analyze sequential data to build recurrent and recursive models.	Analyse	L4

CO5	Analyze the applications using encoders and recurrent networks with Gemini and open AI ecosystem	Analyse	L4
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Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3	3	3	3	3	3	1	2		3	2	3	-
CO2	3	3	2	1	3	2	3	1	-	2	1	3	3	2	-
CO3		3	2		3	2	3	2	-	2	1	3	3	3	-
CO4	3	3	3	3	3	3	3	1	-	2	1	3		3	-
CO5		3	3	3	3	1		3	1	2	2	3	2	1	-

Web links and Video Lectures (e-Resources)

1.	https://www.youtube.com/watch?v=VyWAvY2CF9c
2.	https://www.youtube.com/watch?v=7sB052Pz0sQ
3.	https://www.youtube.com/watch?v=Mubj_fqiAv8
4.	https://www.coursera.org/learn/neural-networks-deep-learning https://onlinecourses.nptel.ac.in/noc20_cs62/preview

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	10				
Understand	10	10			
Apply	20	20	20	20	
Analyse	10	20	20	20	
Evaluate			10	10	10
Create					15

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 3	Module-4	Module-5		
CO1	10	10	5	5	10	10	50	50%
CO2	10	10					20	20%

CO3			5	5			10	10%
CO4					10		10	10%
CO5						10	10	10%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	20
Understand	30
Apply	30
Analyze	20

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 2.5	Module-2.5 3	Module-4	Module-5		
CO1	10	10	5	5	10	10	50	50%
CO2	10	10					20	20%
CO3			5	5			10	10%
CO4					10		10	10%
CO5						10	10	10%
Total	20	20	10	10	20	20	100	100%

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC1)**

PROFESSIONAL CORE
COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to **25 marks**
- The first test will be administered after 40-50% of the syllabus has been covered, and
- The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
 - CCA is evaluated for 50 Marks with review 1 of 20 Marks after and review 2 of 30 Marks includes project demonstration/competition and report submission.
 - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is 10 Marks

Total Marks scored for theory component of CIE (IAT+ CCA) is 25 Marks

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Explainable AI			
Course Code	:	BCA702			
Course Type (Theory/Practical/Project Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE(AI)		CIE	: 50
Teaching hours/ week (L:T:P:S)	:			SEE	: 50
Total Hours	:	40		SEE	: 3 hrs
Credits	:	3		Duration	

Course Learning Objectives: Students will be able to:

Sl.No	Course Objectives
CO1	To Understand the concepts of Explainable AI and the black-box problem in AI/ML.
CO2	To Learn interpretable machine learning models such as regression, decision trees, and GAMs.
CO3	To Study post-hoc explanation techniques like LIME, SHAP, and feature visualization.
CO4	To Explore advanced XAI techniques including counterfactual explanations and model distillation.
CO5	To Analyse evaluation metrics, ethical issues, and real-world applications of XAI

Teaching-Learning Process

Pedagogical Initiatives:

- Some sample strategies to accelerate the attainment of various course outcomes are listed below:
- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three HOTS (Higher-order Thinking Skills) module-wise questions to promote critical thinking.
- Adopt Problem-Based Learning (PBL), which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem, implementing lab programs and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve Teaching-Learning Process (TLP).



Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
 (Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
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1	Introduction to Explainable AI: The "Black Box" Problem in AI/ML, Need for Explainability and Interpretability (Transparency, Trust, Fairness, Safety), Principles of Explainable AI, Types of Explanations (Global vs. Local, Ante-hoc vs. post-hoc).	8hrs
Pedagogy		
2	Interpretable Machine Learning Models (Ante-hoc): Linear Regression and Logistic Regression (Interpretability of Coefficients), Decision Trees and Rule-based Models, Generalized Additive Models (GAMs), Evaluating Interpretability (Complexity, Fidelity).	8hrs
Pedagogy		
3	Post-hoc Explanation Methods: Local Interpretable Model-Agnostic Explanations (LIME), Shapley Additive exPlanations (SHAP) - Feature Importance, Feature Visualization (Grad-CAM, Activation Maps in Neural Networks), Sensitivity Analysis -Attention Mechanism	8hrs
Pedagogy		
4	Advanced XAI Techniques: Counterfactual Explanations (DiCE), Layer-wise Relevance Propagation (LRP), Model Distillation (Approximating complex models with simpler ones), Interactive Machine Learning (IML).	8hrs
Pedagogy		
5	Evaluation, Ethics, and Trustworthy AI: Metrics to Evaluate XAI (Faithfulness, Stability), Human-Computer Interaction (HCI) in Explainability, Ethical Considerations (Fairness, Accountability). Case Studies: XAI in Healthcare, Finance, and Autonomous Vehicles. Healthcare - Medical Imaging (Radiology/Oncology)- Biomedical Signal Analysis - Human-in-the-Loop (HITL)	8hrs
<p>Pedagogical Initiatives (Not limited to):</p> <p>Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another</p> <p>Problem Solving: encourages cognitive thinking and enables creative problem solving</p> <p>Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily.</p> <p>Case studies: maps different domains in real time applications</p> <p>Demonstration: exhibits the implementation process</p>		

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Christoph Molnar, Interpretable Machine Learning, A Guide for Making Black Box Models Explainable, Leanpub, 2023.

Reference Books

1	Denis Rothman "Hands-On Explainable AI (XAI) with Python", Packt Publishing Limited, 2020.
2	Explainable AI for Practitioners by Michael Munn, David Pitman, O'Reilly Media, Inc., 2022
3	Explainable AI: Interpreting, Explaining and Visualizing Deep Learning, Lecture Notes in Artificial Intelligence, Springer Nature, 2019

4	Leonida Gianfagna, Antonio Di Cecco, Explainable AI with Python, Springer, 2021
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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the need for transparency, trust, and fairness in AI systems.	Understand	L2
CO2	Apply interpretable ML models to understand model predictions.	Apply	L3
CO3	Apply post-hoc methods to interpret complex ML/DL models.	Apply	L3
CO4	Analyze advanced explainability techniques for improving model understanding.	Analyze	L4
CO5	Evaluate XAI methods considering ethics, reliability, and real-world case studies.	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2						1				1	3		1
CO2	3	3	2		2							1	3		
CO3	2	3		2	3							1		3	
CO4	2	3	2	2	2							1		3	
CO5	2	2			2	2		3				1		2	

Weblinks and Video Lectures (e-Resources)

1	Responsible and Safe AI Systems (NPTEL) https://nptel.ac.in/courses/106106472
2	Explainable Artificial Intelligence, ELSEVIER, AAAI Conference on Artificial Intelligence
3	<ul style="list-style-type: none"> Explainable AI Overview Lecture https://www.youtube.com/watch?v=-cRzYyTTjzY SHAP and LIME Tutorial https://youtu.be/sURHNhBMnFo Explainable AI for Deep Learning Models https://youtu.be/XIYhKwRLerc
4	<ul style="list-style-type: none"> Kaggle Example – Explainable AI using LIME https://www.kaggle.com/code/teesoong/explainable-ai-on-a-nlp-lstm-model-with-lime
5	Artificial Intelligence and Law – Explainable AI Lecture https://nptel.ac.in/courses/129106748

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2

	50 Marks	50 Marks	50 Marks	50 Marks
Understand	20	10	10	
Apply	20	20	20	20
Analyze	10	20	20	20
Evaluate				10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10		5		5	30	30%
CO2	5	5	5	5	10		30	30%
CO3	5					5	10	10%
CO4		10			10	10	30	30%
CO5								
Total	20	25	5	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Understand	30%
Apply	40%
Analyze	30%
Evaluate	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10		5		5	30	30%
CO2	5	5	5	5	10		30	30%
CO3	5					5	10	10%
CO4		10			10	10	30	30%
CO5								
Total	20	25	5	10	20	20	100	100%

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50	----	----	20	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50)/2	25	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50)/2	25	10	Two CCA methods as per VTU Clause 220B4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
Total CIE Theory						50	20	Total Marks of IAT and CCA is 50
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

**PROFESSIONAL
ELECTIVE COURSE
(PEC-03)**

PEC-03 Course - Professional Elective Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Elective Course (PEC 2)

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to **25 marks**
- The first test will be administered after 40-50% of the syllabus has been covered, and
- The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
 - CCA is evaluated for 50 Marks with review 1 of 20 Marks after and review 2 of 30 Marks includes project demonstration/competition and report submission.
 - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is 10 Marks

Total Marks scored for theory component of CIE (IAT+ CCA) is 25 Marks

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Elective Course (PEC 3) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50	----	----	20	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50)/2	25	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50)/2	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory						50	20
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7			
Course Title	:	Cryptography and Quantum Computing with AI (PEC)			
Course Code	:	BCA703A			
Course Type (Theory/Practical/Project Integrated)	:	Theory			
Category	:	PEC-02			
Stream	:	CSE(AI)	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	:	50
Total Hours	:	40 Hrs	SEE Duration	:	03 Hours
Credits	:	03			

Course Learning Objectives: Students will be able to:

Sl.No	Course Objectives
1	Understand the basics of Cryptography concepts, Security and its principle
2	Apply different cryptographic Algorithms with public and private key cryptography
3	Develop proficiency in linear algebra and complex numbers for quantum information processing
4	Understand the principles of quantum mechanics, including wave functions and operators
5	Mathematically explain qubit states, operations, multi-qubit systems, Hilbert space

Teaching-Learning Process

Pedagogical Initiatives:

- Some sample strategies to accelerate the attainment of various course outcomes are listed below:
- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three HOTS (Higher-order Thinking Skills) module-wise questions to promote critical thinking.
- Adopt Problem-Based Learning (PBL), which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem, implementing lab programs and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve Teaching-Learning Process (TLP).



Scheme of Teaching and Examinations for BE Programme -2025-26

Outcome Based Education and Choice Based Credit System (CBCS)

Title of the Book (Effective for the Academic Year 2025-26) Author Name Year (2025-26) Edition and Year

Sl. No.	1	DSATM	lings, "Cryptography and Network Security", Pearson Publication, Seventh Edition
COURSE CURRICULUM			
Module No.	2	Keith Martin, "Everyday Cryptography", Oxford University Press	Hours
1.		A model for Network Security, Classical encryption techniques: Symmetric cipher model, substitution ciphers Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, One time pad, Steganography. Block Ciphers and Data Encryption Standards: Traditional	8Hours
3.		Quantum Computation and Quantum Information by M. A. Nielsen and I. L. Chuang.	
Reference Books		Block Cipher structures, data Encryption Standard (DES), A DES Example, The strength of DES,	
1		Block cipher design principles. Chapter 1: 1.8 Chapter 3: 3.1, 3.2, 3.5 Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5	
	2	Basic Training in Mathematics: A Fitness Program for Science Students, R. Shankar	
	2	Quantum Computing: A Gentle Introduction" by Eleanor Rieffel and Wolfgang Polak.	
	3	Pseudorandom number Generators: Linear Congruential Generators, Blum Blum Shub Generator. Public key cryptography and RSA: Principles of Public Key Cryptosystems - Public key cryptosystems, Applications for public key cryptosystems, Requirements for public key cryptography, Public key Cryptanalysis, The RSA algorithm: Description of the Algorithm, Computational aspects, The Security of RSA. Diffie-Hellman key exchange: The Algorithm, Key exchange Protocols, Man-in-the-middle Attack, Elliptic Curve Cryptography: Analog of Diffie-Hellman key Exchange, Elliptic Curve Encryption/Decryption, Security of Elliptic Curve Cryptography.	8Hours
	Pedagogy	Demonstration	
	3.	Essential Mathematics and Quantum Mechanics - Linear algebra fundamentals, complex numbers, vector spaces, Hilbert Space, eigenvalues and eigenvectors, basics of quantum mechanics, wave functions, probability amplitudes, operators, and observables	8Hours
	Pedagogy	Problem solving	
	4.	Qubits and Quantum Computers - Qubit, Bloch Sphere, Bra Ket notation, Single Qubit State, Composite state, Linear superposition, Basis states, Entanglement between qubits, Density Matrix Form, Quantum Computing Devices, Systems, Software, and Hardware. Quantum Gates and Circuits - Mathematics of Quantum Gates, Implementation in devices, Types of Gates, Single Qubit and Multi-qubit Gates, Rotation around angle and axis, Quantum circuit Constructions, Bell state circuits, GHZ state, Quantum Adders	8Hours
	Pedagogy	Presentation	
	5.	Basic Quantum Algorithms - Quantum algorithm design, Use of superposition for quantum parallelism, quantum interference, phase kick-back circuits, classical and quantum algorithms for Deutsch's problem, Deutsch-Jozsa algorithm, Bernstein-Vazirani algorithm - Quantum over Hugging face in AWQ – Graph tech in claude – LORA, QLORA	8Hours
<p>Pedagogical Initiatives (Not limited to): Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another Problem Solving: encourages cognitive thinking and enables creative problem solving Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. Case studies: maps different domains in real time applications Demonstration: exhibits the implementation process</p>			

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the basic concepts of Cryptography and Security aspects	Understand	L2
CO2	Apply different Cryptographic Algorithms for different applications	Apply	L3
CO3	Explain quantum mechanics with its operations and functions	Understand	L2
CO4	Apply qubits and its gates with its circuits	Apply	L3
CO5	Analyse Quantum algorithm in cryptographic functionalities	Analyze	L4

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1	2						2				2	2	
CO2	2	2	1	3	3			2	3	3		1	3	2	
CO3	2	2	2	3					2			1	2	3	
CO4		3	3		2				2	2			3	2	
CO5	2		3	2					2				2	2	

Weblinks and Video Lectures (e-Resources)

1	https://onlinecourses.nptel.ac.in/noc22_cs90/preview
2	https://onlinecourses.nptel.ac.in/noc26_cs89/preview

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	10 Marks	15 Marks
Remember				
Understand	20	10		
Apply	20	10		
Analyse	10	20	10	



DSATM

**Scheme of Teaching and Examinations for BE Programme -2025-26
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)**

Semester	:	7 th			
Course Title	:	Federated Learning in AI			
Course Code	:	BCA703D			
Course Type(Theory/Practical/Project Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE(AI)		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	(3:2:0:0)		SEE	: 50
Total Hours	:	50		SEE Duration	: 3 Hours
Credits	:	4			

Course Learning Objectives: Students will be able to:

Sl.No	Course Objectives
1	To know the basics of federated learning.
2	To learn the applications of federated learning
3	To know the privacy preserving deep learning
4	To understand the communication, security, and optimization challenges in federated learning systems.
5	To design and implement federated learning models for real-world distributed data scenarios.

Teaching-Learning Process

Pedagogical Initiatives:

- Some sample strategies to accelerate the attainment of various course outcomes are listed below:
- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three HOTS (Higher-order Thinking Skills) module-wise questions to promote critical thinking.
- Adopt Problem-Based Learning (PBL), which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem, implementing labprograms and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve Teaching-Learning Process (TLP).

COURSE CURRICULUM

Module No.	Topics	Hours
Module 1	Introduction to Federated Learning Definition and Scope – Motivation: Data Privacy, Decentralization, Compliance (GDPR, HIPAA) – Centralized vs. Federated. Introduction to Federated Learning - Privacy Preserving - Distributed Machine Learning Threats to Federated Learning - Data Valuation.	10 Hours

Pedagogy		
Module 2	Horizontal Federated Learning - Vertical Federated Learning and Federated Transfer Learning. . Distributed Learning – Types of FL: Horizontal, Vertical, and Transfer FL – Real-World Applications: Mobile Keyboard (GBoard), Healthcare, IoT – FL System Architecture – Federated Learning Workflow and Lifecycle – Communication Protocols.	10 Hours
Pedagogy		
Module 3	Federated Optimization for Heterogeneous Networks - Deep Networks from Decentralized Data - Federated Multi-task Learning - Personalized Federated Learning. Activity Create a Quiz for understanding Federated Learning Basics Federated Learning Algorithms Federated Averaging (FedAvg) – Federated SGD (FedSGD) – FedProx for handling system heterogeneity – Personalized Federated Learning (pFedMe, FedPer, FedBN) – FL with Non-IID Data – Aggregation and Weight Update Strategies – Convergence Issues – Performance Metrics. Activity Create a flipped class room for Understanding federated learning algorithms Privacy and Security in FL	10 Hours
Pedagogy		
Module 4	Federated Learning Applications: Recommendation in Health Care and Finance Mobile Keyboard Prediction - Learning of Out-of-vocabulary Words. Security Threats in FL – Differential Privacy (DP): Concept, Application in FL – Secure Multiparty Computation (SMC) – Homomorphic Encryption (Overview) – Secure Aggregation Protocols – Byzantine Robustness – Model Inversion Attacks – Data Poisoning – Mitigation Strategies.	10 Hours
Pedagogy		
Module 5	Adaptive Personalized Federated Learning - Privacy Preserving Deep Learning - Advances and Open Problems. 70 Activity Create a flipped class room communication challenges Applications and Frameworks FL Applications in Healthcare, Finance, Smart City, Recommender Systems – Case Studies – Tools and Frameworks: TensorFlow Federated, PySyft, Flower – FL Simulators	10 Hours
	Pedagogical Initiatives (Not limited to): Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another Problem Solving: encourages cognitive thinking and enables creative problem solving Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. Case studies: maps different domains in real time applications Demonstration: exhibits the implementation process	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Qiang Yang, Yang Liu, Yong Cheng, Yan Kang, Tianjian Chen, Han Yu, Federated Learning, Morgan & Claypool Publishers, 2019.
2	Kim-Kwang Raymond Choo, Ali Dehghantanha, Handbook of Big Data Privacy, Springer Nature Switzerland, 2020.
Reference Books	
1	M. Mohri, A. Rostamizadeh, and A. Talwalkar, Foundations of Machine Learning, 2nd ed., Pearson Education, 2020.
2	K. P. Murphy, Machine Learning: A Probabilistic Perspective, Pearson Education, 2017
3	C. M. Bishop, Pattern Recognition and Machine Learning, Oxford University Press, 2016.
4	T. Mitchell, Machine Learning, Tata McGraw-Hill Education, 2017.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
1	Explain the fundamental concepts, architecture, and workflow of federated learning systems.	Understand	L2
2	Apply federated learning algorithms to solve distributed machine learning problems.	Apply	L3
3	Explain privacy-preserving techniques used in deep learning and federated learning environments.		L2
4	Analyze communication efficiency, security threats, and system challenges in federated learning frameworks	Understand Analyze	L4
5	Design and evaluate federated learning models for real-world privacy-sensitive applications.	Create / Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	1	1	2	1	1	1	1			1			
CO2		2			2				2	1		1			
CO3		2	1		2	1			1			1			
CO4		3	1	1	2	1			1	1		1			

CO5		2	1	1	1	1	1	1	1	1		1			
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Weblinks and Video Lectures (e-Resources)

CIE- Continuous Internal Evaluation (50 Marks)

Sl.No	Resource / Platform	Description	Weblink
1	NPTEL Online Courses	Video lectures on Machine Learning, Deep Learning, and distributed AI concepts.	https://nptel.ac.in
2	DeepLearning.AI – Intro to Federated Learning	Short course explaining architecture, privacy issues, and implementation examples.	https://www.deeplearning.ai/short-courses/intro-to-federated-learning/
3	TensorFlow Federated Tutorials	Official tutorials for implementing federated learning using TensorFlow Federated.	https://www.tensorflow.org/federated
4	Google Developers – Federated Learning	Educational resources explaining decentralized machine learning systems.	https://developers.google.com/learn/topics/federated-learning
5	Coursera Machine Learning Courses	Online courses covering fundamentals of Machine Learning and deep learning.	https://www.coursera.org
6	YouTube Federated Learning Tutorials	Video lectures from universities and researchers explaining federated learning concepts.	https://www.youtube.com
7	Microsoft Learn	Tutorials on implementing federated learning using Azure Machine Learning.	https://learn.microsoft.com
8	GitHub Open-Source Projects	Federated learning implementations using PyTorch and TensorFlow.	https://github.com
9	Flower Federated Learning Framework	Framework used for building federated learning applications.	https://flower.dev
10	arXiv Research Papers	Research papers related to federated learning and privacy-preserving AI.	https://arxiv.org

Theory

Bloom's Category	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Understand	10	5	10	
Apply	10	15	10	5
Understand	10	10	10	5
Analyse	10	5	10	20
Create / Evaluate	10	15	10	30

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10					20	20%
CO2	10	10					20	20%
CO3			10	10			20	20%
CO4					10	15	25	25%
CO5					10	5	15	15%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Understand	30
Apply	35
Analyses	35

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10					20	20%
CO2	10	10					20	20%
CO3			10	10			20	20%
CO4					10	10	20	20%
CO5					10	10	20	20%
Total	20	20	10	10	10	10	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7		
Course Title	:	AI in Project Management		
Course Code	:	BCA703C		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	Professional Elective		
Stream	:	CSE		
Teaching hours/ (L:T:P:S) week	:	3:0:2:0		
Total Hours	:	40		
Credits	:	4		
		CIE	:	50 Marks
		SEE	:	50 Marks
		SEE Duration	:	3 hours

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To Understand the fundamental concepts of Artificial Intelligence
2	To Apply the concepts of Artificial Intelligence project management for the given Scenario
3	To Analyse given Artificial Intelligence Project Scenario using a appropriate Artificial Intelligence Technique
4	To Design Artificial Intelligence strategy for Artificial Intelligence model
5	To Implement a Artificial Intelligence project model for a real world problem

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.

Devise innovative pedagogy to improve

Teaching-Learning Process (TLP).



Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	<p>Introducing ChatGPT: The AI Revolution in Project Management</p> <p>Evolution of AI, What Is ChatGPT?, Accessing ChatGPT, The ChatGPT Advantage for Project Managers</p> <p>AI- Driven Project Management</p> <p>What Is Artificial Intelligence, and How Does It Affect Project Management?, What Is Generative AI's Effect on Project Management?, Generative AI Tools for Project Managers, Machine Learning and Its Effect on Project Management, Deep Learning and Its Effect on Project Management.</p> <p>Text Book 1: Chapter 1, 2</p>	8
Pedagogy	Presentation, Quiz	
2	<p>AI-Driven Predictive Approach to Project Management</p> <p>The Initiating Process Phase, The Planning Process Phase, The Executing Process Phase, The Monitoring and Controlling Process Phase, The Closing Process Phase, The Benefits and Limitations of Using a Predictive Approach in AI.</p> <p>AI-Driven Agile and Hybrid Approaches to Project Management</p> <p>The Concept Phase, The Initiating Phase, The Planning and Design Phase, The Iterative Development (Sprint and Cycles) Phase, The Release and Transition Phase, The Deployment Phase</p> <p>AI-Driven Hybrid Approach in Project Management</p> <p>The Concept and Initiating Phase, The Planning and Design Phase, Contents xiii The Iterative Development and Testing phase, The Deployment and Closing Phase, Benefits and Limitations of Using an Agile or Hybrid Approach.</p> <p>Text Book 1: Chapter 3, 4</p>	8
Pedagogy	Collaborative Learning, Presentation	

3	<p>Unleashing the Power of ChatGPT</p> <p>The Chat Interface, Updates and Versioning, How Does ChatGPT Work?, Input Processing, Tokenization, Input Embedding, Transformer Neural Network, Text Generation and Output, Safety, Data Storage, and Accuracy of ChatGPT, Tailor ChatGPT for Project Managers, Guidelines for Effective Interactions, Expanding Beyond Project Management, ChatGPT Format Types, ChatGPT Human Voice Tone Types, Temperature Settings, Safety and Ethical Considerations.</p> <p>Transforming Communication with ChatGPT</p> <p>Project Inquiries and Faster Information Gathering, Simplifying Internal Communications and Agendas, Documenting and Archiving Communications.</p> <p>Text Book 1: Chapter 7, 8</p>	8
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Pedagogy	Practical Based Learning, Project Based Learning
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4	<p>AI in Action: Practical Applications for Project Management</p> <p>Accurate Project Forecasting with ChatGPT - Predictive Data-Driven Analysis, Augmenting Forecasting Tasks, Advanced ChatGPT Features in Forecasting</p> <p>Learning and Development Powered by ChatGPT</p> <p>Personalized Learning, Professional Development and Training, Scalability of Educational Resources, Enhancing Accessibility</p> <p>AI and Human Talent in Projects: A Harmonious Blend</p> <p>AI Chatbots in People Management, The Rise of People Soft Skills in PM-AI.</p> <p>Text Book 1: Chapter 12, 13, 14</p>	8
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Pedagogy	Practical Based Learning, Project Based Learning
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5	<p>Secure AI Implementation Strategies: Principles, AI Model Integration, and PM-AI Opportunities</p> <p>Security and Privacy in AI Model Integration - Strategic Integration of AI in Cybersecurity, AI and Data Security, Ethical Implications and Privacy Concerns, Regulations</p> <p>AI Strategic Project Management Principles</p> <p>Eight Principles for Organizational AI Model Integration</p> <p>Fine- Tuning and Customizing AI Models for Organizational Benefits</p> <p>Fine- Tuning AI Models for Organizations, Six Layers of the AI Model Development Lifecycle, Key Considerations for First- Time AI Implementation</p> <p>Text Book 1: Chapter 15, 16, 17</p>	8
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Pedagogical Initiatives (Not limited to):

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	"Ai-Driven Project Management Harnessing the Power of Artificial Intelligence and ChatGPT to Achieve Peak Productivity and Success" by Kristian Baaney, Published by John Wiley & Sons, Inc, Copyright © 2024.

Reference Books

1	"The AI Revolution in Project Management", Published by Pearson, Vijay Kanabar, Jason Wong, 2024
2	"Project Management with AI for Dummies", Daniel Stanton, Published by John Wiley and Sons, 2025

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the fundamental concepts of Artificial Intelligence	L2	U
CO2	Apply the concepts of Artificial Intelligence project management for the given Scenario	L3	Ap
CO3	Analyse given Artificial Intelligence Project Scenario using a appropriate Artificial Intelligence Technique	L4	An
CO4	Design Artificial Intelligence strategy for Artificial Intelligence model	L6	C
CO5	Implement a Artificial Intelligence project model for a real world problem	L6	C

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	2														
CO3		2													
CO4			2							2	2				
CO5					2					2	2		2		

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=yUOlU0T57UM&list=PLYpO6RCCVZ1TsW_GqdZqOfLEkDDFV_MZVD
2	https://www.youtube.com/watch?v=jWDBAF2hACQ
3	https://www.youtube.com/watch?v=52LvBimNG_w
4	https://www.youtube.com/watch?v=tLabykkGbEw

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests(IAT)		Continuous Comprehensive Assessment (CCA)		
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	20	10			
Understand	20	10	10		10
Apply	10	20	10		10
Analyse		10	10		10
Evaluate				10	10
Create				10	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	2.5	2.5	5	10	40	26.5%
CO2	10	10	2.5	2.5	5	10	40	26.5%
CO3	5	5	5	5	10	20	50	35%
CO4			2.5	2.5	5	10	20	14%
CO5								
Total	25	25	12.5	12.5	25	50		

SEE- Semester End Examination (50 Marks)

SEE	Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
	Remember	10%+2%
	Understand	20%+2%
	Apply	40%+4%
	Analyse	20%+2%
	Evaluate	
	Create	

Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2	-	10	5	5	10	10	40	40%
CO3					5	5	10	10%
CO4					5	5	10	10%
CO5								
Total	20	20	10	10	20	20	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Social Network Analysis			
Course Code	:	BCS703B			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PEC			
Stream	:	CSE	CIE	:	50 Marks
Teaching hours/week (L: T:P:S)	:	3:0:0:0	SEE	:	50 Marks
Total Hours	:	40	SEE	:	3 Hours
Credits	:	3	Duration	:	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamental concepts of Social Network Analysis (SNA) and its societal relevance.
2	Apply network growth models using the structural properties.
3	Analyse network growth models to simulate evolving social systems.
4	Design of link analysis algorithms to interpret relationships within networks.
5	Evaluate community detection and link prediction and anomaly detection techniques for real-world networks.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Integrate multimedia resources, simulations, and demonstration videos to enhance conceptual understanding of Social Network Analysis concepts and algorithms.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Implement Problem-Based Learning (PBL) to strengthen students' problem-solving skills and encourage application of theoretical concepts to real-world network problems.
- Discuss relevant case studies from domains such as social media analytics, healthcare networks, marketing analytics, and cybersecurity to connect theory with real-world applications.
- Devise innovative pedagogical practices periodically to continuously improve the Teaching-Learning Process (TLP) and ensure effective CO attainment.



DSATM

Scheme of Teaching and Examinations for BE Program -2024-25 Outcome Based Education and Choice Based Credit System (CBCS) (Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Networks and Society - What is Social Network Analysis, why do We Study Social Networks, Applications of Social Network Analysis, Preliminaries, Three Levels of Social Network Analysis. Network Measures - Network Basics, Node Centrality, Assortativity, Transitivity and Reciprocity, Similarity, Degeneracy. T1 – Chapter 1 (1.1. – 1.5), Chapter 2 (2.1 – 2.6)	08
Pedagogy	Video demonstration and visualization.	
2	Network Growth Models - Properties of Real-World Networks, Random Network Model, Ring Lattice Network Model, Watts–Strogatz Model, Preferential Attachment Model, Price’s Model, Local-world Network Growth Model, Network Model with Accelerating Growth, Aging in Preferential Attachment. T1 – Chapter 3 (3.1 – 3.9)	08
Pedagogy	Simulation of network models.	
3	Link Analysis - Applications of Link Analysis, Signed Networks, Strong and Weak Ties, Link Analysis Algorithms, PageRank, Personalized PageRank, DivRank, SimRank, PathSIM. T1 – Chapter 4 (4.1 – 4.9)	08
Pedagogy	Demonstration of algorithms.	
4	Community Structure in Networks - Applications of Community Detection, Types of Communities, Community Detection Methods, Disjoint Community Detection, Overlapping Community Detection, Local Community Detection, Community Detection vs Community Search, Evaluation of Community Detection Methods. T1 – Chapter 5 (5.1 – 5.8)	08
Pedagogy	Presentation and poster presentation.	
5	Link Prediction – Applications of Link Prediction, Temporal Changes in a Network, Problem Definition Evaluating Link Prediction Methods, Heuristic Models. Anomaly Detection in Networks- Outliers Versus Network-Based Anomalies, Challenges, Anomaly Detection in Static Networks, Anomaly Detection in Dynamic Networks. T1 – Chapter 6 (6.1 – 6.5), Chapter 8 (8.1 – 8.4)	08
Pedagogy	Video demonstration and simulation.	

Textbooks

Pedagogical Initiatives (Not limited to):

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
 - **Case studies:** maps different domains in real time applications
 - **Demonstration:** exhibits the implementation process

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Tanmoy Chakraborty, "Social Network Analysis", Wiley India Pvt. Ltd., 2021.
Reference Books	
1	Albert-Laszlo Barabasi, "Network Science", Cambridge University Press, 2016.
2	Stanley Wasserman, Katherine Faust, "Social Network Analysis: Methods and Applications", Cambridge University Press, 1994.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the fundamental concepts of Social Network Analysis and its societal relevance.	L2	Un
CO2	Apply network growth models using the structural properties.	L3	Ap
CO3	Analyse network growth models to simulate evolving social systems.	L4	An
CO4	Design of link analysis algorithms to interpret relationships within networks.	L4	An
CO5	Evaluate community detection and link prediction and Anomaly detection techniques for real-world networks.	L5	Ev

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2		-	-	-	-	-	-	-	-	-	2	-	-	
CO3	2	2	-	-	-	-	-	-	-	2	-	-	2	-	-	
CO4	-	2	2	-	-	-	-	-	-	2	-	2	2	-	-	-
CO5	-	2	2	-	-	-	-	-	-	2	-	2	-	-	-	2

Weblinks and Video Lectures (e-Resources)

1	https://onlinecourses.nptel.ac.in/noc22_cs117/preview
2	https://www.coursera.org/learn/social-network-analysis
3	http://networksciencebook.com

CIE- Continuous Internal Evaluation (50 Marks)

	Theory
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Bloom's Category	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	20	10		
Understand	20	10	10	
Apply	10	20	10	10
Analyze		10	20	20
Evaluate			10	10
Create				10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module- 1	Module- 2	Module 2 to 2.5	Module-2.5 to 3	Module- 4	Module- 5		
CO1	10	5	5	5	5	5	35	25%
CO2	10	10	5	5	10	10	50	25%
CO3		5			5	5	15	35%
CO4								15%
CO5								--
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember+ Understand	10% + 2%
Apply	20% + 2%
Analyze	40% + 4%
Evaluate	20% + 2%
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module- 3	Module-4	Module-5		
CO1	20	10				40	40%
CO2		10	10	10	10	40	40%
CO3			10	10	10	20	20%
CO4							-
CO5							-
Total	20	20	20	20	20	100	100%



Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Indian Knowledge Systems			
Course Code	:	BIKS70			
Course Type (Theory/Practical/Project Integrated)	:	Theory			
Category	:	AEC			
Stream	:	Common to all UG Programs	CIE	:	100
Teaching hours/ week (L:T:P:S)	:	1:0:0:0	SEE	:	-
Total Hours	:	15 Hrs	SEE Duration	:	-
Credits	:	01			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the
2	To make the students understand the traditional knowledge and analyse it and apply it to their day-to-day life.

Unit-I	05 Hrs
Introduction to Indian Knowledge Systems (IKS): Overview, Vedic Corpus, Philosophy, Character scope and importance, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge vs. western knowledge.	
Unit – II	05 Hrs
Traditional Knowledge in Humanities and Sciences: Linguistics, Number and measurements- Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.	
Unit -III	05 Hrs
Traditional Knowledge in Professional domain: Town planning and architecture- Construction, Health, wellness and Psychology-Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals.	

Course Outcomes: After completing the course, the students will be able to

CO1:	Provide an overview of the concept of the Indian Knowledge System and its importance.
CO2:	Appreciate the need and importance of protecting traditional knowledge.
CO3:	Recognize the relevance of Traditional knowledge in different domains.
CO4:	Establish the significance of Indian Knowledge systems in the contemporary world.

Reference Books

1	Introduction to Indian Knowledge System- concepts and applications , B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, 2022, PHI Learning Private Ltd, ISBN-978-93- 91818-21-0
	Traditional Knowledge System in India , Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,
2	Knowledge Traditions and Practices of India , Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,
	Suggested Web Links:
1.	https://www.youtube.com/watch?v=LZP1StpYEPM
2.	http://nptel.ac.in/courses/121106003/

3.	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4.	https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5.	https://unctad.org/system/files/official-document/ditcted10_en.pdf
6.	http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7.	https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?qclid=EAlalQobChMlnp-Jtb_p8glVTeN3Ch27LAmPEAAAYASAAEgIm1vD_BwE

ASSESSMENT AND EVALUATION PATTERN	
WEIGHTAGE	100% (CIE)
QUIZZES	
Quiz-I	Each quiz is evaluated for 10 marks adding up to 20 Marks .
Quiz-II	
THEORY COURSE - (Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating)	
Test – I	Each test will be conducted for 25 Marks adding upto 50 marks. Final test marks will be reduced to 40 Marks
Test – II	
EXPERIENTIAL LEARNING	40
Case Study-based Teaching-Learning	--
Sector wise study & consolidation (viz., Engg. Semiconductor Design, Healthcare & Pharmaceutical, FMCG, Automobile, Aerospace and IT/ITeS)	--
Video based seminar (4-5 minutes per student)	--
Maximum Marks for the Theory	---
Practical	--
Total Marks for the Course	100

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	3	-	-	-	1
CO2	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	2	2	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	2	-	-	-	-	-

High-3 : Medium-2 : Low-1

8th SEMESTER

Note: VII and VIII semesters of IV years of the program Swapping Facility

- Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internships/ industry internships/Rural Internship after the VI semester.
- Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.
- Note: For BCA801x and BCA802x courses BOS will announce list of courses in 6th , 7th & 8th Sem .

Students can register in any of the semester to earn the credits in 8th Sem Elucidation:

At the beginning of IV years of the program i.e., after VI semester, VII semester classwork and VIII semester Research Internship /Industrial Internship / Rural Internship shall be permitted to be operated simultaneously by the University so that students have ample opportunity for an internship.

In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship or Rural Internship. Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation center, Incubation center, Start-up, center of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations/institutes. The mandatory Research internship /Industry internship / Rural Internship is for 14 to 20 weeks.

The internship shall be considered as a head of passing and shall be considered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequent University examination after satisfying the internship requirements.

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research. Industry internship: Is an extended period of work experience undertaken by students to supplement their degree for professional development.

It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

Rural Internship: Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departments studying in different academic years for exploring various opportunities in techno-social fields, to connect and work with Rural India for their upliftment.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship. The students are permitted to carry out the internship anywhere in India or abroad.

University shall not bear any expenses incurred in respect of the internship. With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (within or outside the state or abroad), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide.

University shall not bear any cost involved in carrying out the internship by students. However, students can receive any financial assistance extended by the organization.