DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus V Semester

Outcome Based Education

(Academic Year 2025-2026)

Department of Information Science and Engineering

V Semester B.E

ABOUT THE INSTITUTE

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

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

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

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

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

QUALITY POLICY

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

ABOUT THE DEPARTMENT

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

M1: To deliver quality technical training on software application domain.

M2: To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.

M3: To inculcate research practices in teaching thus ensuring research blend among students.

M4: To ensure more doctorates in the department, aiming at professional strength.

M5: To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.

M6: To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.
PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.
PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.

PSO2: Meet the industry requirements in adapting to cutting-edge technologies.

PSO3: Develop business and entrepreneurial ideas to support society requirements.

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSED UG SCHEME

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

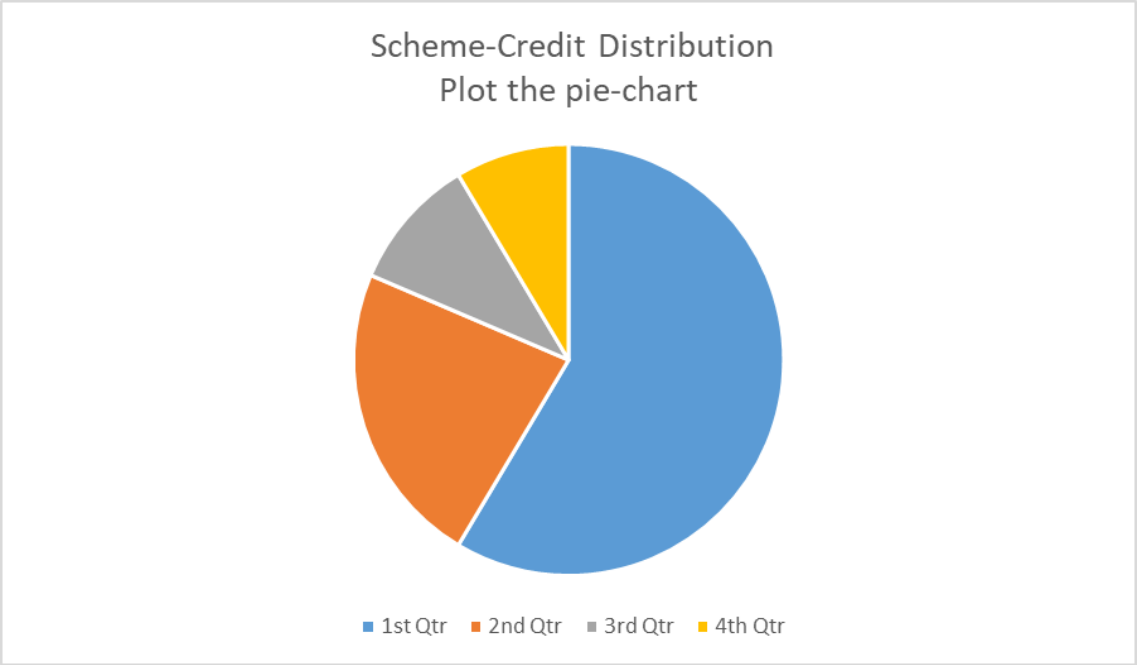
Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 5th Sem

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	IPCC-1	60%	40%	--	--
2	IPCC-1	60%	40%	--	--
3	PCC-1	100%	--	--	--
4	PEC-1	100%	--	--	--
5	PBL	--	100%	--	--
6	PCCL	--	100%	--	--
7	AEC	100%	--	--	--
8	HSMS	--	--	100%	--
9	NCMC	--	--	--	100%
Total Percentage		**47%**	**31%**	**11%**	**11%**

Scheme Distribution

Department of Information Science and Engineering

Course Component	Credits	% of Credits
Integrated Professional Core Course-1(IPCC-1)	4	18%
Integrated Professional Core Course-2(IPCC-2)	4	18%
Professional Core Course-1(PCC-1)	3	14%
Professional Elective Course-1(PEC-1)	3	14%
Project Based Learning (PBL)	3	14%
Professional Core Course laboratory (PCCL)	2	09%
Ability Enhancement Course (AEC)	2	09%
Humanities and Social Sciences (HSMS)	1	04%
Non- Credit Mandatory Course (NCMC)	0	0
Total	**22**	**100**



5th SEMESTER:

Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
					Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
					L	T	P	S						
BIS501	Software Testing and Agile Methodologies	IPCC-1	ISE	ISE	3	-	2	-	5	4	3	50	50	100
BIS502	Computer Networks	IPCC-2	ISE	ISE	3	-	2	-	5	4	3	50	50	100
BIS503	Theory of Computation	PCC-1	ISE	ISE	3	-	-	-	3	3	3	50	50	100
BIS504x	Professional Elective Course	PEC-1	ISE	ISE	3	-	-	-	3	3	3	50	50	100
BIS505	Generative AI	PBL	ISE	ISE	-	2	-	4	6	3	3	50	50	100
BISL506	DevOps Lab	PCCL	ISE	ISE	-	2	2	-	4	2	2	50	50	100
BIS507x	UI/UX	AEC	ISE	ISE	-	-	2	-	2	1	2	50	50	100
BESK508	Environmental Studies and E-waste Management	HSMS	ISE	ISE	2	-	-	-	2	2	2	50	50	100
BPEK509	NSS /PE / YOGA	NCMC	ISE	ISE	-	-	2	-	2	0	-	100	-	100
**** AICTE Activity points mandatory to be covered**			**Total**		**15**	**4**	**8**	**4**	**32**	**22**	**21**	**500**	**400**	**900**

5th Sem Professional Elective Course

1. Computer Vision	2. Introduction to Cybersecurity

5th Sem Ability Enhancement Course

1. UiUx	2. Research Methodology and IPR

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course L: Lecture,

T: Tutorial,

P:Practical

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 V^{th} semesters. Activities shall be carried out between V^{th} semester to the VI^{th} semester (for 6 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Newly introduced subjects in the syllabus

		5th Semester
1	List of Existing Elective Courses	Introduction to Cybersecurity
2	List of New Elective Courses	Professional Elective Courses in 5th Semester
3	List of New Industry-Aligned Courses	1. Generative AI 2. Software Testing and Agile Methodologies 3. UI/UX

V SEMESTER

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

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

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

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)
Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests
- (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive

Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

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

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

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

Semester End Examination (SEE) for IPCC Theory

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

Possible Continuous and Comprehensive Assessment (CCA):

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

4 Credits Courses – Integrated Professional Core Course (IPCC)

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

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/ program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/ observations/ output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	---	05	4	One Internal Practical Test after the conduction of all experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	---	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks.
			Execution	10					
			Viva-voce	05					
				Total CIE Practical			**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment
SEE		Theory exam	Entire theory syllabus including questions from lab component in respective Modules		100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
				CIE + SEE	100	----	----	40	

The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component. The Laboratory Component for the IPCC shall be for CIE only. However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.
Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Dayananda Sagar Academy of Technology and Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Software Testing and Agile Methodologies**				
Course Code	:	**BIS501**				
Course Type (Theory/ Practical/ ntegrated)	:	**Integrated**				
Category	:	**IPCC-1**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40 Theory hours +20 Practical hours**		**SEE Duration**	:	**3 hours**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Understand** fundamental software testing concepts including test case design, error and fault taxonomies, and testing levels along with their role in ensuring software quality & Agile concepts.
2	**Apply** testing techniques to systematically identify defects in software systems.
3	**Analyze** real-world problem scenarios to determine appropriate testing strategies and improve test coverage.
4	**Evaluate** the effectiveness and completeness of various test cases and testing approaches.
5	**Create** test strategies, agile workflows, and planning artifacts for software development projects using industry-aligned agile and modern testing approaches.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**A Perspective on Testing:** Definitions, Test Cases, Insights from Venn Diagram, Identifying Test Cases, Error and fault taxonomies, Levels of testing. **Examples:** Generalized pseudocode, the Triangle problem, the NextDate function, the Commission problem, the SATM system, the Currency converter, Saturn windshield wiper. **Textbook 1: Chapter 1:1.1 to 1.6, Chapter 2: 2.1 to 2.7.**	**8**
Pedagogy	**Poster Presentation**	
2	**Functional Testing**: Boundary Value Testing - Boundary value analysis, Robustness testing, Worst-case testing, Special Value Testing, Examples, Random Testing, Guidelines. **Equivalence Class Testing** - Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations, **Decision Table Based Testing** - Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. **Textbook 1: Chapter 5: 5.1 to 5.7, Chapter 6: 6.1 to 6.5, Chapter 7: 7.1 to 7.5.**	**8**
Pedagogy	**Think Pair and Share**	
3	**Structural Testing:** Overview, Statement testing, Program testing, Condition testing, **Path testing** - DD paths, Test coverage metrics, Basis path testing, guidelines and observations, **Dataflow testing:** Definition-Use testing, Slice-based testing, Guidelines and observations. **Textbook 1: Chapter 9: 9.1 to 9.4, Chapter 10:10.1 to 10.3,Textbook 2:Chapter 6:6.2.1 to 6.2.4**	**8**
Pedagogy	**Problem Solving**	
4	**Why Agile?** Understanding Success Beyond Deadlines The Importance of Organizational Success Enter Agility Organizational Success Technical Success Personal Success **How to Be Agile** Agile Methods Don't Make Your Own Method The Road to Mastery Find a Mentor **Textbook 3: Part I: Chapter 1,Chapter 2**	**8**
Pedagogy	**Blended Learning**	
5	**Understanding XP:**The XP Lifecycle How It Works Our Story Continues The XP Team The Whole Team On-Site Customers Programmers Testers Coaches Other Team Members The Project Community Filling Roles Team Size IX Full-Time Team Members XP Concepts Refactoring Technical Debt Timeboxing The Last Responsible Moment Stories Iterations Velocity Theory of Constraints Mindfulness **Textbook 3: Part I: Chapter 3**	**8**
Pedagogy	**Blended Learning**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another	

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

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Write the program to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.	CO2
2	Design, develop, code and run the program to implement the NextDate function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.	CO2
3	Design, develop, code and run the program to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.	CO3
4	Design and develop a program to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, equivalence class partitioning and decision-table approach and execute the test cases and discuss the results.	CO3
5	Design, develop, code and run the program to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.	CO4
6	Design, develop, code and run the program to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.	CO4
Open ended Programs[Project Based]		
1	Develop a Mini Project with documentation of suitable test-cases and their results to perform automation testing of any E-commerce / social media/online education/banking application. Aspects of application to be demonstrated ● Create a WebDriver session. ● Navigate to a Web page. ● Locate the web elements on the navigated page. ● Perform an actions on the located elements. ● Assert the performed actions did the correct thing. ● Report the results of the assertions. ● End the session. Each inputs / data feeds (ex: website, username, password, mobile no, product name, etc.,) must be provided through a file linked with code and neither to be entered manually nor to be included in the code Use any software testing tool like selenium, Katalon, etc..	CO5
2	Demonstrate the working of Jira tool using suitable case study.	CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Software Testing, A Craftsman's Approach, Paul C. Jorgensen, Auerbach Publications, 3rd Edition2008.

2	Foundations of Software Testing, Aditya P Mathur, Pearson Education, 2008.
3	The Art of Agile Development ,James shore, Chromatic, O'Reilly, 2007
Reference Books	
1	Software Testing and Analysis – Process, Principles and Techniques, Mauro Pezze, Michal Young, Wiley India, 2009.
2	Software testing Principles and Practices – Gopalaswamy Ramesh, Srinivasan Desikan, 2nd Edition, Pearson, 2007.

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

CO	Course Outcomes	RBT Level indicator	RBT Level
CO1	**Understand** the basic concept of software testing and agile methodology .	Understand	**L2**
CO2	**Apply** the testing strategies to derive test cases.	Apply	**L3**
CO3	**Analyse** the scenario for real world problem using suitable technique.	Analyse	**L4**
CO4	**Evaluate** the effectiveness of different software testing strategies and Agile practices in achieving software quality goals.	Evaluate	**L5**
CO5	**Develop** the effective test report for the real-world problem	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															
CO2	2	2	2	1	2								2		
CO3	2	3	2	2	2				1	1			2		
CO4	3	3		2	2				2	1	1	1	2	1	
CO5	3	2	3	2	3			1	2	2	1	1	2	1	

List of AI Tools To Be Used: (Not limited to)
Selenium:- Automation Testing tool

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106/105/106105150/.
2	https://onlinecourses.nptel.ac.in/noc19_cs71/preview
3	https://www.youtube.com/watch?v=OGlmfxO2TEU&t=10s
4	https://www.youtube.com/watch?v=Q50ZyydS7pI
5	VTU e-Shikshana Program 6. VTU EDUSAT Program
6	VTU EDUSAT Program
7	Agile Development - NPTEL Software Engineering
8	https://nptel.ac.in/courses/106105182

CIE- Continuous Internal Evaluation (50 Marks)

	Theory	Practical

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks (Scaled down to 50)	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5		5			15	10%
CO2	5				5	5	15	10%
CO3		5	5	5	5	5	25	25%
CO4		5	10	10	10	10	45	45%
CO5		5	5	5			15	10%
Total	10	20	20	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100 scaled down to 50) (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	30
Analyse	20
Evaluate	15
Create	15

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5		5			15	10%
CO2	5				5	5	15	10%
CO3		5	5	5	5	5	25	25%
CO4		5	10	10	10	10	45	45%
CO5		5	5	5			15	10%
Total	10	20	20	10	20	20	100	100%

Dayananda Sagar Academy of Technology and Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Computer Networks**				
Course Code	:	**BIS502**				
Course Type(Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC-2**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3Hr**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Explain routers, IP and Routing Algorithms in network layer
2	Discuss transport layer services and understand UDP and TCP protocols
3	Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
4	Illustrate concepts of Multimedia Networking and Management
5	Demonstration of application layer protocols

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in networks.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. 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	**Network Layer:** Introduction, Virtual circuit and Datagram Networks, What is inside a router? The Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing in the Internet, Broadcast and Multicast routing **Textbook 1: Chapter 4: 4.1-4.4,4.6-4.7**	8
Pedagogy	**Flip Class Rooms**	
2	**Transport Layer:** Introduction and Transport layer services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP Principles of Congestion Control **Textbook 1: Chapter 3.1-3.6**	8
Pedagogy	**Problem based learning**	
3	**Wireless and Mobile Networks:** Introduction, Wireless Links and Network Characteristics, WiFi:802.11 wireless LAN, Cellular Network Access, Mobility management principles, Mobile IP, Managing Mobility in Cellular Networks **Textbook 1: Chapter 6: 6.1-6.7**	8
Pedagogy	**Case Study**	
4	**Multimedia Networking:** Multimedia Networking Applications, Streaming stored video, Voice-over IP, protocols for Real-Time Conversational Applications, Network support for Multimedia, Introduction to VPN **Textbook 1: Chapter 7: 7.1-7.5, Textbook 2: Chapter 8:8.6.3**	8
Pedagogy	**Demonstration**	
5	**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer:FTP, Electronic Mail in the Internet, DNS- The Internet's Directory Services **Textbook 1: Chapter 2: 2.1-2.5**	8
Pedagogy	**Role Play**	
	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 under- stand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Lab Programs Descriptions(if any)

For the experiments below modify the topology and parameters set for the experiment and take multiple rounds of reading and analyze the results available in log files. Plot necessary graphs and conclude. Use NS3.

Sl. No.	List of Programs	COs
	PART-A	
	Installations and configurations of NS2/NS3 software.	
1.	Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.	CO2
2.	Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.	CO2
3.	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.	CO3
4.	Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.	CO3
5.	Implement and study the performance of GSM on NS3 (Using MAC layer) or equivalent environment.	CO4
6.	Implement and study the performance of CDMA on NS3 (Using stack called Call net) or equivalent environment.	CO4
	PART-B (Implement Using C++/JAVA)	
7.	Write a program for error detecting code using CRC-CCITT (16- bits).	CO2
8.	Write a program to find the shortest path between vertices using Bellman-Ford algorithm.	CO3
9.	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.	CO4
10.	Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.	CO4
11.	Write a program for congestion control using leaky bucket algorithm.	CO5

Conduction of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from part A and part B with lot.
3. Strictly follow the instructions as printed on the cover page of answer script
4. Marks distribution: Procedure + Conduction + Viva: 50 Part A: 8+10+7 =25 Part B: 8+10+7 =25 and then scale down to **10 marks** and 1**5 marks** for the conduction of practical experiment and preparation of the Laboratory record. Therefore Total **Lab Marks =25**
5. Change of experiment is allowed only once and marks allotted to the procedure part to be

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Computer Networking: A Top-Down Approach ; James F Kurose and Keith W Ross; Pearson publishers; sixth edition and 2013 .
2	Computer Network ; Andrew S Tannenbaum, David J. Wetherall; Pearson publishers; 5th Edition and ,2010
Reference Books	
1	Data Communications and Networking ; Behrouz A. Forouzan; Tata McGraw-Hill; 5th Edition and 2013.
2	Computer and Communication Networks ; Nader F Mir; Pearson ;2nd Edition and 2014.

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

COs	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** different network performance for various protocols.	Understand	L2
CO2	**Demonstrate** the functionalities and performance of transport layer protocols such as TCP and UDP.	Apply	L3
CO3	**Analyze** the challenges of wireless and mobile networking.	Analyze	L4
CO4	**Evaluate** the design requirements and protocol behaviour of multimedia networking applications.	Evaluate	L5
CO5	**Develop** the working of application layer protocols like HTTP, FTP, SMTP and DNS	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															
CO2	3	3	2									1			
CO3	3	3							1			1	-	2	-
CO4	3	2							1			2	1	2	1
CO5	3	3	2						1			2	1	2	-

List of AI Tools To Be Used: (Not limited to)
TensorFlow, and Google Colab: Used to analyze, interpret, and optimize network behavior using intelligent techniques.

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106105082
2	https://onlinecourses.nptel.ac.in/noc22_ee61/preview
3	https://www.nptelvideos.com/course.php?id=399
4	https://archive.nptel.ac.in/courses/106/105/106105080/
5	https://archive.nptel.ac.in/courses/106/105/106105183/

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	-	-	-	-	20	50 Marks
CO2	5	5	10	-	-	0	20	
CO3	5	5	-	10	10		30	
CO4	-	-	-	-	10	5	15	
CO5	-	-	-	-	-	15	15	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Understand	20
Apply	20
Analyze	30
Evaluate	15
Create	15

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-	Module-	Module 2	Module-2.5	Module-	Module-		
	1	2	to 2.5	to 3	4	5		
CO1	5	5	5	0	0	0	15	

CO2	5	5	5	0	**5**	0	20	50 Marks
CO3	5	5	0	5	**5**	5	25	
CO4	5	5	0	5	5	5	25	
CO5	**0**	0	0	0	5	10	15	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	**PO**	**PSO**
CO1	-	-
CO2	PO1, PO2,PO3,PO12	-
CO3	PO1, PO2,PO9,PO12	-
CO4	PO1, PO2,PO9,PO12	-
CO5	PO1, PO2,PO3,,PO9,PO12	PSO1, PSO2

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**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	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 and Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Theory of Computation**				
Course Code	:	**BIS503**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC-1**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	**Understand** the core connection between language and computation.
2	**Apply** formal mathematical methods to prove properties of languages, grammars, automata using JFLAP/ JFAST
3	**Analyze** context-free grammars, the Pumping Lemma, and the basics of Turing Machines, including their limitations and undecidable problems.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

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

Outcome Based Education and Choice Based Credit System (CBCS)

DSATM **(Effective from the Academic Year 2025-26)**

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Automata Theory:** Central Concepts of Automata theory, Deterministic Finite Automata (DFA), Non- Deterministic Finite Automata (NFA), Finite Automata with Epsilon- Transitions, NFA to DFA Conversion, Minimization of DFA. **Textbook 1: Chapter:1 – 1.5, Chapter:2 – 2.2, 2.3, 2.5 Chapter:4 –4.4.3**	**08**
Pedagogy	**Poster Presentation**	
2	**Regular Expressions and Languages:** Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Proving Languages Not to Be Regular. **Textbook 1: Chapter: 3 – 3.1, 3.2, 3.3 Chapter: 4- 4.1**	**08**
Pedagogy	**Demonstration using Modern tools**	
3	**Context Free Grammars:** Context-Free Grammars, Parse Trees, Ambiguity and Elimination of Ambiguity, Elimination of Left Recursion, Left Factoring. **Properties of Context-Free Languages:** Normal Forms for Context-Free Grammars. **Textbook 1: Chapter: 5 – 5.1, 5.2 (5.2.1, 5.2.2), 5.4 Chapter: 7- 7.1**	**08**
Pedagogy	**Problem solving**	
4	**Push Down Automata:** Definition of the Pushdown Automata, The Languages of a PDA. Equivalence of PDA's and CFG's, Deterministic Pushdown Automata, The Pumping Lemma for Context Free Languages, Closure Properties of Context Free Languages. **Textbook1: Chapter: 6 – 6.1, 6.2, 6.3, 6.4, Chapter: 7- 7.2, 7.3**	**08**
Pedagogy	**Problem solving**	
5	**Introduction to Turing Machine:** Problems that Computers Cannot Solve, The Turing machine, problems, Programming Techniques for Turing Machine, Extensions to the Basic Turing Machine **Undecidability:** A language That Is Not Recursively Enumerable, An Undecidable Problem That is RE. **Textbook1: Chapter: 8 – 8.1, 8.2,8.3,8.4 Chapter: 9 – 9.1,9.2**	**08**
Pedagogy	**Flip Classroom**	

	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 to understand the topics easily. • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	"Introduction to Automata Theory, Languages and Computation", John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Third Edition, Pearson.
Reference Books	
1	"Automata, Computability and complexity", Elain Rich, 1st Edition, Pearson Education,2018.
2	"An introduction to Formal Languages and Automata" ,Peter Linz, 3rd Edition, Narosa Publishers,1998.
3	"Automata Theory and Computational Intelligence", Nandini Prasad K S, 1st Edition, Cengage Learning, 2019, ISBN-13: 9789386668486.
4	"Introduction to Languages & Theory of Computation", John C Martin, Tata McGraw-Hill, 4th Edition, 2011 ISBN: 978-0-07-319146-1.

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 core connection between language and computation.	Understand	L2
CO2	**Apply** formal mathematical methods to prove properties of languages, grammars, automata.	Apply	L3
CO3	**Analyze** context-free grammars, the Pumping Lemma, and the basics of Turing Machines, including their limitations and undecidable problems.	Analyse	AN
CO4	**Evaluate** the constructed automaton using different tools like JFLAP and JFAST	Evaluate	E
CO5	**Build** computation models for problems in Automata theory and the adaptation of such models in the field of compilers.	Create	C

Mapping of Course Outcomes to Program Outcomes:

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

List of AI tools to be used : (Not limited to)
JFLAP: Helps to design and simulate finite automata, pushdown automation and Turing machine visually.

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106/106/106106049/#
2	https://nptel.ac.in/courses/106/104/106104123/
3	https://www.jflap.org/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests		Continuous Comprehensive Assessment	
	(IAT)		(CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	5			
Understand	5	5	10	
Apply	10	10	15	20
Analyze	10	10	15	20
Evaluate	10	10	10	10
Create	10	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	5	5				5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4		5	5	5	5		20	20%
CO5								
Total	15	25	10	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	15%
Apply	40%
Analyse	20%
Evaluate	10%
Create	10%

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5				5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4		5	5	5	5		20	20%
CO5								
Total	15	25	10	15	20	15	100	100%

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:2:0:4
Total Hours of Pedagogy	30 Hours – Theory + Project
Credits:	03
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		SEE	
	Project Weekly Assessment			
Project	**Project Understanding**	05 Marks	**Write up**	10 Marks
	Technical Competence	10 Marks	**Presentation & Demonstration**	50 Marks
	Innovation	10 Marks	**Project report**	25 Marks
	Problem Solving	15 Marks	**Viva-Voce**	15 Marks
	Project Demonstration	10 Marks	**Total**	**100 Marks**
	Total	**50 Marks**	**100 Marks Reduced to 50 Marks**	

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
- Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes

- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.
- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.

  Level 1- 2nd Year – 3rd Semester & 4th Semester

  Level 2- 3rd year – 5th Semester & 6th Semester

  Level 3 – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2. During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

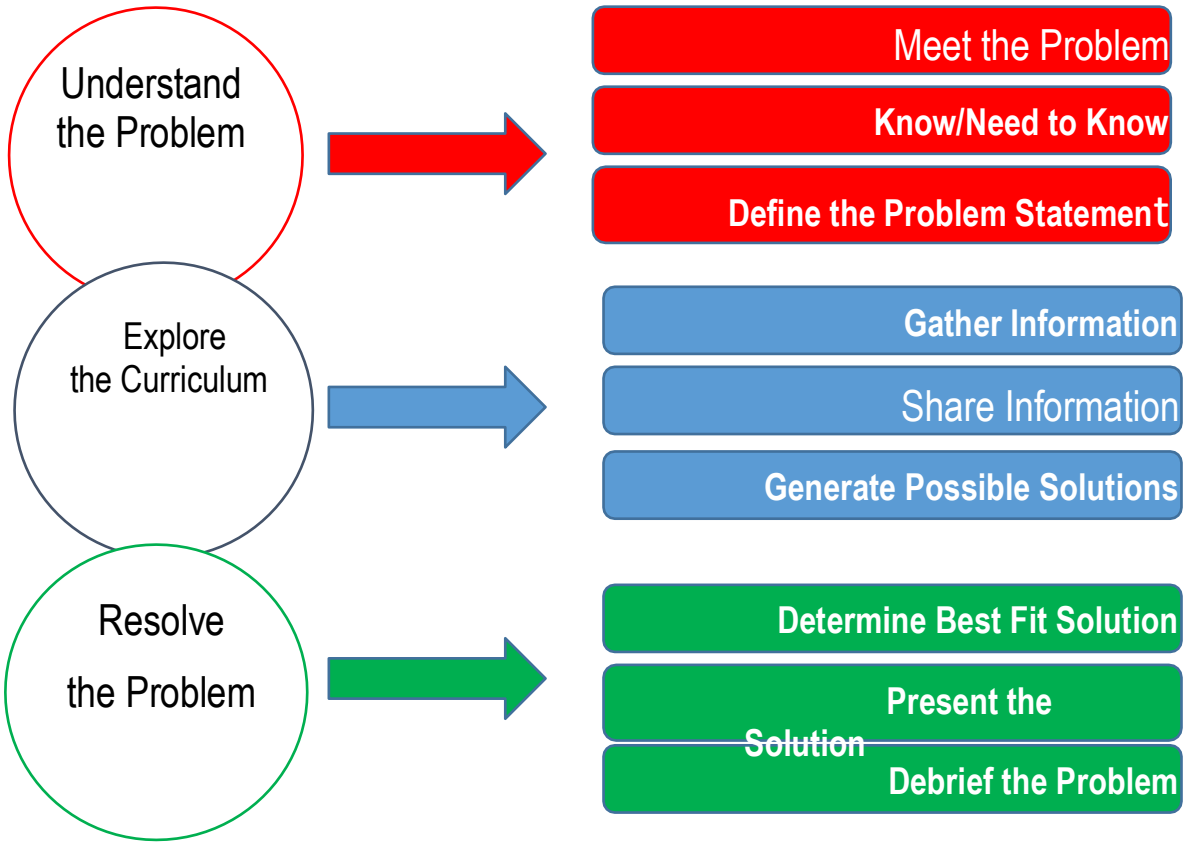
1. Phase 2 is for 11 Weeks

2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

1. Phase 1 – 25 Marks
2. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

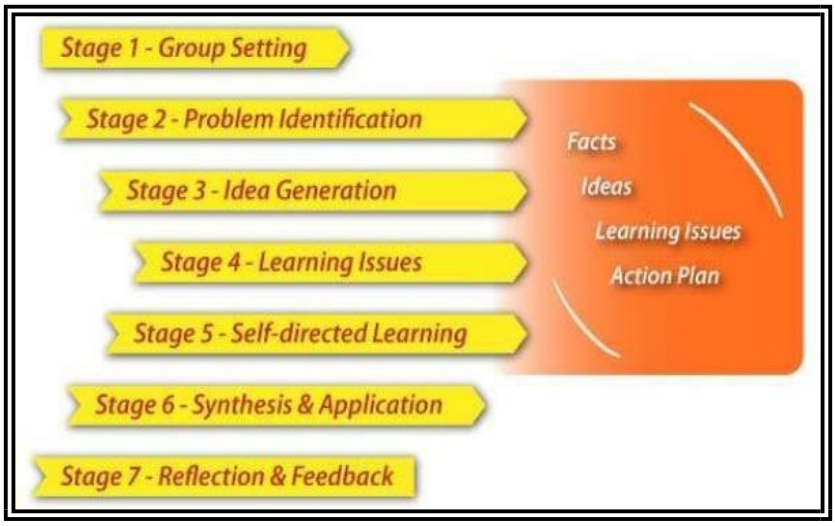
10. Obstacles/Gaps

- Lack of student interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

Sl. No.	Topics	Duration
Phase-1		
1.	Understanding of the project and preparing a project	**3 Weeks**
2.	Literature review	**1 Week**
3.	Planning	**1 Week**
Phase-2		
4.	Analysis and Design	**3 Weeks**
5.	Implementation	**6 Weeks**
6.	Testing	**1 Week**
7.	Writing the project report	**1 Week**
	Total	**16 Weeks**

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review
5. Methodology
6. Analysis and Design
7. Implementation
8. Testing
9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page

2. Certificate

3. Declaration

4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25", Right – 1", Top and Bottom – 0.75".
- The total number of reports to be prepared are
  - One copy to the department.
  - One copy to the concerned guide
  - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand

- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

Score Levels	Content	Conventions	Organization	Presentation
5	▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate	▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice	▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution.	▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out.
4	▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate	▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice	▪ Information supports the solution to the challenge or question.	▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources	▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice	▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently carried out in the project.	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention. Presentation is loosely

2	▪ Provides inconsistent information for solution ▪ Has no apparent application of critical thinking ▪ Has no clear goal ▪ Is pulled from few sources ▪ Has significant factual errors, misconceptions, or misinterpretations	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	V
Subject Identified for PBL	Generative AI
Prerequisite	Foundation in Mathematics, Basic programming skills
Justification for the selected subject	• Understanding GenAI is crucial for students to thrive in an increasingly AI-driven world. • GenAI can be used to spark creativity in students by providing novel ideas and encouraging experimentation. • GenAI can assist in brainstorming, idea generation, and problem-solving, fostering creativity and innovation.
List of possible projects	• AI Blog/Article Generator • ChatBot • Generate short stories or poetry based on user prompts or themes. • Legal or Medical Document Assistant • Speech emotion recognition • Text-to-Image Generator • AI-Powered Logo Designer • Fashion Design Assistant • Sentiment analysis • Stock price prediction • Healthcare diagnosis • Traffic Sign Recognition • Fake products detection • Music Generation • Interior Design Visualizer (Not Limit to)

Signature of the Guide **Signature of HOD**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Project Based Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on……

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide & Designation
Department of Information Science and Engineering

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

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

Project Based Learning – Student(s) – Guide – Interaction

Date		
PBL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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

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

Project Based Learning – Continuous Evaluation

Batch No.	Name	USN	Marks assigned	Remarks by the guide on the progress of the project

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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

Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET							
Batch No.	Name of the Student	USN	Phase I (25 Marks)		Phase II (25 Marks)		Final CIE Marks (Phase I & Phase II) (50 Marks)
			Abstract / Understanding of the Project (5 Marks)	Analysis & Design (20 Marks)	Implementation (20 Marks)	Demonstration (5 Marks)	

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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Project Based Learning Outcomes

Sl.No	Batch No.	Name of Students	USN	Domain	Outcomes

1. (a) Define Objectives

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Learning Goal (LG)-1	To Understand the principles and concepts behind generative AI models
Learning Goal (LG) -2	To Explain the knowledge gained to implement generative models using Prompt design frameworks.
Learning Goal (LG) -3	To Apply various Generative AI applications for increasing productivity.
Learning Goal (LG)-4	To Develop Large Language Model-based Apps.

(b) Course Outcomes

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Course Outcomes (CO)-1	**Understand** the principles and concepts behind generative AI models
Course Outcomes (CO)-2	**Apply** the knowledge gained to implement generative models using Prompt design frameworks.
Course Outcomes (CO)-3	**Analyze** various Generative AI applications for increasing productivity.
Course Outcomes (CO)-4	**Develop** Large Language Model-based Apps.

(c) Alignment

Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program.						
Sl. No.	**Learning Goals**	**Course Outcomes**	**Assessment**	**In-Class Activity**	**Out-of-Class Activity**	**Weightage**
1.	LG-1	CO1	Exam(CIE, SEE)	Debugging Activity	On the spot coding and debu	10%
2.	LG-2	CO2	Exam(CIE, SEE)	Think-Pair-Share	Hands-on Exercises with GenAI	20%
3.	LG-3	CO3	Exam(CIE, SEE)	Project Development	GenAI Projects	20%

4.	LG-4	CO4	Project Reviews	Paper Writing and Presentation	Paper Presentation in Scopus Conference	25%

Curriculum Design

(a) Course integration

Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops.			
Sl. No.	**Course Name**	**Course Code**	**Justification for selecting the Course for Experiential Learning**
1	**Generative AI**	**BIS505**	GenAI can assist in brainstorming, idea generation, and problem-solving, fostering creativity and innovation.

(b) Develop Modules

Develop Modules: Create specific modules within these courses that focus on hands-on experiences.

Module No	Lecture No.	Session Topics	RBT Levels	Activities Planned	Course Outcome Mapping	Mode of Delivery	Planned Date	Actual Date
1		Explore pre-trained word vectors. Explore word relationships using vector arithmetic. Perform arithmetic operations and analyze results Use dimensionality reduction (e.g., PCA or t-SNE) to visualize word embedding. Analyze clusters and relationships. Generate contextually rich outputs using embedding. Train a custom Word2Vec model on a small dataset. Train embedding on a domain-specific corpus (e.g., legal, medical) and analyze how	**L2, L3**	**Problem Solving**	**CO1, CO2**	**Chalk& Talk, Demonstration/ Hand-on-sessions**		

2		Use word embedding to improve prompts for Generative AI model. Retrieve similar words using word embedding.) Use the similar words to enrich a GenAI prompt. Use the AI model to generate responses for the original and enriched prompts. Use word embedding 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. 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.	**L4**	**Hands-on- Sessions/ Certificates**	**CO3**	**Chalk& Talk, Demonstration/ Hand-on-sessions**		
3.		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. 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. Build a Chatbot.	**L5**	**Project Demonstration**	**CO4**	**Chalk& Talk,Demonstration/ Hand-on-sessions**		

Reference Books/ Materials

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.

List of AI tools to be used: (not limited to)
GPT tools, StreamLit, FAISS, Hugging face Transformers- used together to build intelligent AI applications by enabling language processing, interactive dashboards, fast similarity search, and access to powerful pre-trained models.

Suggested Learning Resources
1. https://www.w3schools.com/gen_ai/index.php
2. https://youtu.be/eTPiL3DF27U
3. https://youtu.be/je6AlVeGOV0
4. https://youtu.be/RLVqsA8ns6k

Mapping of Learning objectives with Learning Outcomes

Course/Modules	Learning Objective	Learning Outcome	Assessment Method
Module 1:	LO-1, LO-2, LO-4	CO-1, CO-2, CO-4	Problem-solving
Module 2:	LO-2, LO-3, LO-5	CO-2, CO-3, CO-5	Problem-solving
Module 3:	LO-3, LO-5	CO-3, CO-5	Problem-solving

Partnerships and Resources

Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits.

Sl.No	Name of the Industry Collaboration	Projects undertaken / Industrial Visit	Domain	Project Outcomes

Implement Experiential Activities

PBL Component	Details
Project Title	GenAI can generate realistic text, images, audio, and video, enabling the creation of fake news, deepfake videos, and synthetic media that are hard to distinguish from real content.
Real-World Problem	The following projects can be considered as real-world problems. [**Not Limited to]** • AI Blog/Article Generator • ChatBot • Generate short stories or poetry based on user prompts or themes. • Legal or Medical Document Assistant • Speech emotion recognition

	• Text-to-Image Generator • AI-Powered Logo Designer • Fashion Design Assistant • Sentiment analysis • Stock price prediction • Healthcare diagnosis • Traffic Sign Recognition • Fake products detection • Music Generation • Interior Design Visualizer

Learning Objectives	**Subject Areas:** Artificial Intelligence **Skills Developed:** LLM models
Timeline	**Start Date:** First day of the semester **Milestones/Checkpoints:** 1. Understand the process of the project: 1-3weeks 2. Design and Implement the project: 4-8 weeks 3. Evaluate the working of the project: 9-10 weeks 4. Demonstrate and report submission: 11-12 weeks **End Date:** Last day of the semester
Resources Needed	**Materials:** [List materials] **Technology:** [List technology] **Guest Speakers/Experts:** [List experts]
Team Formation	**Group Size:** 4members **Team Roles:** Analysis, Design, Develop and Test
Background Information	Basic programming skills, basic Data Structures and algorithms, Strings
Research Methods	**Primary Sources:** [List methods such as interviews, surveys] **Secondary Sources:** [List methods such as articles, books, videos]

Team Meetings	**Frequency:** Once in a Month **Structure:** Based on their projects the review for the progress and suggestions given
Collaboration Tools	**Digital Platforms:** Google, Competitive Platforms. **Communication Methods:** In-Person meetings, presentations, demonstrations.
Project Deliverables	Reports, Presentations, Prototypes, Project
Presentation Format	**Options:** PowerPoint, Team Demonstration **Audience:** classmates **Schedule:** Presentation schedule: 11th week
Project Exhibition	Defining the Purpose and Theme Setting Goals Form an Organizing Committee: Invite Participants Choose a Venue Set a Budget for the exhibition Create a Timeline to host

Experiential Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding Experiential Learning Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on……

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide

Designation

Department of Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

Date		
EL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of HOD**

Assessment

Rubrics for Project-Based Learning Assessment

Sl. No	Name of the Student	USN	Criteria	Exemplary (4)	Proficient (3)	Developing (2)	Beginning (1)	Total
			Project Understanding	Demonstrates deep understanding of project goals and requirements; identifies key issues and objectives.	Shows good understanding of project goals and requirements; recognizes most key issues and objectives.	Displays basic understanding of project goals and requirements; some key issues and objectives are unclear.	Lacks clear understanding of project goals and requirements; key issues and objectives are misunderstood.	
			Technical Competence	Mastery of technical skills required for the project; applies skills effectively and efficiently.	Good technical skills; applies skills competently with few errors.	Basic technical skills; occasionally makes errors in application.	Limited technical skills; frequently makes errors in application.	
			Innovation	Highly creative and original ideas; shows significant innovation and out-of-the-box thinking.	Somewhat creative and original ideas; demonstrates innovation in some aspects.	Limited creativity and originality; shows minimal innovation.	Lacks creativity and originality; no evidence of innovative thinking.	
			Problem Solving	Identifies problems accurately and develops effective, comprehensive solutions.	Identifies problems correctly and develops good solutions.	Identifies problems but solutions are somewhat effective or incomplete.	Struggles to identify problems and develop effective solutions.	
			Project Management	Manages project timelines, resources, and tasks exceptionally well; meets all deadlines.	Manages project timelines, resources, and tasks effectively; meets most deadlines.	Manages project timelines, resources, and tasks with some difficulty; misses some deadlines.	Poor management of project timelines, resources, and tasks; frequently misses deadlines.	

			Documentation	Thorough, clear, and well-organized documentation; all necessary details included.	Clear and organized documentation; most necessary details included.	Basic documentation; some necessary details are missing or unclear.	Poor documentation; lacks necessary details and organization.	
			Presentation Skills	Engaging and well-organized presentation; communicates ideas clearly and effectively.	Good presentation; communicates ideas clearly but lacks some engagement or organization.	Basic presentation; some ideas are unclear or poorly organized.	Ineffective presentation; ideas are unclear and poorly organized.	
			Collaboration	Works exceptionally well with team members; shows strong teamwork and leadership skills.	Works well with team members; demonstrates good teamwork.	Works with team members but has some difficulties in collaboration.	Struggles to work with team members; lacks teamwork and collaboration skills.	
			Faculty Assessment	Meets or exceeds faculty expectations in all areas; shows exceptional performance.	Meets faculty expectations in most areas; shows good performance.	Meets some faculty expectations; shows average performance.	Does not meet faculty expectations; shows poor performance.	
			Reflection	Provides deep insights and critical analysis of own work; demonstrates significant learning and growth.	Provides good insights and analysis of own work; demonstrates learning and growth.	Provides basic insights and analysis of own work; shows some learning and growth.	Provides minimal or no insights and analysis of own work; shows little to no learning and growth.	
			Overall Assessment	Exceptional overall performance; exceeds expectations in most or all areas.	Good overall performance; meets expectations in most areas.	Average overall performance; meets expectations in some areas.	Poor overall performance; does not meet expectations in most areas.	

Skills Assessment Course:

Student Name	USN	Skill Acquired	Skill Level Before (1-10)	Skill Level After (1-10)	Improvement (After - Before)	Syntax (1-10) Before	Syntax (1-10) After	Logic & Problem Solving (1-10) Before	Logic & Problem Solving (1-10) After	Data Structures (1-10) Before	Data Structures (1-10) After	Libraries & Frameworks (1-10) Before	Libraries & Frameworks (1-10) After	Code Optimization (1-10) Before	Code Optimization (1-10) After	Debugging (1-10) Before	Debugging (1-10) After

PROFESSIONAL CORE COURSE LAB (PCCL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**Vth**				
Course Title	**:**	**DevOps Lab**				
Course Code	**:**	**BISL506**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical**				
Category	**:**	**PCCL**				
Stream	**:**	**Information Science and Engineering**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**0: 2: 2: 0**		**SEE**	**:**	**50**
Total Hours	**:**	**30**		**SEE Duration**	**:**	**3hr**
Credits	**:**	**02**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Introduce DevOps terminology, definition & concepts.
2	Understand the different Version control tools like Git, Mercurial, concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment), Configuration management using Ansible
3	Illustrate the benefits and drive the adoption of cloud-based DevOps tools to solve real world problems.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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

COURSE CURRICULUM

	Experiments	Course Outcome
Sl. No.	***List of problems for which student should develop program and execute in the Laboratory***	
1	Introduction to Maven and Gradle: Overview of Build Automation Tools, Key Differences Between Maven and Gradle, Installation and Setup	CO1
2	Working with Maven: Creating a Maven Project, Understanding the POM File, Dependency Management and Plugins	CO2
3	Working with Gradle: Setting Up a Gradle Project, Understanding Build Scripts (Groovy and Kotlin DSL), Dependency Management and Task Automation	CO2
4	Practical Exercise: Build and Run a Java Application with Maven, Migrate the Same Application to Gradle	CO3
5	Introduction to Jenkins: What is Jenkins?, Installing Jenkins on Local or Cloud Environment, Configuring Jenkins for First Use	CO1
6	Continuous Integration with Jenkins: Setting Up a CI Pipeline, Integrating Jenkins with Maven/Gradle, Running Automated Builds and Tests	CO2
7	Configuration Management with Ansible: Basics of Ansible: Inventory, Playbooks, and Modules, Automating Server Configurations with Playbooks, Hands-On: Writing and Running a Basic Playbook	CO4
8	Set Up a Jenkins CI Pipeline for a Maven Project, Use Ansible to Deploy Artifacts Generated by Jenkins	CO4
9	Introduction to Azure DevOps: Overview of Azure DevOps Services, Setting Up an Azure DevOps Account and Project	CO1
10	Creating Build Pipelines: Building a Maven/Gradle Project with Azure Pipelines, Integrating Code Repositories (e.g., GitHub, Azure Repos), Running Unit Tests and Generating Reports	CO2
11	Creating Release Pipelines: Deploying Applications to Azure App Services, Managing Secrets and Configuration with Azure Key Vault, Hands-On: Continuous Deployment with Azure Pipelines	CO3
12	Practical Exercise and Wrap-Up: Build and Deploy a Complete DevOps Pipeline, Discussion on Best Practices and Q&A.	CO4

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.
- 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 to 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

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** and demonstrate different actions performed through Version control tools like Git.	Understand	L2
CO2	**Perform** Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle	Apply	L3
CO3	**Inspect** configuration management using Ansible.	Analyse	L4
CO4	**Appraise** Cloud-based DevOps tools using Azure DevOps.	Evaluate	L5

List of AI Tools Used: Not limit to
Sysdig and PagerDuty are used to monitor systems in real time and automate alerting and incident response to ensure reliable and secure application operations.

Weblinks and Video Lectures (e-Resources)	
1	https://www.geeksforgeeks.org/devops-tutorial/
2	https://www.javatpoint.com/devops
3	https://www.youtube.com/watch?v=2N-59wUlPVI
4	https://www.youtube.com/watch?v=87ZqwoFeO88

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1, PO2, PO5	PSO1
CO3	PO1, PO2, PO5	-
CO4	PO1, PO2, PO3, PO5, PO12	PSO2

ABILITY ENHANCEMENT COURSE (AEC)

EXPERIENTIAL LEARNING

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. (a) Define Objectives

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Learning Goal (LG)-1	To Understand the definition and principles of UI/UX Design in order to design with intention.
Learning Goal (LG) -2	To Understand the role of design thinking concepts and mental models in UX design.
Learning Goal (LG) -3	To Discover the industry-standard tools and specific project deliverables in UI/UX.
Learning Goal (LG)-4	To Explore different prototyping methods, UX design principles with case examples.

(b) Course Outcomes

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Course Outcomes (CO)-1	**Understand** the concept of UX design and explain user experience design requirements.

Course Outcomes (CO)-2	**Examine** UX design process and methodology.
Course Outcomes (CO)-3	**Formulate** informed judgments and recommendations for improving UI designs based on user feedback.
Course Outcomes (CO)-4	**Design** comprehensive UI design strategies that integrate user research, prototyping, and user testing.

(c) Alignment

Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program.

Sl.No	Learning Goals	Course Outcomes	Assessment	In-Class Activity	Out-of- Class Activity	Weightage
1.	LG-1	CO1	Exam(CIE, SEE)	Presentation of ideas and discussion	MOOC Course on User Interface/ User experience	20%
2.	LG-2	CO2	Exam(CIE, SEE)	Think-Pair-Share on requirements and prototyping and modelling	Hands-on Coding Exercises with Lunacy, Figma, Visily	30%
3.	LG-3	CO3	Exam(CIE, SEE)	Problem-Solving on designing	Design of any application or page using UI/UX supporting softwares	30%
4.	LG-4	CO4	Exam(CIE, SEE)	Use case/ Scenario based problem solving	Online Competitions (Designing a poster presentations and Challenges)	20%

2. Curriculum Design

(a) Course integration

Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops.

Sl. No	rse Name	rse Code	tification for selecting the Course for Experiential Learning
1.	**UI/UX**	**BIS5071**	rse is appropriate to improve student skills in requirement gathering and demonstrating the design to user satisfaction for real world problems.

(b) Develop Modules

Develop Modules: Create specific modules within these courses that focus on hands-on experiences.

Module No	Lecture No.	Lab Programs	RBT Levels	Activities Planned	Course Outcome Mapping	Mode of Delivery	Planned Date	Actual Date
1	4	**Introduction:** Usability to user experience, Emotional impact as part of user experience, User experience needs a business case. Extracting Interaction Design Requirements: Needs & Requirements, Formal requirement extraction, Methods for requirement extraction.	L1, L2	Problem Solving	CO1	Chalk& Talk, Demonstration/ Hand-on-sessions		
2	4	**Design Thinking, Ideation, and Sketching:** Design Thinking, Design Perspectives, User Personas, Ideation, Sketching. Mental Models and Conceptual Design: Storyboards, Design influencing user behaviour. **Textbook1: Chapter 7, Chapter 8**	L3	Hands-on-Sessions/ Certificates	CO2,CO3	Chalk& Talk, Demonstration/ Hand-on-sessions		
3	4	**UX Design Guidelines:** Using and interpreting design guidelines, Human memory limitations, UX design guidelines & examples, Planning, Translation, Physical action, Outcomes, Assessment, Overall. **Textbook1: Chapter 22**	L4, L5	Project Demonstration	CO4	Chalk &Talk, Demonstration/ Hand-on-sessions		
Experiment -1	1	Create a flexible Low and Mid Fidility wireframe for a login & signup page.	**L5**	Program design and execution	CO-1	Lab Conduction Demonstration		
Experiment -2	2	Enhance webpage design with alignment, distribution, grouping, grid system and grouping for a professional look.	**L6**	Program design and execution	CO-2	Lab Conduction Demonstration		
Experiment -3	3	Create an webpage include masking and gradient features.	**L6**	Program design and execution	CO-2	Lab Conduction Demonstration		

Experiment -4	4	Design a responsive layout with constraints and flex layouts.	**L5**	Program design and execution	CO-3	Lab Conduction Demonstration		
Experiment -5	5	Design an interactive E-Commerce checkout process in Penpot, add interactive navigations.	**L6**	Program design and execution	CO-3	Lab Conduction Demonstration		
Experiment -6	6	Create a minimalist logos using Booleans in Figma.	**L6**	Program design and execution	CO-3	Lab Conduction Demonstration		
Experiment -7	7	Design a course promotion banner using Figma or any UI tools	**L6**	Program design and execution	CO-3	Lab Conduction Demonstration		
Experiment -8	8	Create a user flow diagram for an on;line shopping app using UI tools.	**L4**	Program design and execution	CO-4	Lab Conduction Demonstration		
Experiment -9	9	Create a wireframe and redesign any popular chat app	**L6**	Program design and execution	CO-4	Lab Conduction Demonstration		
Experiment - 10	10	Animate a moving car in Figma, build a dynamic ride hailing app like uber	**L6**	Program design and execution	CO-4	Lab Conduction Demonstration		
Open ended Programs								
1		Create a wireframe, design and prototype the UI pages for the food application.	**L4**	Program design and	CO-4			
2		Create a wireframe, design and protype social meadi photo sharing app	**L4**	Program design and execution	CO-4			
3		Design a dashboard with statistics and graphs, add dropdown options for some dashboard details.	**L6**	Program design and execution	CO-4			
4		Create a designer portfolio which includes about page, work showcase page, blog page, contact page.	**L6**	Program design and execution	CO-4			

5		Create a travel agency website including Home page with search bar, activities page, client testimonial page, Image galary.	**L6**	Program design and execution	CO-4			

Reference Books/ Materials
1. The UX Book-Process and Guidelines for Ensuring a Quality User Experience, REX HARTSON and PARDHA S. PYLA, Morgan Kaufmann, Elsevier, 2012.

List of AI tools Used: Not limit to
Figma tool: Enables collaborative interface design, prototyping etc.,

Suggested Learning Resources
1. https://www.freecodecamp.org/news/ui-ux-design-tutorial-from-zero-to-hero-with- wireframe-prototype-figma/
2. https://www.edureka.co/blog/ui-ux-design-tutorial/
3. https://www.udemy.com/course/introtoux/
4. https://www.youtube.com/watch?v=NTmh8I-XI4c

3. Mapping of Learning objectives with Learning Outcomes

Course/Modules	Learning Objective	Learning Outcome	Assessment Method
Experiment 1	LO-1	CO-1	Program Conduction in Lab
Experiment 2, 3	LO-2	CO-2	Program Conduction in Lab
Experiment 4,5,6,7	LO-3	CO-3	Program Conduction in Lab
Experiment 8,9,10	LO-4	CO-4	Program Conduction in Lab

4. Partnerships and Resources

Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits.

Sl.No	Name of the Industry Collaboration	Projects undertaken / Industrial Visit	Domain	Project Outcomes
1.	ATAL Incubation Centre, DSU	Industrial Visit	mputer Science- Web Development	eb page/app for the Mini Project on real world problems

Implement Experiential Activities

PBL Component	Details
Project Title	Mini Project on User interface design
Real-World Problem	The following projects can be considered as realworld problems. [**Not Limited to]** 1. TOURISM 2. AGRICULTURE, FOODTECH & RURAL DEVELOPMENT 3. SMART EDUCATION 4. SMART AUTOMATION
Learning Objectives	**Subject Areas:** User Interface design **Skills Developed:** XHTML, Figma, Canva, Lunacy, JavaScript, PHP, MySQL
Timeline	**Start Date:**First day of the semester **Milestones/Checkpoints:** 1. Understand the SDLC process of the project: 1-3weeks 2. Design and Implement the project: 4-8 weeks 3. Evaluate the working of the project: 9-10 weeks 4. Demonstrate and report submission: 11-12 weeks **End Date:**Last day of the semester
Resources Needed	**Materials:** [List materials] **Technology:** [List technology] **Guest Speakers/Experts:** [List experts]
Team Formation	**Group Size:**4members **Team Roles:**Analysis, Design, Develop and Test
Background Information	Basic programming skills

Research Methods	**Primary Sources:** [List methods such as interviews, surveys] **Secondary Sources:** [List methods such as articles, books, videos]
Team Meetings	**Frequency:** Once in a Month **Structure:** Based on their SDLC stage the review for the progress and suggestions given
Collaboration Tools	**Digital Platforms:** Google sites, Apache webserver, MySQL database, PHP **Communication Methods:** In-Person meetings, presentations, demonstration.
Project Deliverables	1. Discovery. 2. Strategy. 3. Visual and User Experience Design. 4. Web Development. 5. Content Integration. 6. Quality Assurance. 7. Deployment. 8. Report on project
Presentation Format	**Options:** PowerPoint, Team Demonstration **Audience:** classmates **Schedule:** Presentation schedule: 11th week
Project Exhibition	• Defining the Purpose and Theme • Setting Goals • Form an Organizing Committee: Invite Participants • Choose a Venue • Set a Budget for the exhibition • Create a Timeline to host

Experiential Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

RespectedSir/Madam,

Sub:Regarding Experiential Learning Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on…….

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide Designation

Department of ……. Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

Date		
EL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of HOD**

Assessment

Rubrics for Project-Based Learning Assessment

Sl. No	Name of the Student	USN	Criteria	Exemplary (4)	Proficient (3)	Developing (2)	Beginning (1)	Total
			Project Understanding	Demonstrates deep understanding of project goals and requirements; identifies key issues and objectives.	Shows good understanding of project goals and requirements; recognizes most key issues and objectives.	Displays basic understanding of project goals and requirements; some key issues and objectives are unclear.	Lacks clear understanding of project goals and requirements; key issues and objectives are misunderstood.	
			Technical Competence	Mastery of technical skills required for the project; applies skills effectively and efficiently.	Good technical skills; applies skills competently with few errors.	Basic technical skills; occasionally makes errors in application.	Limited technical skills; frequently makes errors in application.	
			Innovation	Highly creative and original ideas; shows significant innovation and out-of-the-box thinking.	Somewhat creative and original ideas; demonstrates innovation in some aspects.	Limited creativity and originality; shows minimal innovation.	Lacks creativity and originality; no evidence of innovative thinking.	
			Problem Solving	Identifies problems accurately and develops effective, comprehensive solutions.	Identifies problems correctly and develops good solutions.	Identifies problems but solutions are somewhat effective or incomplete.	Struggles to identify problems and develop effective solutions.	
			Project Management	Manages project timelines, resources, and tasks exceptionally well; meets all deadlines.	Manages project timelines, resources, and tasks effectively; meets most deadlines.	Manages project timelines, resources, and tasks with some difficulty; misses some deadlines.	Poor management of project timelines, resources, and tasks; frequently misses deadlines.	
			Documentation	Thorough, clear, and well-organized documentation; all necessary details included.	Clear and organized documentation; most necessary details included.	Basic documentation; some necessary details are missing or unclear.	Poor documentation; lacks necessary details and organization.	
				Engaging and well-organized	Good presentation;	Basic presentation; some	Ineffective	

			Presentation Skills	presentation; communicates ideas clearly and effectively.	communicates ideas clearly but lacks some engagement or organization.	ideas are unclear or poorly organized.	presentation; ideas are unclear and poorly organized.	
			Collaboration	Works exceptionally well with team members; shows strong teamwork and leadership skills.	Works well with team members; demonstrates good teamwork.	Works with team members but has some difficulties in collaboration.	Struggles to work with team members; lacks teamwork and collaboration skills.	
			Faculty Assessment	Meets or exceeds faculty expectations in all areas; shows exceptional performance.	Meets faculty expectations in most areas; shows good performance.	Meets some faculty expectations; shows average performance.	Does not meet faculty expectations; shows poor performance.	
			Reflection	Provides deep insights and critical analysis of own work; demonstrates significant learning and growth.	Provides good insights and analysis of own work; demonstrates learning and growth.	Provides basic insights and analysis of own work; shows some learning and growth.	Provides minimal or no insights and analysis of own work; shows little to no learning and growth.	
			Overall Assessment	Exceptional overall performance; exceeds expectations in most or all areas.	Good overall performance; meets expectations in most areas.	Average overall performance; meets expectations in some areas.	Poor overall performance; does not meet expectations in most areas.	

Skills Assessment Course : UI/UX

tudent Name	USN	Skill Acquir d	Skill Level Before (1-10)	Skill Level After (1-10)	Improvem ent (After-Before)	Syntax (1-10) Before	Syntax (1-10) After	Logic & Problem Solving (1-10) Before	Logic & Problem Solving (1-10) After	Data Structures (1-10) Before	Data Structures (1-10) After	Libraries & Frameworks (1-10) Before	Libraries & rameworks (1 10) After	Code Optimization (1-10) Before	Code Optimization (1-10) After	Debugging (1-10) Before	Debugging (1-10) After

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 UX design and explain user experience design requirements.	A	L3
CO2	**Examine** UX design process and methodology.	AN	L4
CO3	**Formulate** informed judgments and recommendations for improving UI designs based on user feedback.	E	L5
CO4	**Design** comprehensive UI design strategies that integrate user research, prototyping, and user testing.	C	L6

Mapping of Course Outcomes to Program Outcomes:

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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**V**				
Course Title	:	**Research Methodology and Intellectual Property Rights (RM&IPR)**				
Course Code	:	**B**5*8**				
Course Type (Theory/ Practical/ Integrated)	:	**Experiential Learning**				
Category	:	**AEC**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**1:0:0:0**		**SEE**	:	**50**
Total Hours	:	**20 Hours**		**SEE Duration**	:	**2 Hours**
Credits	:	**01**				

Course Learning Objectives: Students will be able to:

1.	Understand the knowledge on basics of research and its types.
2.	Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
3.	Learn Ethics in Engineering Research.
4.	Discuss the concepts of Intellectual Property Rights in engineering

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
6. Discuss various case studies to map with real-world scenarios and improve the understanding.
7. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

COURSE CURRICULUM		
Module No.	**Topics**	**Hours**
1	**Introduction**: Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship. **Tools:** Undermind, Litmaps, Bohrium, Perplexity. **Textbook1: Chapter1**	**4**
Pedagogy	**Think-Pair-Share**	
2	**Literature Review and Technical Reading**, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading. **Paper Writing:** Identification of research problem, Paper writing as per IEEE format, Introduction to LaTeX, Plagiarism Checking **Attributions and Citations**: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations. **Tools:** Grammarly, QuillBot,LaTeX , Jenni.AI, Turnitin , Mendeley , Zotero, Scite.ai, PubMed, ResearchRabbit, Scispace, Speechify. **Textbook 1: Chapter2 -Chapter 3**	**8**
Pedagogy	**Literature Review Paper Writing and Demo of the same**	
3	**Introduction to Intellectual Property:** IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India. **Patents:** Rights Associated with Patents, Enforcement of Patent Rights, Inventions Eligible for Patenting, Non-Patentable Matters, Patent Infringements, Avoid Public Disclosure of an Invention before Patenting. Process of Patenting, Prior Art Search. Choice of Application to be Filed. Patent Application Forms, Jurisdiction of Filing Patent Application, Publication, Pre-grant Opposition, Examination. Grant of a Patent, Validity of Patent Protection, Post-grant Opposition, Commercialization of a Patent, Need for a Patent Attorney/Agent. **Copyrights and Related Rights**: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement **Trademarks**: Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India, Process for Trademarks Registration, Case Study: Coca-Cola Company vs. Bisleri International Pvt. Ltd.	**8**

	Tools: PatentPal, WIPO Lex/GPT-based querying, Google Patents, IPfolio/TurboPatent,WIPO, TrademarkNow Advisor, DesignSearch.ai, DesignShelf, Legal Robot **Text Book1:Chapter 4 to Chapter 10**
Pedagogy	**Case study, Patent Proposal Writing**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1.	Research Methodology and Intellectual Property Rights , Dr. Santosh M Nejakar, Dr. Harish Bendigeri, ISBN 978-93-5987-928-4, Edition: 2023-24.
Reference Books	
1.	Research Methods for Engineers, David V. Thiel , Cambridge University Press, 978-1-107-03488-4
2.	Intellectual Property Rights, N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9
3.	Research Methodology – Methods and Techniques., C. R Kothari, Gourav Garg, New Age International Publishers.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Acquire** the knowledge of research and conduct a literature review.	**Understand**	**L2**
CO2	**Apply** the knowledge of research design, Citations, and the concepts of research methodology to a problem.	**Apply**	**L3**
CO3	**Devise** an effective research paper for a given problem statement and Analyze data collection methods.	**Analyze**	**L4**
CO4	**Choose** Indian patent applications, Patent laws, Gain the requirements about registration and infringements related to trademarks, & copyrights.	**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			3		3		3	2		
CO2				2	2			3		3		3			
CO3				2	3			3		2		3			
CO4					2			3		3		3		2	2

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc24_ge21/preview
2	https://archive.nptel.ac.in/content/syllabus_pdf/121106007.pdf
3	https://onlinecourses.nptel.ac.in/noc21_hs08/preview

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

COs	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5		
CO1	10	10	-	-	-	5	25	50 Marks
CO2	5	5	10	-	-	5	25	
CO3	5	5	-	10	10	5	35	
CO4	-	-	-	-	10	5	15	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
	(90% Theory+10% Practical Questions)
Remember	-
Understand	20
Understand	20
Understand	30
Understand	15
Understand	15

SEE Course Plan

COs	Marks Distribution						Total Marks	Weightage
	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5		
CO1	5	5	5	0	**5**	5	25	50 Marks
CO2	5	5	5	0	**5**	5	25	
CO3	5	5	0	5	**5**	5	25	
CO4	5	5	0	5	5	5	25	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1,PO2,PO5	PSO1
CO3	PO1,PO2,PO5	-
CO4	PO1,PO3	PSO2

PROFESSIONAL ELECTIVE COURSE -1 (PEC-1)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Computer vision**				
Course Code	:	**BIS504x**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC-I**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L: T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3**
Credits	:	**3**				

Sl. No.	Course Objectives
1	Able to understand basic notions in digital image processing
2	Able to apply the image enhancement and transformation techniques in digital image processing
3	Able to analyse spatial domain and frequency domain techniques in digital image processing
4	Able evaluate the Image Processing techniques used for new technologies and its applications.
5	Able to demonstrate applications of image processing and computer vision using image processing tools.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
   Include videos to demonstrate various concepts in C.
2. Encourage collaborative (Group) Learning to encourage team building.
3. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
4. 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.
5. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
6. Discuss various case studies to map with real-world scenarios and improve the understanding.
7. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Digital Image Fundamentals:** Introduction, Origins of digital image processing, Applications of DIP, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic relationships between pixels, Linear and nonlinear operations. **Textbook 1: Chapter 1 and Chapter 2: 2.1 to 2.5, 2.6.2**	8
Pedagogy	**Think Pair and Share**	
2	**Spatial Domain:** Some basic intensity transformation functions, Histogram processing, Fundamentals of spatial filtering, smoothing spatial filters, Sharpening spatial filters. **Frequency Domain:** Preliminary concepts, The Discrete Fourier transform (DFT) of two variables, properties of the 2-D DFT, Filtering in the frequency domain, Image smoothing and image sharpening using frequency domain filters, Selective filtering. **Textbook 1: Chapter 3:3.2 to 3.6, Chapter 4:4.2, 4.5 to 4.10**	8
Pedagogy	**Demonstration**	
3	**Introduction:** What is computer vision? A brief history. Image formation: Geometric primitives and transformations, Photometric image formation, The digital camera. **Textbook 1: Chapter 1:1.1,1.2, : Chapter 2:2.1,2.2, 2.3**	8
Pedagogy	**Visual Aids, Interactive Discussion**	
4	**Feature Extraction:** Importance of Features, Feature extraction techniques, Histogram of Oriented Gradient (HOG), Scale Invariant Feature Transform (SIFT), Background subtraction techniques, Image Matching, Principal Component Analysis (PCA) **Textbook 3: Chapter 4**	8
Pedagogy	**Poster Presentation**	
5	**Applications of Image Processing and Computer vision:** Face Recognition, Facial Expression Recognition, Optical Character Recognition, Automated Video Surveillance **Textbook 1, Textbook 2**	8
Pedagogy	**Case Studies**	

	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	Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Ed., Prentice Hall, 2008.
2	S. Sridhar, Digital Image Processing, Oxford University Press, 2ndEdition, 2016
3	Computer vision: algorithms and applications by Szeliski R. Springer Nature; 2022.
Reference Books	
1	Digital Image Processing- S.Jayaraman, S.Esakkirajan, T.Veerakumar, TataMcGraw Hill 2014.
2	Fundamentals of Digital Image Processing-A. K. Jain, Pearson 2004
3	Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B.K. P. Horn, McGraw-Hill
4	Introductory Techniques for 3D Computer Vision- E. Trucco and A. Verri, Publisher: Prentice Hall.
5	Computer Vision, D. H. Ballard, C. M. Brown- Prentice-Hall, Englewood Cliffs, 1982.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the fundamental concepts of digital image processing.	**Understand**	**L2**
CO2	**Apply** image enhancement and restoration techniques to process the digital image.	**Apply**	**L3**
CO3	**Analyse** the images in the frequency domain and spatial domain using various Transforms.	**Analyse**	**L4**
CO4	**Evaluate** segmentation techniques, color and morphological processing used in image processing and computer vision.	**Evaluate**	**L5**
CO5	**Demonstrate** applications of image processing and computer vision using image processing tools.	**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															
CO2		3											2		
CO3			3												
CO4				3								3	2		
CO5					3				3	3			2		

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=iZmHHVwp0Ow
2	https://www.youtube.com/watch?v=1l6kfkY4GyQ
3	https://www.youtube.com/watch?v=WnWfvWGpuzw&list=PLXOYj6DUOGrrjyRKpD0U0bIKGOXCAOHkE&index=8
4	https://www.youtube.com/watch?v=JKzC1B4JAJw&list=PLXOYj6DUOGrrjyRKpD0U0bIKGOXCAOHkE&index=11
5	https://www.youtube.com/watch?v=uqeOrtAzSyU&list=PLXOYj6DUOGrrjyRKpD0U0bIKGOXCAOHkE&index=14
6	https://www.youtube.com/watch?v=0SIPA8TvCbU&list=PLXOYj6DUOGrrjyRKpD0U0bIKGOXCAOHkE&index=23
7	https://www.youtube.com/watch?v=hL1aHfrDFPs&list=PLXOYj6DUOGrrjyRKpD0U0bIKGOXCAOHkE&index=25
8	https://www.youtube.com/watch?v=p_CYqgroEoI&list=PL3rE2jS8zxAykFjinIf6EsucLv5EA03_m&index=44
9	https://www.youtube.com/watch?v=LXGxK2b1mv4&list=PL3rE2jS8zxAykFjinIf6EsucLv5EA03_m&index=46
10	https://www.youtube.com/watch?v=q1J0VAYFkHg&list=PLuv3GM6-gsE08DuaC6pFUvFaDZ7EnWGX8&index=57

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	-	3	-	2	15	15%
CO2	5	5	5	10	10	10	45	45%
CO3	2	3	2	3	5	5	20	20%
CO4	-	5	3	2	5	5	20	20%
CO5	-	-	-	-	-	-	-	-
Total							100%	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	2	-	-	5	5	10	10%
CO2	5	5	5	10	10	5	40	40%
CO3	-	5	3	-	5	-	10	10%
CO4	-	4	6	5	5	-	20	20%
CO5	2	-	2	2	2	2	10	10%
Total	12	16	6	17	27	12	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Introduction to Cybersecurity**				
Course Code	:	**BIS504x**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC-1**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

1	Relate the sensor network with ad-hoc network.
2	Discuss the design principles for Wireless Sensor Networks.
3	Show the various mechanisms that form typical parts of WSNs.

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.

1. Encourage collaborative (Group) Learning to encourage team building.
2. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
3. Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking
    a. skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
4. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
5. Discuss various case studies to map with real-world scenarios and improve the understanding.
6. 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 ethical hacking?, Penetration testing, why hackers use linux, Getting started with Basics: Introductory Terms & Concepts, The Linux File system, Basic Commands in Linux, Modifying Files & Directories. **Textbook 1**: Specified topics from Chapter 1	8
Pedagogy	**Demonstration (Hands-on Lab with Kali Linux)**	
2	**Text Manipulation:** Viewing files, Numbering the lines, filtering text with grep, using SED to find and replace, Viewing files with more and less, Analyzing and Managing Networks: Analysing networks with ifconfig, checking wireless network devices with iwconfig, Changing your network information, Manipulating the domain name system. **Textbook 1:** Chapter 2, Chapter 3.	8
Pedagogy	**Problem-Based Learning (PBL)**	
3	**Controlling file and Directory Permissions:** Different types of users, granting permissions, checking permissions, changing permissions, Setting more secure default permissions with masks, special permissions. Process Management: Viewing Processes, filtering by process name, Greediest processes, Managing Processes, Killing Processes, Running Processes in the background, Moving a process to the foreground. **Textbook 1**: Chapter 5, Chapter 6	8
Pedagogy	**Gamified Learning (Capture the Flag - CTF)**	
4	**Bash Scripting:** A crash course in BASH, creating and running the bash scripts, scan for open ports, common built-in bash commands, Nmap and detecting and Exploiting vulnerabilities. What is Nmap? Using Nmap to understand and exploit vulnerabilities, Scanning Techniques and Commands, Threat Modelling and Identifying vulnerabilities. **Textbook 1**: Chapter 8 ,Textbook 2: Chapter 5	8
Pedagogy	**Collaborative Learning (Group-Based Scripting Projects)**	
5	**Metasploit Framework** What is Metasploit, Metasploit users, Metasploit Modules, Using Metasploit, Installing Metasploit, Managing Metasploit database, The Metasploit database, The Metasploit workspaces. **Textbook :** Textbook 2: Chapter 7	8
Pedagogy	**Case Studies (Real-World Penetration Testing Scenarios)**	
	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.	" Linux Basics for Hackers", OccupyTheWeb,2019, No Starch Press
2.	Kali Linux Hacking, "A Complete Step by Step Guide to Learn the Fundamentals of Cyber Security, Hacking, and Penetration Testing", Ethem Mining,2019, Amazon Digital Services LLC - Kdp, 2019
Reference Books	
1.	"Linux Command Line Crash Course", William Shotts, No Starch Press,2nd Edition
2.	"Linux Command Line and Bash Scripting Bible", Richard Blum Christine Bresnahan, Wiley, Third Edition, 2015

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** ethical hacking concepts, Linux basics, and file system operations.	**Understand**	**L2**
CO2	**Apply** text manipulation, network analysis, and DNS management using Linux tools.	**Apply**	**L3**
CO3	**Analyze** file permissions, process management, and security configurations	**Analyze**	**L4**
CO4	**Evaluate** Bash scripting, Nmap scanning, and vulnerability detection techniques.	**Evaluate**	**L5**
CO5	**Create** penetration-testing strategies using the Metasploit Framework.	**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															
CO2	3				3							2			
CO3		3		2	3							2			
CO4		2	2	2	3							3			
CO5		3	3	2	3							3			

	Weblinks and Video Lectures (e-Resources)
1	https://www.geeksforgeeks.org/introduction-to-kali-linux/
2	https://www.javatpoint.com/kali-linux-course

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5		
CO1	10	10	-	-	-	-	20	50 Marks
CO2	5	5	10	-	-	0	20	
CO3	5	5	-	10	10		30	
CO4	-	-	-	-	10	5	15	
CO5	-	-	-	-	-	15	15	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
	(90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	20
Analyse	30
Evaluate	15
Create	15

SEE Course Plan:

COs	Marks Distribution						Total Marks	Weightage
	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5		
CO1	5	5	5	0	0	0	15	50 Marks
CO2	5	5	5	0	5	0	20	
CO3	5	5	0	5	5	5	25	
CO4	5	5	0	5	5	5	25	
CO5	**0**	0	0	0	5	10	15	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1,PO5	PSO1
CO3	PO2,PO4,PO5	-
CO4	PO2,PO3,PO4,PO5	PSO2
CO5	PO2,PO3,PO4,PO5	PSO1

Humanities and Social Sciences (HSMS)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**Vth**				
Course Title	:	**Environmental Studies and E-Waste Management**				
Course Code	:	**BNSK507**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**HSMS**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:0:4**		**SEE**	:	**50**
Total Hours	:	**14**		**SEE Duration**	:	**1Hr**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Identify the major challenges of environmental issues
2	Develop skills, critical thinking and demonstrate socio-economic skills for Environmental protection
3	Analyze the impact of issues w. r. t. waste management

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation 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 Case study Based Learning (CBL), which fosters students' analytical skills, develop thinkingskills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

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	Ecosystem and Sustainability: Ecosystem: Structure of Ecosystem, Types: Forest, Desert, Wetlands, Riverine, Oceanic ecosystems. Sustainability: 17SDG targets and possible actions.Self-Study Component (SSC): Components of the environment. **Textbook 1: Chapter- 3, e-resource:1**	3
Pedagogy	**Collaborative Learning**	
2	Natural resources and Energy: Natural Resources: Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water. Energy: Different types of energy, Conventional sources & Non -Conventional sources of Energy, Solar energy, Wind Energy, Hydrogen as an alternative energy Self-Study Component (SSC): Alternative Energy sources **Textbook 1: Chapter- 2**	3
Pedagogy	**Poster Presentation**	
3	Environmental Pollution: Environmental Pollution: Water Pollution, Noise pollution, Air pollution (Sources, Impacts, Preventive measures and Public Health Aspects. Self-Study Component (SSC): Case studies of air pollution episodes Textbook **Textbook 1: Chapter- 5**	3
Pedagogy	**Case study**	
4	Waste management: Waste management: Solid Waste Management , types and sources, functional elements of SWM, Biomedical Waste Management - Sources, Characteristics Environmental Legislation: Solid Waste Management Rules,2016, Biomedical Waste Management Rules, 2016. Self-Study Component (SSC): Case studies on waste management options **Textbook 1: Chapter- 6, e-resource:2**	3
Pedagogy	**Case studies on waste management**	

5	E - Waste Management E- waste; composition and generation. Global context in e- waste; E-waste pollutants, E-waste hazardous properties, Effects of pollutant (E- waste) on human health and surrounding environment, domestic e-waste disposal, Basic principles of E waste management, Component of E waste management. E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2022 - Salient Features and its implications. Self-Study Component (SSC): E-Waste (Management) Amendment Rules, 2023, 2024 **Textbook 1: Chapter- 6**, **Textbook 2: Chapter-2, e-resource:3**	**2**
Pedagogy	**Case Study**	
	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	Environmental Studies, M Prakash , Elite Publishing House, Mangalore, 3rd Edition, , 2018.
2	Electronic Waste Management. Science, Hester R.E., and Harrison R.M, , 2009.
Reference Books	
1	Environmental Studies for UG students, Earch Barucha. 2004.
2	Environmental Studies, Benny Joseph, Tata McGraw – Hill Publishing Company Limited.2005
3	Environmental Studies- From Crisis to Cure ,R. Rajagopalan, Oxford university press, New Delhi, 2nd Edition, 2013.
4	E-waste: implications, regulations, and management in India and current global best practices, Johri R, TERI Press, New Delhi.
5	Principles of Environmental Science and Engineering, Raman Sivakumar, Cengage,2nd edition
6	Environmental Science – working with the Eart, G. Tyler Miller Jr. Thomson Brooks/Cole, Eleventh Edition, , 2006
7	Text Book of Environmental and Ecology ,Dr. Pratiba Singh, Dr.Anoop Singh and Dr. PiyushMalaviya Acme Learning Pvt. Ltd. New Delhi.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Comprehend the principles of ecology and environmental issues pertaining to air, land, and water on a global scale.	Understand	L2
CO2	Acquire observation skills for solving problems related to the environment.	Apply	L3
CO3	Conduct survey to describe the realities of waste management system.	Analyze	L4

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/105107167
2	https://unhabitat.org/waste-wise-cities-toolkit
3	https://nptel.ac.in/courses/105105160
4	https://sdgs.un.org/goals
5	https://kspcb.karnataka.gov.in/waste-management/biomedical-waste

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	-	-	-	-	20	50 Marks
CO2	5	5	10	-	10	20	20	
CO3	5	5	-	10	10		30	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100% Theory)
Understand	30
Analyze	40
Apply	30

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module- 4	Module- 5		
CO1	5	5	5	0	0	0	15	50 Marks
CO2	5	10	5	5	10	10	45	
CO3	10	5	0	5	10	10	40	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO2,PO4,PO7	-
CO3	PO4, PO6,PO7,PO12	-

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT

CURRICULUM

Scheme and Syllabus VI Semester

Outcome Based Education

Department of Information Science and Engineering

2024-2028 Batch

ABOUT THE INSTITUTE

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

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

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

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

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

QUALITY POLICY

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

ABOUT THE DEPARTMENT

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

M1: To deliver quality technical training on software application domain.

M2: To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.

M3: To inculcate research practices in teaching thus ensuring research blend among students.

M4: To ensure more doctorates in the department, aiming at professional strength.

M5: To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.

M6: To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.

PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.

PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.

PSO2: Meet the industry requirements in adapting to cutting-edge technologies.

PSO3: Develop business and entrepreneurial ideas to support society requirements.

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSED UG SCHEME

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

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 6th Sem

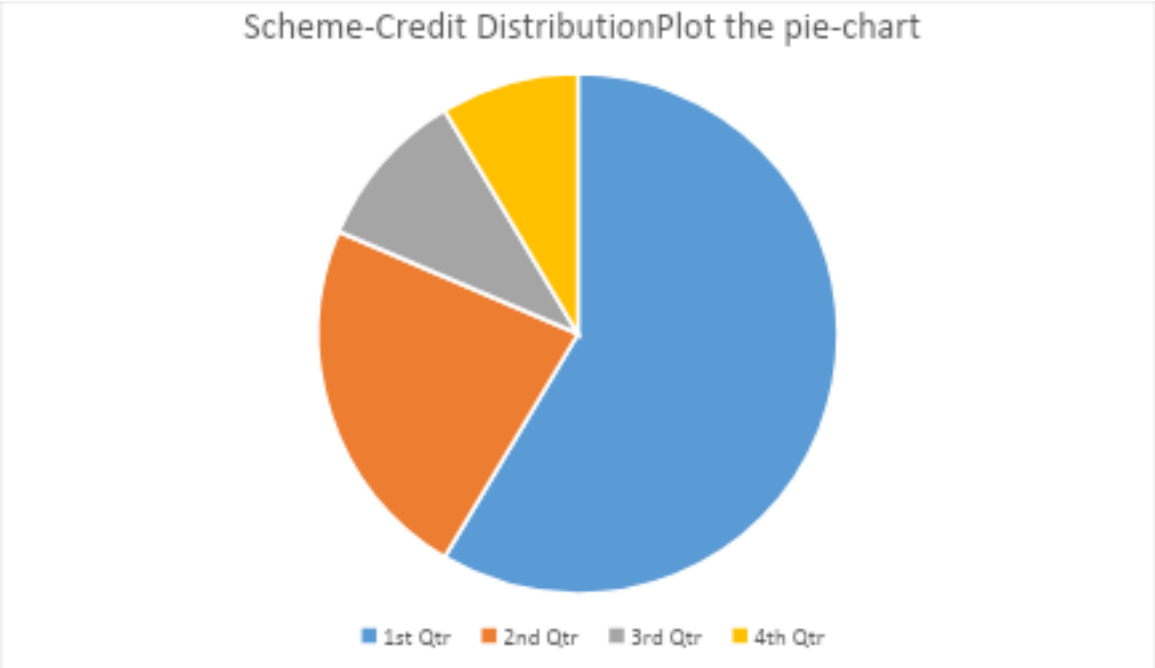
6th Sem

Sl. No	Course Category	Component			
		Theory	**Practical**	**Outreach**	**YOGA/SPORTS**
1	IPCC-1	60%	40%	--	--
2	IPCC-2	60%	40%	--	--
3	PCC-2	100%	--	--	--
4	PEC -2	100%	--	--	--
5	OEC-1	100%	--	--	--
6	PWP-1	--	100%	--	--
7	PCCL	--	100%	--	--
8	AEC	100%	--	--	--
9	NCMC	--	--	--	100%
Total Percentage		**58%**	**31%**	--	**11%**

Scheme Distribution

Department of Information Science and Engineering

Course Component	Credits	% of Credits
Integrated Professional Core Course-1(IPCC-1)	4	18%
Integrated Professional Core Course-2(IPCC-2)	4	18%
Professional Core Course-1(PCC-2)	3	14%
Professional Elective Course-1(PEC-2)	3	14%
Open Elective Course (OEC-1)	3	14%
Project Work Phase-1(PWP-1)	2	09%
Professional Core Course laboratory (PCCL)	2	09%
Ability Enhancement Course (AEC)	1	04%
Non- Credit Mandatory Course (NCMC)	0	0
Total	**22**	**100**



6thSEMESTER:

Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
					Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
					L	T	P	S						
BIS601	Cryptography and Network Security	IPCC-1	ISE	ISE	3	-	2	-	5	4	3	50	50	100
BIS602	NoSQL Database	IPCC-2	ISE	ISE	3	-	2	-	5	4	3	50	50	100
BIS603	Machine Learning	PCC-2	ISE	ISE	3	-	-	-	3	3	3	50	50	100
BIS604x	Professional Elective Course	PEC -2	ISE	ISE	3	-	-	-	3	3	3	50	50	100
Bxx605	Open Elective Course	OEC-1	ISE	ISE	3	-	-	-	3	3	3	50	50	100
BIS606	Project Work phase - 1	PWP-1	ISE	ISE	-	-	-	4	4	2	3	100	--	100
BISL607	Machine Learning Laboratory	PCCL	ISE	ISE	-	2	2	-	4	2	2	50	50	100
BIS608x	Mobile Application Development with Flutter	AEC	ISE	ISE	1	-	-	-	1	1	2	50	50	100
BNSK609	NSS	NCMC	ISE	ISE	-	-	2	-	2	0	-	100	-	100
BPEK609	PE													
BYOK609	YOGA													
**** AICTE Activity points mandatory to be covered**			**Total**		**16**	**2**	**8**	**4**	**30**	**22**	**22**	**500**	**400**	**900**

6thSem Professional Elective Course

1. **Edge Computing**	2. **Blockchain Essentials**	3. **Compiler Design**

6thsem Open Elective Course

1. AI in Project Management

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PEC: Professional Elective Course

OEC: Open Elective Course

PCCL: Professional Core Course Laboratory

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

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

Non Credit Mandatory Course (NCMC) - National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of Vth semesters. Activities shall be carried out between Vth semester to the VIth semester (for 6 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

		6th Semester
1	List of Existing Elective Courses	Nil
2	List of New Elective Courses	1. Edge Computing 2. Blockchain Essentials 3. Compiler Design 4. AI in Project Management
3	List of New Industry-Aligned Courses	1. Mobile Application Development with Flutter 2. Machine Learning

VI SEMESTER

INTEGRATED
PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

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

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

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

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

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

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests

(Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

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

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

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

Semester End Examination (SEE) for IPCC Theory

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,

	● The assessment of these techniques shall be in rubrics. ● The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

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

CIE			Observation book	05					day. 20 marks are for conducting the experiment and calculations/ observations/ output)
		Practical Test	Write up	15	50	---	05	4	One Internal Practical Test after the conduction of all experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	---	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks.
			Execution	10					
			Viva-voce	05					
	Total CIE Practical						**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment
SEE		Theory exam	Entire theory syllabus including questions from lab component in respective Modules		100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE		100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.

- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**Cryptography and Network Security**				
Course Code	:	**BIS601**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40 Theory + 12 Lab**		**SEE Duration**	:	**3**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand Cryptography, Network Security and its principles
2	To Analyse different Cryptography algorithms
3	To Illustrate Public and Private key cryptography
4	To interpret Key management, distribution and certification

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve

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	**Classical Encryption Techniques:** Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One Time Pad. **Block Ciphers and the Data Encryption Standard:** Traditional block Cipher structure, Stream Ciphers and Block Ciphers, Motivation for the Feistel Cipher structure, the Feistel Cipher. **Textbook1:** Chapter 2: 2.1,2.2 ; Chapter 3: 3.1	8
Pedagogy	**Cipher generator demonstration**	
2	**DES Algorithm:** The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm **Public-Key Cryptography and RSA**: Principles of public-key cryptosystems. Public-key cryptosystems. requirements for public-key cryptosystems. public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA. **Textbook1:** Chapter 3: 3.2-3.5; Chapter 9: 9.1,9.2	8
Pedagogy	**Think Pair and Share**	
3	**Other Public-Key Cryptosystems:** Diffie-Hellman key exchange, The algorithm, key exchange protocols, man in the middle attack. **Key Management and Distribution:** Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication. **Textbook1:** Chapter 10: 10.1 Chapter 14: 14.1,14.2	8
Pedagogy	**Problem Solving**	
4	**X-509 certificates**. Certificates, X-509 version 3 **Kerberos**, Motivation, Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one-way Authentication. **Textbook1:** Chapter 14: 14.4	8
Pedagogy	**Blended Learning**	
5	**Applications of Cryptographic** Hash Functions Message Authentication Digital Signatures Other Applications, Two Simple Hash Functions, Requirements and Security, Security Requirements for Cryptographic Hash Functions Brute-Force Attacks Cryptanalysis **IP Security:** IP Security overview, IP Security policy, Encapsulating Security payload, Combining security associations, Internet key exchange. **Textbook1:** Chapter 11, Chapter 20	8

Pedagogy	Blended Learning	
	Pedagogical Initiatives (Not limited to): ● **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another ● **Problem Solving**: encourages cognitive thinking and enables creative problem solving ● **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. ● **Case studies:** maps different domains in real time applications ● **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Design a Python program to perform encryption and decryption using the following algorithms: a) Caesar Cipher b) Substitution Cipher c) Hill Cipher d) Vigener cipher	CO5
2	Develop a Python program to implement the Simple DES(S-DES) algorithm	CO5
3	Develop a Python program to implement RSA algorithm	CO5
4	Implement the Diffie-Hellman Key Exchange mechanism	CO5
5	Calculate the message digest of a text using the SHA-1 algorithm.	CO5
6	Implement Digital Signature Creation and Verification using Cryptographic Techniques	CO5
7	Simulate a Secure Client-Server Communication using SSL/TLS.	CO5
Open ended Programs		
1	Wireshark: i. Packet Capture Using Wireshark ii. Starting Wireshark iii. Viewing Captured Traffic iv. Analysis and Statistics &Filters.	CO5
2	Capture and analyze packets to understand how data is transmitted over different protocols (TCP, UDP, HTTP, etc.) using Wireshark	CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	William Stallings: Cryptography and Network Security, Pearson 6th edition.
Reference Books	
1	V. K Pachghare: Cryptography and Information Security, PHI 2nd Edition
2	Behrouz A.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator

CO1	**Understand** Cryptography, Network Security theories, algorithms and systems	**Understand**	**L2**
CO2	**Apply** different Cryptography and Network Security operations on different applications	**Apply**	**L3**
CO3	**Analyse** different methods for authentication and access control	**Analyse**	**L4**
CO4	**Evaluate** Public and Private key, Key management, distribution and Certification	**Evaluate**	**L5**
CO5	**Design** necessary techniques to build protection mechanisms to secure computer networks	**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															
CO2	3	2	3	2	3								3	3	
CO3	3	2	3	2	3					2			3	3	
CO4	3	3	2	2	3	2				2		2	3	3	
CO5	3	2	3	2	3				2	2		2	3	3	2

List of AI tools to be used:(not limited to)
CrypTool-Tool used to solve Symmetric ciphers, RSA and DES

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106105031
2	https://onlinecourses.nptel.ac.in/noc21_cs16
3	https://www.digimat.in/nptel/courses/video/106105031
4	https://www.youtube.com/watch?v=DEqjC0G5KwU
5	https://www.youtube.com/watch?v=FqQ7TWvOaus
6	https://www.youtube.com/watch?v=PHsa_Ddgx6w
7	https://nptel.ac.in/courses/106105031
8	https://onlinecourses.nptel.ac.in/noc21_cs16

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	5	5			
Understand	5	5			
Apply	10	10	20	20	10
Analyse	10	10	20	20	5
Evaluate	10	10	10	10	5
Create	10	10			5
	50	50	50	50	25
	15	15	10	10	
	15		10		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	5	5		5			15	10%
CO2	5				5	5	15	10%
CO3		5	5	5	5	5	25	25%
CO4		5	10	10	10	10	45	45%
CO5		5	5	5			15	10%
Total	10	20	20	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%
Understand	10%
Apply	30%
Analyse	20%
Evaluate	15%
Create	15%

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage	
	Module-1	Module-2	Module-3	Module-4	Module-5			
CO1	5	5		5			15	10%
CO2	5				5	5	15	10%
CO3		5	5	5	5	5	25	25%
CO4		5	10	10	10	10	45	45%
CO5		5	5	5			15	10%
Total	10	20	20	10	20	20	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**NoSQL Database**				
Course Code	:	**BIS602**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC-2**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40+12**		**SEE Duration**	:	**3**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Extend the concepts and types of NoSQL Databases, the Document-oriented, Key-Value
2	Apply performance tuning on Column-oriented NoSQL databases and Document-oriented NoSQL Databases. useful for diverse applications.
3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data
4	Differentiate the detailed architecture of column-oriented NoSQL database, Document database and Graph Database and relate usage of processor, memory, storage and file system commands.
5	Evaluate several applications for location-based service and recommendation services. Devise an application using the components of NoSQL.

Teaching-Learning Process

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

1. Lecturer methods (L) need not to be only traditional lecture methods, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation 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. Introduce Topics in manifold 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.

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 SQL:** Why NoSQL? The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, A(Mostly) Standard Model, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, **Aggregate Data Models**; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Summarizing Aggregate-Oriented Databases. **More Details on Data Models**; Relationships, Graph Databases, Schema less Databases, Materialized Views, Modelling for Data Access, **Textbook1:** Chapter 1,2,3	**8**
Pedagogy	**Poster Presentation**	
2	**Distribution Models;** Single Server, Shading, Master-Slave Replication, Peer-to-Peer Replication, Combining Shading and Replication. **The CAP Theorem:** Consistency, Update Consistency, Read Consistency, Relaxing Consistency, Relaxing Durability, Quorums. Version Stamps, Business and System Transactions, Version Stamps on Multiple Nodes **Textbook1:** Chapter 4,5,6	8
Pedagogy	**Case Studies**	
3	**MapReduce:** Map Tasks, Reduce Tasks and MapReduce Execution, Composing MapReduce for Calculations and Algorithms, Hive. **Key-Value Databases:** What Is a Key-Value Store?, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preference, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets **Textbook 2:** Chapter 4: 4.1-4.6; **Text Book1:** Chapter 7,8	**8**
Pedagogy	**Problem Solving**	
4	**Document Databases:** What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E- Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure **Textbook1:** Chapter 9	**8**
Pedagogy	Practical Based Learning	

5	**Graph Databases:** What Is a Graph Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use. **NoSQL Big Data Management:** MongoDB and Cassandra: Introduction, NoSQL Data Store, NoSQL Data Architecture Patterns, NoSQL to Manage Big Data, Shared-Nothing Architecture for Big Data Tasks, MongoDB, Databases, Cassandra Databases. **Textbook 2:** Chapter 3: 3.1-3.7 **Textbook1:** Chapter 11;	**8**
Pedagogy	Practical Based Learning Laboratory Demonstration https://www.youtube.com/watch?v=pWbMrx5rVB	
	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	Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addision Wesley, 2012
2	Raj Kamal and Preeti Saxena, "Big Data Analytics Introduction to Hadoop, Spark, and Machine Learning", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966
3.	Ramez Elmasri and Shamkant B. Navathe,"Fundamentals of Database Management Systems 7th Edition, 2017
Reference Books	
1	Dan Sullivan, "NoSQL For Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN-13: 978-9332557338)
2	Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press, 2013. (ISBN-13: 978-9351192022)
3	Kristina Chodorow, "Mongodb: The Definitive Guide- Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publications, 2013. (ISBN-13: 978-9351102694)

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 detailed architecture of Column Oriented NoSQL databases, Document databases, Graph databases.	Understand	L2
CO2	**Apply** the concepts pertaining to all the types of databases and the structural Models of NoSQL	Apply	L3
CO3	**Analyse** the concepts of NoSQL using MongoDB and Cassandra for Big Data.	Analyse	L4
CO4	**Appraise** various applications using NoSQL databases.	Evaluate	L5
CO5	**Build** the MapReduce programming model to process the big data along with Hadoop tools.	Create	L6

Mapping of Course Outcomes to Program Outcomes:

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

List of AI tools to be used:(not limited to)
Workik AI NoSQL Query Generator-Workik AI NoSQL Query Generator: Generates and optimizes NoSQL queries from plain language, making database tasks easier.

Weblinks and Video Lectures (e-Resources):

1. https://www.geeksforgeeks.org/introduction-to-nosql/ (and related links in the page)
2. https://www.youtube.com/watch?v=0buKQHokLK8 (How do NoSQL databases work?
3. https://www.techtarget.com/searchdatamanagement/definition/NoSQL-Not-Only-SQL (What is NoSQL and How do NoSQL databases work)
4. https://www.mongodb.com/nosql-explained (What is NoSQL)
5. https://onlinecourses.nptel.ac.in/noc20-cs92/preview (preview of Bigdata course contains NoSQL
6. https://www.youtube.com/watch?v=n_Krer6YWY4
7. https://web2.qatar.cmu.edu/~mhhammou/15440-f19/recitations/Project4_Handout.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Real world problem solving using group discussion.

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	-	3	-	2	15	15%
CO2	5	5	5	10	10	10	45	45%
CO3	2	3	2	3	5	5	20	20%
CO4	-	5	3	2	5	5	20	20%
CO5	-	-	-	-	-	-	-	-
Total	12	18	10	18	20	22	100%	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	2	-	-	5	5	10	10%
CO2	5	5	5	10	10	5	40	40%
CO3	-	5	3	-	5	-	10	10%
CO4	-	4	6	5	5	-	20	20%
CO5	2	-	2	2	2	2	10	10%
Total	12	16	16	17	27	12	100	10%

List of Programs

PART-A, consists of **6 programs—3 using Hadoop (MapReduce)** and **3 using MongoDB.**		
Sl No.	**Program**	**CO**
1.	Count the number of occurrences of each word in a text file using Hadoop MapReduce **(Word Count)**.	**CO3**
2.	Count the number of characters in a text file **using Hadoop MapReduce**	**CO5**
3.	Find the maximum temperature recorded in a weather dataset.	**CO4**
4.	Insert student records and perform basic queries in MongoDB	**CO3**
5.	Use aggregation pipeline to group by department and Count students by department	**CO3**
6.	Perform update and delete operations **in MongoDB**	**CO3**
Part-B Mini Project		
The mini project should reflect real-world application of NoSQL technologies. Evaluation will be based on execution, report quality, and viva performance		**CO4**

CIE for Practical

Part A-1: Practical (Total: 10 Marks)

To assess basic conceptual understanding and practical execution of foundational NoSQL tools.

CCA-1 Components

Component	Type	Description	Marks
Part A	Practical	Execution of **any one lab program** from the below tools (2 marks)	10
Part B	Mini Project	The mini project should reflect real-world application of NoSQL technologies. Evaluation will be based on execution, report quality, and viva performance	15
	Total		25

Part B: Mini Project + Report (Total: 15 Marks)

To enable students to apply NoSQL concepts to real-world use cases by implementing a mini project and preparing a report.

The mini project should reflect real-world application of NoSQL technologies. Evaluation will be based on execution, report quality, and viva performance

CCA-2 Components

Component	Description	Marks
Mini Project Work	Implementation of use case using at least one NoSQL tool (MongoDB/Hive/etc.)	8
Project Report	Format: Abstract, Architecture Diagram, Technologies Used, Screenshots, Conclusion	5
Viva / Presentation	5-minute explanation + Q&A session	2
Total		**15**

Mini Project Guidelines:

Rule/Guideline	Description
Team Formation	Team of **2-3 students** only
Tool Restriction	Use **at least one NoSQL tool** (MongoDB, Hive, Cassandra, etc.)
Use Case	Should demonstrate a clear NoSQL use-case (e.g., real-time analytics, logs)
Report Submission	Should follow department-specified template
Viva Assessment	Should be conducted in lab by a panel/faculty team
Plagiarism Policy	Report similarity should be **less than 20%** (Turnitin/Urkund)

Suggested Mini Project Topics:

1. **Student Performance Tracker** using MongoDB
2. **Log File Analysis** using Hadoop MapReduce
3. **E-commerce Data Analysis** using Hive
4. **Book Recommendation System** using Cassandra
5. **NoSQL-Based Smart Attendance System**

Summary of Marks Allotment (Out of 25):

CCA Component	Activity	Marks
Part A	Test + Practical	10
Part B	Mini Project + Viva + Report	15
Total		**25**

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours	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 week of the semester and review 2 after the 12th week of the semester, with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for the 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**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	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	:	**VIth**				
Course Title	:	**MACHINE LEARNING**				
Course Code	:	**BIS603**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC-2**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50 Marks**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hrs**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Teaching-Learning Process (General Instructions)

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/Practical Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills, and practical skill 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.
7. Demonstrate the concepts using PYTHON and its libraries wherever possible

Course objectives:

1. To introduce the fundamental concepts and techniques of machine learning.
2. To understanding of various types of machine learning and the challenges faced in real-world applications.
3. To familiarize the machine learning algorithms such as regression, decision trees, Bayesian models, clustering, and neural networks.
4. To explore advanced concept like reinforcement learning and provide practical insight into its applications.
5. To enable students to model and evaluate machine learning solutions for different types of problems.

COURSE SYLLABUS		
Module No.	**Contents of the Module**	**Hours**
1	**Introduction:** Need for Machine Learning; Machine Learning Explained; Machine Learning in Relation to Other Fields; Types of Machine Learning; Challenges of Machine Learning; Machine Learning Process, Machine Learning Applications. **Understanding Data**: Big Data Analysis Framework; Descriptive Statistics; Univariate Data Analysis and Visualization; Bivariate Data and Multivariate Data; Multivariate Statistics; Essential Mathematics for Multivariate Data; Feature Engineering and Dimensionality Reduction Techniques. **Textbook 2 - Chapter 1, Chapter 2 : 2.3-2.8, 2.10**	**8**
Pedagogy	**Think Pair and Share**	
2	**Learning Theory:** Designing a Learning System; Concept Learning: Find-S Algorithm and Candidate- Elimination Algorithm; Modelling in Machine Learning **Regression Analysis:** Introduction to Regression; Introduction to Linear Regression; Multiple Linear Regression; Logistic Regression. **Textbook 1- Chapter 1 : 1.2, Chapter 2 : 2.4-2.5.** **Textbook 2- Chapter 3 : 3.6, Chapter 5 : 5.1,5.3, 5.5, 5.7**	**8**
Pedagogy	**Problem Solving**	
3	**Instance-based Learning:** k-Nearest-Neighbour Learning; Locally Weighted Regression; Nearest Centroid Classifier. **Decision Tree Learning:** Introduction to Decision Tree Learning Model; Decision Tree Induction Algorithm, ID3 Tree construction, Classification and Regression Trees construction, Regression Trees. **Textbook 1- Chapter 8 : 8.2- 8.3,** **Textbook 2- Chapter 4 : 4.4 , Chapter 6 : 6.1- 6.2.1, 6.2.3, 6.2.4**	**8**
Pedagogy	**Poster Presentation**	
4	**Artificial Neural Networks:** Introduction; Perceptron; Backpropagation Algorithm, Biological Neurons; Types of Artificial Neural Networks. **Bayesian Learning:** Introduction; Bayes Theorem; Bayes Theorem and Concept Learning; Bayes Optimal classifier; Gibbs algorithm; Naïve Bayes Classifier; Bayesian Belief Networks **Introduction to Support Vector Machine** **Textbook 1- Chapter 4 : 4.1, 4.4, 4.5.2 , Chapter 6 :6.1, 6.2, 6.3, 6.7, 6.8, 6.9, 6.11** **Textbook 2- Chapter 10 : 10.2, 10.5**	**8**
Pedagogy	**Case studies** on different domains in real time applications	
5	**Clustering Algorithms:** Introduction to clustering Approaches; Hierarchical clustering algorithms; Partitional Clustering Algorithm **Reinforcement Learning:** Overview of Reinforcement Learning; Scope of Reinforcement Learning, Reinforcement Learning as Machine Learning; Components of Reinforcement Learning, Markov Decision Process; Q-Learning. **Textbook 2- Chapter 13 : 13.1, 13.3, 13.4 , Chapter 14 : 14.1 – 14.5, 14.9**	**8**
Pedagogy	**Demonstration**	

Textbooks	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Machine Learning, Tom M Mitchell, MIT Press and The Mc-Graw-Hill Companies, Inc., 2017.
2	Machine Learning", S Sridhar, M Vijayalakshmi, ,OXFORD University Press 2021, First Edition.
Reference Books	
1	Machine Learning: Theory and Practice, Murty, M. N., and V. S. Ananthanarayana , Universities Press, 2024
2	The hundred-page machine learning book, Burkov, Andriy., Vol. 1. Quebec City, QC, Canada: Andriy Burkov, 2019.

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the machine learning techniques, their types and data analysis framework.	**Understand**	**L2**
CO2	**Apply** statistical/mathematical concepts for feature engineering and perform dimensionality reduction to enhance model performance.	**Apply**	**L3**
CO3	**Examine** similarity-based learning models and regression models for solving classification and prediction tasks	**Analyse**	**L4**
CO4	**Build** probabilistic learning models and design neural network models using perceptron and multilayer architectures along with similarity-based learning models and regression models for solving classification and prediction tasks.	**Evaluate**	**L5**
CO5	**Design** supervised and unsupervised learning algorithms on the given dataset and implement Reinforcement learning techniques.	**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															
CO2	3	3	2	3	2							2	3	2	
CO3	3	3	3	2	3				2	2		2	3	3	
CO4	3	2	3	2	3				2	2		2	3	3	
CO5	3	3	2	2	3				2	2	2	3	2	2	

List of AI tools to be used:(not limited to)
Orange tool -Simulation of Machine Learning Algorithms

Weblinks and Video Lectures (e-Resources)	
1	https://www.universitiespress.com/resources?id=9789393330697
2	https://www.drssridhar.com/?page_id=1053
3	Machine Learning Tutorials: https://www.geeksforgeeks.org/machine-learning/
4	Machine Learning Tutorials: https://www.tutorialspoint.com/machine_learning/index.htm
5	Python for Machine Learning: https://www.w3schools.com/python/python_ml_getting_started.asp Introduction to Machine Learning: https://onlinecourses.nptel.ac.in/noc22_cs29/preview

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Problem Solving Questions)
Remember	5
Understand	5
Apply	10
Analyse	10
Evaluate	10
Create	10

SEE Course Plan

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

PROFESSIONAL ELECTIVE CORE COURSE (PEC-2)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

semester	**:**	**VI**				
Course Title	**:**	**Edge Computing**				
Course Code	**:**	**BIS604x**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	:	**PEC-2**				
Stream	**:**	**Information Science and Engineering**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand how cloud computing environments can be scaled to workloads.
2	Identify potential technical challenges of the transition process and suggest solutions.
3	Design edge computing solutions, including architectures, models, and platforms.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Edge Computing Scenarios and Use cases**: Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures, Edge platforms. **Textbook 1: Chapter 8**	8
Pedagogy	**Poster Presentation**	

2	**Edge Routing and Networking:** TCP/IP Network functions at the edge, Edge Level Network security, Software Defined Networking. **Textbook 1: Chapter 9.**	**8**
Pedagogy	**Think Pair and Share**	
3	**Edge to Cloud Protocols:** Introduction to MQTT and Kafka for end-to-end edge pipeline. Edge analytics topologies for M2M and WSN network (MQTT) **Textbook 1: Chapter 10**	**8**
Pedagogy	**Demonstration**	
4	**Data Analytics and Machine Learning in the cloud and Edge:** Basic Data analytics in IOT, Machine Learning in IOT, IOT data analytics and machine learning comparison and assessment. **Textbook 1: Chapter 12**	**8**
Pedagogy	**Problem Solving**	
5	**IOT and Edge Security:** Cybersecurity vernacular, Anatomy of IOT cyber-attacks, physical and hardware security. **Textbook 1: Chapter 13**	**8**
Pedagogy	**Case Studies**	
	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	Perry Lea, IoT and Edge Computing for Architects - Second Edition, Publisher: Packt Publishing, 2020, ISBN: 9781839214806.
Reference Books	
1	Satish Narayana Srirama and Rajkumar Buyya, Fog and Edge Computing: Principles and Paradigms, (Wiley Series on Parallel and Distributed Computing), 2019.
2	Assad Abbas, Samee U. Khan, Albert Y. Zomaya. Fog Computing: Theory and Practice, Wiley 2020.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the fundamental concepts of edge computing and its significance.	Understand	L2
CO2	**Apply** performance analysis and optimization techniques to evaluate the effectiveness and efficiency of edge computing solutions.	Apply	L3
CO3	**Analyse** an edge ecosystem and identify areas of improvement, demonstrating knowledge of edge-computing architectures and their constituents.	Analyse	L4
CO4	**Compare** design and model infrastructures.	Evaluate	L5
CO5	**Develop** data and application requirements and pertaining issues.	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															
CO2	3	3	2										2		
CO3	3	3	2	2											
CO4	3		2										2		
CO5	3		3		3				3	3		3		2	

List of AI tools to be used:(not limited to)
Edge Computing: Edge Impulse, copilot -Edge Impluse is cloud-based AI platform that allows users to build, train, and deploy model on edge devices like sensors

Weblinks and Video Lectures (e-Resources)	
1	NPTEL :: Computer Science and Engineering - NOC:Foundation of Cloud IoT Edge ML
2	https://onlinecourses.nptel.ac.in/noc24_cs66/preview
3	https://www.amrita.edu/course/btech-edge-computing/
4	https://www.icms.edu.au/courses/undergraduate/edge-computing/
5	https://www.google.co.in/books/edition/IoT_and_Edge_Computing_for_Architects/LNDVDwAAQBAJ?hl=en&gbpv=0
6	https://www.udemy.com/course/introduction-to-edge-computing/?srsltid=AfmBOooQJziOBWbUAB5_7somynoXfX6VpxZm8uYQIOe5zQBBYGlhRtXx&couponCode=IND21PM
7	https://www.edx.org/learn/computer-programming/the-linux-foundation-business-considerations-for-edge-computing

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	-	3	-	2	15	15%
CO2	5	5	5	10	10	10	45	45%
CO3	2	3	2	3	5	5	20	20%
CO4	-	5	3	2	5	5	20	20%
CO5	-	-	-	-	-	-	-	-
Total							100%	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	2	-	-	5	5	10	10%
CO2	5	5	5	10	10	5	40	40%
CO3	-	5	3	-	5	-	10	10%
CO4	-	4	6	5	5	-	20	20%
CO5	2	-	2	2	2	2	10	10%
Total	12	16	6	17	27	12	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**BLOCKCHAIN ESSENTIALS**				
Course Code	:	**BIS604x**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC-2**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Explain the fundamentals of distributed computing and blockchain
2	Discuss the concepts in bitcoin.
3	Explore the driving force behind the cryptocurrency Bitcoin.
4	Demonstrate Ethereum platform, Along with the Decentralization, Cryptography, Bitcoins with its alternative coins, Smart contracts and outside of currencies

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Blockchain:** Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain. **Decentralization and Cryptography:** Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. **Textbook 1:** Chapter: 1, 2	8
Pedagogy	**Think pair and Share**	
2	**Introduction to Cryptography & Cryptocurrencies:** Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Cryptocurrency. **How Bitcoin Achieves Decentralization:** Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work, Putting it all together. **Textbook 2:** Chapter 1, 2	8
Pedagogy	**Case Study**	
3	**Mechanics of Bitcoin:** Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bitcoin network, Limitations and improvements. **How to Store and Use Bitcoins:** Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, 03092022 Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets. **Textbook 2:** Chapter 3,4	8
Pedagogy	**Case Study**	
4	**Bitcoin Mining:** The task of Bitcoin miners, Mining Hardware, Energy consumption and ecology, Mining pools, Mining incentives and strategies. **Bitcoin and Anonymity:** Anonymity Basics, How to De-anonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin and Zerocash. **Textbook 2:** Chapter 5,6	8
Pedagogy	**Poster Presentation**	
5	**Smart Contracts and Ethereum 101**: Smart Contracts: Definition, Ricardian contracts. **Ethereum 101**: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts. **Textbook 1:** Chapter 10	8
Pedagogy	**Poster Presentation**	
	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	Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017.
2	Arvind Narayanan, Joseph Bonneau, Edward W. Felten, Andrew Miller, Steven Goldfeder and Jeremy Clark., Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press, 2016.
Reference Books	
1	Mastering Bitcoins: Unlocking Digital Cryptocurrencies by Andreas Antonopoulos. O'Reilly Media, Inc, 2013.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the concepts of Distributed computing and its role in Blockchain	**Understand**	**L2**
CO2	**Apply** the concepts of Cryptography and its role in Blockchain	**Apply**	**L3**
CO3	**Analyze** the technologies involved in Bitcoin	**Analyze**	**L4**
CO4	**Demonstrate** using Ethereum platform to develop blockchain application.	**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															
CO2	3	3											2		
CO3		2		3							2	2	2	2	
CO4					3				2			3	3		

List of AI tools to be used:(Not limited to)
Blockchain: Blockchain 3D explorer, Blockchain Visualizer, copilot-Blockchain: copilot chain visualizer - visualizes the inner workings of blockchain

Weblinks and Video Lectures (e-Resources)

1	http://bitcoinbook.cs.princeton.edu/?_ga=2.8302578.1344744326.1642688462-86383721.1642688462
2	https://nptel.ac.in/courses/106/105/106105184/
3	https://ethereum.org/en/developers/
4	https://developer.ibm.com/components/hyperledger-fabric/tutorials/

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	20
Apply	20
Analyse	30
Evaluate	15
Create	15

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		

CO1	5	5	--	--	5	--	15	50 marks
CO2	5	5	5	5	5	--	25	
CO3	5	5	5	5	5	10	35	
CO4	5	5	--	--	5	10	15	
Total	20	20	10	10	20	20	100	

Cos Matched with Pos

Cos	POs	PSOs
CO1	--	--
CO2	PO1,PO2	--
CO3	PO2, PO4	PSO1
CO4	PO5	PSO1

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**Compiler Design**				
Course Code	:	**BIS604x**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC-2**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L: T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	**To Understand** the structure, components, and functions of language processors and compilers.
2	**Apply** the knowledge of compiler phases to perform lexical analysis, parsing, and code translation.
3	**Analyse** different techniques used in parsing, syntax-directed translation, and intermediate code generation.
4	**Evaluate** various approaches in compiler construction to select the most effective methods for language processing.
5	**Build** a simple compiler using concepts from all phases including analysis and code generation.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction:** Language Processors, Structure of Compiler, The evolution of Programming Languages, The science of Building a Compiler, Applications of Compiler Technology, Programming Language Basics **A Simple Syntax Directed Translator:** Introduction, Syntax Definition, Syntax Directed Translation, Parsing **Textbook 1: Chapter 1: 1.1,1.2,1.3,1.4,1.5,1.6,1.7; Chapter 2: 2.1,2.2,2.3,2.4**	**08**
Pedagogy	**Think Pair share**	
2	**Lexical Analysis:** The Role of Lexical Analyzer, Input buffering, Specification of Tokens, Recognition of Tokens, The lexical Analyzer Generator Lex **Syntax Analysis:** Introduction, Context Free Grammars, Writing a Grammar **Textbook 1: Chapter 3: 3.1,3.2,3.3,3.4,3.5; Chapter 4: 4.1 4.2 4.3**	**08**
Pedagogy	**Problem Solving**	
3	**Top-Down Parsing:** Recursive Descent Parsing, First and Follow, LL(1) Grammars. **Bottom-Up Parsing:** Reductions, Handle Pruning, Shift Reduce Parsing **Textbook 1: Chapter 4: 4.4, 4.5**	**08**
Pedagogy	**Problem Solving**	
4	**Introduction to LR Parsing:** Simple LR, LR Parsing Algorithm, Construction of SLR parsing Tables, CLR, LALR. **Text Book 1: Chapter 5: 5.1,5.2**	**08**
Pedagogy	**Poster Presentation**	
5	Viable Prefixes, Syntax Directed Definitions, Evaluation Orders for SDD , Variants of Syntax Trees, Three Address Code, Types and Declarations. Control Flow **Code generation:** Issues in the Design of a Code Generator, The target language **Textbook 1: Chapter 6: 6.1,6.2,6.3,6.6; Chapter 8:8.1,8.2**	**08**
Pedagogy	**Case study**	
	Pedagogical Initiatives (Not limited to): ● **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 to understand the topics easily.	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Compilers: Principles, Techniques, and Tools, A. Aho, M. Lam, R. Sethi, and J. Ullman.,2nd Edition, Pearson.
Reference Books	
1	K Muneeswaran," Compiler Design", Oxford University Press 2013.
2	Nandini Prasad K S: Principles of Compiler Design, Cengage Learning, 2017, ISBN-13: 9788131534069
3	Compiler Construction Principles & Practice, Kenneth C Louden; Cengage Learning, 1st Edition, 2009. ISBN – 0534939724

	• **Case studies:** maps different domains in real time applications

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 structure, components, and functions of language processors and compilers.	Understand	L2
CO2	**Apply** the knowledge of compiler phases to perform lexical analysis, parsing, and code translation.	Apply	L3
CO3	**Analyze** different techniques used in parsing, syntax-directed translation, and intermediate code generation.	Analyse	L4
CO4	**Evaluate** various approaches in compiler construction to select the most effective methods for language processing.	Evaluate	L5
CO5	**Build** a simple compiler using concepts from all phases including analysis and code generation.	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															
CO2	3											3	3		
CO3		3	3												
					2				3	3		3	2		

CO4															
CO5			3	3								3	2		

List of AI tools to be used : (not limited to)
ANTLR, YACC, and Lex- used to build lexical analysers and syntax parsers efficiently Visualization tools like JFLAP and Graphviz help in understanding automata, parse trees, and syntax structures. Compiler frameworks such as LLVM incorporate advanced optimization techniques, sometimes supported by machine learning

Weblinks and Video Lectures (e-Resources)	
1	http://www.digimat.in/nptel/courses/video/106104123/L01.html
2	NPTEL Course on Compiler Design by Prof. Y. N. Srikanth, IISc. Bangalore, Prof. Sanjeev K. Aggarwal, IIT Kanpur, Prof. Santanu Chattopadhyay, IIT Kharagpur.

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	5			
Understand	5	5	10	
Apply	10	10	15	20
Analyse	10	10	15	20
Evaluate	10	10	10	10
Create	10	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	5	5				5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%

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

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	15%
Apply	40%
Analyse	20%
Evaluate	10%
Create	10%

PROFESSIONAL CORE COURSE LABORATORY (PCCL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**Machine Learning Laboratory**				
Course Code	:	**BISL607**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PCCL**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:2:2:0**		**SEE**	:	**50**
Total Hours	:	**30**		**SEE Duration**	:	**2 Hours**
Credits	:	**2**				

Course Learning Objectives: Students will be able :

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

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	Experiments	COs
1	Develop a program to create histograms for all numerical features and analyze the distribution of each feature. Generate box plots for all numerical features and identify any	CO2

	outliers. Use California Housing dataset.	
2	Develop a program to Compute the correlation matrix to understand the relationships between pairs of features. Visualize the correlation matrix using a heatmap to know which variables have strong positive/negative correlations. Create a pair plot to visualize pairwise relationships between features. Use California Housing dataset.	CO3
3	Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.	CO3
4	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.	CO4
5	Develop a program to implement k-Nearest Neighbour algorithm to classify the randomly generated 100 values of x in the range of [0,1]. Perform the following based on dataset generated. a. Label the first 50 points {x1,……,x50} as follows: if (xi ≤ 0.5), then xi ε Class1, else xi ε Class1 b. Classify the remaining points, x51,……,x100 using KNN. Perform this for k=1,2,3,4,5,20,30	CO3
6	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs	CO4
7	Develop a program to demonstrate the working of Linear Regression and Polynomial Regression. Use Boston Housing Dataset for Linear Regression and Auto MPG Dataset (for vehicle fuel efficiency prediction) for Polynomial Regression.	CO5
8	Develop a program to demonstrate the working of the decision tree algorithm. Use Breast Cancer Data set for building the decision tree and apply this knowledge to classify a new sample.	CO5
9	Develop a program to implement the Naive Bayesian classifier considering Olivetti Face Data set for training. Compute the accuracy of the classifier, considering a few test data sets.	CO4
10	Develop a program to implement k-means clustering using Wisconsin Breast Cancer data set and visualize the clustering result.	CO5

Text Books	
Sl. No.	**Suggested Learning Resources: Books:**
1	S Sridhar and M Vijayalakshmi, Oxford University Press, 2021.
2	M N Murty and Ananthanarayana V S, Machine Learning: Theory and Practice", Universities Press (India) Pvt. Limited, 2024.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Illustrate** the principles of multivariate data and apply dimensionality reduction techniques.		**L2**

		Understand	
CO2	**Apply** similarity-based learning methods and perform regression analysis.	**Apply**	**L3**
CO3	**Analyse** decision trees algorithms and Bayesian learning concepts.	**Analyze**	**L4**
CO4	**Evaluate** supervise and unsupervised learning algorithms.	**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															
CO2	3		3										3		
CO3		3			3	3							3	2	
CO4				3	3	3		2	3	3	3	3	3	3	

Weblinks and Video Lectures (e-Resources)	
1	https://www.drssridhar.com/?page_id=1053
2	https://www.universitiespress.com/resources?id=9789393330697
3	https://onlinecourses.nptel.ac.in/noc23_cs18/preview

ABILITY ENHANCEMENT COURSE (AEC)

Experiential Learning

(a) Define Objectives

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Learning Goal (LG)-1	To **Understand** Mobile Platforms and Architecture
Learning Goal (LG) -2	**Apply** Programming Skills for Mobile Apps .
Learning Goal (LG) -3	**Utilize** Mobile Development Tools and SDKs .
Learning Goal (LG)-4	I**mplement** Functional Mobile Applications

(b) Course Outcomes

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Course Outcomes (CO)-1	**Understand** the Android programming language and the Flutter framework for app development.
Course Outcomes (CO)-2	**Design** and build responsive user interfaces using Android widgets
Course Outcomes (CO)-3	**Develop** basic mobile applications for Android.

(c) Alignment

Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program.						
Sl.No	**Learning Goals**	**Course Outcomes**	**Assessment**	**In-Class Activity**	**Out-of-Class Activity**	**Weightage**
1.	LG-1	CO1	Exam(CIE, SEE)	Debugging Activity	MOOC Course on Flutter	10%
2.	LG-2	CO2	Exam(CIE, SEE)	Problem-Solving on designing automation scripts	Hands-on Coding Exercises with Android Studio	20%
3.	LG-3	CO3	Exam(CIE, SEE)	Problem-Solving on designing	Coding Exercises	25%
5.	LG-4	CO3	Project Reviews	Project-Based Problem Solving and Demonstrations	App Development	25%

1. **Curriculum Design**
   (a) **Course integration**

Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops.

Sl.No	**Course Name**	**Course Code**	**Justification for selecting the Course for Experiential Learning**
1	Mobile Application Development with Flutter	BIS608x Note: x= a, b, c(courses)	Flutter enables the development of applications for both iOS and Android from a single codebase. This significantly reduces development time and effort compared to building separate native applications for each platform, offering a highly efficient learning experience focused on broad applicability. Learning Flutter provides access to diverse career paths in mobile application development, including freelance opportunities, startup roles, and positions within larger enterprises.

(b) **Mobile Application Development Modules**

Develop Modules: Create specific modules within these courses that focus on hands-on experiences.								
Module No	**Lecture No.**	**Session Topics**	**RBT Levels**	**Activities Planned**	**Course Outcome Mapping**	**Mode of Delivery**	**Planned Date**	**Actual Date**
1	1	Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for development Lifecycle-The Mobile Application the Mobile Application Back-End-Key Mobile Application Services-What is Android-Android version history Required Tools-Launching Your First Android Application-Exploring the IDE-Debugging Application-Publishing Your Application	**L1, L2**	**Problem Solving**	**CO1, CO2**	**Chalk& Talk, Demonstration/ Hand-on-sessions**		
2	**2**	Get started, Build your first app, Activities, Testing, debugging and using support libraries User Interaction, Delightful user experience, Testing your UI	**L3**	**Hands-on- Sessions/**	**CO3**	**Chalk& Talk, Demonstration/ Hand-on-sessions**		

3.	3.	Introduction to Flutter framework and its architecture. Creating a "Hello World" Flutter App Understanding widgets: Stateless vs Stateful.Material Design components Layouts: Column, Row, Stack, ListView, GridView Handling user input: TextField, Buttons, Forms	L3,L4	Hands-on- Sessions/ Certificates	CO1, CO3	Chalk& Talk,Demonstration/ Hand-on-sessions		

Laboratory Programs

Sl. No.	Program Title
1	Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number
2	Create a SIGN-Up activity with Username and Password. Validation of password should happen based on the following rules: a) Password should contain uppercase and lowercase letters. b) Password should contain letters and numbers. c) Password should contain special characters. d) Minimum length of the password (the default value is 8). On successful SIGN UP proceed to the next Login activity. Here the user should SIGN IN using the Username and Password created during signup activity. If the Username and Password are matched, then navigate to the next activity which displays a message saying “Successful Login” or else display a toast message saying “Login Failed”. The user is given only two attempts and after that display a toast message saying “Failed Login Attempts” and disable the SIGN IN button. Use Bundle to transfer information from one activity to another

3	Write a program to create an activity with two buttons START and STOP. On pressing of the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a TextView control.
4	Develop a simple application with one EditText so that the user can write some text in it. Create a button called “Convert Text to Speech” that converts the user input text into voice
5	Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.
6	Create an application to demonstrate a basic media player that allows the user to Forward Backward, Play and Pause an audio. Also, make use of the indicator in the seek bar to move the audio forward or backward as required.
7	Design a Flutter app to take 3 numbers as input and display the largest
8	Create an app with a counter that increases/decreases when buttons are clicked using Flutter
9	Build a user registration form using TextFields, radio buttons, checkboxes, and submit button.
10	Design a basic calculator app that performs arithmetic operations.

Reference Books/ Materials
1.Jerome DiMarzio“*Beginning Android Programming with Android Studio*”, 4thEdition.
2. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference”, Google Developer Training Team, 2017. 3.https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)
4.“Beginning Flutter: A Hands-On Guide to App Development” – Marco L. Napoli, Wiley

List of AI tools to be used:(Not limited to)
GitHub Copilot,Tabnine-Suggests flutter widgets and functions and provides complete code

Suggested Learning Resources
Flutter Documentation – https://docs.flutter.dev
Google Flutter Codelabs – https://codelabs.developers.google.com/
https://developer.android.com/guide
Develop App for Free

2. **Mapping of Learning objectives with Learning Outcomes**

Course/Modules	Learning Objective	Learning Outcome	Assessment Method
Module 1:	LO-1, LO-2,	CO-1, CO-2, CO-3	Problem-solving
Module 2:	LO-2, LO-3,	CO-2, CO-3,	Problem-solving
Module 3:	LO-2, LO-3,	CO-2, CO-3,	Problem-solving

3. **Partnerships and Resources**

Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits.

Sl.No	Name of the Industry Collaboration	Projects undertaken / Industrial Visit	Domain	Project Outcomes

Experiential Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding Experiential Learning Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on…….

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide

Designation

Department of ……. Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

Date		
EL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide

Signature of HOD

OPEN ELECTIVE COURSE (OEC-1)

AI in Project Management