DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus V to VI Semester

Outcome Based Education

(Academic Year 2025-2026)

Department of COMPUTER SCIENECE AND DESIGN

5th & 6th 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 calibre 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 Computer Science and Design Department, established in 2021, is a dynamic and innovative centre of learning and research, dedicated to advancing the frontiers of technology and creative design. Our state-of-the-art facilities and experienced faculty provide students with a robust education in programming, algorithms, data structures, artificial intelligence, and user experience design. We emphasize critical thinking, problem-solving, and hands-on experience, ensuring our graduates are well-equipped for the challenges of the tech and design industries. Through industry partnerships, internships, and collaborative projects, students gain real-world experience and professional growth opportunities. The department is committed to fostering a supportive and inclusive environment, encouraging creativity, and inspiring future leaders in computer science and design.

VISION OF THE DEPARTMENT

Envisions to become a renowned faculty of engineering globally with a profound impact on the society through continual innovation in education and research in the field of Computer Science & Design

MISSION OF THE DEPARTMENT

• To create technology enabled experiential learning environment for students focusing on development of problem solving and design thinking

• To collaborate with Industries, R & D organizations and Universities to solve socially relevant problems through joint research in the field of Computer Science keeping design as a focus

• To create a conducive environment for faculty to upskill and reskill themselves

• To attract talented faculty to the work force and talented students to the program

PROGRAM EDUCATION OBJECTIVES (PEO'S):

• To create technology enabled experiential learning environment for students focusing on development of problem solving and design thinking

• To collaborate with Industries, R& D organizations and Universities to solve socially relevant problems through joint research in the field of Computer Science keeping design as a focus

• To create a conducive environment for faculty to upskill and reskill themselves

• To attract talented faculty to the work force and talented students to the program.

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)

1. Students will have the knowledge of Computer hardware, system software, algorithms, networking and data bases 2. Students will be able to design, analyze and develop efficient and secure algorithms using appropriate data structures, databases for processing of data. 3. Students will be capable of developing stand alone, embedded and web-based solutions having easy to operate interface using software engineering practices and contemporary computer programming languages. 4. Students will be able to demonstrate ability to self-learn, write technical articles, project reports and research papers**.**

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSED UG SCHEME

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

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 3rd & 4th Sem

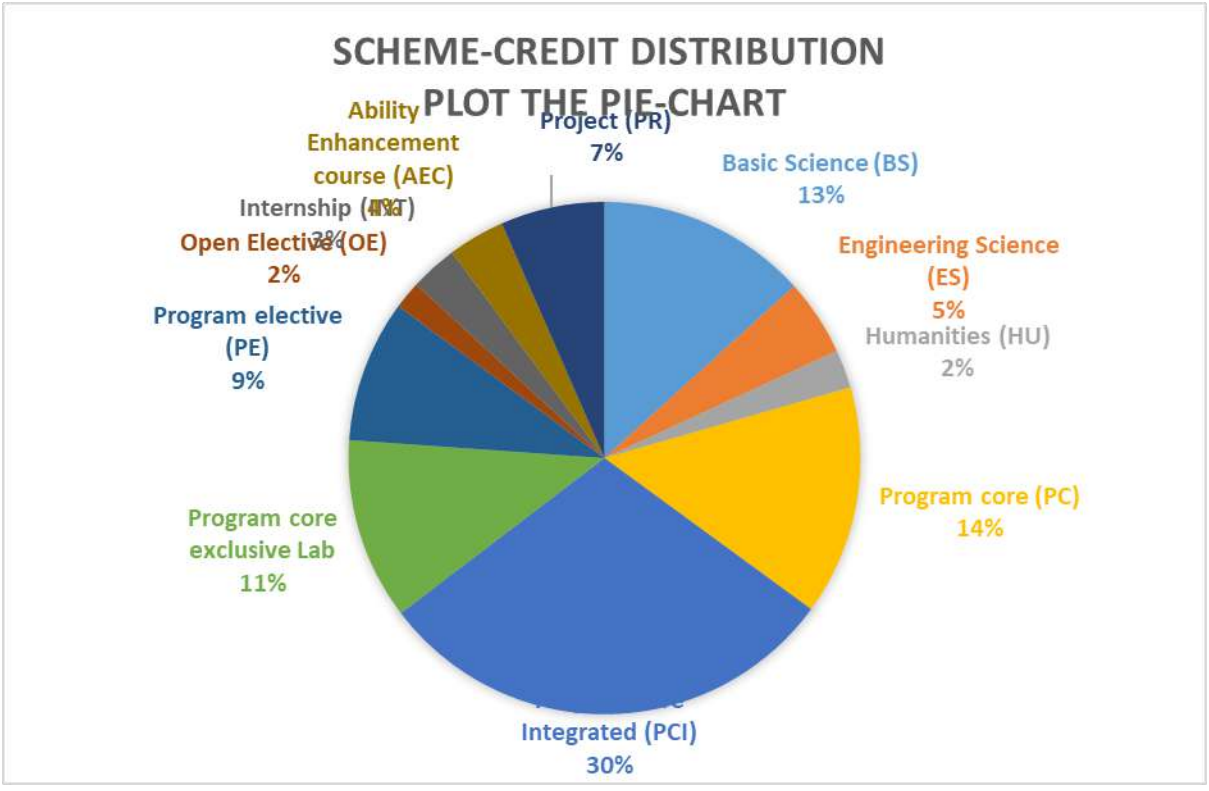
5th Sem & 6th Sem

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

Scheme Distribution

Department of COMPUTER SCIENCE AND DESIGN

Course Component	Credits	% of Credits
Basic Science (BS)	22	13.75
Engineering Science (ES)	09	5
Humanities (HU)	04	2.5
Program core (PC)	24	15
Program core Integrated (PCI)	49	30.62
Program core exclusive Lab	19	11.87
Program elective (PE)	15	9.3
Open Elective (OE)	03	1.8
Internship (INT)	05	3.1
Ability Enhancement course (AEC)	06	3.7
Project (PR)	11	6.8
Total	**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					22
Engineering Sciences (ESC)	3	6							9
Humanities, Social Sciences and Management (HSMC)	2	2							4
Ability Enhancement Course (AEC)	1	1	1	1	1	1			6
Universal Human Values (UHV)			1	1	1	1			4
Professional Core Courses (PCC)			6	6	6	3	3		24
Integrated Professional core Course (IPCC)	6	3	8	8	8	8	8		49
Professional Elective Course (PEC)					4	4	4	3	15
Institutional Open Elective Courses (IOE)						3			3
Internship (INT)							5		5
Mini Project / Project Work (PW)			2	2	2	2		11	19
Non-credit Mandatory Courses (NCMC)									
Total Credits	20	20	21	21	22	22	20	14	160

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, CIVIL)

Scheme of Teaching and Examinations – 2025
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2025-26)

5th SEMESTER: COMPUTER SCIENCE & DESIGN (CSD)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total Hrs/week		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCG501	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
2	BCG502	SOFTWARE ENGINEERING AND AGILE METHODOLOGIES	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
3	BCG503	THEORY OF COMPUTATAION	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
4	BCG504X	PROFESSIONAL ELECTIVE COURSE -1	PEC-1	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
5	BCG505	MOBILE APPLICATION DEVELOPMENT-MINI PROJECT	PBL	CSD	CSD	0	2	0	2	4	3	3hrs	50	50	100
6	BCG506	OBJECT ORIENTED MODELLING AND DESIGN PATTERNS LAB	PCCL	CSD	CSD	0	0	2	0	2	2	2hrs	50	50	100
7	BCG507X	A) UI/UX LAB B) RESEARCH METHODOLOGY AND IPR	AEC	CSD	CSD	1	0	0	0	1	1	2hrs	50	50	100
8	BCG508	ENVIRONMENTAL STUDIES AND E-WASTE MANAGEMENT	HSMS	CSD	CSD	2	0	0	0	2	2	2hrs	50	50	100
9	BPEK509 ,BNSS509, BYOK509	NSS, Sports, Yoga	NCMC	CSD	CSD	0	0	2	0	2	0	-	100	-	100
AICTE Activity Points Mandatory					Total	15	4	8	4	27	22	21	500	400	900

PROFESSIONAL ELECTIVE COURSE-2	
SALESFORCE AI WITH DATA CLOUD MASTER	BCG504A
AMAZON WEB SERVICES WITH DEVOPS	BCG504B

6th SEMESTER: COMPUTER SCIENCE & DESIGN (CSD)

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	BCG601	DEEP LEARNING	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
2	BCG602	CRYPTOGRAPHY AND NETWORK SECURITY	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
3	BCG603	HUMAN COMPUTER INTERFACE	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
4	BCG604X	PROFESSIONAL ELECTIVE COURSE-2	PEC-2	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
5	BCG6XX	OPEN ELECTIVE	OEC-1	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
6	BCG606	PROJECT PHASE-1	PWP-1	CSD	CSD	0	0	0	2	2	2	3hrs	100	0	100
7	BCG607	GENERATIVE AI	PCCL	CSD	CSD	0	0	2	0	2	2	2hrs	50	50	100
8	BCG608A BCG608B	AGENTIC AI MLOPS	AEC	CSD	CSD	0	0	2	0	2	1	2hrs	50	50	100
9	BPEK609, BNSK609, BYOK609	NSS, Sports, Yoga	NCMC	CSD	CSD	0	0	0	0	0	0	--	100	0	100
AICTE Activity Points Mandatory		Total									22	22	500	400	900

PROFESSIONAL ELECTIVE COURSE-2	
NATURAL LANGUAGE PROCESSING	BCG604A
BLOCKCHAIN TECHNOLOGY	BCG604B

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

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 practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

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

Newly introduced subjects in the syllabus

		5th Semester	6th Semester
1.	**List of Existing Elective Courses**	1. VIDEO PROCESSING 2. ARTIFICIAL INTELLIGENCE 3. UNIX SYSTEM PROGRAMMING 4. DESIGNING HUMAN CENTRED SYSTEMS	1. INTRODUCTION TO DATA STRUCTURES 2. FUNDAMENTALS OF OPERATING SYSTEMS 3. INTRODUCTION TO ARTIFICIAL INTELLIGENCE 4. MOBILE APPLICATION DEVELOPMENT WITH FLUTTER
2.	**List of New Existing Elective Courses**	1. SALESFORCE AI WITH DATA CLOUD MASTER 2. AMAZON WEB SERVICES WITH DEVOPS	1. HUMAN COMPUTER INTERFACE 2. DEEP LEARNING 3. MLOPS 4. AGENTIC AI
3.	**List of New Industry Aligned Courses**	1. SALESFORCE AI WITH DATA CLOUD MASTER 2. AMAZON WEB SERVICES WITH DEVOPS	1. HUMAN COMPUTER INTERFACE 2. DEEP LEARNING

Percentage of Change in the Syllabus

5th Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
1	BCG501	DEEP LEARNING	Lab introduced		30%	
2	BCG502	SOFTWARE ENGINEERING AND AGILE METHODOLOGIES	New topic added Agile methodologies		30%	
3	BCG503	THEORY OF COMPUTATAION				
4	BCG504	a) SALESFORCE AI WITH DATA CLOUD MASTER b) AMAZON WEB SERVICES WITH DEVOPS	Industry driven -Newly Introduced		60%	
5	BCG505	MOBILE APPLICATION DEVELOPMENT	Mini Project			
6	BCG506	OBJECT ORIENTED MODELLING AND DESIGN PATTERNS LAB	New software tool introduced -Industry driven			
6th Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
1	BCG601	ARTIFIFCIAL INTELLIGENCE AND MACHINE LEARNING				
2	BCG602	HUMAN COMPUTER INTERFACE	New course introduced		50%	
3	BCG603	CRYPTOGRAPHY AND NETWORK SECURITY				
4	BCG604	a) NATURAL LANGUAGE PROCESSING b) BLOCKCHAIN TECHNOLOGY	New course introduced		50%	
5	BCG607	GENERATIVE AI	New course introduced		50%	
6	BCG608	UI/UX LAB	Industry driven tools		60%	

5th 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	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th Semester**				
Course Title	:	**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**				
Course Code	:	**BCG501**				
Course Type (Theory/ Practical/ Integrated)	:	**INTEGRATED**				
Category	:	**IPCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**05**		**SEE Duration**	:	**3hrs**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand the basic theory underlying machine learning, types, and the process.
2	To become familiar with data and visualize univariate, bivariate, and multivariate data using statistical techniques and dimensionality reduction.
3	To understand various machine learning algorithms such as similarity-based learning, regression, decision trees, and clustering.
4	To familiarize with learning theories, probability-based models, and reinforcement learning, developing the skills required for decision-making in dynamic environments.

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 -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: Definition of AI**. Agents and environment, Concept of Rationality, The nature of environment, The structure of agents. Problem- solving: Problem-solving agents, Example problems, Searching for Solutions.	8
Pedagogy	**Case Studies on Applications of AI**	
2	**Uninformed Search Strategies**: Breadth First search, Depth First Search, Iterative deepening depth first search Informed Search Strategies: Heuristic functions, Greedy best first search, A* search.	8
Pedagogy	**Poster Presentation on various AI algorithms**	
3	**Introduction to Machine Learning:** Need for Machine Learning, Machine Learning Explained, Machine Learning in Relation to Other Fields, Types of Machine Learning, Challenges of Machine Learning, Machine Learning Process, Machine Learning Application. **Understanding Data:** Introduction, Big Data Analytics and Types of Analytics, Big Data Analysis Framework, Descriptive Statistics, Univariate Data Analysis and Visualization, Bivariate Data and Multivariate Data. Multivariate Statistics, Essential Mathematics for Multivariate Data.	8
Pedagogy	**Data Exploration and Multivariate Statistics Project**	
4	**Basics of Learning Theory:** Introduction to Learning and its Types, Introduction to Computation Learning Theory, Design of a Learning System, Introduction to Concept Learning, Induction Biases, Modelling in Machine Learning. **Similarity-based Learning:** Introduction to Similarity or Instance-based Learning, Nearest-Neighbor Learning, Weighted K-Nearest-Neighbour Algorithm, Nearest Centroid Classifier, Locally Weighted Regression (LWR).	8
Pedagogy	**Group Activity: Machine Learning Applications Brainstorm**	
5	**Regression Analysis:** Introduction to Regression, Introduction to Linearity, Correlation, and Causation, Introduction to Linear Regression, Validation of Regression Methods, Multiple Linear Regression, Polynomial Regression, Logistic Regression. **Models Based on Decision Trees:** Introduction to Decision Tree, Decision Tree for Classification, Impurity Measures for Decision Tree Construction, Properties of Decision Tree Classifier (DTC), Applications in Breast Cancer Data.	8

Pedagogy: Hands-on Activities in Decision Trees and Bayesian Learning	
	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:

Sl. No.	Experiments/Programs	COs
1	Implement A* star algorithm	**CO3,CO4**
2	Implement AO* star algorithm	**CO3,CO4**
3	Develop a program to create histograms for all numerical features and analyse the distribution of each feature. Generate box plots for all numerical features and identify any outliers. Use California Housing dataset.	**CO3,CO4**
4	Develop a program to Compute the correlation matrix to understand the relationships between pairs of features. Visualize the correlation matrix using a heatmap to know which variables have strong positive/negative correlations. Create a pair plot to visualize pairwise relationships between features. Use California Housing dataset.	**CO3,CO4**
5	Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.	**CO3,CO4**
6	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.	**CO3,CO4**
7	Develop a program to implement k-Nearest Neighbour algorithm to classify the randomly generated 100 values of x in the range of [0,1]. Perform the following based on dataset generated. a. Label the first 50 points {x1,……,x50} as follows: if (xi ≤ 0.5), then xi ∈ Class1, else xi ∈ Class1 b. Classify the remaining points, x51,……,x100 using KNN. Perform this for k=1,2,3,4,5,20,30	**CO3,CO4**
8	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs	**CO3, CO4**
9	Develop a program to demonstrate the working of Linear Regression and Polynomial Regression. Use Boston Housing Dataset for Linear Regression and Auto MPG Dataset (for vehicle fuel efficiency prediction) for Polynomial Regression.	**CO3, CO4**
10	Develop a program to demonstrate the working of the decision tree algorithm. Use Breast Cancer Data set for building the decision tree and apply this knowledge to classify a new sample.	**CO3, CO4**
Open ended Programs		

1	"How would you approach building a machine learning model to predict student performance in a university course?	**CO3, CO4**
2	Describe the types of data you would need, the model selection process, and how you would evaluate its success."	**CO3, CO4**
3	"Discuss the ethical implications of using machine learning in hiring decisions. What steps can be taken to ensure fairness, transparency, and accountability?"	**CO3, CO4**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Stuart J. Russell and Peter Norvig , Artificial Intelligence, 3rd Edition, Pearson, 2015.
2	S Sridhar and M Vijayalakshmi, "Machine Learning", Oxford University Press, 2021.
Reference Books	
1	Tom M. Mitchell, "Machine Learning", McGraw-Hill Education, 2013.
2	Miroslav Kubat, "An Introduction to Machine Learning", Springer, 2017.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Demonstrate the need for machine learning, its relationship to other fields, and different types of machine learning	L2	UNDERSTANDING
CO2	Illustrate the fundamental principles of multivariate data and apply dimensionality reduction techniques	L2	UNDERSTANDING
CO3	Apply similarity-based learning methods and perform linear, polynomial regression analysis	L3	APPLY
CO4	Apply decision trees for classification and regression problems, and Bayesian models for probabilistic learning	L3	APPLY
CO5	Analyse the clustering algorithms and reinforce their understanding by applying Q-learning for decision making tasks	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.drssridhar.com/?page_id=1053
2	https://www.universitiespress.com/resources?id=9789393330697
3	https://onlinecourses.nptel.ac.in/noc23_cs18/preview
4	https://www.geeksforgeeks.org/machine-learning/
5	https://www.w3schools.com/python/python_ml_getting_started.asp
6	https://www.tutorialspoint.com/machine_learning/index.htm

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	5	5	-	-	-
Understand	20	20	10	10	-
Apply	20	20	20	20	25

Analyze	5	2	20	20	25
Evaluate					
Create					

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	20						20	20%
CO2		20					20	20%
CO3			10	10			20	20%
CO4					20		20	20%
CO5						20	20	20%
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	10
Understand	30
Apply	30
Analyze	30
Evaluate	
Create	

SEE Course Plan

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

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	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		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

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
		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	:	**5Th Semester**				
Course Title	:	**SOFTWARE ENGINEERING AND AGILE METHODOLOGIES**				
Course Code	:	**BCG502**				
Course Type (Theory/ Practical/ Integrated)	:	**INTEGRATED**				
Category	:	**IPCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3hrs**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand Software Engineering Principles
2	Apply Agile Methodologies in Software Projects
3	Apply Software Engineering Techniques within Agile
4	Assess Project Requirements and Constraints
5	Communicate Process Decisions Effectively

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 -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 - Overview of Software Development Projects, Emergence of Software Engineering, Software Metrics Software Life Cycle Models - Basic Concepts, Waterfall Model and its Extensions, Rapid Application Development, Agile Development Models: Essential Ideas Behind Agile Models, Agile vs. Other Models, Spiral Model, Comparison of Different Life Cycle Models	8
Pedagogy	**Concept Mapping (Software Metrics and Life Cycle Models)**	
2	Requirements Analysis and Specification - Requirements Gathering and Analysis, Software Requirements Specification (SRS) Case Study - IEEE SRS Software Design - Overview of the Design Process, Characteristics of Good Software Design: Cohesion and Coupling, Approaches to Software Design Function-Oriented Software Design - Overview of SA/SD Methodology, Structured Analysis: Developing the DFD Model of a System, Structured Design and Detailed Design	8
Pedagogy	**IEEE SRS Case Study Analysis**	
3	Software Project Management - Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques: Empirical Estimation Techniques, COCOMO (A Heuristic Estimation Technique), Scheduling and Team Structures	8
Pedagogy	**Team Structure Role-Play and Design**	
4	Understanding Agile - What is Agile?, The Agile Manifesto and Principles, Why Agile Works Better than Traditional Models Kanban and Lean - Introduction to Kanban Method, Lean Principles in Agile Jira Fundamentals - Overview of Jira: Project Boards, Enrich Issues, Kanban Boards, Scrum Projects, Quick Search and Basic Search, JQL (Jira Query Language), Filters, Epics, Dashboards	8
Pedagogy	**Agile Manifesto Deep-Dive & Group Reflection**	

5	Understanding XP - The XP Life cycle, The XP Team, XP Concepts, Software Configuration Management - Configuration Management Process, Version Control Systems, Change Management and Control	**8**
	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	
	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:

Sl. No.	Experiments/Programs	COs
1	Setting Up a Scrum Project in Jira for a To-Do List Application	**CO3,CO4**
2	Requirements Analysis and IEEE SRS with Scrum and Jira	**CO3,CO4**
3	Software Design with Scrum and Jira	**CO3,CO4**
4	Software Project Management with Scrum and Jira	**CO3,CO4**
5	Kanban and Lean Principles in Jira	**CO3,CO4**
6	Extreme Programming (XP) Practices with Scrum and Jira	**CO3,CO4**
7	Software Configuration Management with Git and Jira	**CO3,CO4**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Fundamentals of Software Engineering, Rajib Mall, 5th Edition, Publisher PHI Learning, 2018
2	Agile Foundations: Principles, Practices, and Frameworks, Peter Measey,1st Edition, Publisher BCS Learning & Development Limited,2015
3	Atlassian Jira Service Desk A Complete Guide, Gerardus Blokdyk, 1st Edition, Publisher 5STARCooks,2020
Reference Books	
1	Essential Scrum: A Practical Guide to the Most Popular Agile Process,, Kenneth Rubin, Pearson,2017
2	Hands-On Agile Software Development with JIRA: Design and manage software projects using the Agile methodology, David Harned, Packt,2018

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the principles of software engineering frameworks and processes.	L3	APPLY
CO2	Apply agile practices and software engineering techniques to manage and develop software projects using agile tools.	L3	APPLY
CO3	Analyze different software development models and agile practices to select the most effective approach for specific project requirements	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=Fi3_BjVzpqk
2	https://www.youtube.com/watch?v=83-S5Qu6VP8
3	https://www.youtube.com/watch?v=lr0vA_p6T7Q
4	https://www.youtube.com/watch?v=8eVXTylZ1Hs
5	https://www.youtube.com/watch?v=Yc8sCSeMhi4

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	20	20	20
Understand	30	30	30	30
Apply				
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%

CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

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
		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	:	**5Th Semester**				
Course Title	:	**Theory of Computation**				
Course Code	:	**BCG503**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**03**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Introduce core concepts in Automata and Theory of Computation.
2	Identify different Formal Language Classes and their Relationships.
3	Learn concepts of Grammars and Recognizers for different formal languages
4	Prove or disprove theorems in automata theory using their properties
5	Determine the decidability and intractability of Computational problems

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 -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 Finite Automata, Structural Representations, Automata and Complexity. The Central Concepts of Automata Theory. Deterministic Finite Automata, Nondeterministic Finite Automata, An Application: Text Search, Finite Automata with Epsilon-Transitions.	8
Pedagogy	**DFA/NFA Construction Challenge**	
2	Regular Expressions, Finite Automata and Regular Expressions, Proving Languages not to be Regular. Closure Properties of Regular Languages, Equivalence and Minimization of Automata, Applications of Regular Expressions	8
Pedagogy	**Automata Minimization Puzzle**	
3	Context-Free Grammars, Parse Trees, Ambiguity in Grammars and Languages, Ambiguity in Grammars and Languages, Definition of the Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.	8
Pedagogy	**Grammar Ambiguity Investigation**	
4	Normal Forms for Context-Free Grammars, The Pumping Lemma for Context-Free Languages, Closure Properties of Context-Free Languages.	8
Pedagogy	**Closure Properties of Context-Free Languages – Group Discussion and Problem Solving**	
5	Introduction to Turing Machines: Problems That Computers Cannot Solve, The Turing Machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Undecidability: A Language That Is Not Recursively Enumerable	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman," Introduction to Automata Theory, Languages and Computation", Second Edition, Pearson.
Reference Books	
1	Elain Rich, "Automata,Computability and complexity", 1st Edition, Pearson Education,2018.
2	. K.L.P Mishra, N Chandrashekaran , 3rd Edition , 'Theory of Computer Science",PHI,2012.
3	Peter Linz, "An introduction to Formal Languages and Automata ", 3rd Edition, Narosa Publishers,1998.
4	Michael Sipser : Introduction to the Theory of Computation, 3rd edition, Cengage learning,2013.
5	John C Martin, Introduction to Languages and The Theory of Computation, 3rd Edition, Tata McGraw –Hill Publishing Company Limited, 2013.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the fundamentals of automata theory to write DFA, NFA, Epsilon-NFA and conversion between them.	L3	APPLY
CO2	Prove the properties of regular languages using regular expressions	L3	APPLY
CO3	Design context-free grammars (CFGs) and pushdown automata (PDAs) for formal languages.	L3	APPLY
CO4	Design Turing machines to solve the computational problems.	L3	APPLY
CO5	Explain the concepts of decidability and undecidability.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO5	3											3		

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/106/105/106105196/
2	https://archive.nptel.ac.in/courses/106/106/106106049/
3	https://nptelvideos.com/course.php?id=717

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	10	10	20	20
Apply	20	20	30	30
Analyse	20	20		
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
CO6					5	5	10	10%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
Evaluate	
Create	

SEE Course Plan

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

PROFESSIONAL ELECTIVE COURSE-1(PEC)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th Semester**				
Course Title	:	**SALESFORCE AI WITH DATA CLOUD MASTER**				
Course Code	:	**BCG504A**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Gain a foundational understanding of Salesforce Data Cloud, including its architecture, features, and Capabilities
2	Learn how Data Cloud integrates with other Salesforce products to create a unified customer view.
3	Learn how to ingest and manage data within Data Cloud; Understand how to create unified customer profiles by linking data from multiple sources using identity resolution rulesets.
4	To Learn the foundational concepts of artificial intelligence, including machine learning, natural language processing, and predictive analytics.
5	To get in depth knowledge on how to integrate AI solutions within the Salesforce ecosystem, ensuring seamless operation with existing Salesforce products and services.

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 -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 Data : Learn How Data + AI + CRM Work Together, Data Modelling; Data Management, Data Quality, Data Literacy Basics. Salesforce Data Cloud: Salesforce Data Cloud : Quick Look; Unlock your Data with Data Cloud, Data Cloud Powered Experiences.	8
Pedagogy	**Data Cloud Use Case Exploration & Group Presentation**	
2	Data Cloud Applied : Data Spaces in Data Cloud, Data Cloud use Cases, Data Cloud Basics for marketers; Customer Data Platform Strategy, Data Cloud for Commerce. Data Cloud advanced topics : Data Cloud for Admins, Data Cloud Solutions for AppExchange, Ingestion and Modelling in Data Cloud, Packaging and Data kits in the Data Cloud, Customer 360 Data Model for Data Cloud, Streaming Data Transforms in Cloud, Batch Data Transforms in Data Cloud.	8
Pedagogy	**Hands-on Data Cloud Project: Creating a Data Stream**	
3	Analytics on Data Cloud: Data and Identity in the Data Cloud; Segmentation and Activation; Insights Builder in Data Cloud; Data Cloud Insights; Data Cloud insights using SQL; Project : Get Hands on with Data Cloud- Create a Data Stream in Data Cloud; Quick Start : Create an Identity Resolution Ruleset; Project : Quick Start - Enhance Data with Insights; Project - Quick Start : Create a Data Cloud Segment;	8
Pedagogy	**AI for Business Strategy - Case Study Analysis**	
4	Data Cloud and External Data with Data Lakes : BYOL Data Shares in Data Cloud, Project - Improve Data Quality for your Sales and Support Teams, Web Engagement Data in the Data Cloud; Data Cloud in Flows; Unstructured Data in the Data Cloud. Data Analytics and Tableau: Data Analytics Fundamentals; Correlation and Regression	8
Pedagogy	**Hands-on Project: Quick Start with Einstein Copilot**	
5	Tableau Basics; The Tableau Data Model; Data Presentation in Tableau; Metadata Management in Tableau; Detailed Data Analysis; The Tableau Workflow. Artificial Intelligence Fundamentals: Data Fundamentals for AI, Artificial Intelligence Fundamentals; Artificial Intelligence for Business; Natural Language Processing Basics; Large Language	8

	Models; Model Fine-Tuning; Machine Learning Predictions; Data Bias Recognition and Prevention in AI; Artificial Intelligence for Marketing. Generative AI : Generative AI Basics; Generative AI for Organizations; Generative AI for Images	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Damiana Spadafora, Lars Malmqvist, "Tableau for Salesforce: Visualise data and generate insights with the leading platforms for data analytics", 1st Edition, 2024, BPB Publications
Reference Books	
1	Joyce Kay Avila, "Hands-On Salesforce Data Cloud: Implementing and Managing a Real-Time
2	Customer Data Platform", 1st Edition, 2024, O'Reilly Publications
3	Gourab Mukherjee, "Ultimate Salesforce Data Cloud for Customer Experience: Explore, Implement,
4	Eliot Harper, "Salesforce Data Cloud Architect's Handbook", 1st Edition, 2024, Harper Pub.
5	Lindy Ryan, "Visual Analytics Fundamentals: Creating Compelling Data Narratives with Tableau", 1st

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Master the skills needed to manage and manipulate data within the Data Cloud, including data modelling and data quality management.	L2	UNDERSTAND
CO2	Learn how to use Data Cloud to generate actionable insights and analytics.	L2	UNDERSTAND
CO3	Customize AI models to improve accuracy and relevance in predictions and recommendations	L3	APPLY

CO4	Formulate strategies to incorporate AI into existing workflows, such as Einstein, Einstein Copilot, Generative AI along with Agent force	L3	APPLY
CO5	Understand the importance of change management in AI implementation.	L2	UNDERSTAND

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		
CO2	3				2								3		
CO3		3			2								3		
CO4	3				2								3		
CO5	3												3		
CO6			3	3	3								3		

Weblinks and Video Lectures (e-Resources)	
1	https://trailhead.salesforce.com/users/strailhead/trailmixes/unlock-your-data-with-data-cloud
2	https://trailhead.salesforce.com/content/learn/trails/explore-customer-360-audiences
3	https://trailhead.salesforce.com/users/strailhead/trailmixes/drive-productivity-with-einstein-ai
4	https://trailhead.salesforce.com/content/learn/trails/get-started-with-prompts-and-prompt-studio

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	10	10	**20**	**20**
Apply	20	20	**30**	**30**
Analyse	20	20		
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
CO6					5	5	10	10%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
Evaluate	
Create	

SEE Course Plan

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

CO5				**5**	**10**	**10**	**25**	**25%**
Total					**5**	**5**	**10**	**10%**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th Semester**				
Course Title	:	**AMAZON WEB SERVICES AND DEVOPS**				
Course Code	:	**BCG504B**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand how to use Amazon CloudWatch to monitor system metrics, configure alarms, and analyze resource utilization for effective cloud infrastructure management.
2	Analyze AWS service logs and performance metrics to identify, troubleshoot, and resolve system performance issues, leading to improved resource optimization.
3	Apply AWS CloudTrail to track user activities and API calls, ensuring compliance with security and audit requirements.
4	Implement Auto Scaling policies to dynamically adjust resource capacity based on real-time demand patterns.
5	Evaluate the performance of distributed applications and identify bottlenecks using AWS X-Ray, with the goal of optimizing overall system performance

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

DSATM

Teaching-Learning Process (TLP)

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Cloud Computing & AWS Fundamentals Concepts to Cover, What is Cloud Computing? (IaaS, PaaS, SaaS) ,Benefits of cloud over traditional infrastructure, Introduction to AWS ecosystem ,AWS Free Tier and hands-on console usage ,Core AWS services: EC2, S3, RDS, IAM	8
Pedagogy	**Hands-on Activity: Create an AWS Free Tier account, Launch an EC2 instance, Host a static website using S3**	
2	Infrastructure as Code (IaC) & AWS CLI Concepts to Cover: What is Infrastructure as Code? ,Introduction to AWS CLI (Command Line Interface),AWS CloudFormation basics, IAM Roles, Policies and basic security	8
Pedagogy	**Hands-on Project: Automate EC2 and S3 provisioning using AWS CLI, Write a basic CloudFormation script to deploy a web app infrastructure**	
3	DevOps Lifecycle & CI/CD with AWS Concepts to Cover:, What is DevOps? — Culture, Principles, Lifecycle , CI/CD pipeline introduction ,Tools overview: Git, Jenkins, Docker	8
Pedagogy	**Hands-on Project: Set up a Git-based CI/CD pipeline using GitHub + AWS CodePipeline ,Deploy a simple Node.js or Python app to EC2 automatically**	
4	Containers and Docker on AWS Concepts to Cover: Introduction to Containers and Docker, Docker components: Images, Containers, Dockerfile ,Overview of ECS (Elastic Container Service) & EKS (Kubernetes) , Running containers on EC2 and ECS	8
Pedagogy	**Security Groups and Network ACLs: Containerize a sample app using Docker**	
5	Monitoring, Logging & DevOps Security Concepts to Cover: Importance of monitoring/logging in DevOps , AWS CloudWatch: Metrics, Logs, Alarms , DevOps Security Basics: ○ Secrets Management (AWS Secrets Manager, .env files) ○ IAM Policy Design (Least Privilege) ○ S3 Bucket Access Control	8
Pedagogy	**Use AWS Secrets Manager to store/retrieve credentials: Set IAM roles and secure S3 access**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving	

	• **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	"AWS Certified Solutions Architect Official Study Guide" by Joe Baron, Hisham Muhammad, Tim Bixler, and others.
2	"Amazon Web Services in Action" by Michael Wittig, Andreas Wittig.
Reference Books	
1	"Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl.
2	"AWS for Non-Engineers" by Hiroko Nishimura.

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Understand (Knowledge) how to use Amazon CloudWatch to monitor system metrics, set up alarms, and gain insights into resource utilization.	**Understand**	**L2**
CO2	Identify AWS service logs and metrics to troubleshoot performance issues and optimize resource usage.	**Apply**	**L2**
CO3	Apply (Application) AWS CloudTrail to track user activity and API calls, ensuring auditability and compliance.	**Apply**	**L3**
CO4	Implement (Synthesis) Auto Scaling policies to scale resources dynamically based on real-time demand.	**Apply**	**L3**
CO5	Develop application performance and troubleshoot bottlenecks using AWS X-Ray to optimize distributed applications	**Apply**	**L3**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1													3		
CO2	3												3		
CO3		3											3		
CO4	3												3		
CO5	3												3		
CO6			3	3	3								3		

Weblinks and Video Lectures (e-Resources)	
1	https://docs.aws.amazon.com/
2	https://aws.amazon.com/training/
3	https://aws.amazon.com/education/awseducate/
4	https://aws.amazon.com/architecture/well-architected/
5	https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/

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	10	10	**20**	**20**

Apply	20	20	**30**	**30**
Analyse	10	10		
Evaluate	10			
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
CO6					5	5	10	10%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
Evaluate	
Create	

SEE Course Plan

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

PROJECT BASED LEARNING(PBL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th Semester**				
Course Title	:	**MOBILE APPLICATION DEVELOPMENT**				
Course Code	:	**BCG505**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**Min-Proj**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**24**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn to setup Android application development environment
2	Illustrate user interfaces for interacting with apps and triggering actions
3	Interpret tasks used in handling multiple activities
4	Identify options to save persistent application data
5	Appraise the role of security and performance in Android 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 in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

Module No.	Topics
1	Get started, Build your first app, Activities, Testing, debugging and using support libraries
2	User Interaction, Delightful user experience, Testing your UI
3	Background Tasks, Triggering, scheduling and optimizing background tasks
4	All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders
5	Permissions, Performance and Security, Firebase and AdMob, Publish
6	How does Apache Cordova enable the development of mobile applications using web technologies like HTML, CSS, and JavaScript? Explain its role in bridging the gap between web and native platforms.
7	In what ways can Cordova be used to deploy a single web application across multiple mobile platforms, including Android? Illustrate the advantages and limitations of this approach.
8	3. Discuss the architecture of a Cordova-based mobile app. How does it differ from traditional Android app development using Java/Kotlin?
9	What are Cordova plugins and how do they enable access to native device features (such as the camera, GPS, or file system)? Provide examples of real-world use cases.
10	Compare and contrast hybrid app development using Cordova with other frameworks like React Native or Flutter

Course Outcomes: Students will be able to:

Sl. No	Course Outcomes
1	Create, test and debug Android application by setting up Android development environment
2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
3	Infer long running tasks and background work in Android applications
4	Demonstrate methods in storing, sharing and retrieving data in Android applications
5	Analyze performance of android applications and understand the role of permissions and security

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developerfundamentals-course-concepts/details (Download pdf file from the above link).
Reference Books	
1	"Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd, 2014
2	Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.
3	J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
4	Anubhav Pradhan, Anil V Deshpande, " Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

Weblinks and Video Lectures (e-Resources)	
1	Steps to Install : cordova.apache.org/#getstarted
2	cordova.apache.org/docs/en/latest/guide/cli/installation.html

PROFESSIONAL CORE COURSE LAB (PCCL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th SEMESTER**				
Course Title	:	**OBJECT ORIENTED MODELLING AND DESIGN PATTERN LAB**				
Course Code	:	**BCG506**				
Course Type (Theory/ Practical/ Integrated)	:	**PRACTICAL**				
Category	:	**PCCL**				
Stream	:	**2023**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce the fundamental principles and concepts of design patterns and their role in object-oriented software development
2	To equip the skills to identify and apply the most appropriate design patterns to solve common software design problems
3	To develop the ability to analyze the advantages and disadvantages of different design patterns in real-world applications.
4	To provide hands-on experience in implementing various design patterns using object-oriented programming languages.

List of Programs

Sl. No.	Experiments/Programs	COs
1	Design and implement ShapeFactory class that generates different types of Shape objects (Circle, Square, Rectangle) based on input parameters using Factory Design Pattern.	L3
2	Design and Implement an AbstractFactory class to create families of related or dependent objects with respect to decathlon store without specifying their concrete classes using Abstract Factory	L3
3	Design and implement a complex object like a House using a step-by-step Builder pattern, allowing different representations of the house (wooden, brick, etc.).	L3
4	Design and Implement to Extend a Coffee object with dynamic features (e.g., milk, sugar, whipped cream) using Decorators	L3
5	Design and Implement a Logger class ensuring a single instance throughout the application	L3
6	Design and implement an Adapter Pattern for a Music System.	L3
7	Design and Implement an Observer pattern for a news agency to notify subscribers of updates	L3
8	Design and Implement a Façade pattern for home theatre system.	L3
9	Design and Implement a Template Method for Document Processing (word, pdf, excel)	L3
10	Design and Implement weather monitoring system that notifies multiple display devices whenever the weather conditions change that follows the Observer Design Pattern.	L3
11	Design and Implement a Proxy pattern to control access to an object (e.g., a protected resource or remote service).	L3
12	Design and Implement a Mediator pattern to manage communication between a set of objects (e.g., chat room with multiple participants).	L3

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Design the model for the given problem using UML concepts and notations	L2	UNDERSTAND
CO2	Develop the solution for the given real world problem using design patterns	L3	APPLY
CO3	Analyse the results and produce substantial written documentation.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO2		1	3									2		2	
CO3 CO3		1							3			2		2	1

Weblinks and Video Lectures (e-Resources)	
1	https://www.udemy.com/course/design-patterns-java/?couponCode=ST6MT60525G3
2	https://nptel.ac.in/courses/106105224

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			
Understand	20	30		
Apply		20	30	30
Analyse			20	20
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								

Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	20
Apply	40
Analyse	40
Evaluate	
Create	

SEE Course Plan

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

1 Credit Course – Practical	
	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). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Continuous Internal Evaluation (CIE):** CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. • Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session. • Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. • Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). • Weightage to be given for neatness and submission of record/write-up on time. • Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. • In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. • The suitable rubrics can be designed to evaluate each student's performance and learning ability. • The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student. **Semester End Evaluation (SEE):** SEE marks for the practical course are 50 Marks.

	• SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
	• The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
	• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
	• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
	• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
	• General rubrics suggested for SEE are mentioned here,
	  • Writeup-20%,
	  • Conduction procedure and result in -60%,
	  • Viva-voce 20% of maximum marks.
	SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
	• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
	• The minimum duration of SEE is 02 hours.

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical (Internal Examiners only)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5TH SEMESTER**				
Course Title	:	**RESEARCH METHODOLOGY AND IPR**				
Course Code	:	**BCG507**				
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**				
Category	:	**AEC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand Fundamental Research Methodologies
2	Design a Research Study Using Appropriate Methods
3	Apply Ethical Guidelines in Research Practice
4	Apply IPR Principles in Research and Innovation
5	Identify and Define Research Problems Clearly

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 -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	Research Methodology: An Introduction - Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research methods vs Methodology, Research and scientific method, Research Process, Criteria of Good Research. Define the Research Problem - What is research problem, Selecting the problem, Necessity of Defining the problem, Technique involved in Defining a Problem Research Design - Meaning of Research Design, Need for Research Design, Features of Good Design, Important concepts Relating to Research Design, Different Research Design.	8
Pedagogy	Concept Mapping: Types and Approaches of Research	
2	. Design of Sample Surveys - Introduction, Sample Design, Sampling and Non-Sampling Errors, Sample Survey vs Census Survey, Types of Sampling Designs Chi-Square Tests - Test of Difference of more than Two proportions, Test of Independence of Attributes, Test of Goodness of Fit Analysis of Variance - The ANOVA technique, The Basic principle of ANOVA, One way ANOVA, Two way ANOVA, Latin-square Design.	8
Pedagogy	Group Activity: Design a Sample Survey	
3	Nature of Intellectual property, IPRs- Invention and Creativity - Importance and Protection of Intellectual Property Rights (IPRs) – procedure for grant of patents and patenting under PCT-types of patents technological research and innovation- international cooperation on IP	8
Pedagogy	Case Study: Technology Transfer and Innovation	
4	A brief summary of Patents-Copyrights-Trademarks, patent rights licensing and transfer of technology-patent databases-case studies on IPR-Geographical indications-new developments in IPR-protection of IPR rights.	8
Pedagogy	Interactive Session: Creativity and IP Protection - Designing an IP Strategy	

5	Interpretation and Report Writing - Meaning of Interpretation, Techniques of Interpretation, Precautions in Interpretation, Significance of Report Writing, Different steps in Writing Report, Layout of the Research Report, Types of Reports, Oral presentation, Mechanics of writing a research Report, Precautions of Writing Research Report.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Research Methodology: Methods and Techniques,C R Kothari, Gaurav Garg,Multicolor (Fourth),Published by New Age International Publishers,2019
2	An introduction to Research Methodology ,Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K,,RBSA Publishers,2002
3	Handbook of Intellectual property law and practise ,Subbaram NR, S Viswanathan Printers and Publishing Private Limited,1998
Reference Books	
1	"Research Methodology and Intellectual Property Rights" by Dr. Santosh M. Nejakar & Dr. Harish Bendigeri.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply appropriate research techniques to conduct studies and present findings.	L3	APPLY
CO2	Apply ethical principles in conducting research and intellectual property rights, ensuring the integrity and credibility of scientific inquiry.	L3	APPLY
CO3	Analyse various research problems and their solutions critically.	L3	ANALYZE

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.coursera.org/learn/res earch-methods
2	https://www.udemy.com/course/fu ndamentals-of-researchmethodology/

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				
Apply				
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	20
Apply	40
Analyse	40
Evaluate	
Create	

SEE Course Plan

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

1 Credit Course – Practical	
	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). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Continuous Internal Evaluation (CIE):** CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. • Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session. • Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. • Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). • Weightage to be given for neatness and submission of record/write-up on time. • Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. • In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. • The suitable rubrics can be designed to evaluate each student's performance and learning ability. • The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

	Semester End Evaluation (SEE):
	SEE marks for the practical course are 50 Marks.
	• SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
	• The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
	• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
	• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
	• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
	• General rubrics suggested for SEE are mentioned here,
	  • Writeup-20%,
	  • Conduction procedure and result in -60%,
	  • Viva-voce 20% of maximum marks.
	SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
	• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
	• The minimum duration of SEE is 02 hours.

ABILITY ENHANCEMENT COURSE (AEC)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th SEMESTER**				
Course Title	:	**UI/UX LAB**				
Course Code	:	**BCG507**				
Course Type (Theory/ Practical/ Integrated)	:	**PRACTICAL**				
Category	:	**AEC**				
Stream	:	**2023**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Chat App Redesign: Create a Wireframe and redesign any popular chat app	CO2,CO3
2	Food App: Create a wireframe, Design and Prototype the UI Pages for the food application.	CO2,CO3
3	Social Media App: Create a wireframe, Design and Prototype social media photo sharing app	CO2,CO3
4	Product Website: Design and prototype a product website page. Create web pages and rollovers for the web pages	CO2,CO3
5	Travel Agency Website: Create a wireframe, Design and prototype the UI for the website including design for Home Page with search bar, Activities page, Client Testimonial Page, Image Gallery	CO2,CO3
6	UI/UX Designer Portfolio Design: Create a wireframe, Design and prototype a UI for a portfolio including design for About page, Work showcase page, Blog page, contact page	CO2,CO3
7	Dashboard Design: Create a wireframe, Design and Prototype Dashboard UI page, add some Dashboard details, statistics and graphs, Add dropdown options for some dashboard details	CO2,CO3
8	E-Commerce Website: Create a wireframe, Design and prototype Web pages including product category pages (example: mobiles, gaming consoles, Speakers), product pages in each category, buynow page, add to cart page	CO2,CO3
9	Educational Website: Create a wireframe, Design and Prototype the UI for an educational website – Include a Homepage with footer, About Us Page, Programs	CO2,CO3
10	Music Player App: Create a wireframe, Design and prototype the pages with a background and a Rollover button, and Song selection Page with a Home Rollover button. The third page may include animated play and pause button, play music animation, timer animation.	CO2,CO3

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the basics of wireframing in designing apps and Websites.	L3	APPLY
CO2	Make use of Figma for designing and prototyping UI/UX for different types of apps and Websites.	L3	APPLY
CO3	Analyse user requirements and translate the requirements to design prototypes.	L3	APPLY
CO4	Demonstrate the UI/UX concepts applied when designing the prototype of apps and Websites.	L2	UNDERSTAND
CO5	Develop (redesign) the existing apps & Websites with customized design.	L3	APPLY

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.figma.com/
2	UX Programming for Beginners, August, 2022
3	https://www.udemy.com/course/learn-figma-web-design
4	https://www.udemy.com/course/figma-2023-master-class-realtime-uiux-web-projects

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	10	10	**20**	**20**
Understand	20	20	**30**	**30**
Apply	20	20		
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	
Apply	
Analyse	
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution		Weightage

	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5	Total Marks	
CO1	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	100%

1 Credit Course – Practical	
	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). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Continuous Internal Evaluation (CIE):** CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. • Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session. • Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. • Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). • Weightage to be given for neatness and submission of record/write-up on time. • Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. • In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. • The suitable rubrics can be designed to evaluate each student's performance and learning ability. • The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

- SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here,
    - Writeup-20%,
    - Conduction procedure and result in -60%,
    - Viva-voce 20% of maximum marks.

  SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
- The minimum duration of SEE is 02 hours.

6th 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	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**6th Semester**				
Course Title	**:**	**DEEP LEARNING**				
Course Code	**:**	**BCG601**				
Course Type (Theory/ Practical/ Integrated)	**:**	**INTEGRATED**				
Category	**:**	**IPCC**				
Stream	**:**	**CSD**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40 hours Theory + 20 Hours of Practical Classes**		**SEE Duration**	**:**	**3hrs**
Credits	**:**	**04**				

Course Learning Objectives: Students will be able to:

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

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 -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: What is a Neural Network?, The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Feedback, Network Architectures, Rosenblatt"s Perceptron: Introduction, Perceptron, The Perceptron Convergence Theorem, Relation Between the Perceptron and Bayes Classifier for a Gaussian Environment..	8
Pedagogy	**Concept Mapping Activity (Collaborative Learning)**	
2	Multilayer Perceptrons: Introduction, Batch Learning and On-Line Learning, The Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back- Propagation Algorithm Perform Better, Back Propagation and Differentiation.	8
Pedagogy	**Debug the String (Problem Solving)**	
3	Regularization for Deep Learning: Parameter Norm Penalties - L2 Parameter Regularization, Dataset Augmentation, Semi-Supervised Learning. Optimization for Training Deep Models: Challenges in Neural Network Optimization – Ill Conditioning, Local Minima, Plateaus, Saddle Points and Other Flat Regions.	8
Pedagogy	**Experiential Learning and Creative Coding**	
4	Convolution neural networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Convolutional Networks and the History of Deep Learning.	8
Pedagogy	**Servlet Lifecycle Roleplay (Concept Reinforcement)**	
5	Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to- Sequence	8

	Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Long Short-Term Memory and Other Gated RNNs	
Pedagogy	**Transaction Simulation (Problem Solving + Group Work)**	
	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:

Sl. No.	Experiments/Programs	COs
1	Design and implement a neural based network for generating word embedding for words in a document corpus	CO3
2	Write a program to demonstrate the working of a deep neural network for classification task.	CO3
3	Design and implement a Convolutional Neural Network (CNN) for classification of image dataset	CO3
4	Build and demonstrate an autoencoder network using neural layers for data compression on image dataset.	CO3
5	Design and implement a deep learning network for classification of textual documents.	CO3
6	Design and implement a deep learning network for forecasting time series data	CO3
7	Write a program to enable pre-train models to classify a given image dataset.	CO3
8	Write a program to read a dataset of text reviews. Classify the reviews as positive or negative.	CO3
	Open ended Programs	
1	Develop a convolutional neural network model for classifying images from a dataset of your choice (e.g., CIFAR-10, MNIST, or a custom dataset). Analyze and improve model performance using data augmentation and transfer learning.	CO3, CO4
2	Design a deep learning-based solution for detecting and localizing objects within images using models like YOLO or SSD. Evaluate precision and recall on different datasets.	CO3, CO4

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Simon Haykin, Neural networks and Learning Machines, Third Edition, Pearson, 2016
2	Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016. https://www.deeplearningbook.org/lecture_slides.html
Reference Books	
1	Deep Learning with Tensor Flow and Keras, Amita Kapoor, Antonio Gulli, Sujit Pal, Third Edition, Published by Packt , 2022
2	Learning Deep Learning: Theory and Practice of Neural Networks, Computer Vision, NLP, and Transformers using TensorFlow, Magnus Ekman, First Edition, Published by Addison-Wesley Professional,2021

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Analyse and interpret the concepts of neural networks relating to artificial intelligence.	L3	APPLY
CO2	Illustrate the learning processes and their statistical properties	L2	UNDERSTAND
CO3	Design deep learning models using regularization and convolutional operations.	L3	APPLY
CO4	Analyse sequential data to build recurrent and recursive models	L3	APPLY
CO5	. Develop and analyse the applications using Autoencoders.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO5	**3**	**3**	**3**		**3**							**3**	**3**		

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=7sB052Pz0sQ
2	https://www.youtube.com/watch?v=7sB052Pz0sQ
3	https://www.youtube.com/watch?v=Mubj_fqiAv8
4	https://www.coursera.org/learn/neural-networks-deep-learning
5	https://onlinecourses.nptel.ac.in/noc20_cs62/preview

CIE- Continuous Internal Evaluation (50 Marks)

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

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	**20**						**20**	**20%**

CO2		20					20	20%
CO3			10	10			20	20%
CO4					20		20	20%
CO5						20	20	20%
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	10
Understand	30
Apply	30
Analyse	30
Evaluate	
Create	

SEE Course Plan

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

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course - Professional Core 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	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**6th SEMESTER**				
Course Title	:	**CRYPTOGRAPHY AND NETWORK SECURITY**				
Course Code	:	**BCG602**				
Course Type (Theory/ Practical/ Integrated)	:	**INTEGRATED**				
Category	:	**IPCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40 hours Theory + 20 Hours of Practical Classes**		**SEE Duration**	:	**03HRS**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand Classical Encryption Techniques
2	Identify Real-World Applications of Cryptographic Techniques
3	Apply Classical Encryption Techniques to Solve Cryptographic Problems
4	Analyse the Structure and Operation of Block Ciphers
5	Effectively communicate and present, in a team setting, the principles, mechanisms, algorithms, and tools used in cryptography and network security

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 -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: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques – Caesar Cipher, Monoalphabetic Ciphers, Play fair Cipher, Hill Cipher, Polyalphabetic Ciphers, One-Time Pad, Transposition Techniques.	8
Pedagogy	**Encryption Technique Demonstration**	
2	Block Ciphers: Traditional Block Cipher Structure – Stream Ciphers and Block Ciphers, Motivation for the Feistel Cipher Structure, The Feistel Cipher, Block Cipher Design Principles, The Simplified Data Encryption Standard (S-DES) – S-DES Encryption, S-DES Decryption, S- DES Key Generation. Stream Ciphers: Stream Ciphers, RC4 – Initialization of S, Stream Generation, Strength of RC4.	8
Pedagogy	**Exploring Block and Stream Ciphers: Implementation, Key Generation, and Security**	
3	Public-Key Cryptosystems: Principles of Public-Key Cryptosystems – Public-Key Cryptosystems, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptosystems, Public-Key Cryptanalysis, The RSA Algorithm – Description of the Algorithm, Computational Aspects, The Security of RSA, Diffie-Hellman Key Exchange – The Algorithm, Key Exchange Protocols, Man-in-the-Middle Attack. Cryptographic Hash Functions: Secure Hash Algorithm (SHA) – SHA-512 Logic, SHA-512 Round Function, Examples.	8
Pedagogy	**Understanding Public-Key Cryptography: RSA, Diffie-Hellman, SHA-512, and Cryptanalysis**	
4	Key Management and Distribution: Symmetric Key Distribution using Symmetric Encryption, Symmetric Key Distribution using Asymmetric Encryption, Distribution of Public Keys. Transport-Level Security: Transport Layer Security – Architecture, Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol, Cryptographic Computations, Heartbeat Protocol, SSL/TLS Attacks, HTTPS – Connection Initiation, Connection Closure.	8

Pedagogy	**Key Management and Transport-Level Security: Symmetric and Asymmetric Encryption, TLS, and HTTPS**	
5	Digital Signatures: Digital Signatures – Properties, Attacks and Forgeries, Digital Signature Requirements, Direct Digital Signature, SCHNORR Digital Signature Scheme, NIST Digital Signature Algorithm. IP Security: IP Security Overview – Applications, Benefits, Routing Applications, IPsec Documents, IPsec Services, IP Security Policy – Security Associations and its Database, Security Policy Database, IP Traffic Processing, Encapsulating Security Payload – ESP Format, Encryption and Authentication Algorithms.	**8**
	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:

Sl. No.	Experiments/Programs	COs
1	Write a Java program that contains a string(char pointer) with a value \Hello World'.The programs should XOR each character in this string with 0 and display the result.	**CO3**
2	Write a Java program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.	**CO3**
3	Write a Java program to perform encryption and decryption using the following algorithms: a. Ceaser Cipher b. Substitution Cipher c. Hill Cipher	**CO3**
4	Write a Java program to implement the DES algorithm logic	**CO3**
5	Write a JAVA program to implement the Diffie-Hellman Key Exchange Algorithm	**CO3**
6	Write a Java Program to Calculate the message digest of a text using the SHA-1 algorithm	**CO3**
7	Write the RC4 logic in Java Using Java Cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.	**CO3**
8	Write a Java program to implement RSA Algorithm.	**CO3**
	Open ended Programs	
1	Design and Implement a Custom Encryption-Decryption System Objective	**CO3, CO4**
2	Simulate Secure Message Transmission Using RSA and Digital Signatures	**CO3, CO4**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Cryptography and Network Security – Principles and Practice by William Stallings, Person, 7th Edition, 2017.
Reference Books	
1	Network Security Essentials Applications and Standards, William Stallings, Pearson, 4th Edition, 2012
2	Network Security Private Communication in a Public world, Charlie Kaufman, Radia Perlman and Mike Speciner, 2nd Edition, PHI, 2013
3	Network Security and Management, Brijendra Singh, 3rd Edition, PHI, 2013.

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 basic concepts of classical encryption techniques, block ciphers, stream ciphers, cryptographic functions, key management and IP security.	L2	UNDERSTAND
CO2	Apply the knowledge of classical encryption techniques to solve cryptographic problems, public key cryptosystems, hash functions and key distribution techniques.	L3	APPLY
CO3	Analyse the structure of various block ciphers, stream ciphers, transport level security, IP security and digital signatures.	L3	APPLY
CO4	Make an effective communication and presentation in a team on different algorithms or tools used in cryptography and network security.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO4	3	3										2	3		
CO5	3	3			2							2	3		

Weblinks and Video Lectures (e-Resources)	
1	https://dl.hiva-network.com/Library/security/Cryptography-and-network-securityprinciples- and-practice.pd
2	https://imcs.dvfu.ru/lib.int/docs/Networks/Security/Network%20Security%20Foundations.pdf
3	https://www.mooc-list.com/course/network-security-wma
4	https://www.coursera.org/specializations/applied-crypto

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	20	20	20
Understand	30	30	30	30
Apply				
Analyse				
Evaluate				
Create				

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	5	5					10	10%

CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	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
		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	:	**6th SEMESTER**				
Course Title	:	**HUMAN COMPUTER INTERFACEE**				
Course Code	:	**BCG603**				
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**				
Category	:	**PCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**03HRS**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2	Recognize how a computer system may be modified to include human diversity.
3	Select an effective style for a specific application
4	Design mock ups and carry out user and expert evaluation of interfaces
5	Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction 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 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 -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: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.	8
Pedagogy	**Practical Activities in User Interface and Web Design**	
2	Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions. Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design	8
Pedagogy	**Hands-on Activities in Human-Computer Interaction and Screen Design**	
3	Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors	8
Pedagogy	**Exploring Windows, Navigation Schemes, and Interface Components Design**	
4	HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction	8
Pedagogy	**Exploring HCI in Software Development: Design, Evaluation, and Universal Principles**	

5	Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood –augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.Units 1,2,3
2	Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5.
Reference Books	
1	Human – Computer Interaction. D. R. Olsen, Cengage Learning
2	Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech
3	User Interface Design, SorenLauesen , Pearson Education

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand to express syntax and semantics in formal notation.	**L2**	**UNDERSTAND**
CO2	Employ to apply suitable programming paradigm for the application.	**L3**	**APPLY**
CO3	Design to program in different language paradigms and evaluate their relative benefits	**L3**	**APPLY**

CO4	Understand the programming paradigms of modern programming languages	**L2**	**UNDERSTAND**
CO5	Knowledge to compare the features of various programming.	**L3**	**APPLY**

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

Weblinks and Video Lectures (e-Resources)	
1	http://courses.iicm.tugraz.at/hci/hci.pdf
2	http://www.prenhall.com/behindthebook/0132240858/pdf
3	http://ebooksfile.com/pdf/Zz2/human-computer-interaction-sample-exam-questions.pdf
4	http://nptel.ac.in/courses.php?disciplineId=106
5	Introduction to Human Computer Interaction (youtube.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	20	20	20

Understand	30	30	30	30
Apply				
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

PROFESSIONAL ELECTIVE COURSE (PEC-2)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**6th Semester**				
Course Title	:	**NATURAL LANGUAGE PROCESSING**				
Course Code	:	**BCG604A**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**03**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objective
1	Apply foundational concepts and architectures of deep learning
2	Analyze and select suitable deep learning models and techniques by evaluating problem requirements, data characteristics, and performance trade-offs to ensure optimal solution design.
3	Design and develop deep learning models to address real-world problems, and effectively collaborate within a team to implement solutions.
4	Conduct hands-on experiments to implement, train, and evaluate deep learning models using appropriate tools and frameworks for solving application-specific tasks.

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 -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	Overview and language modelling Overview: Origins and challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Information Retrieval. Language Modelling: Various Grammar - based Language Models, Statistical Language Model.	8
Pedagogy	**Lecture, Case study discussion (e.g., chatbots, translation)**	
2	Word level and syntactic analysis Word Level Analysis: Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and correction, Words and Word Classes, Part-of-Speech Tagging. Syntactic Analysis: Context-free Grammar, Constituency, Parsing, Probabilistic Parsing.	8
Pedagogy	**Hands-on using NLTK, spaCy**	
3	Semantic analysis and Discourse processing Semantic Analysis: Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: Cohesion, Reference Resolution, Discourse Coherence and Structure.	8
Pedagogy	**Parse tree activities, Syntax error correction**	
4	Natural language generation and machine translation Natural Language Generation: Architecture of NLG Systems, Generation Tasks and Representations, Application of NLG, Machine Translation: Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages.	8
Pedagogy	**Coding assignments using Gensim/sklearn**	
5	Application and lexical resources Information Extraction, Automatic Text Categorization and Text Summarization, Question Answering System. Lexical Resources: Word Net, Frame Net, Stemmers, Research Corpora	
Pedagogy	**Build simple N-gram models, RNNs**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another	

	• **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Natural Language Processing and Information Retrieval, Tanveer Siddiqui, U.S. Tiwary, 1st edition, Oxford University Press, 2008
Reference Books	
1	Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, Daniel Jurafsky, James H Martin, 1st edition, Prentice Hall, 2019
2	Natural Language Processing: Python and NLTK, Deepti Chopra, Jacob Perkins, NitinHardeniya, 1st edition, Packt, 2018

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply various Natural language processing techniques	L3	APPLY
CO2	Analyse the different Natural language processing techniques	L3	APPLY
CO3	Design and develop an application using Natural Language Processing tools	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO5	**3**											**3**		

Weblinks 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

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	10	10	**20**	**20**
Apply	20	20	**30**	**30**
Analyse	20	20		
Evaluate				
Create				

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	**5**	**5**					**10**	**10%**
CO2	**10**	**10**	**5**				**25**	**25%**
CO3	**5**	**5**	**5**				**15**	**15%**
CO4				**5**	**5**	**5**	**15**	**15%**
CO5				**5**	**10**	**10**	**25**	**25%**
Total					**5**	**5**	**10**	**10%**

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
Evaluate	
Create	

SEE Course Plan

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

PROFESSIONAL ELECTIVE COURSE (PEC-2)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**6th Semester**				
Course Title	:	**BLOCKCHAIN TECHNOLOGY**				
Course Code	:	**BCG604B**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**2023**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**03**		**SEE Duration**	:	**3hrs**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Apply the knowledge of the structure and key components of blockchain technology to design and develop transparent, secure, and decentralized blockchain-based systems.
2	Analyze application-specific requirements to design, develop, and implement smart contracts or chaincode on appropriate blockchain platforms.
3	Conduct experiments on real-time problems to design, implement, and evaluate blockchain-based solution models that address specific application needs.

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 -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 BlockChain: Introduction to Blockchain, Backstory of Blockchain, what is Blockchain? Centralized vs. Decentralized Systems, Centralized Systems, Decentralized Systems, Layers of Blockchain, Application Layer, Execution Layer, Semantic Layer, Propagation Layer, Consensus Layer, why is Blockchain Important? Limitations of Centralized Systems, Blockchain Adoption So Far, Blockchain Uses and Use Cases.	8
Pedagogy	**Blockchain Simulation Game**	
2	How BlockChain Works: Laying the Blockchain Foundation, Cryptography, Symmetric Key Cryptography, Cryptographic Hash Functions, MAC and HMAC, Asymmetric Key Cryptography, Diffie-Hellman Key Exchange, Symmetric vs. Asymmetric Key Cryptography	8
Pedagogy	**Blockchain Hash Function Demonstration**	
3	Game Theory: Nash Equilibrium, Prisoner's Dilemma, Byzantine Generals' Problem, Zero-Sum Games, why to Study Game Theory. Computer Science Engineering, The Blockchain, Merkle Trees, Putting It All Together, Properties of Blockchain Solutions, Blockchain Transactions, Distributed Consensus Mechanisms, Blockchain Applications, Scaling Blockchain, Off-Chain Computation, Shading Blockchain State.	8
Pedagogy	**Nash Equilibrium Simulation, Merkle Tree Construction**	
4	How Bitcoin Works: The History of Money, Dawn of Bitcoin, What Is Bitcoin? Working with Bitcoins, The Bitcoin Blockchain, Block Structure, The Genesis Block, The Bitcoin Network, Discovery for a New Node, Bitcoin Transactions, Consensus and Block Mining, Block Propagation, Putting it all Together. Bitcoin Scripts, Bitcoin Transactions Revisited, Scripts, Full Nodes vs. SPVs, Full Nodes, SPVs, Bitcoin Wallets.	8
Pedagogy	**Bitcoin Transaction Simulation, Build a Simple Bitcoin Wallet**	
5	How Ethereum Works: From Bitcoin to Ethereum, Ethereum as a Next-Gen Blockchain, Design Philosophy of Ethereum, Enter the Ethereum Blockchain, Ethereum Blockchain, Ethereum	8

	Accounts, Trie Usage, Merkle Patricia Tree, RLP Encoding, Ethereum Transaction and Message Structure, Ethereum State Transaction Function, Gas and Transaction Cost, Ethereum Smart Contracts, Contract Creation, Ethereum Virtual Machine and Code Execution, Ethereum Ecosystem, Swarm, Whisper, DApp, Development Components.	
	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Beginning Block chain: A beginners guide to build Block chain solution, Bikramaditya Singhal, Gautam Dhameja, Priyansu sekhar panda, Apress.
2	BlockChain by Example, Development guide for creating decentralized applications using Bitcoin, Etereum and Hyperledger, Bellaj Badr. Richard Horrocks & Xun(Brion) Wu. Packt
Reference Books	
1	Blockchain for Business with Hyperledger Fabric, Nakul Shah,Enterprice Blockchain implementation for business using Hyperledger, BPB Publications
2	Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Author-Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1- 78712-544-5, 2017

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the knowledge of structure and key components of Block chain technology towards creating a transparent and secure block chain system	L3	APPLY
CO2	Analyse the requirements based on applications to write smart contract/chain code	L3	APPLY
CO3	Conduct Experiments for a given real time problems and obtain block chain based solution model for the problem.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	Introduction to BlockChain Technology and applications - NPTEL Course https://nptel.ac.in/courses/106104220
2	Block Chain and its applications – NPTEL Course https://onlinecourses.nptel.ac.in/noc22_cs44/preview

CIE- Continuous Internal Evaluation (50 Marks)

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

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	10%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
Evaluate	
Create	

SEE Course Plan

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

PROFESSIONAL CORE COURSE LAB (PCCL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**6th SEMESTER**				
Course Title	:	**GENERATIVE AI**				
Course Code	:	**BCG607**				
Course Type (Theory/ Practical/ Integrated)	:	**PRACTICAL**				
Category	:	**PCCL**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Explore pre-trained word vectors. Explore word relationships using vector arithmetic. Perform arithmetic operations and analyze results.	CO3
2	Use dimensionality reduction (e.g., PCA or t-SNE) to visualize word embeddings for Q 1. Select 10 words from a specific domain (e.g., sports, technology) and visualize their embeddings. Analyze clusters and relationships. Generate contextually rich outputs using embeddings. Write a program to generate 5 semantically similar words for a given inpu	CO3
3	Train a custom Word2Vec model on a small dataset. Train embeddings on a domain-specific corpus (e.g., legal, medical) and analyze how embeddings capture domain-specific semantics.	CO3
4	Use word embeddings to improve prompts for Generative AI model. Retrieve similar words using word embeddings. Use the similar words to enrich a GenAI prompt. Use the AI model to generate responses for the original and enriched prompts. Compare the outputs in terms of detail and relevance.	CO3
5	Use word embeddings to create meaningful sentences for creative tasks. Retrieve similar words for a seed word. Create a sentence or story using these words as a starting point. Write a program that: Takes a seed word. Generates similar words. Constructs a short paragraph using these words	CO3
6	Use a pre-trained Hugging Face model to analyze sentiment in text. Assume a real-world application, Load the sentiment analysis pipeline. Analyze the sentiment by giving sentences to input	CO3

7	Summarize long texts using a pre-trained summarization model using Hugging face model. Load the summarization pipeline. Take a passage as input and obtain the summarized text.	**CO3**
8	Install langchain, cohere (for key), langchain-community. Get the api key(By logging into Cohere and obtaining the cohere key). Load a text document from your google drive . Create a prompt template to display the output in a particular manner.	**CO3**

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Develop the ability to explore and analyse word embeddings, perform vector arithmetic to investigate word relationships, visualize embeddings using dimensionality reduction techniques	L3	APPLY
CO2	Apply prompt engineering skills to real-world scenarios, such as information retrieval, text generation.	L3	APPLY
CO3	Utilize pre-trained Hugging Face models for real-world applications, including sentiment analysis and text summarization	L3	APPLY
CO4	Apply different architectures used in large language models, such as transformers, and understand their advantages and limitations.	L2	UNDERSTAND

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=eTPiL3DF27U
2	https://youtu.be/je6AlVeGOV0

3	https://youtu.be/RLVqsA8ns6k , https://www.youtube.com/watch?v=8iuiz-c-EBw,
4	https://youtu.be/0SAKM7wiC-A , https://youtu.be/7oQ8VtEKcgE
5	https://youtu.be/28_9xMyrdjg , https://www.youtube.com/watch?v=seXp0VWWZV0

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	10	10	20	20
Understand	20	20	30	30
Apply	20	20		
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	
Apply	

Analyse	
Evaluate	
Create	

SEE Course Plan

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

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical (Internal Examiners only)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**6th SEMESTER**				
Course Title	:	**AGENTIC AI**				
Course Code	:	**BCG608A**				
Course Type (Theory/ Practical/ Integrated)	:	**PRACTICAL**				
Category	:	**AEC**				
Stream	:	**2023**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Module 1: Introduction, Architectures and Design Patterns Introduction to Agentic AI, Agent Structure and Architecture of multi-agent systems, Autonomous Agents, Human in the Loops Systems, Multi Agent AI Systems, Agentic AI Frameworks, Design Considerations and Best Practices; Modules: Perception, Cognitive, Action, Learning, Collaboration, Security Design Patterns: Reflection, Tool Use, Planning, ReAct (Reasoning and Acting) and ReWOO (Reasoning with Open Ontology), Multi Agent **Practical:** 1. Exploring different Agentic AI frameworks 2. Implementing different agentic AI design patterns	**CO2,CO3**
2	Module 2: Building AI Agents with LangGraph Introduction to LangGraph, State Management, Trim and Filter Messages, Memory and External Memory, Short and Long Term Memory, Memory Schema, Deployment; **Practical:** 1. Building a chatbot agent with LangGraph for an appropriate industry domain.	**CO2,CO3**
3	Module 3: Agentic RAG Comparing Agentic RAG with Traditional RAG, Agentic RAG Architecture and Components, Adaptive RAG, Variants of Agentic RAG, Applications, Agentic RAG with Llamaindex **Practical:** 1. Build an agent to perform appropriate market research implementing agentic RAG techniques	**CO2,CO3**

4	Module 4: Agent Development with AutoGen Autogen Introduction, Roles and Conversations, Conversation Patterns, Developing Autogen-powered Agents, Deployment and Monitoring Multi Agent Systems with LangGraph: Multi Agent Systems, Workflows, Collaboration, Multi Agent Designs, Workflow with LangGraph **Practical:** 1. Develop an AI Research Agent with Autogen	**CO2,CO3**
5	Module 5: Deploying AI Agent AI Agent Observability and AgentOPs, AI Observability with Langsmith, Monitoring AI Agent Performance, Managing AI Workflows, Implementing AI Experimentation and Observability **Practical:** 1. AI Observability with Langsmith 2. AgentOps Practical Implementation	**CO2,CO3**

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply agentic AI principles to design autonomous and multi-agent systems using appropriate architectures and design patterns.	L3	APPLY
CO2	Apply LangGraph for state management, memory integration, and system deployment.	L3	APPLY
CO3	Apply Agentic RAG to build adaptive retrieval systems and compare with traditional RAG	L3	APPLY
CO4	Apply Autogen and LangGraph to develop, deploy, and manage collaborative multi-agent workflows.	L2	UNDERSTAND
CO5	Apply observability tools to monitor, manage, and evaluate AI agent workflows and performance	L3	APPLY

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**	**1**			**3**							**2**			
CO2	**2**	**1**			**3**							**2**			
CO3	**1**	**2**			**3**							**2**			
	1	**2**			**3**							**2**			

CO4															
CO5	1	1			3							2			

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	10	10	20	20
Understand	20	20	30	30
Apply	20	20		
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	
Apply	
Analyse	
Evaluate	
Create	

SEE Course Plan

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

Reference Books	
1	Mastering AI Agents: From Design to Deployment of Autonomous Systems by Elbert Gale January 18, 2025 ISBN-13: 979-8307403822
2	https://www.amazon.in/Mastering-Agentic-Practical-Self-Directed-Independently-ebook/dp/B0DT4RLWP5
3	https://www.amazon.in/Mastering-Agentic-Practical-Self-Directed-Independently-ebook/dp/B0DT4RLWP5

1 Credit Course – Practical	
	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). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Continuous Internal Evaluation (CIE):** CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. • Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session. • Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. • Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). • Weightage to be given for neatness and submission of record/write-up on time. • Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. • In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. • The suitable rubrics can be designed to evaluate each student's performance and learning ability. • The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

	Semester End Evaluation (SEE):
	SEE marks for the practical course are 50 Marks.
	• SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
	• The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
	• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
	• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
	• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
	• General rubrics suggested for SEE are mentioned here,
	  • Writeup-20%,
	  • Conduction procedure and result in -60%,
	  • Viva-voce 20% of maximum marks.
	SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
	• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
	• The minimum duration of SEE is 02 hours.

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**5th SEMESTER**				
Course Title	:	**MACHINE LEARNING OPERATIONS (MLOPS)**				
Course Code	:	**BCG608B**				
Course Type (Theory/ Practical/ Integrated)	:	**PRACTICAL**				
Category	:	**AEC**				
Stream	:	**CSD**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**02**		**SEE Duration**	:	**03hrs**
Credits	:	**01**				

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Data Ingestion and Pre-processing: Create a pipeline for data ingestion from multiple sources. Perform data cleaning, transformation, and feature engineering	CO2,CO3
2	Model Training and Hyperparameter Tuning: Implement a script to train a machine learning model. Use grid search or random search for hyperparameter tuning	CO2,CO3
3	Model Evaluation and Validation: Evaluate model performance using various metrics. Validate the model using cross validation techniques	CO2,CO3
4	Model Versioning and Management: Implement model versioning using tools like DVC or Moldflow. Manage different versions of models and track changes.	CO2,CO3
5	Model Deployment: Deploy a trained model using a REST API with Flask or Fast API. Containerize the deployment using Docker	CO2,CO3
6	Automated Testing and CI/CD Pipeline: Set up automated testing for the model and data pipeline. Implement a CI/CD pipeline using tools like Jenkins or GitHub Actions.	CO2,CO3
7	Monitoring and Logging: Implement monitoring for model performance in production. Set up logging for tracking predictions and errors.	CO2,CO3
8	Data Drift and Model Retraining:	CO2,CO3

	Detect data drift and its impact on model performance. Automate model retraining when significant drift is detected.	
9	Orchestration with Workflow Management Tools: Use tools like Apache Airflow or Kubeflow to orchestrate machine learning workflows. Schedule and manage different stages of the ML pipeline	**CO2,CO3**
10	Collaboration and Version Control with Git and GitOps: Implement version control for code and model using Git. Utilize GitOps principles to automate deployment and manage infrastructure as code.	**CO2,CO3**

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Comprehend the complete process from data preparation, model training, evaluation, and deployment to monitoring and maintenance.	L3	APPLY
CO2	Leverage MLOps principles and tools to efficiently scale, manage, and automate the deployment of machine learning models in production	L3	APPLY
CO3	Acquire the skills to select the ideal MLOps stack and leverage Git and GitOps for efficient version control and seamless collaboration in machine learning	L3	APPLY

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.coursera.org/specializations/mlops-machine-learning-duke
2	https://www.udemy.com/course/mlops-course/?couponCode=LOCLZDOFFPINCTRL

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	10	10	20	20
Understand	20	20	30	30
Apply	20	20		
Analyse				
Evaluate				
Create				

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	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
Total					5	5	10	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	
Apply	
Analyse	
Evaluate	
Create	

SEE Course Plan

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

1 Credit Course – Practical	
	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). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Continuous Internal Evaluation (CIE):** CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. • Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session. • Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. • Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). • Weightage to be given for neatness and submission of record/write-up on time. • Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. • In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. • The suitable rubrics can be designed to evaluate each student's performance and learning ability. • The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student. **Semester End Evaluation (SEE):** SEE marks for the practical course are 50 Marks.

	• SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
	• The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
	• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
	• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
	• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
	• General rubrics suggested for SEE are mentioned here,
	  • Writeup-20%,
	  • Conduction procedure and result in -60%,
	  • Viva-voce 20% of maximum marks.
	SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
	• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
	• The minimum duration of SEE is 02 hours.