DAYANANDA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT

CURRICULUM

Scheme and Syllabus V & VI Semester

Outcome Based Education
(Academic Year 2023-2027)
Department of Computer Science and Engineering (Artificial Intelligence)
5th& 6thSemester B.E

ABOUT THE INSTITUTE

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

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

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

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

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

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

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

Adopting learning beyond curriculum through outbound activities and creative assignments.

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

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

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

Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

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

QUALITY POLICY

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

ABOUT THE DEPARTMENT

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

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

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

VISION OF THE DEPARTMENT

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

MISSION OF THE DEPARTMENT

M1: To Impart Strong foundation of statistics for understanding Artificial Intelligence.
M2: To develop skilled and knowledgeable professionals in the field of Artificial Intelligence.
M3: To contribute towards advanced AI technologies that provide increased and better performance.
M4: To collaborate with renowned companies for multidisciplinary research and development.
M5: To guide the students in learning and creative for developing intelligent technology based solutions to societal problems.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: The Graduates of CSE(AI) acquire a comprehensive understanding of the fundamentals of Artificial Intelligence (AI) and its applications.
PEO2: To apply AI techniques and tools to solve real-world problems and create innovative solutions.
PEO3: To develop skills in data analysis, Cloud Computing, Full Stack development and Machine learning for AI implementation.
PEO4: To develop the ability to design, analyse, and evaluate the CSE(AI) systems.
PEO5: To foster creativity, innovative thinking, entrepreneurial Skills and a commitment to lifelong learning in the field of CSE(AI) to contribute towards DIGIWORLD.

PROGRAM OUTCOMES (PO's)

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

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: To Apply Analytical Skills for Problem Solving in Engineering, Business and Societal Applications using CSE (AI) Approaches safely and securely.
PSO 2: Ability to Enrich the Critical Thinking Skills and Decision making in Emerging Technologies such as Natural Language Processing, Machine Learning, Deep Learning, Data Analysis, Robotics and Computer Vision .

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSEDUG SCHEME

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

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

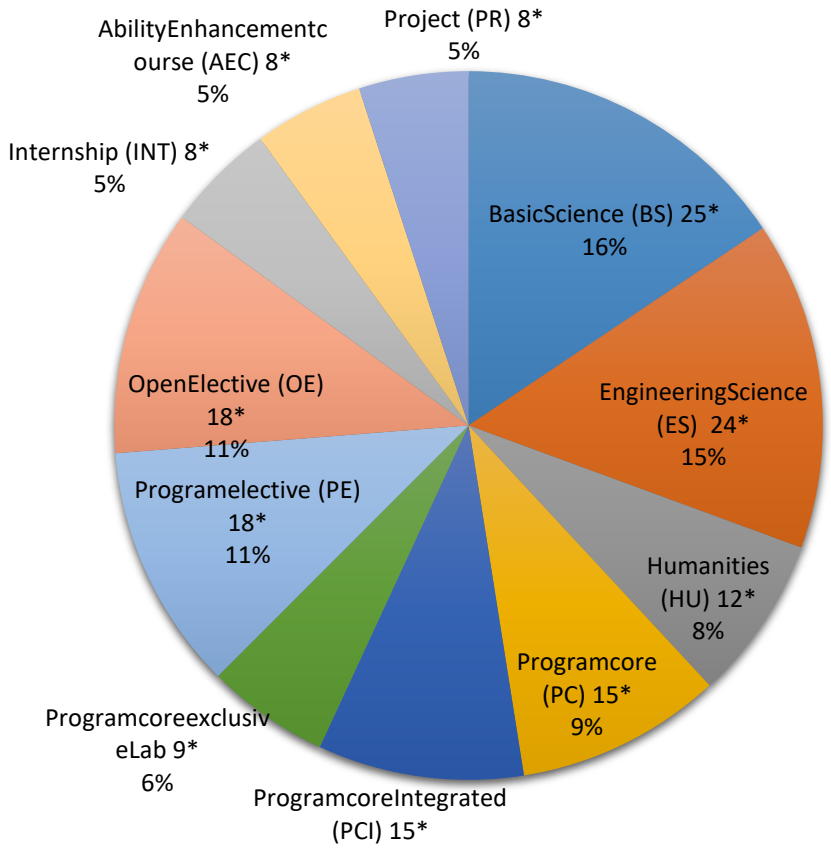
5thSem &6th Sem

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

Scheme Distribution

Department of Computer Science and Engineering (Artificial Intelligence)

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



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

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

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

5th SEMESTER: CSE(AI)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BCA501	Machine Learning with Python	IPCC1	CSE (AI)	CSE (AI)	3	0	2	0	5	4	03	50	50	100
2	BCA502	Database Management Systems	IPCC2	CSE (AI)	CSE (AI)	3	0	2	0	5	4	03	50	50	100
3	BCA503	Theory of Computation	PCC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
4	BCA504A	Computer Networks	PEC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
5	BCA505	Computer Vision	PBL	CSE (AI)	CSE (AI)	0	0	2	2	4	3	03	50	50	100
6	BCAL506	Web Technology	PCCL	CSE (AI)	CSE (AI)	0	0	2	0	2	2	03	50	50	100
7	BRM507A	Research Methodology and IPR	AEC	CSE (AI)	CSE (AI)	1	0	0	0	1	1	02	50	50	100
8	BESK508	Environmental Studies and E Waste Management	HSMS	Concern Dept	Concern Dept	2	0	0	0	2	2	02	50	50	100
9	BNSK509 / BPEK509 / BYOK509	National Service Scheme (NSS) / Physical Education (PE) / YOGA	NCMC	CSE (AI)	CSE (AI)	0	0	2	0	2	0	-	100	-	100
					Total	15	0	10	2	27	22	22	500	400	900

Ability Enhancement Course / Skill Enhancement Course-V

BCA504B | **Project Management with GIT**

6th SEMESTER: CSE(AI)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration	CIE Marks	SEE Marks	Total Marks
1	BCA601	Natural Language Processing	IPCC1	CSE (AI)	CSE (AI)	3	0	2	0	5	4	03	50	50	100
2	BCA602	Full stack web development with Java	IPCC2	CSE (AI)	CSE (AI)	3	0	2	0	5	4	03	50	50	100
3	BCA603	Human Centered AI	PCC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
4	BCA604	Prompt Engineering for Large Language Models	PEC	CSE (AI)	CSE (AI)	3	0	0	0	3	3	03	50	50	100
5	BCA605	Institutional Open Elective Courses	IOE-1	Con-dept	Con-dept	3	0	0	0	3	3	03	50	50	100
6	BCA606	Project Evaluation Phase 1	Major Proj	CSE (AI)	CSE (AI)	0	0	0	2	2	2	03	50	50	100
7	BCAL607	Generative & Agentic AI	PCCL	CSE (AI)	CSE (AI)	0	0	2	0	2	2	03	50	50	100
8	BCA608	Data Visualization	AEC	CSE (AI)	CSE (AI)	0	0	2	0	2	1	03	50	50	100
9	BNSK609 / BPEK609 / BYOK609	National Service Scheme (NSS) / Physical Education (PE) / YOGA	NCMC	CSE (AI)	CSE (AI)	0	0	2	0	2	0	0	100	0	100
		Total				17	0	10	2	28	22	24	600	400	1000

Ability Enhancement Course / Skill Enhancement Course-VI

BCA608A | **UI&UX Design**

IPCC: Integrated Professional Core Course,
PCC: Professional Core Course
PEC-1: Professional Elective Course
PCCL: Professional Core Course Laboratory
HSMC: Humanity and Social Science & Management Course
OEC- Open Elective Course
AEC: Ability Enhancement Course
NCMC: Non-Credit Mandatory Course
L: Lecture,
T: Tutorial,
P: Practical
S= SDA: Skill Development Activity,
CIE: Continuous Internal Evaluation,
SEE: Semester End Evaluation.

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

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

Newly introduced subjects in the syllabus

		5thSemester	6thSemester
1.	List of Existing Elective Courses		
2.	List of New Existing Elective Courses		
3.	List of New Industry Aligned Courses		

Percentage of Change in the Syllabus

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

6thSEMESTER

INTEGRATED PROFESSIONAL CORE COURSE (IPCC1)

IPCCCourse–IntegratedProfessionalCoreCourse

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

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

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

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

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

Internal Assessment Test (IAT):

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

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

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

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks**are for conducting the experiment, **05 Marks** for preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test **(duration 03 hours)**at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce. Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

Possible Continuous and Comprehensive Assessment (CCA):

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

4 Credits Courses – Integrated Professional Core Course (IPCC)

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

	Practical		Observation book	05					conducting the experiment and calculations/observations/output)
		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 20marks. 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	:	6				
Course Title	:	Natural Language Processing				
Course Code	:	BCA601				
Course Type (Theory/ Practical/ Project/ Integrated)	:	Integrated				
Category	:	IPCC1				
Stream	:	CSE(AI)		**CIE**	:	50
Teaching hours/ week (L:T:P:S)	:	03:00:02:00		**SEE**	:	50
Total Hours	:	40 (T) + 20 (L)		**SEE Duration**	:	03 Hrs
Credits	:	4				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn the importance of natural language modelling
2	Understand the Applications of natural language processing
3	Study spelling, error detection and correction methods and parsing techniques in NLP
4	Illustrate the information retrieval models in natural language processing
5	To analyze machine translation techniques, including encoder-decoder models, evaluation methods, and ethical considerations."

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 -2025-26
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1.	**Introduction:** What is Natural Language Processing? Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications. Language Modeling: Statistical Language Model - N-gram model (unigram, bigram), Paninion Framework, Karaka theory. **Textbook 1: Ch. 1, Ch. 2.**	**8Hours**
Pedagogy		
2.	**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, Top-down and Bottom-up Parsing, CYK Parsing. **Textbook 1: Ch. 3, Ch. 4.**	**8Hours**
Pedagogy		
3.	**Naive Bayes, Text Classification and Sentiment:** Naive Bayes Classifiers, Training the Naive Bayes Classifier, Worked Example, Optimizing for Sentiment Analysis, Naive Bayes for Other Text Classification Tasks, Naive Bayes as a Language Model. **Textbook 2: Ch. 4.**	**8Hours**
Pedagogy		
4.	**Information Retrieval:** Design Features of Information Retrieval Systems, Information Retrieval Models - Classical, Non-classical, Alternative Models of Information Retrieval - Custer model, Fuzzy model, LSTM model, Major Issues in Information Retrieval. Lexical Resources: WordNet, FrameNet, Stemmers, Parts-of-Speech Tagger, Research Corpora. **Textbook 1: Ch. 9, Ch. 12.**	**8Hours**
Pedagogy		
5.	**Machine Translation:** Language Divergences and Typology, Machine Translation using Encoder Decoder, Details of the Encoder-Decoder Model, Translating in Low-Resource Situations, MT Evaluation, Bias and Ethical Issues. **Textbook 2: Ch. 13.**	**8Hours**
	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 Python program for the following preprocessing of text in NLP: ● Tokenization ● Filtration ● Script Validation ● Stop Word Removal ● Stemming	CO2
2	Demonstrate the N-gram modeling to analyze and establish the probability distribution across sentences and explore the utilization of unigrams, bigrams, and trigrams in diverse English sentences to illustrate the impact of varying n-gram orders on the calculated probabilities.	CO2
3	Investigate the Minimum Edit Distance (MED) algorithm and its application in string comparison and the goal is to understand how the algorithm efficiently computes the minimum number of edit operations required to transform one string into another. ● Test the algorithm on strings with different type of variations (e.g., typos, substitutions, insertions, deletions) ● Evaluate its adaptability to different types of input variations	CO3
4	Write a program to implement top-down and bottom-up parser using appropriate context free grammar.	CO3
5	Given the following short movie reviews, each labeled with a genre, either comedy or action: ● fun, couple, love, love comedy ● fast, furious, shoot action ● couple, fly, fast, fun, fun comedy ● furious, shoot, shoot, fun action ● fly, fast, shoot, love action and A new document D: fast, couple, shoot, fly Compute the most likely class for D. Assume a Naive Bayes classifier and use add-1 smoothing for the likelihoods.	CO3
6	Demonstrate the following using appropriate programming tool which illustrates the use of information retrieval in NLP: ● Study the various Corpus – Brown, Inaugural, Reuters, udhr with various methods like filelds, raw, words, sents, categories ● Create and use your own corpora (plaintext, categorical) ● Study Conditional frequency distributions ● Study of tagged corpora with methods like tagged_sents, tagged_words ● Write a program to find the most frequent noun tags ● Map Words to Properties Using Python Dictionaries ● Study Rule based tagger, Unigram Tagger Find different words from a given plain text without any space by comparing this text with a given corpus of words. Also find the score of words.	CO4
7	Write a Python program to find synonyms and antonyms of the word "active" using WordNet.	CO4
8	Implement the machine translation application of NLP where it needs to train a machine translation model for a language with limited parallel corpora. Investigate and incorporate techniques to improve performance in low-resource scenarios.	CO4
	Open ended Programs	
1	Text Classification Game ● Objective: Learn supervised learning and text classification. ● Activity: Provide students with a set of documents (e.g., movie reviews) labeled as positive or negative. Divide them into groups and have them create a simple classification model using keywords or phrases. They can then test their model on new reviews.	CO5

2	Grammar Check and Correction ● Objective: Learn about language structure and NLP tools. ● Activity: Provide sentences with grammatical errors. Students can use grammar checking tools (like Grammarly or LanguageTool) to identify errors and suggest corrections, discussing why each suggestion is made.	CO5

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

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
1	Understand the fundamental concept of NLP, grammar-based language model and statistical-based language model.	Understand	L2
2	Apply the concepts of information retrieval, Naïve Bayes classifier and sentiment analysis for Natural language problems and text classifications.	Apply	L3
3	Analyse Model morphological using Finite State Transducers and parsing using context-free grammar and different parsing approaches.	Analyze	L4
4	Investigate Models of Information Retrieval and Major Issues in Information Retrieval.	Evaluate	L5
5	Implement machine Translation applications of NLP using Encode and Decoder	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

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

Web links and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=M7SWr5xObkA
2	https://youtu.be/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**				**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	10				
Understand	10	10			
Apply	20	20	20	20	
Analyse	10	20	20	20	
Evaluate			10	10	10
Create					15

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

INTEGRATED PROFESSIONAL CORE COURSE (IPCC2)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	6th				
Course Title	:	FULL STACK WEB DEVELOPMENT WITH JAVA				
Course Code	:	BCA602				
Course Type (Theory/ Practical/ Project/ Integrated)	:	Integrated				
Category	:	IPCC2				
Stream	:	CSE(AI)		**CIE**	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		**SEE**	:	50
Total Hours	:	40 Hrs		**SEE Duration**	:	03 Hrs
Credits	:	4				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Apply core Java SE & J2EE principles—including OOP features, with Java Beans, reflection, and exception concepts
2	Analyze and implement Collections, XML, AWT/Swing components to model, manipulate structured data efficiently
3	Demonstrate and execute JDBC programming with driver configuration and also its batch processing skills
4	Develop and manage Servlets, JSP, and MVC design to manage session state, and process applications
5	Design and integrate enterprise solutions using Hibernate and Spring Boot for full-stack Java web development

Teaching-Learning Process
Pedagogical Initiatives:

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

course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.

2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.

3. Encourage collaborative (Group) Learning in the class.

4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.

6. Topics will be introduced in multiple representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

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

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1.	**Introduction**: J2EE and J2SE, Why J2EE? Introduction - Client/Server - 3 tier and N tier Systems - Web Applications – Databases - Java Beans – String - upcasting – downcasting – reflection - MVC architecture **Language Principles**: Abstraction – Encapsulation - Inheritance – Polymorphism – Interfaces- Abstract class – Exception **Textbook** 1: Ch. 1, Ch. 2, Ch. 7, Ch. 8	**8Hours**
Pedagogy	**Quiz**	
2.	**UI Components**: AWT – Event Handling – Listener – Adapter classes - Swing components **Collections**: Collection Frameworks – ArrayList – LinkedList – HashSet – TreeSet – Queue – Map – HashMap – LinkedHashMap – TreeMap – Vector – Enum – Comparator **Textbook** 1: Ch. 18, Ch. 19 Textbook 2: Ch. 3, Ch. 4	**8Hours**
Pedagogy	**Demonstration**	
3.	**XML**: XML – Types – DTD – XML Schema – elements – simple – complex – types - XPath – Xquery **JDBC Concepts**: The Concept of JDBC; JDBC Driver Types - JDBC Drivers - JDBC Package - The JDBC process - MySQL - Database Connection - Associating the JDBC/ODBC Bridge with the Database - Statement Object - ResultSet Object – Prepared Statement – Callable statement – Batch Updates – Advanced RowSet – types - Transaction Processing **Textbook** 1: Ch. 26	**8Hours**
Pedagogy	**Presentation**	
4.	**Servlets:** Servlet – Servlet API – Generic Servlet – HttpServlet – Life cycle - How servlet works – Servlet example with HTML components - Session – Tracking mechanism – cookie – Hidden form field, URL rewriting – Request Dispatcher – sendRedirect – HttpSessionEvent - CRUD Application **JSP:** JSP –lifecycle – API – Scripting elements – implicit objects – Directive elements – Exception - Expression Language – Standard action tags – custom action tags - Core Tags – Function tags – formatting tags **Textbook 4:**Ch. 5, Ch. 6, Ch. 7, Ch. 8	**8Hours**
Pedagogy	**Case Study**	
5.	**Hibernate**: Hibernate architecture – JPA - with xml – annotation – generator – dialects – mapping - HQL – HCQL – Named query – caching **Spring**: Spring.io – spring initalizr - spring boot – Spring Modules- Dependency Injection - Spring AOP – Spring ORM – SPEL - Problem Solving Examples	**8Hours**

	API - Rest - web - SOAP - Test API - postman, curl, httpie, jmeter, rest assured, swagger UI **Textbook** 5: Ch. 1, Ch. 3, Ch. 6 **Textbook** 6: Ch. 2, Ch. 4	
	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 core OOP concepts (Abstraction, Inheritance, Polymorphism, Interfaces) using a Banking application with its interest rate and balance with deposit and withdrawn functions - Get user account number - Account name - Branch Utilize functions – to access accounts	CO2
2.	Create a Java application demonstrating upcasting, downcasting, exception handling, and reflection API. - Banking application to raise exception if amount < 0 To analyze software by itself – variables, functions and classes	CO2
3.	Develop a student record management system using ArrayList, HashMap, and implement sorting using Comparator and Enum - Sorting techniques Listing techniques and others	CO2
4.	Create an XML based program to display the student details w.r.t its section. Utilize XML Schema to adapt and fetch student information	CO2
5.	Create a basic calculator that performs addition, subtraction, multiplication, and division. - Use AWT concepts using Events Use Listener and its functions	CO2
6.	Create a JDBC application to connect to a MySQL database, and perform basic CRUD operations using PreparedStatement - Updation of student mark details - Insertion of student records - Deletion of records Creating an aggregation of marks	CO3
7.	Develop a CRUD web application using Servlets and HTML forms, with session tracking using cookies and URL rewriting - Display the session ID - Access the html file and process the UI controls using servlets Update and access the data	CO3
8.	Create a JSP-based web app using Expression Language, JSTL core tags, and formatting tags, including error handling and MVC structure. - Display the values using implicit objects - Use standard action tags command to include and forward the page Use JSTL core tags to display values using expression language	CO4
9.	Build a Hibernate-based application with XML and annotation-based mapping, and perform CRUD with HQL queries - Create a Pojo class file and annotate it - Create hibernate xml file for doing the mapping with database concepts Use server file to start the transaction	CO4
10.	Create a Spring Boot application using Spring Initializr, with Dependency Injection, Spring ORM, and AOP features - Develop a spring boot application by developing packages using spring initializr - Create a class to access dependency injection - Testing API's	CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1.	Herbert Schildt, "Java: The Complete Reference", McGraw-Hill, 13 th ed., 2024 ch 1,2,7,8
2.	Maurice Naftalin & Philip Wadler, "Java Generics and Collections", O'Reilly, 2 nd ed., 2025
3.	Joe Fawcett, Danny Ayers & Liam Quin, "Beginning XML", Wrox/Wiley, 5 th ed., 2012
4.	Joel Murach & Michael Urban, "Murach's Java Servlets and JSP", Murach & Associates, 3rd ed., 2014 (full Servlet 3.1/JSP 2.3 coverage, JSTL, EL, MVC)
5.	Java Persistence with Hibernate – Christian Bauer, Gary Gregory & Gavin King, Manning, 2nd ed., 2015
6.	Craig Walls, "Spring in Action", Manning, 6 th ed., 2022
Reference Books	
1.	Cay S. Horstmann,"Core Java, Vol I – Fundamentals", Pearson/Oracle Press, vol 1, 12th ed., 2021
2.	Cay S. Horstmann, "Core Java, Vol II – Advanced Features", OraclePress, vol 2,12 th ed., 2022

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand core Java SE & J2EE concepts such as OOP, JavaBeans, reflection, and exception handling in application development.	Understand	L2
CO2	Apply and use Collection package, XML, and GUI components for effective data handling and user interaction.	Apply	L3
CO3	Develop JDBC-based applications, including database connectivity, queries, and batch processing with transaction	Apply	L3
CO4	Analyse dynamic web applications using Servlets, JSP, and MVC architecture, managing session and request flow.	Analyse	L4
CO5	Evaluate enterprise-level full-stack applications by integrating Hibernate ORM and Spring Boot frameworks.	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

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

Web links and Video Lectures (e-Resources)	
1.	http://acl.digimat.in/nptel/courses/video/106105191/lec1.pdf
2.	http://acl.digimat.in/nptel/courses/video/106105225/L21.html
3.	https://archive.nptel.ac.in/courses/106/105/106105191/
4.	https://www.coursera.org/specializations/java-fullstack
5.	https://www.youtube.com/watch?v=WkKT5M-ABnY&list=PLlhM4lkb2sEiiEAP0uSFXiFY8KdXPnN0f
6.	https://www.coursera.org/specializations/object-oriented-programming
7.	https://www.youtube.com/watch?v=v5Q7TC5u5Co
8.	https://www.coursera.org/specializations/spring-framework

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	10				
Understand	10	10			
Apply	20	20	20	20	
Analyse	10	20	20	20	
Evaluate			10	10	10
Create					15

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 t 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	5	5	10	10	50	50%
CO2	10	10					20	20%
CO3			5	5			10	10%
CO4					10		10	10%
CO5						10	10	10%
Total	20	20	10	10	20	20	100	100%

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

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

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

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

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

Semester-End Examination:

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is 10 Marks
Total Marks scored for theory component of CIE (IAT+ CCA) is 25 Marks

Possible Continuous and Comprehensive Assessment (CCA):

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

Professional Core Course (PCC) – 3 Credit course – Theory								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				50	----	----	20	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50)/2	25	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50)/2	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					50	20	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	**:**	6				
Course Title	**:**	Human Centred AI				
Course Code	**:**	BCA603				
Course Type Theory/Practical/Project Integrated)	**:**	Theory				
Category	**:**	PCC				
Stream	**:**	CSE(AI)		**CIE**	**:**	50
Teaching hours/ week (L:T:P:S)	**:**	3:0:0:0		**SEE**	**:**	50
Total Hours	**:**	40hrs		**SEE Duration**	**:**	3 hours
Credits	**:**	3				

Course Learning Objectives: Students will be able to:

SI.No	Course Objectives
CO1	To understanding of the foundational principles of Human-Centred AI
CO2	To learn and evaluate reliable, safe, and trustworthy AI systems using the HC AI framework
CO3	To understand governance strategies that bridge the gap between ethical principles and practical steps
CO4	To learn how to create and assess safety cultures in organizations through management strategies, incident reporting, and trustworthy certification practices
CO5	To understand how AI can amplify human-to-human communication and cooperation

Teaching-Learning Process

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

1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation/Demonstration to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Use animations/videos to help the students to understand the concepts.

Pedagogical Initiatives:

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

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**WHAT IS HUMAN-CENTERED ARTIFICIAL INTELLIGENCE:** Introduction, Are People and Computers in the Same Category? Will Automation, AI, and Robots Lead to Widespread Unemployment? **Textbook: Chapter 1, Chapter 3, Chapter 4**	8Hours
Pedagogy		
2	**HUMAN-CENTERED AI FRAMEWORK:** Introduction, Defining Reliable, Safe, and Trustworthy Systems, Two-Dimensional HCAI Framework, Design Guidelines and Examples **Textbook: Chapter 6, Chapter 7, Chapter 8, Chapter 9**	8Hours
Pedagogy		
3	**DESIGN METAPHORS:** Introduction, Science and Innovation Goals, Intelligent Agents and Super tools, Teammates and Tele-bots, Social Robots and Active Appliances **Textbook: Chapter 11, Chapter 12, Chapter 13, Chapter 14, Chapter 16**	8Hours
Pedagogy		
4	**GOVERNANCE STRUCTURES – 1:** Introduction, Reliable Systems Based on Sound Software Engineering Practice, Safety Culture through Business Management Strategies, Trustworthy Certification by Independent Oversight **Textbook: Chapter 18, Chapter 19, Chapter 20, Chapter 21**	8Hours
Pedagogy		
5	**GOVERNANCE STRUCTURES – 2:** Government Interventions and Regulations, Introduction: Driving HC AI Forward, Assessing Trustworthiness, Caring for and Learning from Older Adults **Textbook: Chapter 22, Chapter 24, Chapter 25, Chapter 26,**	8Hours
	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.	Shneiderman, Ben. Human-centered AI. Oxford University Press, 2022.
Reference Books	
1.	Nam, Chang S., Jae-Yoon Jung, and Sangwon Lee, eds. Human-Centered Artificial Intelligence:Research and Applications. Academic Press, 2022.
2.	Chetouani, Mohamed, et al., eds. Human-centered artificial intelligence: Advanced lectures. Vol.13500. Springer Nature, 2023.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Demonstrate a foundational of Human-Centered AI with human values such as rights, dignity, and justice.	Understand, Remember	L1, L2
CO2	Apply the Human-Centered AI framework to design AI systems that achieve high levels of both human control and automation	Apply	L3
CO3	Utilize design metaphors (super tools and tele-bots) to innovate and develop AI applications that enhance human creativity	Apply	L3
CO4	Develop governance structures and ethical strategies to ensure the safe and responsible deployment of AI systems	Create	L6
CO5	Identify emerging trends and challenges in Human-Centered AI and Design strategies for enhancing trustworthiness and societal benefits	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1.	https://www.youtube.com/playlist?app=desktop&list=PL2ovtN0KdWZiBkaQsHXMGFTEzok7YQkvt
2.	https://www.youtube.com/watch?v=HcCZSw-Rm-w

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		
Understand	10	20		
Apply	25	20		
Evaluate	5			
Create			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10		10	10	10	50	50%
CO2	10	10	5		10	10	45	45%
CO3								
CO4								
CO5			5				5	5%
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	25%
Understand	25%
Apply	45%
Evaluate	5%

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10		10	10	10	50	50% (25%+25%)
CO2	10	10	5		10	10	45	45%
CO3								
CO4								
CO5			5				5	5%
Total	20	20	10	10	20	20	100	

PROFESSIONAL ELECTIVE COURSE (PEC-02)

PEC-02 Course - Professional Elective Course

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

3 Credit Course – Professional Elective Course (PEC 2)

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

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

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

Semester-End Examination:

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is 10 Marks
Total Marks scored for theory component of CIE (IAT+ CCA) is 25 Marks

Possible Continuous and Comprehensive Assessment (CCA):

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

Professional Elective Course (PEC 2) – 3 Credit course – Theory								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				50	----	----	20	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50)/2	25	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50)/2	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					50	20	Total Marks of IAT and CCA is 50
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

Semester	**:**	6				
Course Title	**:**	Prompt Engineering for Large Language Models				
ourse Code	**:**	BCA604				
ourse Type heory/Practical/Project Integrated)	**:**	Theory				
ategory	**:**	PEC-02				
Stream	**:**	CSE(AI)		**CIE**	**:**	50
Teaching hours/ week (L:T:P:S)	**:**	3:0:0:0		**SEE**	**:**	50
Total Hours	**:**	40 Hrs		**SEE Duration**	**:**	03 Hours
Credits	**:**	03				

Course Learning Objectives: Students will be able to:

SI.No	Course Objectives
1	Learn details on transformers and BERT models
2	Illustrate how pretrained models work
3	Explore the fundamentals of prompt engineering with GPT3 and optimizing LLMs
4	Learn about hugging face and hugging face library.
5	Investigate the case studies on LLMs

Teaching-Learning Process

Pedagogical Initiatives:

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

DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1.	**Introduction to Transformers:** Motivation behind transformers, Self-attention mechanism, Transformer architecture and components. BERT: Working of BERT, BERT pre-trained model, input representation, Use cases of BERT Tokens and Embeddings: Token Embeddings, Text Embeddings (for Sentences and Whole Documents), Word Embeddings Beyond LLMs, Embeddings for Recommendation Systems. **Textbook2: Chapter 2, Chapter 3, Textbook 3 : Chapter 2**	**8Hours**
Pedagogy	**Quiz**	
2.	**Introduction to Large language models:** Semantic Search with LLMs, The task, Asymmetric Semantic Search, Solution Overview, Embedding, Document Chunker, Finding custom delimiters, Using Clustering to Create Semantic Documents, Vector Databases, Re-ranking the Retrieved Results. Prompt Engineering with GPT3: Introduction, Prompt engineering, working with prompts across models, Building Q/A bot with GPT Retrieval Evaluation Metrics, Retrieval-Augmented Generation (RAG), From Search to RAG, Advanced RAG Techniques, RAG Evaluation. **Textbook1: Chapter2, Chapter3, Textbook3: Chapter 8**	**8Hours**
Pedagogy	**Demonstration**	
3.	**Optimizing LLMs with Customized Fine Tuning:** Introduction, Transfer learning and fine tuning, OpenAI Fine tuning API, Amazon Review category classification. Advanced Prompt Engineering: Introduction, Prompt engineering, Introduction, Prompt injection attacks, Input/Output Validation, Batch Prompting, Prompt Chaining, chain of thought prompting, Testing and Iterative prompt development. **Textbook1: Chapter 4, Chapter5**	**8Hours**
Pedagogy	**Problem solving**	
4.	**Hugging Face:** Introduction, Features of hugging face platform, Components of hugging face, Pipelines **Tasks using hugging face library:** Introduction to Gradio, Creating a space on hugging face, Hugging face tasks, Q/A, Translation. **Fine-Tuning Generation Models:** The Three LLM Training Steps: Pretraining, Supervised Fine-Tuning, and Preference Tuning, Low-Rank Adaptation (LoRA), Instruction Tuning with QLoRA, Evaluating Generative Models, Preference-Tuning / Alignment / RLHF **Textbook2: Chapter 4, Chapter 5, Textbook3 : Chapter12**	**8Hours**
Pedagogy	**Presentation**	

5.	Case Study – Building a Recommendation System, Case Study—Visual Q/A, Case Study—Reinforcement Learning from Feedback. Deploying Custom LLMs to the Cloud Overview of Cloud Deployment, Best Practices for Cloud Deployment **Textbook1: Chapter 6,7,9**	**8Hours**
	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	"Quick Start Guide to Large Language Models: Strategies and Best Practices for using ChatGPT and Other LLMs" by Sinan Ozdemir, O'reilly Publications, October 2023
2	"Introduction to Transformers for NLP: With the Hugging Face Library and Models to Solve Problems" by Shashak mohan Jain, O'reilly publications, October 2022.
3	"Hands-on Large Language Models: Language Understanding and Generation" by Jay Alammar , Maarten Grootendorst, O'reilly Publications, October 2024.
Reference Books	
1	"The Art of Prompt Engineering with ChatGPT: A Hands-on Guide (learn AI Tools the Fun Way!)" by Nathan Hunter.
2	"Prompt Engineering: Unlocking Generative AI: Ethical Creative AI for All" by Navveen Balani.
3	"The Ultimate Guide to ChatGPT: A Beginner's Handbook to Understanding Prompt Engineering, the Future of Artificial Intelligence and How to Use It Effectively" by Percival C. Verena.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the concept of transformers and BERT models and illustrate how pretrained models work.	Understand	L2
CO2	Apply prompt engineering with GPT3 and optimizing LLMs.	Apply	L3
CO3	Analyse hugging face platform, transformers for LLMs and deploying Custom LLMs to the Cloud, Best Practices for Cloud Deployment.	Analyse	L4
CO4	Investigate tasks using hugging face library.	Evaluate	L5
CO5	Building a Recommendation System, Visual Q/A, Reinforcement Learning from Feedback.	Create	L6

Mapping of Course Outcomes to Program Outcomes:

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

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

Weblinks and Video Lectures (e-Resources)

1 https://www.youtube.com/watch?v=vCra2J3-tak

2 https://www.youtube.com/watch?v=LWiMwhDZ9as

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			
	Continuous Assessment Tests (IAT)		**Continuous Comprehensive Assessment (CCA)**	
	IAT-1	**IAT-2**	**CCA-1**	**CCA-2**
	50 Marks	**50 Marks**	**10 Marks**	**15 Marks**
Remember				
Understand	10	10		
Apply	30	30		
Analyse	10	10	10	
Evaluate				15
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	10	10			10	10	40	40%
CO2	10	10	10				30	30%
CO3				10			10	10%
CO4					10		10	10%
CO5						10	10	10%
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	**SEE Marks (90% Theory+10% Practical Questions)**
Remember	0
Understand	20
Apply	40
Analyze/ Evaluate	40

SEE Course Plan

CO's	**Marks Distribution**						**Total Marks**	**Weightage**
	Module-1	**Module-2**	**Module 2 to 2.5**	**Module-2.5 to 3**	**Module-4**	**Module-5**		
CO1	10	10			10	10	40	40%
CO2	10	10	10				30	30%
CO3				10			10	10%
CO4					10		10	10%
CO5						10	10	10%
Total								

Professional Core Course laboratory(PCCL)

PCCL- Professional coreCourse Laboratory

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	20 hours – Practical
Credits:	02

Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical

2 Credit Course – Professional Core Course Laboratory (PCCL)

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):

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. 1. 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. 2. Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks. 3. Total marks scored by the students are scaled down to 30 marks (60% of maximum marks). 4. Weightage to be given for neatness and submission of record/write-up on time. 5. Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. 6. 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. 7. The suitable rubrics can be designed to evaluate each student's performance and learning ability. 8. The marks scored shall be scaled down to 20 marks (40% of the maximum marks).

Semester End Evaluation (SEE):

1. SEE marks for the practical course are 50 Marks.
2. SEE shall be conducted jointly by the two examiners of the same institute examiners are appointed by the Head of the Institute.
3. 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.
4. All laboratory experiments are to be included for practical examination.
5. (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.
6. Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
7. 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

Semester	:	6				
Course Title	:	Generative & Agentic AI				
Course Code	:	BCA606				
Course Type Theory/Practical/Project Integrated)	:	Practical				
Category	:	PCCL				
Stream	:	CSE(AI)		**CIE**	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		**SEE**	:	50
Total Hours	:	25 Hrs		**SEE Duration**	:	03 Hrs
Credits	:	01				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the principles and concepts behind generative AI models
2	Explain the knowledge gained to implement generative models using Prompt design frameworks.
3	Apply various Generative AI applications for increasing productivity.
4	Develop Large Language Model-based Apps.

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 analysing 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).

SL.No	List of Experiments	
1	Explore pre-trained word vectors. Explore word relationships using vector arithmetic. Perform arithmetic operations and analyze results.	CO1
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 input.	CO2
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.	CO2
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.	CO2
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.	CO4
9	Take the Institution name as input. Use Pydantic to define the schema for the desired output and create a custom output parser. Invoke the Chain and Fetch Results. Extract the below Institution related details from Wikipedia: The founder of the Institution. When it was founded. The current branches in the institution . How many employees are working in it. A brief 4-line summary of the institution.	CO4
10	Build a chatbot for the Indian Penal Code. We'll start by downloading the official Indian Penal Code document, and then we'll create a chatbot that can interact with it. Users will be able to ask questions about the Indian Penal Code and have a conversation with it.	CO4
	Open Ended Programs	
1	AI Agent for Customer Complaint Resolution Scenario: A company receives customer complaints via email. The AI agent must read the message, categorize the complaint (e.g., billing, technical issue, product defect), suggest an appropriate action, and generate a reply. Objective: Design a reflection-capable agent that can: * Extract key details from input text * Classify the issue * Generate a response and revise it if flagged as inappropriate or incomplete Outcome: Students learn prompt refinement, classification tools, and reflective reasoning.	CO3
2	Smart Travel Planner Agent Scenario: A user provides a travel query like: “Plan a 3-day budget trip to Goa in October.” The AI agent breaks the task into subtasks: finding flights, booking hotels, and suggesting activities. Objective: Build a multi-agent system where each specialized agent contributes to an overall plan, coordinated by a supervising agent. Outcome: Students gain experience in agent collaboration, delegation, and real-time data/API integration.	CO4

3	Smart Travel Planner Agent Scenario: A user provides a travel query like: "Plan a 3-day budget trip to Goa in October." The AI agent breaks the task into subtasks: finding flights, booking hotels, and suggesting activities. Objective: Build a multi-agent system where each specialized agent contributes to an overall plan, coordinated by a supervising agent. Outcome: Students gain experience in agent collaboration, delegation, and real-time data/API integration.	CO4

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Modern Generative AI with ChatGPT and OpenAI Models: Leverage the Capabilities of OpenAI's LLM for Productivity and Innovation with GPT3 and GPT4, by Valentina Alto, Packt Publishing Ltd, 2023.
2	Generative AI for Cloud Solutions: Architect modern AI LLMs in secure, scalable, and ethical cloud environments, by Paul Singh, Anurag Karuparti ,Packt Publishing Ltd, 2024.
Reference Books	
1	https://www.pwc.com/m1/en/publications/documents/2024/agentic-ai-the-new-frontier-in-genai-an-executive-playbook.pdf
2	A Practical Guide to Building AI Agents: From Concept to Deployment, Sanjay Kumar , Ph.D.

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 analyze word embeddings, perform vector arithmetic to investigate word relationships, visualize embeddings using dimensionality reduction techniques	Apply	L3
CO2	Apply prompt engineering skills to real-world scenarios, such as information retrieval, text generation.	Apply	L3
CO3	Analyse pre-trained Hugging Face models for real-world applications, including sentiment analysis and text summarization.	Analyse	L4
CO4	Investigate different architectures used in large language models, such as transformers, and understand their advantages and limitations.	Create	L5

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.w3schools.com/gen_ai/index.php
2	https://youtu.be/eTPiL3DF27U
3	https://youtu.be/seXp0VWWZV0
4	https://youtu.be/0SAKM7wiC-A
5	https://youtu.be/je6AlVeGOV0
6	https://youtu.be/0SAKM7wiC-A

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)

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.

IContinuous 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	:	6th				
Course Title	:	Data Visualization				
Course Code	:	BCA608				
Course Type Theory/Practical/Project Integrated)	:	Practical				
Category	:	AEC				
Stream	:	CSE(AI)		**CIE**	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		**SEE**	:	50
Total Hours	:	25 Hrs		**SEE Duration**	:	03 Hrs
Credits	:	01				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the principles and importance of PowerBI and Tableau
2	Familiarize with the PowerBI and Tableau interface and its components
3	Learn how to clean, transform, and model data using PowerBI and Tableau tools
4	Learn how to import data from various sources into PowerBI and Tableau
5	Understand the principles of dashboard design

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 analysing 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 -2025-26
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

SL.No	List of Experiments	CO'S
1	Creating a View - Connecting to Database, Different types of Tableau Joins, formatting charts, adding filters, creating calculated fields and defining parameters.	CO1
2	Dashboard Design and Storytelling – Components of Dashboard, understanding how to place worksheets in Containers, Action filters and its types.	CO2
3	Creating Reports & Visualizations - Different types of charts, Formatting charts with Title, Colors, Filters in Power BI, Formatting dashboards.	CO1
4	Querying Data from CSV - Query Editor, Connecting the data from the Excel Source, Clean, Transform the data.	CO3
5	Analysis of revenue in sales dataset: i) Createachoroplethmap(fillthemap)tospotthespecialtrendstoshowthestatewhichhasthehighest revenue. ii) Create a line chart to show the revenue based on the month of the year. iii) Createabinofsize10fortheagemeasuretocreateanewdimensiontoshowtherevenue. iv) Createadonutchartviewtoshowthepercentageofrevenueperregionbycreatingzeroaccessinthe calculated field. v) Createabutterflychartbyreversingthebarcharttocomparefemale&malerevenuebasedonproduct category. vi) Createacalculatedfieldtoshowtheaveragerevenueperstate&displayprofitable&non-profitable state. vii) Build a dash board.	CO5
6	Analysis of GDP data set: i) Visualizethecountriesdatagiveninthedatasetwithrespecttolatitudeandlongitudealongwith country name using symbol maps. ii) CreateabargraphtocompareGDPofBelgiumbetween2006–2026. iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singaporebytheyear2010. iv) Visualize the countries Bhutan & Cost a Ricacompe ting in term so GDP. iv) Create a scatter lotor circle view of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006. vi) Build an inter active as board.	CO5
7	Design the Dashboard for Car Dataset Analysis using PowerBI (Use Car dataset) 1. Create a Clustered Column Chart for Car Price by Car Names 2. Create a Donut Chart for Horsepower 3. Create a Tree Map for High way mpg 4. Create a Stacked Bar Chart for Wheelbase by Car Name 5. Include slicer for various Car Names	CO4
8	Analysis of Amazon Prime Dataset: i) Create a Do nut chart to show the percentage of movie and tv shows ii) Create a are a chart to shows by release year and type iii) CreateahorizontalbarcharttoshowTop10genre iv) Create a map to display total shows by country v) Create a text sheet to show the description of any movie/movies. vi) Build anointer active Dash board.	CO5
9	Design the Dashboard for Sales Analysis – Region and Segment-wise using Power BI (Use Global Superstore Sales dataset)	CO4

	i) Create a clustered Column chart for Sum of Sales by Region and segment ii) Create a Clustered Column chart Sum of Profit and quantity by Region-wise iii) Create a Donut chart for Sum of Discount by region-wise iv) Create a Treemap for Sum of Profit and sales by region-wise v) Create an Area chart for Sum of sales by Region and segment-wise. vi) Create a Piechart for Sum of sales by segment-wise. vii) Add the slicer for the Region data.	
10	Design the Dashboard for TFL Bus Safety using Tableau(Use tfl-bus-incident Dataset) i) Create a Bar Chart on Boroughs Field to visualize the trend in the count. ii) Create a line chart for date of incidents for each month in a 1 quarter, comment on possibilities and suitability of different charts for this timeline. iii) In above question, apply formatting to display the first letter of the month on x-axis. iv) Create Tree Maps of all the data fields except date & year and comment on significance of tree map. v) Create an interactive dashboard for the above data.	CO4
11	Analysis of Customer Analysis dataset: i) Create a map (fill the map) to spot the special trends to show the state which has the highest revenue. ii) Create a line chart to show the revenue based on the month of the year. iii) Create a bin of size 10 for the age measure to create a new 3 dimension to show the revenue. iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field. v) Create a bar chart to compare female & male revenue based on product category. vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state. vii) Build a dashboard.	CO5
12	Analysis of HR Dataset: i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age. ii) CreateaLollipopCharttoshowtheattritionratebasedongendercategory. iii) Createapiecharttoshowtheattritionpercentagebasedon DepartmentCategory-Dragdepartment into colour sand change automatic topie. Entireview, Dragattrition count toangle. Label attrition count, change to percent, add total also, edit label. iv) Create a barcha rttodis play thenum berof employees by Age group, v) CreateahighlighttabletoshowtheJobSatisfactionRatingforeachjobrolebasedonemployeecount. vi) CreateahorizontalbarcharttoshowtheattritioncountforeachEducationfieldEducation fieldwise attrition – drag education field to rows, sum attrition count to col, vii) CreatemultipledonutcharttoshowtheAttritionRatebyGenderfordifferentAgegroup.	CO5
	Open Ended Programs	
1	Implement an AR application that recognizes a printed marker and displays a 3D object using Unity	CO5
2	Create a navigable 3D environment (like a museum or park) using Unity and simulate movement via gaze or controllers.	
3	Create a desktop-based VR simulation in Unity where the user can walk inside a 3D room and interact with objects using keyboard and mouse inputs.	

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 principles of effective data visualization and the importance of visual storytelling in data analysis.	L1 , L2	U/R
CO2	Apply the concepts of Power BI's and Tableau to clean, transform, and model data	L3	Apply
CO3	Analyze between various data visualization techniques and choose the most appropriate one for a given dataset or business.	L4	Analyse
CO4	Evaluate the performance and efficiency of Power BI and Tableau dashboards and reports, identifying areas for optimization.	L3	Evaluate
CO5	Design and build customized, interactive dashboards that meet specific business needs also with AR application	L4	Create

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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	-	3	-	-	3	-	-	-	-	-	-	-

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Data visualization with python: create an impact with meaningful data insights using interactive and engaging visuals, Mario Dobler, Tim Grobmann, Packt Publications, 2019
2	Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018
Reference Books	
1	Jonathan Linowes, Unity Virtual Reality Projects", Packt Publishing, 2nd Edition, Unity 2020
2	Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020

Weblinks and Video Lectures (e-Resources)	
1	https://learn.unity.com/
2	https://docs.unity3d.com/Manual/AROverview.html
3	https://codelabs.developers.google.com/arcore-unity-ar-foundation
4	https://developers.google.com/ar/develop/unity
5	https://needle.tools/docs/intro

Dayananda Sagar Academy of Technology & Management

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Semester	:	6th				
Course Title	:	Indian Knowledge Systems				
Course Code	:	BIKS609				
Course Type Theory/Practical/Project Integrated)	:	Theory				
Category	:	AEC				
Stream	:	Common to all UG Programs		**CIE**	:	100
Teaching hours/ week (L:T:P:S)	:	1:0:0:0		**SEE**	:	-
Total Hours	:	15 Hrs		**SEE Duration**	:	-
Credits	:	01				

Course Learning Objectives: Students will be able to:

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

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

Course Outcomes: After completing the course, the students will be able to	
CO1:	Provide an overview of the concept of the Indian Knowledge System and its importance.
CO2:	Appreciate the need and importance of protecting traditional knowledge.
CO3:	Recognize the relevance of Traditional knowledge in different domains.
CO4:	Establish the significance of Indian Knowledge systems in the contemporary world.

Reference Books	
1	**Introduction to Indian Knowledge System- concepts and applications**, B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, 2022, PHI Learning Private Ltd, ISBN-978-93- 91818-21-0
	Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,
2	**Knowledge Traditions and Practices of India**, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,
	Suggested Web Links:

1.	**https://www.youtube.com/watch?v=LZP1StpYEPM**
2.	**http://nptel.ac.in/courses/121106003/**
3.	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4.	https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5.	https://unctad.org/system/files/official-document/ditcted10_en.pdf
6.	http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7.	https://unfoundation.org/what-we-do/issues/sustainable-development- goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE

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

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

High-3 : Medium-2 : Low-1