

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
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

The Department of Computer Science & Engineering (CSE) stands at the forefront of innovation, shaping the future of technology and empowering students to become leaders in the digital era. CSE is a blend of strong fundamental foundations like algorithms and system design with cutting-edge technologies such as Artificial Intelligence, Machine Learning, Deep Learning, Data Science, Cloud Computing, Cybersecurity, Blockchain, Internet of Things (IoT), Big Data Analytics and Computer Vision.

The CSE department is a team of highly qualified and passionate faculty, the department nurtures academic excellence while fostering curiosity, creativity, and problem-solving skills. Along with traditional classroom teaching, the students are trained through workshops, seminars, hackathons, coding competitions, internships, paper presentations, and mini-projects to stay aligned with current and emerging industry needs. The department encourages start-up culture, ideation programs and incubation support, empowering students to become innovators and job creators.

Faculty and students are actively engaged in research, contributing quality papers in reputed journals and conferences in the areas of AI, IoT, Computer Vision, Natural Language Processing, Computer Networking and Cloud Security. The department emphasizes holistic development with students encouraged to participate in national and international competitions, cultural activities, sports, and entrepreneurial ventures, transforming them into well-rounded individuals ready to face global challenges. With a strong track record in placements, the CSE Department continues to prepare its graduates to not just adapt to the future, but to create it.

VISION OF THE DEPARTMENT

Epitomize CSE graduate to carve a niche globally in the field of computer science to excel in the world of information technology and automation by imparting knowledge to sustain skills for the changing trends in the society and industry.

MISSION OF THE DEPARTMENT

M1: To educate students to become excellent engineers in a confident and creative environment through world-class pedagogy.

M2: Enhancing the knowledge in the changing technology trends by giving hands-on experience through continuous education and by making them to organize & participate in various events.

M3: Impart skills in the field of IT and its related areas with a focus on developing the required competencies and virtues to meet the industry expectations.

M4: Ensure quality research and innovations to fulfill industry, government & social needs.

M5: Impart entrepreneurship and consultancy skills to students to develop self-sustaining life skills in multi-disciplinary areas.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Engage in professional practice to promote the development of innovative systems and optimized solutions for Computer Science and Engineering.

PEO2: Adapt to different roles and responsibilities in interdisciplinary working environment by respecting professionalism and ethical practices within organization and society at national and international level.

PEO3: Graduates will engage in life-long learning and professional development to acclimate the rapidly changing work environment and develop entrepreneurship skills.

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)

PSO1: Foundation of Mathematical Concepts: Ability to use mathematical methodologies to solve the problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO2: Foundation of Computer System: Ability to interpret the fundamental concepts and methodology of computer systems. Students can understand the functionality of hardware and software aspects of computer systems.

PSO3: Foundations of Software Development: Ability to grasp the software development lifecycle and methodologies of software systems. Possess competent skills and knowledge of software design process. Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations towards research.

PSO4: Foundations of Multi-Disciplinary Work: Ability to acquire leadership skills to perform professional activities with social responsibilities, through excellent flexibility to function in multi-disciplinary work environment with self-learning skills.



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

Affiliated to **VTU**
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	1 st Semester	20
2	2 nd Semester	20
3	3 rd Semester	21
4	4 th Semester	21
5	7 th SEMESTER	22
6	8 th SEMESTER	22
7	7 th Semester	20
8	8 th Semester	14
Total		160

PROPOSED UG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week					Credits
				Lecture	Tutorial	Practical	Project	Total (Hrs/week)	
				L	T	P	S		
1	IPCC	CSE	CSE	3	0	2	0	5	4
2	PCC	CSE	CSE	3	0	0	0	3	3
3	PEC-3	CSE	CSE	3	0	0	0	3	3
4	OEC-2	CSE	CSE	3	0	0	0	3	3
5	PWP-2	CSE	CSE	0	0	0	7	7	7
6	NCMC	NSS / YOGA / PED		1	-	-	-	1	0
9	Total			13	-	2	7	22	20
10	AICTE Activity Points								
Total									20

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 7th Sem & 8th Sem

7th Sem

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	IPCC	60%	40%	--	--
2	PCC	100%	--	--	--
3	PEC-3	100%	--	--	--
4	OEC-2	100%	--	--	--
5	PROJ-2		100%	--	--
6	NCMC	--	--	--	100%
Total Percentage		60%	23.33%		16.67%

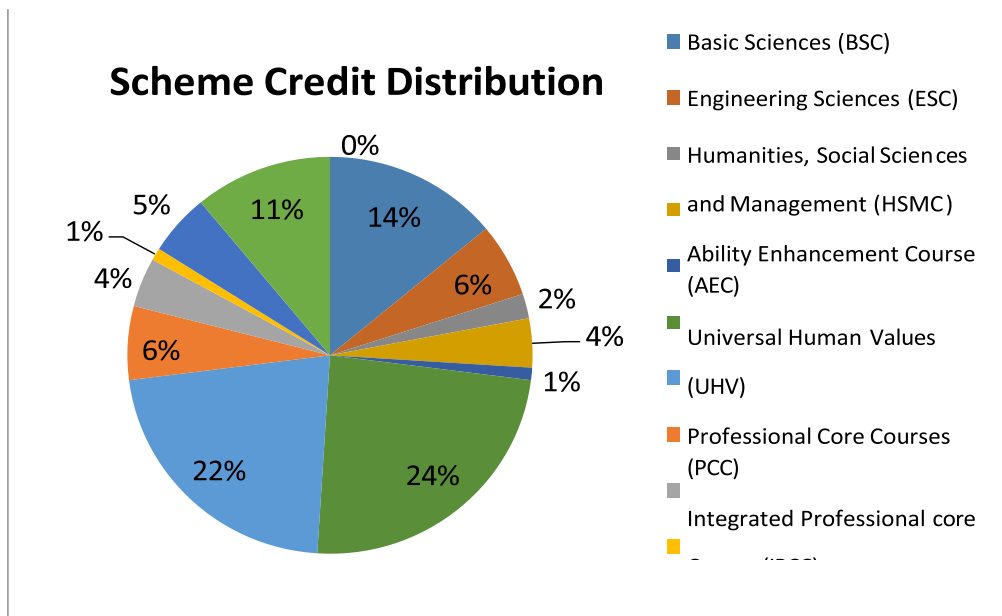
8th Semester

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	Capstone Project Phase -3	--	100%	--	--
2	INT	--	100%	--	--
Total Percentage		--	100%	--	--

Scheme Distribution

Department of Computer Science and Engineering

Course Component	Credits	% of Credits
Basic Sciences (BSC)	22	14
Engineering Sciences (ESC)	9	6
Humanities, Social Sciences and Management (HSMC)	3	2
Ability Enhancement Course (AEC)	7	4
Universal Human Values (UHV)	2	1
Professional Core Courses (PCC)	39	24
Integrated Professional core Course (IPCC)	36	22
Professional Elective Course (PEC)	9	6
Institutional Open Elective Courses (IOE)	6	4
Internship (INT)	1	1
Project based Learning / Mini Project	8	5
Project Work (PW)	18	11
Non-credit Mandatory Courses (NCMC)	0	0
Total Credits	160	100



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

Course Category	Semester								Total Credits
	1st	2nd	3rd	4th	5th	6th	7th	8th	
Basic Sciences (BSC)	8	8	3	3	0	0	0	0	22
Engineering Sciences (ESC)	3	6	0	0	0	0	0	0	9
Humanities, Social Sciences and Management (HSMC)	1	2	0	0	0	0	0	0	3
Ability Enhancement Course (AEC)	2	1	1	1	0	0	0	2	7
Universal Human Values (UHV)	0	0	1	1	0	0	0	0	2
Professional Core Courses (PCC)	6	3	6	6	6	6	6	0	39
Integrated Professional core Course (IPCC)	0	0	8	8	8	8	4	0	36
Professional Elective Course (PEC)	0	0	0	0	6	3	0	0	9
Institutional Open Elective Courses (IOE)	0	0	0	0	0	3	3	0	6
Internship (INT)	0	0	0	0	0	0	1	0	1
Project based Learning / mini-Project	0	0	2	2	2	2	0	0	8
Project Work (PW)	0	0	0	0	0	0	6	12	18
Non-credit Mandatory Courses (NMC)	0	0	0	0	0	0	0	0	0
Total Credits	20	20	21	21	22	22	20	14	160



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Scheme of Teaching and Examinations – 2026-27
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

7th SEMESTER: Computer Science & Engineering (CSE)

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	BCS701	Intelligent Language Processing	IPCC	CSE	CSE	3	-	2	-	5	4	3	50	50	100
2	BCS702	Deep Learning	PCC	CSE	CSE	3	-	-	-	3	3	3	50	50	100
3	BCS703X	Professional Elective Course	PEC	CSE	CSE	3	-	-	-	3	3	3	50	50	100
4	BXX704X	Open Elective Course	OEC	CSE	CSE	3	-	-	-	3	3	3	50	50	100
5	BCS705	Capstone Project - phase – 2	PWP-2	CSE	CSE	-	-	-	14	14	7	3	50	50	100
6	BIKS706	Indian Knowledge Systems	NCMC	CSE	CSE	-	-	-	-	-	0	-	100	-	100

Details of 80 AICTE Activity Points Earned

Total	12	-	2	14	28	20	15	350	250	600
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7th Sem Professional Elective Course

1. Business Intelligence – BCS703A	2. Parallel Computing – BCS703B
3. Social Network Analysis – BCS703C	4. Soft Computing – BCS703D

7th Sem Open Elective Course

1. Supply Chain Management – BME704A	2. Drone Technology with AI – BEC704B
3. AI in Green Technology- BC704A	AI for Wireless Communication – BEC704A

8th SEMESTER: Computer Science & Engineering (CSE)

Sl.No	Course Code	Course Title	Cours 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	BCS801X	Capstone Project- Phase 3 (Publication & Patent)	PROJ	CSE	CSE	-	-	-	8	8	4	3	50	50	100
2	BCS802	Internship	INT	CSE	CSE	Two Contact hours/week for integration between faculty and students					10	3	100	100	200

AICTE Activity points

Total	-	-	-	8	8	14	6	150	150	300
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Details of 100 AICTE Activity Points Earned

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

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.

NonCredit 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.

7th SEMESTER

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**

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/out
		Record	05					

Practical		Observation book	05					put)
	Practical Test	Write up	15	50	---	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
		Execution	25					
		Viva-voce	10					
	Open Ended Experiment	Write up	05	20	---	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
		Execution	10					
Viva-voce		05						
	Total CIE Practical					25	10	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment
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



Semester	:	7th			
Course Title	:	Intelligent language processing			
Course Code	:	BCS701			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSE	CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	:	50 Marks
Total Hours	:	40+20	SEE	:	3 Hours
Credits	:	4	Duration	:	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn the importance of natural language modelling, grammar structures, and transformer architectures.
2	Understand applications of NLP and modern Large Language Models (LLMs) in real-world scenarios.
3	Study spelling error detection, parsing techniques, and advanced prompt engineering strategies.
4	Illustrate information retrieval models and Hugging Face pipelines for text processing tasks.
5	Analyse and evaluate machine translation techniques, encoder-decoder models, and ethical considerations in AI-driven language systems.

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 & encourage the students to come up with creative & 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)**.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2026-27
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2026-27)**

COURSE CURRICULUM

Module No.	Topics	Hours
1	<p>Introduction: What is Natural Language Processing? Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications.</p> <p>Word Level Analysis: Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of Speech Tagging.</p> <p>Syntactic Analysis: Context-Free Grammar, Constituency, Top-down and Bottom-up Parsing, CYK Parsing.</p> <p>Transformers: Motivation behind transformers, self-attention mechanism, architecture, BERT basics and pretrained models.</p> <p>Textbook 1: Ch 1, Ch 2, Ch 3, Ch 4 and Textbook 2: Ch 2, Ch 3</p>	8
Pedagogy	Video demonstration and algorithm walkthroughs	
2	<p>Language Models & Prompt Engineering Basics: Large Language Models: Definition, modern LLMs, domain-specific LLMs, applications.</p> <p>Prompt Engineering with GPT-3: Introduction, prompt design, working with prompts across models, building Q/A bots.</p> <p>NLP Applications: Case studies in text classification, sentiment analysis, Naïve Bayes.</p> <p>Textbook 2: Ch 1, Ch 3</p> <p>Reference Book 1: Practical text classification and sentiment analysis</p>	8
Pedagogy	Demonstration and problem-solving sessions.	
3	<p>Advanced Parsing & Optimizing LLMs: Parsing techniques revisited: Constituency, dependency parsing, CYK.Optimizing LLMs: Transfer learning, fine-tuning, OpenAI fine-tuning API, Amazon review classification. Advanced Prompt Engineering: Prompt injection attacks, validation, batch prompting, chaining, chain-of-thought, iterative development.</p> <p>Textbook 1: Ch 3, Ch 4, Textbook 2: Ch 4, Ch 5 and Reference Book 2: Parsing and ML integration</p>	8
Pedagogy	Problem-based learning and simulation exercises.	
4	<p>Information Retrieval & Hugging Face Ecosystem: Information Retrieval: Classical, non-classical, fuzzy, LSTM models; major issues.</p> <p>Lexical resources: WordNet, FrameNet, stemmers, corpora.</p> <p>Hugging Face: Features, pipelines, Gradio, creating spaces, tasks (Q/A, translation).</p> <p>Textbook 1: Ch 9, Ch 12, Reference Book 3: Information Storage and Retrieval Systems and Textbook 2: Ch 4, Ch 5</p>	8
Pedagogy	Poster presentation and hands-on labs with Hugging Face.	
5	<p>Machine Translation & Ethical Considerations: Machine Translation: Encoder-decoder models, low-resource translation, evaluation, bias & ethics.</p> <p>Speech & multimodal translation: Speech-to-text, end-to-end speech translation.</p> <p>Case studies: Mapping MT to real-world applications.</p> <p>Textbook 2: Chapter 13 and Textbook 1: Machine Translation context</p> <p>Case Studies: RLHF, ethical considerations</p>	8
Pedagogy	Video demonstration, simulation, case study analysis.	

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.

List of Programs:**Warmup Programs:**

- **Load a pre-trained transformer model (e.g., BERT or GPT).**
Print tokenized representations for three sentences and analyze how tokenization affects input length and cost.
- **Design your first prompt.**
Write 3 different prompts for the same task (e.g., summarization) and compare outputs for clarity, detail, and hallucinations.

Sl. No.	Experiments/Programs	COs
1	Explore Transformer Attention. Visualize self-attention weights for a sample sentence and explain how words attend to each other.	CO1
2	Work with BERT embeddings. Extract embeddings for three sentences and compare semantic similarity using cosine similarity	CO1
3	Zero-shot vs Few-shot Prompting. Classify text sentiment using zero-shot prompting, then improve accuracy with few-shot examples. Chain-of-Thought Prompting. Solve math word problems using normal prompts vs. CoT prompts (“Think step by step”). Compare correctness.	CO2
4	Role-based Prompting. Design prompts where the LLM acts as a teacher, lawyer, and doctor. Compare tone, vocabulary, and reasoning.	CO2
5	RAG Build a RAG-based recommendation system that suggests products by retrieving relevant product descriptions and generating personalized recommendations based on user queries.	CO4
6	Tree-of-Thought Prompting. Use ToT prompting to solve a logic puzzle. Document multiple reasoning paths and final solution.	CO4
7	Iterative Prompt Refinement. Start with a weak summarization prompt. Refine it through 3–4 iterations and assess improvements in coherence and accuracy.	CO3
8	Prompt Injection Simulation. Create a safe summarization prompt, then attempt adversarial instructions. Document vulnerabilities and propose guardrails	CO4
9	Prompting for Code Generation. Write prompts to generate Python code for factorial. Then provide a broken snippet and prompt the LLM to debug it.	CO3
10	Prompting for Data Analysis. Design prompts to summarize a dataset, generate visualizations, and interpret statistical results	CO3
Open ended Programs		
1	Creative Prompt Chaining for Contextual Story Generation: Design a storytelling prompt using a seed word and semantically related words, then construct a prompt chain that progressively builds the narrative. Iteratively refine the chain to improve coherence, creativity, and contextual flow , and evaluate outputs at each stage.	CO2

2	Agentic AI for Bias Detection: Design an Agentic AI system that analyzes prompts and responses to detect bias, suggest improvements, and generate ethically refined prompts. The agent should iteratively evaluate outputs and apply prompt refinement strategies to mitigate bias and improve fairness	CO4
3	Contextual Prompt Optimization: Design prompts that adapt to different contexts (academic, professional, casual) for summarizing the same dataset or document. Iteratively refine prompts to improve coherence, accuracy, and contextual relevance.	CO3

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Tanveer Siddiqui, U.S. Tiwary – Natural Language Processing and Information Retrieval, Oxford University Press.
2	Daniel Jurafsky, James H. Martin – Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Pearson Education, 2023.
Reference Books	
1	Akshay Kulkarni, Adarsha Shivananda – Natural Language Processing Recipes: Unlocking Text Data with Machine Learning and Deep Learning using Python, Apress, 2019.
2	T.V. Geetha – Understanding Natural Language Processing – Machine Learning and Deep Learning Perspectives, Pearson, 2024.
3	Gerald J. Kowalski, Mark T. Maybury – Information Storage and Retrieval Systems, Kluwer Academic Publishers.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand and explain the fundamental concepts of NLP, including language models, grammar structures, and transformer-based architectures.	U	L1/L2
CO2	Apply NLP techniques and prompt engineering methods (e.g., GPT-3 prompts, sentiment analysis, classification) to solve real-world problems.	Ap	L3
CO3	Analyse parsing strategies, fine-tuning approaches, and IR models to evaluate their effectiveness in language processing tasks.	An	L4
CO4	Evaluate and investigate NLP models, Hugging Face pipelines, and ethical issues in deploying LLMs and translation systems.	E	L5
CO5	Design and implement NLP applications such as machine translation systems and AI-enabled solutions using encoder–decoder models and prompt engineering.	C	L6

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	2	2											2			
CO2	2	3			2				2				2			
CO3	2	3							2	2			2	2		
CO4		2	2	3					2	2			2			
CO5			3		3				3	2		2	2	2		

Web links and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=M7SWr5xObkA
2	https://www.youtube.com/watch?v=02QWRAhGc7g
3	https://www.youtube.com/watch?v=CMrHM8a3hqw
4	https://onlinecourses.nptel.ac.in/noc23_cs45/preview?utm_source=copilot.com
5	https://www.youtube.com/results?search_query=Encoder%E2%80%93Decoder+Models+for+Machine+Translation

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember		-			
Understand	20	15	10		10
Apply	25	25	20	10	20
Analyze	5	10	10	15	10
Evaluate	-	-	10	10	
Create	-	-		15	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 3 to 3.5	Module-3.5 to 4	Module-4	Module-5		
CO1	10	5	5	5	5	5	35	35%
CO2	10	10	5	5	10	10	50	50%
CO3		5			5	5	15	15%
CO4								
CO5								
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 + Understand	10%+2%
Apply	20%+2%
Analyse	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%

**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).

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 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 th		
Course Title	:	Deep Learning		
Course Code	:	BCS702		
Course Type (Theory/Practical/ Integrated)	:	Theory		
Category	:	PCC		
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	To understand the fundamental concepts of deep learning and neural network architectures, including perceptrons, multilayer neural networks, and back propagation learning.
2	To study optimization techniques and regularization methods used for efficient training of deep neural networks.
3	To explore convolutional neural networks (CNNs) for image processing and computer vision applications.
4	To understand recurrent neural networks (RNNs), LSTM, and GRU architectures for modeling sequential and temporal data.
5	To apply advanced deep learning models and frameworks for solving real-world problems in domains such as computer vision, natural language processing, and healthcare.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Classroom lectures supported by visual illustrations, neural network architecture diagrams, and mathematical derivations to strengthen the theoretical understanding of deep learning concepts.
2. Practical implementation of deep learning models using **Python, TensorFlow, or PyTorch**, enabling students to develop and train neural network architectures on real datasets.
3. Demonstrations of real-world applications of deep learning in areas such as **computer vision, natural language processing, healthcare analytics, and autonomous systems**.
4. Regular assignments and coding tasks that require students to implement deep learning algorithms and analyze their performance.
5. Students design and develop deep learning solutions for selected real-world problems using appropriate datasets and evaluation metrics.
6. Discussion and analysis of recent research papers or emerging trends in deep learning to expose students to current developments in the field.
7. Students present topics such as advanced neural network architectures, deep learning frameworks, and applications to enhance understanding and communication skills.
8. Supplementary learning through online platforms, open datasets, tutorials, and deep learning libraries to encourage self-learning and exploration.



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	<p>UNIT – 1: Foundations of Deep Learning: Introduction to Deep Learning, Difference between Machine Learning and Deep Learning, Biological Neuron vs Artificial Neuron, Neural Network Architectures.</p> <p>Single Layer Perceptron: Perceptron model, Learning rule, Perceptron Convergence Theorem, Limitations of Perceptron.</p> <p>Multilayer Perceptron (MLP): Feedforward Neural Networks, Activation Functions (Sigmoid, Tanh, ReLU, Softmax), Loss Functions, Gradient Descent Optimization.</p> <p>Backpropagation Algorithm: Chain Rule, Error propagation, Training of neural networks.</p> <p>Need of DL: Use case: DL in Computer Vision Applications, NLP, Healthcare and Medical Imaging</p> <p>Text book 1: Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016 – Chapter 6 (Deep Feedforward Networks)</p> <p>Text book 3: Simon Haykin, Neural Networks and Learning Machines, 3rd Edition, Pearson – Chapters 1 & 4</p>	8
Pedagogy	Conceptual lectures, visualization, coding exercises, quizzes	
2	<p>UNIT – 2: Optimization and Regularization in Deep Learning Challenges in training deep neural networks: Vanishing gradients, Exploding gradients, Overfitting.</p> <p>Optimization techniques: Stochastic Gradient Descent (SGD), Momentum, Nesterov Accelerated Gradient, AdaGrad, RMSProp, Adam.</p> <p>Regularization techniques: L1 and L2 Regularization, Dropout, Early Stopping, Batch Normalization, Weight Initialization methods.</p> <p>Text book 1: Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press – Chapter 8 (Optimization for Training Deep Models)</p> <p>Text book 2: Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, 2018 – Chapter 3</p>	8
Pedagogy	Case studies, optimizer demonstrations, group discussions	
3	<p>UNIT – 3: Convolutional Neural Networks (CNN): Introduction to CNN, Motivation for CNN in image processing.</p> <p>CNN Architecture: Convolution layers, Padding, Stride, Pooling layers (Max and Average pooling).</p> <p>Popular CNN Architectures: LeNet, AlexNet, VGGNet, ResNet.</p> <p>Applications of CNN: Image classification, Object detection, medical image analysis. Transfer Learning and Data Augmentation.</p> <p>Text book 1: Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press – Chapter 9 (Convolutional Networks)</p> <p>Text book 2: Charu C. Aggarwal, Neural Networks and Deep Learning, Springer – Chapter 8</p>	8
Pedagogy	CNN implementation labs, dataset experiments, student presentations	
4	<p>UNIT – 4: Sequence Modeling and Recurrent Neural Networks: Sequential Data and Temporal Modeling.</p> <p>Recurrent Neural Networks (RNN): Architecture, Backpropagation Through Time (BPTT), Vanishing gradient problem.</p> <p>Advanced RNN architectures: Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), Bidirectional RNN.</p>	8

	<p>Applications: Speech recognition, Language modeling, Time-series prediction, Introduction to Attention Mechanism.</p> <p>Text book 1: Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press – Chapter 10 (Sequence Modeling: Recurrent and Recursive Nets)</p> <p>Text book 2: Charu C. Aggarwal, Neural Networks and Deep Learning, Springer – Chapter 9</p>	
Pedagogy	Sequence modelling exercises, RNN coding labs, real-world case studies	
5	<p>UNIT – 5: Advanced Deep Learning Architectures and Applications</p> <p>Autoencoders: Basic Autoencoder, Sparse Autoencoder, Denoising Autoencoder.</p> <p>Generative Models: Variational Autoencoders (VAE), Generative Adversarial Networks (GANs).</p> <p>Transformers and Attention: Self-attention mechanism, Transformer architecture overview.</p> <p>Deep Learning Frameworks: Introduction to TensorFlow and PyTorch.</p> <p>Applications of Deep Learning in Healthcare, Autonomous systems, Natural Language Processing, Computer Vision.</p> <p>Text book 1: Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press – Chapter 14 (Autoencoders)</p> <p>Text book 2: Charu C. Aggarwal, Neural Networks and Deep Learning, Springer – Chapter 10</p>	8
Pedagogy	Research paper discussions, seminars, mini-projects	
	<p>Pedagogical Initiatives (Not limited to):</p> <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. 	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
2	Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, 2018
3.	Simon Haykin, Neural Networks and Learning Machines, 3rd Edition, Pearson
Reference Books	
1	Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer.

2	Tom Mitchell, Machine Learning, McGraw Hill.
3	Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow, O'Reilly.

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, architecture and training of Deep Neural Networks	U	L1/L2
CO2	Apply principles of Deep Learning to solve numerical and analytical problems involving neural network computations, gradient updates, and performance evaluation .	Ap	L3
CO3	Analyze the performance of deep learning models by evaluating metrics, and optimization techniques	An	L4
CO4	Evaluate the available different deep learning solutions for real-world problems by selecting appropriate architectures, tuning hyperparameters, and interpreting model results	E	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	PSO4
CO1	3															
CO2	3												1			
CO3		3												1		
CO4			3		2				2	2					1	

Weblinks and Video Lectures (e-Resources)

1	https://www.coursera.org/specializations/deep-learning
2	https://nptel.ac.in/courses/106106184
3	https://nptel.ac.in/courses/106105215
4	https://introtodeeplearning.com
5	https://cs231n.stanford.edu

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
Remember		-		
Understand	20	15	10	
Apply	25	25	20	10
Analyse	5	10	10	15
Evaluate	-	-	10	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 3 to 3.5	Module-3.5 to 4	Module-4	Module-5		
CO1	10	5	5	5	5	5	35	35%
CO2	10	10	5	5	10	10	50	50%
CO3		5			5	5	15	15%
CO4								
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 + Understand	10%+2%
Apply	20%+2%
Analyse	40%+4%
Evaluate	20%+2%

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							-
Total	20	20	20	20	20	100	100%

**PROFESSIONAL
ELECTIVE COURSE
(PEC)**

PEC 1 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)

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 1) – 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	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	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Business Intelligence			
Course Code	:	BCS703A			
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 Business Intelligence, Analytics and Decision Support system
2	Apply the techniques for Automated decision systems
3	Analyse sentiment analysis techniques
4	Design the Multi-criteria Decision making systems and predictive modelling techniques
5	Evaluate Knowledge Management and Collaborative Systems

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.



Scheme of Teaching and Examinations for BE Program -2026-27 Outcome Based Education and Choice Based Credit System (CBCS) (Effective from the Academic Year 2026-27)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	An Overview of Business Intelligence, Analytics, and Decision Support , Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics T1 – Chapter 1 (1.4. – 1.9)	08
Pedagogy	Video demonstration and visualization.	
2	Decision Making , Introduction and Definitions, Phases of the Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components. T1 – Chapter 2 (2.2 – 2.11)	08
Pedagogy	Simulation of network models.	
3	Neural Networks and Sentiment Analysis , Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis, Speech Analytics. T1 – Chapter 6 (6.2 – 6.7), Chapter 7(7.7 – 7.10)	08
Pedagogy	Demonstration of algorithms.	
4	Model-Based Decision Making , Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making With Pairwise Comparisons T1 – Chapter 9 (9.2 – 9.9)	08
Pedagogy	Presentation and poster presentation.	
5	Automated Decision Systems and Expert Systems Automated Decision Systems , The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Knowledge Management and Collaborative Systems Introduction to Management, Approaches to Knowledge Management, Information Technology (IT) in Knowledge Management T1 – Chapter 11 (11.2 – 11.5), Chapter 12 (12.1 – 12.4)	08
Pedagogy	Video demonstration and simulation.	

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

Textbooks

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ramesh Sharda, Dursun Delen, Efraim Turban, J.E.Aronson, Ting-Peng Liang, David King, "Business Intelligence and Analytics: System for Decision Support", 10th Edition, Pearson Global Edition, 2013

Reference Books

1	Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017 by Edward Mize
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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	Understand the Business Intelligence, Analytics and Decision Support system	L2	Un
CO2	Apply the techniques for Automated decision systems	L3	Ap
CO3	Analyse sentiment analysis techniques	L4	An
CO4	Evaluate Knowledge Management and Collaborative Systems	L5	Ev
CO5	Design the Multi-criteria Decision making systems and predictive modelling techniques	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	PSO4
CO1																
CO2	2															
CO3		2											2			
CO4			2							2		2	2			2
CO5				2					2	2		2				2

Web links and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=zbcCdoHeS4w
2	https://www.youtube.com/watch?v=cVWwC97wxS20&list=PLyqSpQzTE6M_68YmFFmjAAvTMne3xq9jf
3	https://www.youtube.com/watch?v=hDJdkcdG1iA

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
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	:	Parallel computing			
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	: 100 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 need for Parallel Computing basics ,algorithms and Classification of Parallel Computers
2	Apply the suitable parallel programming techniques for efficient performance of parallel computing
3	Analyze the concepts of programming techniques distributed memory programming and shared memory programming in parallel computing
4	Design Message Passing Interface and OpenMP interface programs for various types of parallel computers
5	Evaluate the study of distributed, shared memory organizations using suitable interfaces in parallel computing and CUDA system

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 Parallel Computing 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.
- Devise innovative pedagogical practices periodically to continuously improve the Teaching–Learning Process (TLP) and ensure effective CO attainment.



Scheme of Teaching and Examinations for BE Program -2026-27 Outcome Based Education and Choice Based Credit System (CBCS) (Effective from the Academic Year 2026-27)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Parallel Algorithm Models with Hardware and software in Parallel Computing Introduction to Types of Parallel Models, Classifications of parallel computers, SIMD systems, MIMD systems, Interconnection networks, Cache coherence, Shared-memory vs. distributed-memory, Coordinating the processes/threads, Shared-memory, Distributed-memory.	08
Pedagogy	Video demonstration and visualization.	
2	GPU programming, Programming hybrid systems, MIMD systems, GPUs, Performance – Speedup and efficiency in MIMD systems, Amdahl's law, Scalability in MIMD systems, Taking timings of MIMD programs, GPU performance	08
Pedagogy	Simulation of network models.	
3	Distributed memory programming with MPI – MPI functions, The trapezoidal rule in MPI, Dealing with I/O, Collective communication, MPI-derived datatypes, Performance evaluation of MPI programs, A parallel sorting algorithm	08
Pedagogy	Demonstration of algorithms.	
4	Shared-memory programming with OpenMP – openmp pragmas and directives, The trapezoidal rule, Scope of variables, The reduction clause, loop carried dependency, scheduling, producers and consumers, Caches, cache coherence and false sharing in openmp, tasking, tasking, thread safety.	08
Pedagogy	Presentation and poster presentation.	
5	GPU programming with CUDA - GPUs and GPGPU, GPU architectures, Heterogeneous computing, Threads, blocks, and grids Nvidia compute capabilities and device architectures, Vector addition, Returning results from CUDA kernels, blocks with more than one warp	08
Pedagogy	Video demonstration and simulation.	
	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 	

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)

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
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	



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

Semester	:	7 th			
Course Title	:	Social Network Analysis			
Course Code	:	BCS703C			
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 -2026-27 Outcome Based Education and Choice Based Credit System (CBCS) (Effective from the Academic Year 202-25)

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.	

Pedagogical Initiatives (Not limited to):	
	Textbooks
Sl. No.	<ul style="list-style-type: none"> Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another
1	<ul style="list-style-type: none"> 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.
	Reference Books
1	<ul style="list-style-type: none"> Case studies: maps different domains in real time applications Demonstration: exhibits the implementation process
2	<ul style="list-style-type: none"> Albert-Laszlo Barabasi, "Network Science", Cambridge University Press, 2016. 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	Evaluate community detection and link prediction and Anomaly detection techniques for real-world networks.	L5	Ev
CO5	Design of link analysis algorithms to interpret relationships within networks.	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												2		
CO3		2											2		
CO4			2							2		2	2		
CO5				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)

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
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	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	7 th			
Course Title	:	Soft Computing			
Course Code	:	BSC703D			
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	To introduce the fundamental principles and architectures of Soft Computing techniques including Artificial Neural Networks (ANN), Fuzzy Logic, Genetic Algorithms, and Swarm Intelligence.
2	To develop the ability to design and implement Fuzzy Logic systems and Genetic Algorithms for solving engineering and real-world optimization problems.
3	To enable students to analyze and compare various soft computing techniques based on their characteristics, strengths, and limitations.
4	To provide exposure to performance evaluation methods for selecting appropriate soft computing approaches for complex problem-solving applications.

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.
- 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 & encourage the students to come up with creative & 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 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	Introduction to soft computing: ANN, FS, GA, SI, ES, Comparing among intelligent systems ANN: introduction, biological inspiration, BNN&ANN, classification, first Generation NN, perceptron, illustrative problems Text Book 1: Chapter1: 1.1-1.8, Chapter2: 2.1-2.6	08
Pedagogy	Video Demonstration and Visualization.	
2	Adaline, Medaline, ANN:(2 nd generation), introduction, BPN, KNN, RBF, SVM and illustrative problems Text Book 1: Chapter 3	08
Pedagogy	Demonstration of Algorithms	
3	Fuzzy logic: introduction, human learning ability, undecidability, probability theory, classical set and fuzzy set, fuzzy set operations, fuzzy relations, fuzzy compositions, natural language and fuzzy interpretations, structure of fuzzy inference system, illustrative problems Text Book 1: Chapter 5	08
Pedagogy	Presentation	
4	Introduction to Genetic Algorithm, GA, procedures, working of GA, GA applications, applicability, evolutionary programming, working of EP, GA based Machine learning classifier system, illustrative problems Text Book 1: Chapter 7	08
Pedagogy	Poster Presentation	
5	Swarm Intelligent system: Introduction, Background of SI, Ant colony system Working of ACO, Particle swarm Intelligence (PSO). Text Book 1: 8.1-8.4, 8.7	08
Pedagogy	Video demonstration and Simulation	
	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 	

Textbooks

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Soft computing: N. P Padhy and S P Simon, Oxford University Press 2015
Reference Books	
1	Principles of Soft Computing, Shivanandam, Deepa S. N Wiley India, 2011.

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 Soft Computing including ANN, Fuzzy Logic, Genetic Algorithms, and Swarm Intelligence	L2	U
CO2	Apply Fuzzy Logic and Genetic Algorithms to solve engineering and real-world problems.	L3	AP
CO3	Analyze and compare different soft computing techniques and their applicability	L4	AN
CO4	Evaluate the performance and suitability of soft computing methods for complex problem-solving	L5	E

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	3												3	1		
CO3		3												2		
CO4			3		2											

Web links and Video Lectures (e-Resources)

1	https://archive.nptel.ac.in/courses/106/105/106105173/?utm
2	https://onlinecourses.swayam2.ac.in/ntr25_ed107/preview?utm
3	https://ajitsahoocs.github.io/courses/Soft_Computing/index.html?utm
4	https://www.oreilly.com/library/view/introduction-to-soft/9789332514201/?utm

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	30	20	10	
Apply	10	20	10	
Analyze	10	10	10	
Evaluate				10
Create				10

CIE Course Assessment Plan

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%

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	:	7th Sem				
Course Title	:	Project Phase -2				
Course Code	:	BCS706				
Course Type (Theory/ Practical/Integrated)	:	Project Work				
Category	:	PWP-2				
Stream	:	CSE	:	CIE	:	100
Teaching hours/ week (L: T:P:S)	:	0:0:0:14	:	SEE	:	100
Credits	:	7	:	SEE Duration	:	3 hours

Guidelines:

1. Implementation of the remaining modules and their integration.
 2. Testing and validation.
 3. Preparation and publication of the implementation paper.
 4. Preparation and submission of the Major Project Phase 2 report.
- In-house project teams should meet their Guides weekly and update them on the progress of the projects, whereas the industry project students meet their Guides once every fifteen days.
 - CIE evaluation: Carried out twice in a semester by an internal panel comprising an Internal Guide and three other faculty members of the department.
 - SEE evaluation: Conducted at the end of the seventh semester by both an internal guide and an external examiner from other institutions.
 - Evaluation is based on the demonstration of the working project by the team, the project report and publication.
 1. of the Project Phase1 technical report.
 - In-house project teams should meet their Guides weekly and update them on the progress of the projects, whereas the industry project students should meet their Guides once every fifteen days.
 - CIE evaluation: Carried out thrice in a semester by an internal panel comprising an Internal Guide and at least three other faculty members of the department.
 - SEE evaluation: Conducted at the end of the sixth semester by both an internal guide and an external examiner from other institutions. Evaluation is based on the team presentation, project report and publication.

Note: CIE and SEE will be evaluated for 100 Marks and will be reduced to 50 Marks.

Course Outcomes (COs) :

CO1	Ability to identify and formulate the problems for the defined thrust area through research survey and industry interaction
CO2	Apply the domain knowledge to solve the problem statement with teamwork and a multi-disciplinary approach using proper methodology and modern tools
CO3	Demonstrate the developed project with professionalism, Ethics, and effective presentation
CO4	Design/Develop a solution to the proposed problem statement and test the hypothesis wherever applicable
CO5	Create a logically coherent project report and publish a paper

Mapping Scale:

0 = No Mapping; 1 = Low; 2 = Medium; 3 = High

Articulation Matrix of Project Phase I

Activity	CO1	CO2	CO3	CO4	CO5
Literature	3	1	1	1	2
Problem Formulation	3	2	1	2	1
Modules Identification	2	3	1	3	1
Presentation and Communication	1	1	3	1	2
Time Management	1	2	2	2	1

Program Outcomes (POs) :

PO1	Engineering knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations of complex problems
PO5	Modern tool usage
PO6	The engineer and society
PO7	Environment and sustainability
PO8	Ethics
PO9	Individual and team work
P10	Communication
P11	Project management and finance
P12	Life-long learning

Program Specific Outcomes (PSOs):

PSO1: Foundation of Mathematical Concepts: Ability to use mathematical methodologies to solve the problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO2: Foundation of Computer System: Ability to interpret the fundamental concepts and methodology of computer systems. Students can understand the functionality of hardware and software aspects of computer systems.

PSO3: Foundations of Software Development: Ability to grasp the software development life cycle and methodologies of software systems. Possesses competent skills and knowledge of software design process. Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations towards research.

PSO4: Foundations of Multi-Disciplinary Work: Ability to acquire leadership skills to perform professional activities with social responsibilities, through excellent flexibility to function in multi-disciplinary work environment

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3											3			
CO2					3				3					3		3
CO3	3									3				3		
CO4			3	3											3	
CO5					3						3			3		

Assessment Plan for CIE:

Tool	Remarks	Marks
Evaluation by Panel	-	100
	Total	100

Rubrics:

REVIE W 4	MARK S	CO3,PO1,PO10,PSO2	CO4,PO3,PO4,PSO3		
	Max marks	25	10	15	
	Excellent	25	Demonstrate the developed project with Good Presentation and communication	Testing completion and solution for two objectives	
	good	15	Demonstrate the partially developed project with Good Presentation and communication	Testing completion and solution for one objective	
	satisfactory	10	Demonstrate the initial development of the project with a good presentation and communication	Partial Testing completion and solution for one objective	
	Not Satisfactory	5	No demonstration and no Good Presentation	No testing done, and a partial solution	
	Poor	2	No presentation	No testing and no solution	
REVIE W 5	MARK S	CO5,PO5,PO11,PSO2			
	Max marks	50	50		
	Excellent	50	Create a logically coherent project report and publish a paper		
	good	40	Create a logically coherent project report and paper that is yet to be published		

	satisfactory	30	No good project report and ongoing paper preparation			
	Not Satisfactory	20	No good project report and paper writing not started			
	Poor	10	report in preparation stage, and no paper			



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	Seventh		
Course Title	:	Indian knowledge systems		
Course Code	:	BIKS706		
Course Type (Theory/Practical/ Integrated/Project)	:	Theory		
Category	:	IKS		
Stream	:	CSE	CIE	: 100
Teaching hours/ week (L:T:P:S)	:	1:0:0:0	SEE	: -
Total Hours	:	15 Hrs	SEE	: -
Credits	:	0	Duration	

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 Importance of roots of knowledge system
2	To make the students understand the traditional knowledge and analyse it and apply it to their day-to-day life

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)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	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.	5
Pedagogy	ICT Based Learning	
2	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	5
Pedagogy	ICT Based Learning	
3	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.	5
Pedagogy	ICT Based Learning	
	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 	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
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
2	Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,
Reference Books	
1	Knowledge Traditions and Practices of India, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,

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 concept of the Indian Knowledge System and its importance.	Remember/ Understand	L1/L2
CO2	Appreciate the need and importance of protecting traditional knowledge.	Apply	L3
CO3	Recognize the relevance of Traditional knowledge in different domains. .	Analyze	L4
CO4	Establish the significance of Indian Knowledge systems in the contemporary world.	Design	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	2	-	-	-	-	-	-	3	-	-	-	1	-	-	-
CO2	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-
CO3	-	-	2	2	-	-	-	-	-	-	-	-	-	-	1
CO4	-	-	-	-	-	3	2	-	-	-	-	-	-	1	-

Web links and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=LZP1StpYEPM
2	http://nptel.ac.in/courses/121106003/

CIE- Continuous Internal Evaluation (100 Marks)

ASSESSMENT AND EVALUATION PATTERN	
WEIGHTAGE	100% (CIE)
Quiz-I	Each quiz is evaluated for 10 marks adding up Quiz-II 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

8th SEMESTER



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	8th Sem				
Course Title	:	Project Phase -3				
Course Code	:	BCS801				
Course Type (Theory/ Practical/Integrated)	:	Project Work				
Category	:	PWP-3				
Stream	:	CSE	:	CIE	:	50
Teaching hours/ week (L: T:P:S)	:	0:0:0:8	:	SEE	:	50
Credits	:	4	:	SEE Duration	:	3 hours

Guidelines:

1. Implementation of the remaining modules and their integration.
 2. Testing and validation.
 3. Preparation and publication of the implementation paper.
 4. Preparation and submission of the Major Project Phase 2 report.
- In-house project teams should meet their Guides weekly and update them on the progress of the projects, whereas the industry project students meet their Guides once every fifteen days.
 - CIE evaluation: Carried out twice in a semester by an internal panel comprising an Internal Guide and three other faculty members of the department.
 - SEE evaluation: Conducted at the end of the seventh semester by both an internal guide and an external examiner from other institutions.
 - Evaluation is based on the demonstration of the working project by the team, the project report and publication.
2. of the Project Phase1 technical report.
 - In-house project teams should meet their Guides weekly and update them on the progress of the projects, whereas the industry project students should meet their Guides once every fifteen days.
 - CIE evaluation: Carried out thrice in a semester by an internal panel comprising an Internal Guide and at least three other faculty members of the department.
 - SEE evaluation: Conducted at the end of the sixth semester by both an internal guide and an external examiner from other institutions. Evaluation is based on the team presentation, project report and publication.

Note: CIE and SEE will be evaluated for 100 Marks and will be reduced to 50 Marks.

Course Outcomes (COs) :

CO1	Ability to identify and formulate the problems for the defined thrust area through research survey and industry interaction
CO2	Apply the domain knowledge to solve the problem statement with teamwork and a multi-disciplinary approach using proper methodology and modern tools
CO3	Demonstrate the developed project with professionalism, Ethics, and effective presentation
CO4	Design/Develop a solution to the proposed problem statement and test the hypothesis wherever applicable
CO5	Create a logically coherent project report and publish a paper

Mapping Scale:

0 = No Mapping; 1 = Low; 2 = Medium; 3 = High

Articulation Matrix of Project Phase I

Activity	CO1	CO2	CO3	CO4	CO5
Literature	3	1	1	1	2
Problem Formulation	3	2	1	2	1
Modules Identification	2	3	1	3	1
Presentation and Communication	1	1	3	1	2
Time Management	1	2	2	2	1

Program Outcomes (POs) :

PO1	Engineering knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations of complex problems
PO5	Modern tool usage
PO6	The engineer and society
PO7	Environment and sustainability
PO8	Ethics
PO9	Individual and team work
P10	Communication
P11	Project management and finance
P12	Life-long learning

Program Specific Outcomes (PSOs):

PSO1: Foundation of Mathematical Concepts: Ability to use mathematical methodologies to solve the problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO2: Foundation of Computer System: Ability to interpret the fundamental concepts and methodology of computer systems. Students can understand the functionality of hardware and software aspects of computer systems.

PSO3: Foundations of Software Development: Ability to grasp the software development life cycle and methodologies of software systems. Possesses competent skills and knowledge of software design process. Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations towards research.

PSO4: Foundations of Multi-Disciplinary Work: Ability to acquire leadership skills to perform professional activities with social responsibilities, through excellent flexibility to function in multi-disciplinary work environment

CO-PO-PSO Mapping:

	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3											3			
CO2					3				3					3		3
CO3	3									3				3		
CO4			3	3											3	
CO5					3						3			3		

Assessment Plan for CIE:

Tool	Remarks	Marks
Evaluation by Panel	-	100
	Total	100

Rubrics:

REVIE W 4		MARK S	CO3,PO1,PO10,PSO2	CO4,PO3,PO4,PSO3		
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	Excellent	25	Demonstrate the developed project with Good Presentation and communication	Testing completion and solution for two objectives		
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Dayananda Sagar Academy of Technology & Management
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Affiliated to **VTU**
Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

Semester	:	8 th			
Course Title	:	Internship			
Course Code	:	BCS803			
Course Type (Theory/Practical/ Integrated)	:	Project			
Category	:	INT			
Stream	:	CSE		CIE	: 100 Marks
Teaching hours/ week (L:T:P:S)	:	0:0:0:10		SEE	: 100 Marks
Total Hours	:			SEE	: 3 Hours
Credits	:	10		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To enable students to apply theoretical knowledge to real-world problems and develop analytical, problem-solving, and critical thinking skills.
2	To promote teamwork, professional collaboration and effective interpersonal communication in a workplace environment.
3	To provide students with practical exposure to industry practices, tools, and professional work culture.
4	To enhance students' technical documentation and presentation skills through the preparation of a professional report and oral presentation.

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.

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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	Recall and explain core computer science concepts and technologies relevant to the internship domain.	Remember & understand	L2
CO2	Apply programming, database, and software engineering principles to perform assigned industrial tasks.	Apply	L3
CO3	Analyze real-time industrial problems, identify performance gaps, and propose suitable computing solutions.	Analyze	L4
CO4	Evaluate software systems, tools, and workflows in terms of efficiency, usability, and scalability.	Evaluate	L5
CO5	Design and develop a functional prototype, report or solution demonstrating innovation, teamwork, and professional ethics.	Create	L6

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	3	2								2			2	3		
CO2	3		3		2									2	3	
CO3		3		2	2								2		3	
CO4		3			2			1				2		2		3
CO5			3		3			2	2						3	2

