

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus V to VI Semester

Outcome Based Education

(Academic Year 2026-2027)

Department of CSE-Cyber Security

5th & 6th Semester B.E

ABOUT THE INSTITUTE

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

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

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

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

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

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

QUALITY POLICY

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

ABOUT THE DEPARTMENT

Year of Establishment: 2023

Intake of the Department = 60

About the Course

“Security is the chief enemy of mortals.”

By William Shakespeare

In today's, economy organizations are using more and more digitization for all their financial transactions and other data communication and due to this organizations are more prone to attack; thus, we need a to secure our transaction. Cyber-Security is a process to secure all our transactions and assure the privacy, confidentiality and integrity for organizations as well as personal information. Cybersecurity is the practice of protecting critical systems and sensitive information from digital attacks. Also known as information technology (IT) security, cybersecurity measures are designed to combat threats against networked systems and applications, whether those threats originate from inside or outside of an organization. As per the survey done by IBM in 2020, the average cost of a data breach was USD 3.86 million globally and USD 8.64 million in the United States. A strong cybersecurity strategy has layers of protection to defend against cybercrime, including cyber-attacks that attempt to access, change, or destroy data; extort money from users or the organization; or aim to disrupt normal business operations. Cyber Security must address the following cybersecurity issues in Critical infrastructure security, Network security, Application Security, Cloud security, Information security, End-user education, Disaster recovery/business continuity planning, Storage security, and Mobile security. This course provides a wide variety of knowledge to enrich the students to be ready for the world of securing life. With this small introduction, I would like to welcome all of you to the Department of CS in Cyber Security and Engineering.

VISION OF THE DEPARTMENT

To deliver quality education, foster professionalism, and develop cybersecurity skills to create globally competent, socially responsible engineers.

MISSION OF THE DEPARTMENT

M1: Foster dynamic learning with innovative curriculum and pedagogy for quality technical education.

M2: Partner with industry, academia, and society to enhance design thinking, research, innovation, and entrepreneurship.

M3: Promote Co-Curricular & extracurricular activities to build leadership, accountability, and ethical values.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Excel in careers by applying knowledge in basic sciences, Computer Science, AI, ML, and Cybersecurity, contributing as skilled professionals or entrepreneurs.

PEO2: Pursue advanced studies and research in relevant fields.

PEO3: Adapt to technological advancements in multidisciplinary settings through lifelong learning, leadership, ethics, and strong soft skills.

PROGRAM OUTCOMES (PO's)

A Computer Science & Engineering (Cyber Security) graduate must demonstrate:

- **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **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.
- **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.
- **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.
- **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **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.
- **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.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **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.

- **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.
- **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: Ability to understand, investigate, and analyze cybersecurity incidents to restore resources and develop cyber defense strategies.

PSO2: Apply advanced tools and techniques to identify, analyze, and mitigate cybersecurity threats and vulnerabilities effectively.

PSO3: Demonstrate awareness of ethical and socially responsible technical solutions during the design and development of applications.



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6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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



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Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2026-27)

5th SEMESTER PROPOSED UG SCHEME

Sl. No	Course Code	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
					Lecture	Tutorial	Practical	Project	Total (Hrs/week)		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
					L	T	P	S						
1	BCY501	IPCC	MAT	MAT	3	0	2	-	5	4	3	50	50	100
2	BCY502	IPCC	CSE-CY	CSE-CY	3	0	2	-	5	4	3	50	50	100
3	BCY503	PCC	CSE-CY	CSE-CY	3	0	-	-	3	3	3	50	50	100
4	BCY504	PEC-1	CSE-CY	CSE-CY	3	0	-	-	3	3	3	50	50	100
5	BCY505	PBL	CSE-CY	CSE-CY	-	2	-	4	6	3	3	50	50	100
6	BCY506	PCCL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
7	BCY507	AEC	CSE-CY	CSE-CY	1	0	-	-	1	1	2	50	50	100
8	BESK508	HSMS	BSC	BSC	2	0	-	-	2	2	2	50	50	100
9	B**K509	NCMC	NSS / YOGA / PED		-		2	-	2	0	-	100	-	100
AICTE Activity Points mandatory to be covered Total					15	4	8	4	31	22	21	500	400	900



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6th SEMESTER PROPOSED UG SCHEME

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Cred its	Examination			
						Lecture	Tutorial	Practical	Project	Total (Hrs/ week)		SEE Durati on (Hrs)	CIE Mark s	SEE Mark s	Total Marks
1	BCY601	Artificial Intelligence and Machine Learning	IIPCC	MAT	MAT	3	-	2	-	5	4	3	50	50	100
2	BCY602	Cryptography and Network Security	IIPCC	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
3	BCY603	Digital Forensics	PCC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
4	BCY604	Professional Elective Course	PEC-2	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
5	BCY605	Course Open Elective Course	OEC-1	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
6	BCY606	Project Work Phase-1	PWP-1	CSE-CY	CSE-CY	-	-	-	4	4	2	3	50	50	100
7	BCY607		PCCL/PBL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
8	BCY608		AEC	BSC	BSC	1	-	-	-	1	1	2	50	50	100

9	BCYK609		NCMC	NSS / YOGA / PED	-	-	2	-	2	-	-	100	-	100
		AICTE Activity Points mandatory to be covered Total			16	2	8	4	30	22	22	500	400	900

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

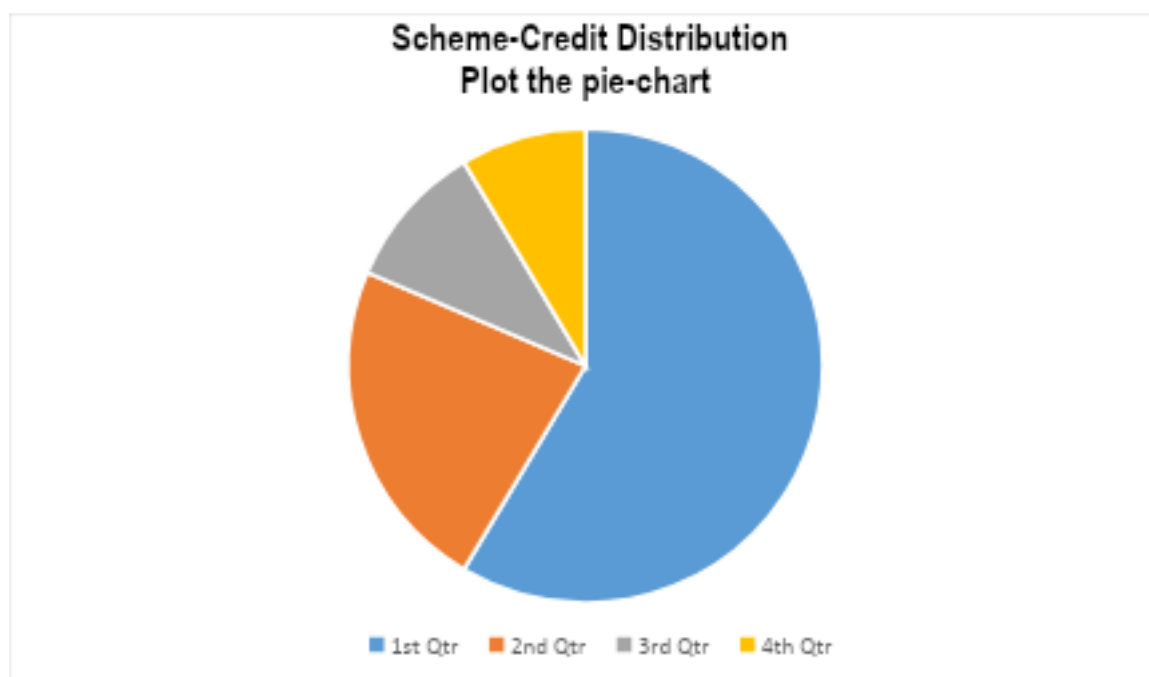
5th Sem & 6th Sem

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

Scheme Distribution

Department of Information Science & Engineering -3rd Semester

Course Component	Credits	% of Credits
Basic Science (BS)		
Engineering Science (ES)		
Humanities (HU)		
Program core (PC)		
Program core Integrated (PCI)		
Program core exclusive Lab		
Program elective (PE)		
Open Elective (OE)		
Internship (INT)		
Social Connect Responsibilities (SCR)		
Ability Enhancement course (AEC)		
Project (PR)		
Total	160	100



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

Course Category	Semester								Total Credits
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
Basic Sciences (BSC)			3	3	-	-			6
Engineering Sciences (ESC)			-	-	-	-			-
Humanities, Social Sciences and Management (HSMC)			-	-	2	-			-
Ability Enhancement Course (AEC)			1	1	1	1			5
Universal Human Values (UHV)			-	1	-	-			1
Professional Core Courses (PCC)			6	6	3	3			18
Professional Core Courses Lab (PCCL)			-	-	2	-			
Integrated Professional core Course (IPCC)			8	8	8	8			31
Professional Elective Course (PEC)			-	-	3	3			6
Institutional Open Elective Courses (IOE)			-	-	-	3			3
Internship (INT)			-	-	-	-			4
Mini Project / Project Work (PW)			2	2	3	4			13
Social Connect & Responsibility (SCR)			1	-	-	-			1
Non-credit Mandatory Courses (NCMC)			-	-	-	-			-
Total Credits			21	21	22	22			86



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Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2025-26)

5TH SEMESTER: CSE-Cyber Security

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCY501	Elements of Cyber Security	IPCC-1	CSE-CY	CY	3	0	2	-	5	4	3	50	50	100
2	BCY502	Computer Networks	IPCC-2	CSE-CY	CY	3	0	2	-	5	4	3	50	50	100
3	BCY503	Software Engineering and Project Management	PCC	CSE-CY	CY	3	0	-	-	3	3	3	50	50	100
4	BCY504X	Professional Elective Course	PEC-1	CSE-CY	CY	3	0	-	-	3	3	3	50	50	100
5	BCY505	Mobile Application Development	PBL	CSE-CY	CY	-	2	-	4	6	3	3	50	50	100
6	BCY506	Advanced Cyber Security Lab	PCCL	CSE-CY	CY	-	2	2	-	4	2	2	50	50	100
7	BCY507X	Ability Enhancement Course	AEC	CSE-CY	CY	0	0	2	-	2	1	2	50	50	100
8	BESK508	Environmental Studies and E-waste Management	HSMS	CSE-CY	CY	2	0	-	-	2	2	2	50	50	100
9	BNSK509 BPEK509 BYOK509	Yoga, NSS, Physical Education	NCMC*					2		2	-		100	-	
Total						15	4	8	4	31	22	21	500	400	900

***Non-Credit Mandatory Course**

5TH Professional Elective Courses			
BCY504A	Hacker Techniques, Tools, and Incident Handling	BCY504B	Information Retrieval

5TH Ability Enhancement Course			
BCY507A	Generative AI in Cyber Security	BCY507B	Research Methodology and IPR



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Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2025-26)

6th SEMESTER: Cyber Security

SL.NO	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BCY601	Machine Learning	IPCC1	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
2	BCY602	Cryptography and Network Security	IPCC-2	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
3	BCY603	Digital Forensics	PCC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
4	BCY604X	Professional Elective Courses Cloud Computing and Security	PEC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
5	BCV605D	Occupational Safety and Health Engineering	OEC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
6	BCY606	Project Phase-1	PWP-1	CSE-CY	CSE-CY	-	-	-	4	4	2	3	50	50	100
7	BCY607L	Digital Forensic Lab	PBL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
8	BCY608X	Industrial Cyber Security	AEC	CSE-CY	CSE-CY	0	-	2	-	2	1	2	50	50	100
9	BYOK609	Yoga, NSS, Physical Education, Indian Knowledge System	NCCMC*		PD	-	-	2	-	2	-	-	100	-	100
	BNSK609				NSS										
	BPEK609				PD										
Total						16	2	8	4	30	22	22	500	400	900

***Non-Credit Mandatory Course**

6th Sem Professional Elective Courses			
BCY604A	Cloud Computing & Security	BCY604B	Big Data Analytics

6th Sem OPEN Elective Courses			
BCV605D	Occupational Safety and Health Engineering	BME605B	Renewable Energy Power Plant

6th Sem Ability Enhancement Course			
BCY608A	Industrial Cyber Security	BCY608B	Network Administration

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

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

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

Percentage of Change in the Syllabus: NA

5 th Semester						
Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1						

5th SEMESTER

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**

IPCC Course – Integrated Professional Core Course

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

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

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

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

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

Internal Assessment Test (IAT):

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

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

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

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

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

Semester End Examination (SEE) for IPCC Theory

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

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

- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

Possible Continuous and Comprehensive Assessment (CCA):

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

4 Credits Courses – Integrated Professional Core Course (IPCC)

Asses ment Metho d	Component	Type of Assessments	Syllabus Coverage	Maximu m 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

CIE	Practical	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
			Total CIE Practical						25

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	:	V			
Course Title	:	Elements of Cyber Security			
Course Code	:	BCY501			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40h Theory + 20h Practical		SEE	: 3 Hours
Credits	:	04		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamental principles of cyber security, including threats, vulnerabilities, attacks, and comprehensive policies.
2	Apply security practices to mobile devices and digital payment systems, recognizing challenges and preventive measures
3	Analyze the mechanisms of email and IP security protocols to identify secure communication methods
4	Evaluate the effectiveness of web, wireless, and mobile network security mechanisms like SSL/TLS, SSH, and IEEE standards.
5	Design secure systems using cryptographic techniques, including symmetric/asymmetric encryption, steganography, and key management.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.	8
Pedagogy	Problem Solving	
2	Mobile and Digital Payments Security: Security Challenges and types of attacks on Mobile devices, Security for Mobile Apps, Mobile Device Management tools and techniques. Digital payments Security: Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. Note: Aadhar Enabled Payments topic as a case study not for the examination point of view.	8
Pedagogy	Virtual Lab, Think Pair and Share	
3	E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange.	8
Pedagogy	Problem Solving, Virtual Lab	
4	Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH). Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security	8
Pedagogy	Poster Presentation	
5	AI for Cyber Security – Foundations-Introduction to Artificial Intelligence in Cyber Security - Role of AI in threat detection and prevention Anomaly detection in network traffic using AI- Time series analysis for intrusion detection-Machine learning-based detection of malicious URLs -Email spam and phishing detection using AI and NLP -- Fraud detection in digital transactions -Malware detection using AI techniques -AI in intrusion detection systems (IDS) and intrusion prevention systems (IPS) - AI-driven adaptive security systems Behavioral analytics and user profiling - Explainable AI (XAI) in cyber security -Adversarial machine learning and AI attacks -Ethical and legal issues in AI-based cyber security	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	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Install Kali Linux and explore basic Linux commands and tools.	C05
2	Perform basic network scanning using the Nmap tool (Zenmap on Windows). Identify services, open ports, active hosts, operating systems, and vulnerabilities.	C05
3	Phishing simulations (Google, LUCY and GoPhish).	C05
4	Packet Analysis using Wireshark	C05
5	Perform SQL injection using BurpSuite	C05
6	Ransomware tabletop exercise on insider threat.	C05
7	Crypt analysis of symmetric ciphers using Cryptool.	C05
8	Crypt analysis of asymmetric ciphers using Cryptool.	
9	Pwning machines (HackTheBox). - Demonstration	C05
Open ended Programs		
1	Design and deploy a basic honeypot to detect unauthorized access and analyze attacker behavior.	C04

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2	Introduction to Cyber Security, Chwan-Hwa(john) Wu, J. David Irwin, CRC Press T&F Group.
3	Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education
4	Textbook: Hands-On Machine Learning for Cybersecurity by Soma Halder and Sinan Ozdemir
Reference Books	
1	Hacking: The Art of Exploitation ,2nd Edition, <i>Jon Erickson, No Starch Press</i>
2	The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws ,2nd Edition, <i>Dafydd Stuttard and Marcus Pinto, Wiley Publishing</i>

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand basic cyber security concepts and categorize various types of attacks and cyber threats	U	L2
CO2	Apply security measures to protect mobile devices and digital payment systems against common frauds.	A	L3
CO3	Analyze different security protocols like PGP, S/MIME, IPsec to ensure secure email and network communication	An	L4
CO4	Evaluate the effectiveness of web and wireless network security protocols in different cyber environments	E	L5
CO5	Design AI-based secure systems using modern techniques to prevent data breaches.	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	3	3	2	1	1	2	2	2	1	2	1	2	3	2	3
CO2	2	2	2	1	2	2	2	2	1	2	1	2	3	2	3
CO3	3	3	2	2	3	1	1	1	1	2	1	2	3	3	2
CO4	2	2	2	2	3	2	2	2	2	2	2	2	3	3	3
CO5	3	3	3	3	3	2	2	2	2	3	2	3	3	3	3

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

CIE Course Assessment Plan

[illegible]

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	5			5	5	10	10%
CO2	5	10	10		10	5	40	10%
CO3		5			5		10	40%
CO4	2	10	5		5		20	10%
CO5	12	2	2		2	2	10	20%
Total	12	32	17		27	12	100	10%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Computer Networks			
Course Code	:	BCY502			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40h Theory + 20h Practical		SEE	: 3 Hours
Credits	:	4		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Study the TCP/IP protocol suite, switching criteria and Medium Access Control protocols for reliable and noisy channels.
2	Learn network layer services and IP versions.
3	Discuss transport layer services and understand UDP and TCP protocols.
4	Demonstrate the working of different concepts of networking layers and protocols.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27
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COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: Data Communications, Networks, Network Types, Networks Models: Protocol Layering, TCP/IP Protocol suite, The OSI model, Introduction to Physical Layer: Transmission media, Guided Media, Unguided Media: Wireless. Switching: Packet Switching and its types. Textbook: Ch. 1.1 - 1.3, 2.1 - 2.3, 7.1 – 7.3, 8.3.	8
Pedagogy		
2	Data Link Layer: Error Detection and Correction: Introduction, Block Coding, Cyclic Codes. Data link control: DLC Services: Framing, Flow Control, Error Control, Connectionless and Connection Oriented, Data link layer protocols, High Level Data Link Control. Media Access Control: Random Access, Controlled Access. Check Sum and Point to Point Protocol Textbook: Ch. 10.1-10.4, 11.1 -11.4, 12.1 - 12.2	8
Pedagogy		
3	Network Layer: Network layer Services, Packet Switching, IPv4 Address, IPv4 Datagram, IPv6 Datagram, Introduction to Routing Algorithms, Unicast Routing Protocols: DVR, LSR, PVR, Unicast Routing protocols: RIP, OSPF, BGP, Multicasting Routing-MOSPF Textbook: Ch. 18.1, 18.2, 18.4, 22.2,20.1-20.3, 21.3.2	8
Pedagogy		
4	Introduction to Transport Layer: Introduction, Transport-Layer Protocols: Introduction, User Datagram Protocol, Transmission Control Protocol: services, features, segments, TCP connections, flow control, Error control, Congestion control. Textbook: Ch. 23.1- 23.2, 24.1- 24.3.4, 24.3.6-24.3.9	8
Pedagogy		
5	AI-Driven Intelligent Application Layer and Secure Communication Systems Introduction to AI in application layer protocols, AI-based HTTP traffic analysis, spam detection in email systems, DNS anomaly detection, machine learning for network traffic analysis, AI in secure communication (SSH/TLS) Textbook two: Chs. 1,2,4 - 7	8
Pedagogy	Problem Solving	
	Pedagogical Initiatives (Not limited to):	

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

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Implement 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.	CO4
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.	CO4
3	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.	CO4
4	Develop a program for error detecting code using CRC-CCITT (16- bits).	CO1
5	Develop a program to implement a sliding window protocol in the data link layer.	CO3
6	Develop a program to find the shortest path between vertices using the Bellman-Ford and path vector routing algorithm.	CO1
7	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.	CO3
8	Develop a program on a datagram socket for client/server to display the messages on client side, typed at the server side.	CO3
9	Develop a program for a simple RSA algorithm to encrypt and decrypt the data.	CO1
10	Develop a program for congestion control using a leaky bucket algorithm.	CO4
Open ended Programs		
1	implement a timer function using select and poll system calls	CO3, CO4
2	Develop a socket program to filter the messages based on the custom header provided	CO5
3	Capture ping packets directed on a port or captured in a file and interpret them using a python program.	CO2, CO3, CO4

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, Tata McGraw-hill 2013
2	Artificial Intelligence for Cybersecurity – Leslie F. Sikos (Springer)
Reference Books	
1	Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2019.
2	UNIX network programming by Richard L stevens

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 TCP/IP protocol suite, switching criteria and Medium Access Control protocols for reliable and noisy channels	U	L1
CO2	Apply network layer services and IP versions	A	L1
CO3	Discover transport layer services and understand UDP and TCP protocols	An	L4
CO4	Demonstrate the working of different concepts of networking layers and protocols	C	L5
CO5	Evaluate and apply application layer protocols in client-server programming and secure data communication	E	L5

Mapping of Course Outcomes to Program Outcomes:

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

CIE- Continuous Internal Evaluation (50 Marks)

Weblinks and Video Lectures (e-Resources)

1	https://www.digimat.in/nptel/courses/video/106105183/L01.html 2.
2	http://www.digimat.in/nptel/courses/video/106105081/L25.html
3	https://nptel.ac.in/courses/10610

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

CIE Course Assessment Plan

[illegible]

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	5			5	5	10	10%
CO2	5	10	10		10	5	40	10%
CO3		5			5		10	40%
CO4	2	10	5		5		20	10%
CO5	12	2	2		2	2	10	20%
Total	12	32	17		27	12	100	10%

**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

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

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Software Engineering and Project Management			
Course Code	:	BCY503			
Course Type (Theory/Practical/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40h Theory		SEE Duration	: 3
Credits	:	3			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to Software Engineers.
2	Describe the process of requirement gathering, requirement classification, requirement specification and requirements validation.
3	Recognize the importance of Project Management with its methods and methodologies.
4	Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



Scheme of Teaching and Examinations for BE Programme -2026-27
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(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process, DevOps Introduction and Steps Involved in Deployment.	8
Pedagogy		
2	Software Requirements: Functional and Non-Functional, User requirements, System requirements, problem analysis Software Requirements Document — Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, Problem Analysis and Design for Problem Solving, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.	8
Pedagogy		
3	Software Design-Design process — Design Concepts-Design Model– Design Heuristic — Architectural Design -Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components. Design tools.	8
Pedagogy		
4	Software testing fundamentals-Internal and external views of Testing-white box testing — basis path testing-control structure testing-black box testing- Regression Testing — Unit Testing — Integration Testing — Validation Testing–Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering-CASE Tools – Use Case, Class Diagrams, Sequence Diagrams, Deployment Diagram.	8
Pedagogy		
5	Software Project Management, Estimation LOC FP Based Estimation Make Buy Decision COCOMO I and II, Types Tools for Estimation and Planning, AI Integration in Project Management AI based Effort Estimation Predictive Scheduling Risk Analysis Intelligent Resource Allocation AI based Monitoring Chatbots Integration of OpenAI APIs	8
Pedagogy	Problem Solving	
	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
- **Mandatory CASE tools based CCA or on DevOps**

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Software Engineering A Practitioners Approach, McGraw-Hill Education.
2	Software Engineering, Pearson Education.
3	Agile Software Development Principles Patterns and Practices, Prentice Hall.

Reference Books

1	Fundamentals of Software Engineering, PHI Learning.
2	The Mythical Man Month Essays on Software Engineering, Addison-Wesley.

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 software engineering, software development life cycle (SDLC), and software quality principles.	L1/L2	Compare, Differentiate, Organize
CO2	Apply appropriate software engineering methods, tools, and estimation to develop software solutions.	L3	Apply, Derive, Implement
CO3	Analyze the importance of various software testing methods and Agile methodologies	L4	Analyze, Critique, Examine

CO4	Evaluate different software design approaches, testing strategies, and quality models to select optimal solutions for given scenarios.	L5	Implement, Prepare, Produce
CO5	Design and develop a complete software system or prototype by integrating suitable methodologies, tools, and best practices.	L6	Evaluate, Justify, Recommend

Weblinks and Video Lectures (e-Resources)

1	https://www.geeksforgeeks.org/software-engineering/
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Mapping of Course Outcomes to Program Outcomes:

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

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	5	10		5	15	15%
CO2	5	10			10	5	45	45%
CO3	5	5	5	5	5	5	20	20%
CO4		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	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	5		10	5	5	10	10%
CO2	5	10			10	5	40	40%
CO3		5		5	5		10	10%
CO4		10		2	5		20	20%
CO5	2	2			2	2	10	10%
Total	12	32		17	27	12	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Hacker Techniques, Tools, and Incident Handling			
Course Code	:	BCY504A			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PEC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L: T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Hours		SEE Duration	: 3
Credits	:	3			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand ethical hacking, penetration testing and physical security controls
2	To identify the various foot printing and port scanning tools and techniques
3	To study enumeration and wireless vulnerabilities exploited by hackers
4	To learn about common types of malware, Trojans, backdoors, spyware, ransomware and sniffers
5	To study various incident response and defensive technologies

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Hacking: The Next Generation: Profiles and Motives of Different Types of Hackers, History of Computer Hacking, Ethical Hacking and Penetration Testing, Common Hacking Methodologies, Performing a Penetration Test, The Role of the Law and Ethical Standards. Physical Security: Basic Equipment Controls, Physical Area Controls, Facility Controls, Personal Safety Controls, Physical Access Controls, Avoiding Common Threats to Physical Security, Defense in Depth Textbook: Chapter 1, Chapter 4	8
Pedagogy	Problem Solving	
2	Footprinting Tools and Techniques: The Information-Gathering Process, The Information on a Company Website, Discovering Financial Information, Google Hacking, Exploring Domain Information Leakage, Tracking an Organization's Employees, Exploiting Insecure Applications, Using Social Networks, Using Basic Countermeasures. Port Scanning: Determining the Network Range, Identifying Active Machines, Mapping Open Ports, OS Fingerprinting, Mapping the Network, Analyzing the Results. Textbook: Chapter 5, Chapter 6	8
Pedagogy	Seminar Presentation	
3	Enumeration and Computer System Hacking: Windows Basics, Commonly Attacked and Exploited Services, Enumeration, System Hacking, Types of Password Cracking, Using Password Cracking, Using PsTools, Rootkits, Covering Tracks. Wireless Vulnerabilities: The Importance of Wireless Security, Working with and Securing Bluetooth, Working with Wireless LANs, Threats to Wireless LANs, Internet of Things (IoT), Wireless Hacking Tools, Protecting Wireless networks. Textbook: Chapter 7, Chapter 8	8
Pedagogy	Poster Presentation	
4	Malware: Malware, Viruses and How they Function, Worms and How they Function, Significance of Trojans, Detection of Trojans and Viruses, Trojan Tools, Distribution Methods, Trojan Construction Kits, Backdoors, Covert Communication, Spyware, Adware, Scareware,	8

	Ransomware. Sniffers, Session Hijacking, and Denial of Service Attacks: Sniffers, Session Hijacking, Distributed Denial of Service (DDoS) Attacks, Botnets and the Internet of Things (IoT). Textbook: Chapter 10, Chapter 11	
Pedagogy	Collaborative Learning	
5	Incident Response: What is Security Incident? The Incident Response Process, Incident Response Plans, Planning for Disaster and Recovery, Evidence Handling and Administration, Requirements of Regulated Industries. Defensive Technologies: Defense in Depth, Intrusion Detection Systems, The Purpose of Firewalls, Honeypots / Honeynets, The Role of Controls, Security Best Practices. Textbook: Chapter 14, Chapter 15	8
Pedagogy	Demonstration	
	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	Sean-Philip Oriyano, Michael G Solomon “Hacker Techniques, Tools, and Incident Systems”, Third Edition, Jones & Bartlett Learning, 2020.	
Reference Books		
1	Abhinav Ojha, “Beginners Guide to Ethical Hacking and Cyber Security”, Notion Press, 2020.	
2	Hugo Hoffman, “Ethical Hacking with Kali Linux - Learn Fast how to Hack like a Pro”, 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 hacking and penetration testing, including ethical and legal implications and identify basic equipment controls, physical area controls, and facility controls	U	L2
CO2	Identify common information gathering tools and techniques and analyse how port scanning and fingerprinting are used by hackers.	An	L4
CO3	Analyse how enumeration is used in conjunction with system hacking and analyse wireless network vulnerabilities exploited by hackers	An	L4
CO4	Analyse common types of malware, Trojans, backdoors, and covert communication methods.	An	L4
CO5	Apply incident handling by using appropriate methods, compare and contrast defensive technologies.	A	L3

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://www.techtarget.com/whatis/feature/17-free-cybersecurity-tools-you-should-know-about
2	https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks
3	https://www.youtube.com/watch?v=mOOlv8-luEo
4	https://www.youtube.com/watch?v=R0up9SZJqyQ
5	https://archive.nptel.ac.in/courses/106/105/106105217/

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		10	
Understand	5	5	20	20
Apply	20	25	20	10
Analyse	10	10		5
Evaluate	10	10		

CIE Course Assessment Plan

[illegible]

SEE- Semester End Examination (50 Marks)

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

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	5	10	10%
CO2	5	10		10	10	5	40	10%
CO3		5		5	10		10	40%
CO4	2	12		2	2	2	40	30%
Total	12	32		17	27	12	100	100



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Information Retrieval			
Course Code	:	BCY504B			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PEC-1			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Hours		SEE Duration	: 3
Credits	:	3			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the need of an information retrieval system
2	Understand various retrieval models and the factors of evaluation
3	Explore on text, query and indexed based processing for information retrieval
4	Realize the importance of user interfaces for visualization and the web-based search

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: Information retrieval, IR problem, IR System, The web. User interfaces for search: Introduction, How people search. Retrieval Process Architecture Boolean Retrieval Evolution of the World Wide Web Open-Source IR Systems, History of Web Search Web Characteristics, The impact of the web on IR, IR Versus Web Search Textbook one: Chapter 1, Chapter 2	8
Pedagogy	Problem Solving	
2	Conceptual IR on the Web: Modeling: IR models, Classic information retrieval, Alternative set theoretic models, Alternative algebraic models, Alternative probabilistic models, Other models. Textbook: Chapter 1, chapter 10	8
Pedagogy	Seminar Presentation	
3	Modelling: Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting, Scoring and Ranking Models –Language Models – Set Theoretic Models - Probabilistic Models-Models for Browsing Textbook: Chapter 2, Chapter 3 & Chapter 4	8
Pedagogy	Poster Presentation	
4	AI Compliant Analytical Models Latent Semantic Analysis-Semantic Similarity Models: Distance Based Models, Similarity Based Models, Co-occurrence Based Models- Web retrieval: The web, Search engine architectures, Search engine ranking, XML retrieval, XML retrieval evaluation Textbook: Chapter 2, Chapter 3, Chapter 4, Chapter 6 & Chapter 10	8
Pedagogy	Collaborative Learning	
5	Evaluation, Querying and Case Studies: The Page Rank Model - IR Evaluation Metrics: Precision, Recall and Other Derived Measures- Keyword Based Querying and its categorization- Case Study on Hash Table Clustering for Web People Search- Case Study on Extracting Meta Data using Element Tree for Tag Recommendation. Textbook: Chapter 4, Chapter 5, Chapter 6 & Chapter 10	8
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
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Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ricardo BaezaYates and BerthierRibeiroNeto, Modern Information Retrieval, 2nd Edition, Pearson 2011

Reference Books

1	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2	Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T Maybury, Springer, 2nd Edition, 2002
3	Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 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 the models and the tools for building an Information Retrieval system	U	L2
CO2	Apply query based operations for information retrieval.	A	L3
CO3	Analyze the text based operations for information retrieval from the documents.	An	L3
CO4	Apply indexing and searching techniques for information retrieval	A	L3
CO5	Design user interface for search and retrieval of information from the web/documents	D	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	3	2	2	1	2	2	1	1	1	2	2	2	2	2	2
CO2	3	3	2	2	3	1	1	1	1	2	1	2	2	3	2
CO3	3	3	3	2	3	1	1	2	2	2	2	2	2	3	3
CO4	3	3	3	2	3	1	1	2	2	2	2	2	2	3	2
CO5	3	3	3	2	3	2	1	2	2	3	2	3	3	3	3

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=ecRMy60oBrA
2	https://www.youtube.com/watch?v=dXHxPvAlwcl
3	https://www.youtube.com/playlist?list=PLpwnR8mPhhf8m7L_b9cSRLdjPW2soerAd
4	https://www.youtube.com/watch?v=m0oiAOgSQFw
5	https://www.youtube.com/watch?v=yIuvahNq3wk
6	https://www.youtube.com/watch?v=cv7ztWilaAM

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		10	
Understand	5	5	20	20
Apply	20	25	20	10
Analyse	10	10		5
Evaluate	10	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		15		5		
CO2	5	10	5	10	15	5		
CO3	5	5			10	5		
CO4		5	5					
CO5								
Total								

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	15%
Understand	45%
Apply	20%
Analyse	10%
Evaluate	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	10	10%
CO2	5	10		10	10	5	40	10%
CO3		5		5	10		10	40%
CO4	2	12		2	2	2	40	30%
Total	12	32		17	27	12	100	100

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:0:2
Total Hours of Pedagogy	25 hours – Project
Credits:	03
Modules	3
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		SEE	
	Project Weekly Assessment		Final Project Evaluation	
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.

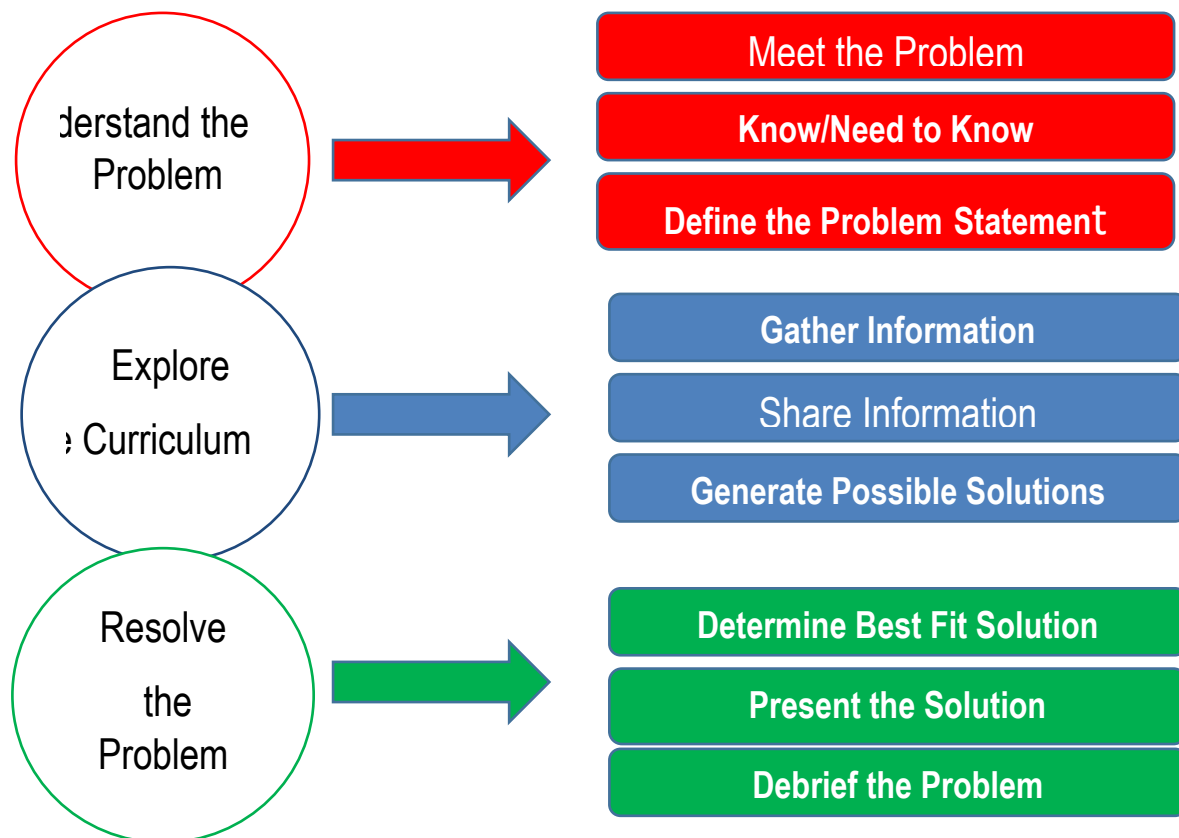
Phase 2:

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.

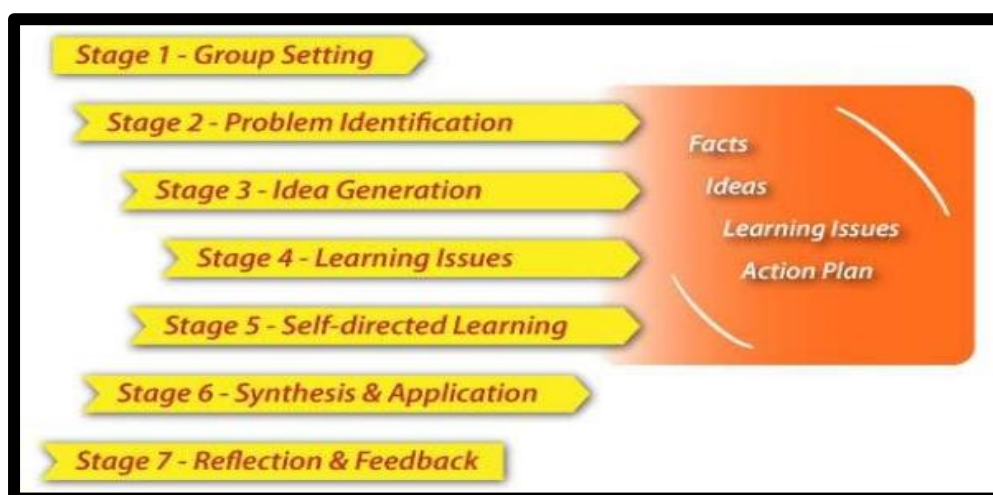
10. Obstacles/Gaps

- Lack of student's 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 plan	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 • Has some factual errors or inconsistencies	• 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. • Information loosely supports the solution.	• Multimedia loosely illustrates the main points. • Format does not suit the content. • Presentation does not capture audience attention. • Presentation is loosely organized.
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.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Mobile Application Development			
Course Code	:	BCY505			
Course Type (Theory/ Practical/ Integrated)	:	Practical			
Category	:	PBL			
Stream	:	Cyber Security	CIE		50
Teaching hours/ week (L:T:P:S)	:	0:2:0:4	SEE		50
Total Hours	:	25 Hours	SEE Duration		2
Credits	:	3			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand and apply the setup Android application development environment
2	Demonstrate hands-on proficiency in development of user interfaces for interacting with apps and triggering actions
3	Design and develop a basic android mobile application & learn deployment of it.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	Get started, build your first app, Activities, Testing, debugging and using support libraries	5
Pedagogy		
2	User Interaction, Delightful user experience, Testing your UI	5
Pedagogy		
3	Background Tasks, Triggering, scheduling and optimizing background tasks	5
Pedagogy		
4	All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders	5
Pedagogy		
5	Permissions, Performance and Security, Firebase and AdMob, Publish	5

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

Reference Books

1	Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2	Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Create, test and debug Android application by setting up Android development environment	C	L5
CO2	Implement adaptive, responsive user interfaces that work across a wide range of devices.	C	L5
CO3	Infer long running tasks and background work in Android applications	A	L2
CO4	Demonstrate methods in storing, sharing and retrieving data in Android applications	E	L4
CO5	Analyse performance of android applications and understand the role of permissions and security	An	L3

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
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1	https://develo per.android.com/
2	https://dl.ebooksworld.ir/motoman/OReilly.Head.First.Android.Development.A.Brain-Friendly.Guide.2nd.Edition.www.EBooksWorld.ir.pdf
3	https://www.scribd.com/document/253137289/Programming-Android-Java-Programming-for-the-New-Generation-of-Mobile-Devices
5	https://www.youtube.com/watch?v=fhbc6cCLBME
6	https://www.youtube.com/watch?v=ymq8z8z8z8z
7	https://nptel.ac.in/courses/106/105/106105215/ (<i>Operating System and System Programming – IIT Kharagpur</i>)
8	https://nptel.ac.in/courses/106/106/106106144/ (<i>Advanced Operating Systems – IIT Madras</i>)
9	https://www.coursera.org/learn/linux-command-line-basics (<i>Linux Command Line Basics – Coursera</i>)
10	https://www.edx.org/course/introduction-to-linux (<i>Introduction to Linux – edX / Linux Foundation</i>)

CIE- 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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								



Dayananda Sagar Academy of Technology & Management
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Project Based Learning - Batch

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

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 Cyber Security Engineering



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(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



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(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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(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning – Review

CONTINUOUS INTERNAL ASSESSMENT

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



Dayananda Sagar Academy of Technology & Management
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Grade
6 Programs Accredited by **NBA**

Project Based Learning Outcomes

[illegible]

**Professional Core
Course Laboratory (PCCL)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Advanced Cyber Security Lab			
Course Code	:	BCYL506			
Course Type (Theory/ Practical/ Integrated)	:	Practical			
Category	:	PCCL			
Stream	:	CSE-CY	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	Cyber Security	SEE	:	50
Total Hours	:	0:0:2:0	SEE	:	3 Hrs
Credits	:	25 Hours	Duration	:	

List Of Programs:

Sl. No.	Experiments/Programs	COs
1	Password Cracking Objective: To understand password vulnerabilities and the importance of strong passwords Tools: Hashcat, John the Ripper	CO3
2	Cross-Site Scripting (XSS) Objective: To learn about XSS attacks and how to mitigate them Tools: DVWA	CO3
3	Insecure Direct Object References (IDOR) Objective: To identify and exploit IDOR vulnerabilities Tools: Burp Suite, DVWA, custom web application	CO3
4	File Upload Vulnerabilities Objective: To understand the risks associated with file uploads Tools: DVWA, Burp Suite, a vulnerable web application	CO1
5	Command Injection Objective: To learn how command injection attacks work Tools: DVWA, Burp Suite, custom vulnerable web application	CO3
6	Man-in-the-Middle (MITM) Attack Objective: To understand how MITM attacks intercept and manipulate network traffic.	CO3

	Tools: Ettercap, Wireshark	
7	Privilege Escalation Objective: To learn techniques to escalate privileges on a compromised system Tools: Metasploit, Linux/Windows VMs with known vulnerabilities	CO3
8	Buffer Overflow Exploitation Objective: To understand how buffer overflow vulnerabilities can be exploited Tools: Immunity Debugger, Metasploit, vulnerable application (e.g., VulnServer)	CO2
9	XML External Entity (XXE) Injection Objective: To learn about XXE vulnerabilities and how to exploit them Tools: Burp Suite, a vulnerable XML-based application	CO3
10	Session Hijacking and Fixation Objective: To learn how session hijacking and fixation attacks work Tools: DVWA, Burp Suite, browser developer tools	CO3
Open Ended Questions		
1	Digital Forensics Objective: To learn the basics of digital forensics and evidence collection Tools: Autopsy, FTK Imager	
2	Acquisition of Mobile Data Objective: To learn the methods for acquiring data from mobile devices	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Web Penetration Testing with Kali Linux – Explore the Methods and Tools of Ethical Hacking with Kali Linux by Gilberto Najera-Gutierrez, Juned Ahmed Ansari – 2018, Third Edition, Packt Publishing https://terrorgum.com/tfox/books/webpenetrationtestingwithkalilinux_ebook.pdf
2	Practical Web Penetration Testing – Secure Web Applications using Burp Suite, Nmap, Metasploit, and more by Gus Khawaja – 2018, Packt Publishing 12082024 https://edu.anarcho-copy.org/Against%20Security%20%20Self%20Security/Practical%20Web%20Penetration%20Testing.pdf
Reference Books	
1	Ethical Hacking with Kali Linux – Learn Fast how to Hack like a Pro by Hugo Hoffman, 2020 https://edu.anarcho-copy.org/Against%20Security%20-%20Self%20Security/Ethical%20Hacking%20With%20Kali%20Linux%20Learn%20Fast%20How%20To%20Hack.pdf

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Design the experiment for the given problem using cyber-security tools.	C	L6
CO2	Develop the solution for the given real world cyber-security problem	E	L5
CO3	Analyze the results and produce substantial written documentation.	An	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	3	2	2	2	3	2	2	2	1	2	1	2	2	3	2
CO2	3	3	3	2	3	2	2	2	1	2	1	2	3	3	3
CO3	3	3	3	3	3	1	1	2	1	2	1	2	3	3	2

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/@NetworkChuc
2	https://www.youtube.com/@_CryptoCat
3	https://www.freecodecamp.org/news/crack-passwords-using-john-the-ripper-pentesting-tutorial/
4	http://eprints.binadarma.ac.id/1000/1/KEAMANAN%20SISTEM%20INFORMASI%20MATERI%201.pdf
5	https://blackhawkk.medium.com/cross-site-scripting-xss-dvwa-damn-vulnerable-web-applications36808bff37b3
6	https://medium.com/@eudorina67/dvwa-file-upload-vulnerabilities-40104b54d488
7	https://www.youtube.com/@HackerSploit

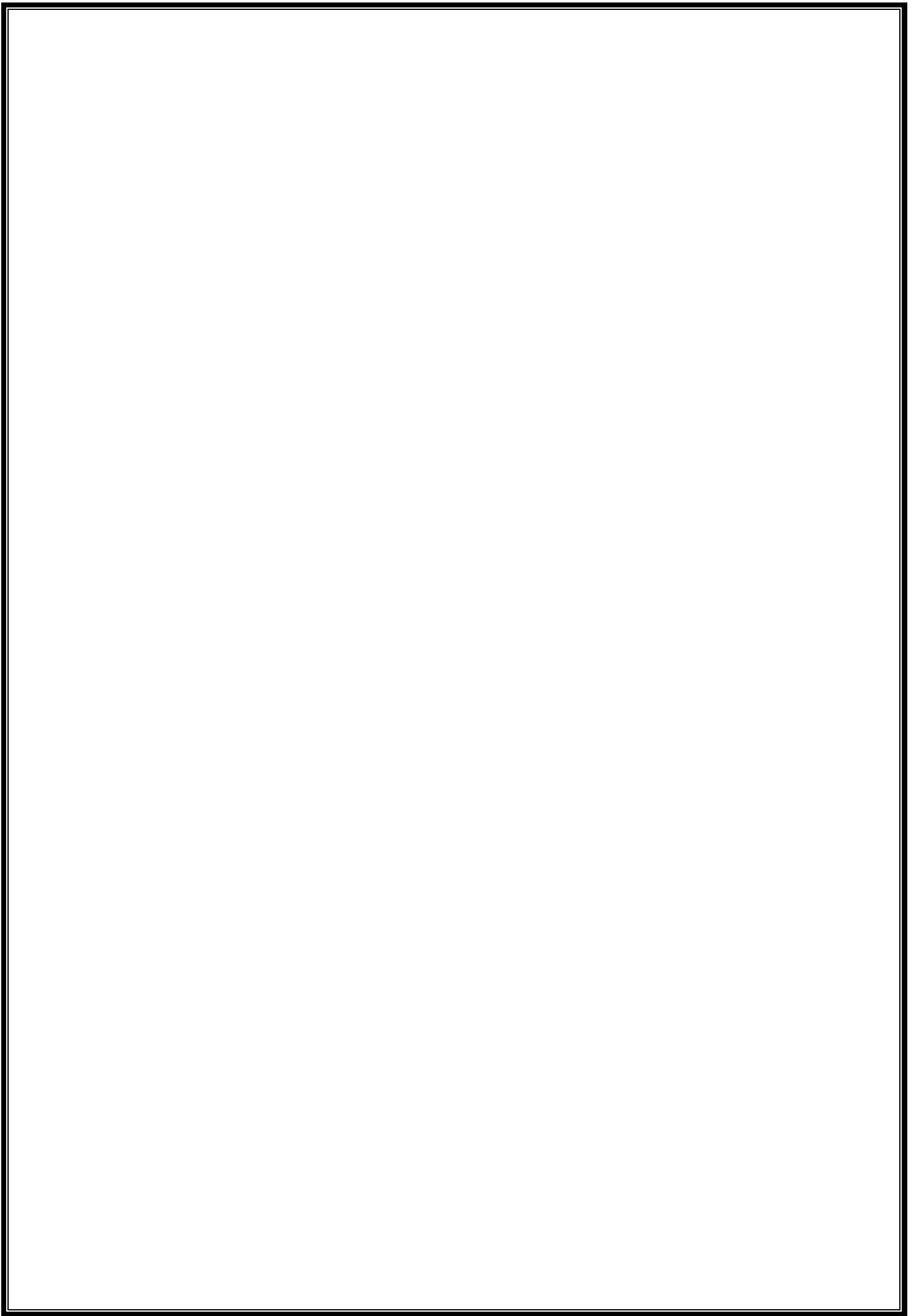
CIE Course Assessment Plan

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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

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	Not Applicable							
CO2								
CO3								
CO4								
Total								

**ABILITY ENHANCEMENT
COURSE (AEC)**



AEC Course – Ability Enhancement Course

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Generative AI in Cybersecurity			
Course Code	:	BCY507A			
Course Type (Theory/ Practical/ Integrated)	:	Practical			
Category	:	AEC			
Stream	:	Cyber Security	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	:	50
Total Hours	:	27 Hours	SEE Duration	:	2 Hrs
Credits	:	2			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To explore the application of Generative AI in cybersecurity tasks such as threat detection, report generation, and adversarial simulations.
2	To enable students to build and evaluate AI-driven tools for phishing, malware generation, vulnerability summarization, and threat intelligence.
3	To promote awareness of security challenges such as prompt injection, hallucinations, and adversarial misuse of GenAI.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Generate and detect phishing emails	3
Pedagogy	Hands on Practical	
2	Malware log synthesis using TextGAN	3
Pedagogy	Hands on Practical	
3	Cyber threat summarization using LLMs (CVE/MITRE)	3
Pedagogy	Hands on Practical	
4	RAG-based Cybersecurity Bot Synthesis	3
Pedagogy	Hands on Practical	
5	Secure Code Review with GenAI	3
Pedagogy	Hands on Practical	
6	Prompt injection attack and defense simulation	3
Pedagogy	Hands on Practical	
7	SIEM log assistant using LLM	3
Pedagogy	Hands on Practical	
8	Mini project: GenAI-based cybersecurity tool.	3
Pedagogy	Peer Learning & 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
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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Implement GenAI models for cybersecurity data generation and summarization.	Apply (Level 3)	Apply knowledge to practical tasks
CO2	Simulate phishing and malware threats using LLMs and GANs.	Apply (Level 3)	Use models/tools in new situations
CO3	Develop prompt-based assistants for threat intelligence and log analysis.	Create (Level 6)	Design and build functional tools
CO4	Demonstrate and defend against prompt injection attacks in GenAI systems.	Analyze (Level 4)	Examine and explain vulnerabilities
CO5	Build a mini-project integrating GenAI tools into a cybersecurity workflow.	Create (Level 6)	Construct a complete working solution

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

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

Mapping of Course Outcomes to Program Outcomes:

Weblinks and Video Lectures (e-Resources)

1	OpenAI Prompt Engineering Guide: https://platform.openai.com/docs/guides/prompt-engineering
2	MITRE ATT&CK-Phishing Techniques: https://attack.mitre.org/techniques/T1566/
3	GPT-2 Model Info (OpenAI): https://openai.com/research/better-language-models
4	RAG-based Cybersecurity Bot using LangChain - LangChain Documentation: https://docs.langchain.com - AgentForce Builder (open-source): https://github.com/langchain-ai/langchain
5	Secure Code Review with GenAI - GitHub Copilot for Code Review: https://github.com/features/copilot - OWASP Secure Coding Guidelines: https://owasp.org/www-project-secure-coding-practices/
6	Prompt Injection Attacks & Defense - OWASP LLM Top 10 (Prompt Injection): https://owasp.org/www-project-top-10-for-large-language-model-applications/ - Simon Willison's Blog on Prompt Injection: https://simonwillison.net/2023/Jul/19/prompt-injection/
7	SIEM log Assistant using LLM: - ELK Stack (SIEM logs): https://www.elastic.co/what-is/siem - Example: Using OpenAI for Log Analysis: https://towardsdatascience.com/using-openai-to-analyze-logs-77cdcc31404d

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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

SEE- Semester End Examination (50 Marks)

CO2	
CO3	
CO4	
Total	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Research Methodology and IPR			
Course Code	:	BCY507B			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	AEC			
Stream	:	Cyber Security	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	:	50
Total Hours	:	40 Hours	SEE Duration	:	2 Hrs
Credits	:	3			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To Understand the knowledge on basics of research and its types.
2	To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
3	To learn Ethics in Engineering Research.
4	To 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:

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



DSATM

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

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: 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	8
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. Tools: Google Scholar, IEEE Xplore, ACM Digital Library, PubMed, Scopus, Web of Science, arXiv, bioRxiv, Semantic Scholar, Connected Papers / Research Rabbit	8
Pedagogy	Literature Review Paper Writing and Demo of the same	
3	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.	8
Pedagogy	Case study, Patent Proposal Writing	
4	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	8

	Opposition, Examination. Grant of a Patent, Validity of Patent Protection, Post-grant Opposition, Commercialization of a Patent, Need for a Patent Attorney/Agent. Tools: PatentPal, WIPO Lex/GPT-based querying, Google Patents, IPfolio/TurboPatent, WIPO, TrademarkNow Advisor, DesignSearch.ai, DesignShelf, Legal Robot	
Pedagogy	Case study, Patent Proposal Writing	
5	Copyrights and Related Rights: □ Classes of copyrights, criteria, ownership, and author rights, Copyright infringement and legal remedies Trademarks: Trademark symbols, classification, validity, and registration process in India Types of trademarks, AI in trademarks: similarity detection, brand monitoring, counterfeit detection Tools: WIPO Lex, Google Scholar (Case Law), HeinOnline, LexisNexis / Westlaw, SCOPUS / Web of Science, Plagscan / Turnitin, WIPO Copyright Registration Tools, Scholarcy, Elicit	8
Pedagogy	Peer Learning & 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	Dr. Santosh M Nejakar, Dr. Harish Bendigeri "Research Methodology and Intellectual Property Rights", ISBN 978-93-5987-928-4, Edition: 2023-24.
2	Law Relating to Intellectual Property Rights – by V. K. Ahuja
Reference Books	
1	David V. Thiel "Research Methods for Engineers" Cambridge University Press, 978-1-107-03488-4 2.
2	Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9

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 meaning and scope of engineering research.	L2	Interpret, Summarize, Explain
CO2	Grasp the procedures for conducting literature reviews and performing technical reading.	L3	Demonstrate, Use, Implement
CO3	Learn the fundamentals of patent laws and the process of drafting patents.	L2/L3	Describe, Illustrate (L2) / Apply, Draft (L3)
CO4	Explain copyright laws, their subject matter, and principles of industrial design.	L2	Explain, Discuss, Differentiate
CO5	Comprehend the basic principles behind design rights.	L2	Describe, Recognize, Explain

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	NPTEL :: Multidisciplinary - NOC:Research Methodology
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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		10		
Understand					
Apply	20	25	20	10	
Analyse	10	10		5	
Evaluate	10	10		15	
Create					

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	5	10		5	15	15%
CO2	5	10			10	5	45	45%
CO3	5	5	5	5	5	5	20	20%
CO4		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	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	5		10	5	5	10	10%
CO2	5	10			10	5	40	40%
CO3		5		5	5		10	10%
CO4		10		2	5		20	20%
CO5	2	2			2	2	10	10%
Total	12	32		17	27	12	100	100%

1 Credit Course – Practical**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

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

SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
- The minimum duration of SEE is 02 hours.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	V			
Course Title	:	Environmental Studies and E-Waste Management			
Course Code	:	BESK508			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	HSMS			
Stream	:	Cyber Security	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	1:0:0:0	SEE	:	50
Total Hours	:	15 Hours	SEE Duration	:	21Hrs
Credits	:	2			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce students to the fundamental concepts of the environment, ecosystems, and biodiversity, emphasizing their interdependence and significance in sustaining life.
2	To identify the causes, effects, control measures major challenges of pollution of environmental problems and e-waste management.
3	To provide guidance on developing skills, and demonstrate socio-economic skills for Environmental protection e-waste management.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Environment and Sustainability: Environment & Ecosystem: Components of the environment, Ecosystems: Structure and Function, Types: Forest, Wetlands, River, Oceanic and Lake ecosystem. Sustainability: 17SDG targets and possible actions. Self-Study Component (SSC): Biodiversity: Types, Values, and Conservation of biodiversity.	3
Pedagogy	Chalk and talk, PowerPoint presentation and animation tools	
2	Natural resources and Energy: Natural Resources: Water resources – Availability & Quality aspects, Water borne diseases & Fluoride problem in drinking water. Energy: Different types of energy, Wind Energy, Hydrogen as an alternative energy. Self-Study Component (SSC): Conventional sources & Non -Conventional sources of Energy, Solar energy	3
Pedagogy	Chalk and talk, PowerPoint presentation , Videos, Case studies	
3	Environmental Pollution and Global Environmental Issues Environmental Pollution: Water Pollution, Noise pollution, Air pollution (Sources, Impacts, Preventive measures, Case studies, Relevant Environmental Acts) Global Environmental Issues: Acid Rain, Ozone Depletion, Global warming and Ground water depletion. Self-Study Component (SSC): Case studies of air pollution episodes.	3
Pedagogy	PowerPoint presentation, Videos and Case studies.	
4	Waste management & Environmental Legislation: Waste management: Solid Waste Management, types and sources, Biomedical Waste Management - Sources, Characteristics,	3

	Environmental Legislation: Water Act 1974, Air Act 1981, Environmental Protection Act 1984 Solid Waste Management Rules, 2016, Biomedical Waste Management Rules, 2016. Self-Study Component (SSC): Case studies on waste management options	
Pedagogy	PowerPoint presentation, Seminar, Demonstration Videos	
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. 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	3
Pedagogy	Power Point presentation, Demonstration videos and 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	S M Prakash – Environmental Studies, 3 rd Edition Elite Publishers, Mangalore, 2018.
2	Hester R.E., and Harrison R.M, Electronic Waste Management. Science, 2009.
3	Benny Joseph- Environmental studies, Tata Mcgraw-Hill 2nd edition 2012.
Reference Books	
1	R Geetha Balakrishna & K G Lakasminarayana Bhatta- Environmental Studies, S M Publications, 2006-2007.
2	M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007
3	Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi.
4	Dr. B.S Chauhan- Environmental studies, university of science press 1st edition
5	M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Describe various types of cyber crimes	Remember	L1
CO2	Illustrate various applications through which cyber-crimes happens	Analyze	L3
CO3	Explain various cyber laws related to the Indian IT Act.	Understand	L2

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://youtu.be/l_bnGkviWOU https://youtu.be/Ar04qG1P8Es
2	https://sdgs.un.org/goals
3	https://kspcb.karnataka.gov.in/waste-management/biomedical-waste
4	https://archive.nptel.ac.in/courses/109/105/109105190/
5	https://youtu.be/l_bnGkviWOU https://youtu.be/Ar04qG1P8Es

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	25	25	10		
Understand					
Apply					
Analyse					
Evaluate			25		
Create				25	

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

6th SEMESTER



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

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

Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2025-26)

6th SEMESTER: Cyber Security

SL. NO	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lect ure	Tutorial	Practi cal	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCY601	Machine Learning	IPCC1	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
2	BCY602	Cryptography and Network Security	IPCC-2	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
3	BCY603	Digital Forensics	PCC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
4	BCY604X	Cloud computing and security	PEC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
5	BCY605X	AI & IOT Enabled Smart Buildings	OEC	-	-	3	-	-	-	3	3	3	50	50	100
6	BCY606	Project Phase- I	PWP-1	CSE-CY	CSE-CY	-	-	-	4	4	2	3	50	50	100
7	BCY607	Digital Forensics Lab	PCCL /PBL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
8	BUHK608X	Industrial Cyber Security	AEC	CSE-CY	CSE-CY	1	-	-	-	1	1	2	50	50	100
9	BYOK609	Yoga, NSS, Physical Education, Indian Knowledge System	NCMC*		PD	-	-	2	-	2	-	-	50	50	100
	BNSK609				NSS										
	BPEK609				PD										
Total						16	2	8	4	30	22	22	500	400	900

6th Sem Professional Elective Courses			
BCY604A	Cloud Computing & Security	BCY604B	Big Data Analytics

6th Sem OPEN Elective Courses			
BCY605A	AI & IoT Enabled Smart Buildings	BCY605B	AI in Project Management

6th Sem Ability Enhancement Course			
BCY608A	Industrial Cyber Security	BCY608B	Network Administration

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

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

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

**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)

Assess ment Method	Component	Type of Assessments	Syllabus Coverage	Maximu m 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

CIE									
	Practical	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
									Scale down Marks of Experiments, Record,

	Total CIE Practical					25	10	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	:	Machine Learning			
Course Code	:	BCY601			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	PCC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40h Theory + 20h Practical		SEE	: 3 Hours
Credits	:	04		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the foundational principles of Artificial Intelligence, including Turing tests, rational agent architectures, and their interaction with diverse environments.
2	Master problem-solving through state-space construction and the implementation of uninformed and heuristic search techniques.
3	Apply concepts like First-Order Logic, inference engines, and expert system shells for complex decision-making and model information systems.
4	Analyze the mathematical framework of Machine Learning, including feature engineering, dimensionality reduction, and multivariate data preprocessing.
5	Implement similarity-based models and clustering algorithms to evaluate patterns and solve predictive classification tasks.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	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 – 1: Introduction, Big Data Analysis Framework, Descriptive Statistics, Univariate Data Analysis and Visualization. Chapter-1, 2 (2.1-2.5)	8
Pedagogy		
2	Understanding Data – 2: Bivariate Data and Multivariate Data, Multivariate Statistics, Essential Mathematics for Multivariate Data, Feature Engineering and Dimensionality Reduction Techniques. Basic Learning Theory: Design of Learning System, Introduction to Concept of Learning, Modelling in Machine Learning. Chapter-2 (2.6-2.8, 2.10), Chapter-3 (3.3, 3.4, 3.6)	8
Pedagogy		
3	Similarity-based Learning: Nearest-Neighbor Learning, Weighted K-Nearest-Neighbor Algorithm, Nearest Centroid Classifier, Locally Weighted Regression (LWR). Regression Analysis: Introduction to Regression, Introduction to Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression. Decision Tree Learning: Introduction to Decision Tree Learning Model, Decision Tree Induction Algorithms. Chapter-4 (4.2-4.5), Chapter-5 (5.1-5.3, 5.5-5.7), Chapter-6 (6.1, 6.2)	8
Pedagogy		
4	Bayesian Learning: Introduction to Probability-based Learning, Fundamentals of Bayes Theorem, Classification Using Bayes Model, Naïve Bayes Algorithm for Continuous Attributes. Artificial Neural Networks: Introduction, Biological Neurons, Artificial Neurons, Perceptron and Learning Theory, Types of Artificial Neural Networks, Popular Applications of Artificial Neural Networks, Advantages and Disadvantages of ANN, Challenges of ANN. Chapter-8 (8.1-8.4), Chapter-10 (10.1-10.5, 10.9-10.11)	8
Pedagogy		
5	Clustering Algorithms: Introduction to Clustering Approaches, Proximity Measures, Hierarchical Clustering Algorithms, Partitional Clustering Algorithm, Density-based	8

	Methods, Grid-based Approach. Reinforcement Learning: Overview of Reinforcement Learning, Scope of Reinforcement Learning, Reinforcement Learning as Machine Learning, Components of Reinforcement Learning, Markov Decision Process, Multi-Arm Bandit Problem and Reinforcement Problem Types, Model-based Learning, Model Free Methods, Q-Learning, SARSA Learning. Chapter -13 (13.1-13.6), Chapter-14 (14-1-14.10)	
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	

List of Programs:

Sl. No.	Experiments/Programs	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 outliers. Use California Housing dataset. Book 1: Chapter 2	CO1
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. Book 1: Chapter 2	CO1
3	Develop a program to implement principle component analysis (PCA) for reducing the dimentionality of the Iris Dataset From 4 features to 2. Book 1:Chapter 2	CO2
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. Book 1: Chapter 3	CO2
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	CO3

	generated. 1. Label the first 50 points $\{x_1, \dots, x_{50}\}$ as follows: if $(x_i \leq 0.5)$, then $x_i \in \text{Class1}$, else $x_i \in \text{Class2}$. 2. Classify the remaining points, $x_{51}, \dots, x_{100}$ using KNN. Perform this for $k=1, 2, 3, 4, 5, 20, 30$. Book 2: Chapter – 2	
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 Book 1: Chapter – 4	CO3
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. Book 1: Chapter – 5	CO3
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. Book 2: Chapter – 3	CO3
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. Book 2: Chapter – 4	CO4
10	Develop a program to implement k-means clustering using Wisconsin Breast Cancer data set and visualize the clustering result. Book 2: Chapter – 4	CO5

Open ended Programs

1	Unsupervised Anomaly Detection via Clustering: How can clustering algorithms be made robust to label-less, noisy, and sparse cyber threat data?	CO5
2	Neural Networks with Limited Data: What novel architectures(e.g. Few-shot learning, transfer learning) can overcome ANN's reliance on large datasets	CO5

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	S Sridhar, M Vijayalakshmi, "Machine Learning", OXFORD University Press 2021, First Edition.

Reference Books

1	Murty, M. N., and V. S. Ananthanarayana. Machine Learning: Theory and Practice, Universities Press, 2024. 2.
2	T. M. Mitchell, "Machine Learning", McGraw Hill, 1997. 3.
3	Burkov, Andriy. The hundred-page machine learning book. Vol. 1. Quebec City, QC, Canada: Andriy
4	T. M. Mitchell, "Machine Learning", McGraw Hill, 1997. 3.
5	Burkov, Andriy. The hundred-page machine learning book. 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	RBT Level Indicator
CO1	Demonstrate the evolution of AI, the concept of rationality, and the various agent architectures (reflex, goal, and utility-based) in relation to their operating environments.	1	
CO2	Apply concepts of feature engineering, dimensionality reduction (PCA), and data preprocessing to enhance the performance of multivariate learning models.	3	A
CO3	Analyze knowledge engineering processes, including forward/backward chaining and Bayesian belief networks, to arrive at optimal intelligent solutions.	3	An
CO4	Demonstrate real-time application development using similarity-based learning and clustering algorithms to evaluate patterns in complex data and learning tasks.	4	E
CO5	Build and evaluate simple Machine Learning models.	5	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	3	2	2	1	2	0	0	0	1	1	0	2	2	2	1
CO2	3	3	2	2	2	0	0	0	1	1	0	2	2	2	1
CO3	3	3	3	2	3	0	0	1	1	1	1	2	3	3	2
CO4	3	3	2	3	3	1	0	1	1	2	1	2	3	3	2
CO5	2	2	2	3	3	1	1	1	2	2	1	2	3	3	2

Weblinks and Video Lectures (e-Resources)

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

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	15	10		
Apply	25	25		
Analyse	5	15		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	36	54%
CO3	0	3	3	5	10	15	34	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
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Remember	5%
Understand	25%
Apply	35%
Analyse	35%
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module-2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	54	54%
CO3	0	3	3	5	10	15	36	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI				
Course Title	:	Cryptography and Network Security				
Course Code	:	BCY602				
Course Type (Theory/ Practical/ Integrated)	:	Integrated				
Category	:	IPCC				
Stream	:	Cyber Security		CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	:	50
Total Hours	:	40h Theory + 20h Practical		SEE	:	3 Hours
Credits	:	04		Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the basics of Cryptography concepts, Security and its principle.
2	To analyse different Cryptographic Algorithms
3	To illustrate public and private key cryptography
4	To understand the key distribution scenario and certification
5	To Develop/test/Conduct approaches and techniques to build protection mechanism in order to secure computer networks

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	A model for Network Security, Classical encryption techniques: Symmetric cipher model, Substitution ciphers-Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, One time pad, Steganography-Block Ciphers and Data Encryption Standards: Traditional Block Cipher structures, data Encryption Standard (DES), A DES Example, The strength of DES, Block cipher design principles.	8
Pedagogy		
2	Pseudorandom number Generators: Linear Congruential Generators, Blum Blum Shub Generator. Public key cryptography and RSA: Principles of public key cryptosystems-Public key cryptosystems, Applications for public key cryptosystems, Requirements for public key cryptography, Public key Cryptanalysis, The RSA algorithm: Description of the Algorithm, Computational aspects, The Security of RSA. Diffie-Hellman key exchange: The Algorithm, Key exchange Protocols, Man-in-the-middle Attack, Elliptic Curve Cryptography: Analog of Diffie-Hellman key Exchange	8
Pedagogy		
3	Introduction to PKI , Definition and importance of PKI in cybersecurity, Role in ensuring confidentiality, integrity, authentication, and non-repudiation, PKI components: Certification Authorities (CA), Registration Authorities (RA), repositories, Cryptographic Foundations , Symmetric vs. asymmetric encryption, Public and private keys, Hash functions and digital signatures, Digital Certificates , Structure of X.509 certificates, Certificate fields and extensions, Types of certificates: SSL/TLS, code-signing, email, root/intermediate certificates, Certificate Lifecycle , Issuance and enrollment process, Validation and verification (chain of trust), Renewal and revocation (CRL, OCSP), PKI Operations , Key management and storage, Certificate policies and practices, Role of PKI in secure communications (HTTPS, VPNs, email security)	8
Pedagogy		

4	User Authentication: Remote user authentication principles, Kerberos, Remote user authentication using asymmetric encryption. Web security consideration, Transport layer security. Email Threats and comprehensive email security, S/MIME, Pretty Good Privacy.	8
Pedagogy		
5	AI enhanced IPSec systems through, Intrusion Detection, ML models detect abnormal traffic patterns, Identifies attacks like DDoS and spoofing, Adaptive Security Policies, AI dynamically updates IPSec policies based on traffic behavior Intelligent Key Management, Predicts secure key lifetimes, Detects suspicious key exchanges	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	

List of Programs:

Sl. No.	Experiments/Programs	COs
	Design & Implement Database tables & query	
1	Implement Caesar Cipher, Monoalphabetic and Playfair Cipher	CO5
2	Implement Hill Cipher and Vigenère Cipher	CO5
3	Implement DES (Data Encryption Standard)	CO2
4	Implement RSA algorithm – key generation, encryption and decryption	CO2
5	Generate digital signature	CO5
6	Simulate Diffie-Hellman Key Exchange	CO2
7	Configure a firewall and test rules	CO5
8	Perform packet capture and analysis using Wireshark	CO5
9	Simulate ARP spoofing and countermeasures using tools like Ettercap	CO5
10	Crack passwords using John the Ripper or Hashcat and demonstrate best practices	CO5

Open ended Programs

1	Design and Analyze a Custom Substitution Cipher with Key Rotation	C03
2	Build a Secure Messaging App Prototype using RSA and AES Hybrid Encryption	C03

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 Publication, Seventh Edition.
2	AI-Integrated Network Security- <i>DomainKeys Identified Mail & IP Security with Artificial Intelligence</i>

Reference Books

1	Keith M Martin, "Everyday Cryptography", Oxford University Press.
2	V.K Pachghare, "Cryptography and Network Security", PHI, 2nd Edition. .

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
C01	Understand the basic concepts of Cryptography and Security aspects	U	L2
C02	Apply different Cryptographic Algorithms for different applications	A	L3
C03	Analyze different methods for authentication and access control.	AN	L4
C04	Explain key management, key distribution and Certificates	E	L2
C05	Discuss Electronic mail and IP Security.	C	L2

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	0	2	1	1	0	0	1	0	2	2	2	2
CO2	3	3	3	2	3	1	1	0	1	1	1	2	3	3	2
CO3	2	3	2	2	2	1	1	0	1	1	0	1	3	2	3
CO4	2	2	2	1	2	1	1	0	0	1	0	1	2	2	2
CO5	2	3	2	1	3	1	2	1	1	1	1	1	3	3	3

Weblinks and Video Lectures (e-Resources)

1	https://onlinecourses.nptel.ac.in/noc22_cs90/preview
2	https://www.youtube.com/watch?v=zlWGjkr0ENE
3	https://www.mitel.com/articles/web-communication-cryptography-and-network-security

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		10		10
Understand	5	5	20		15
Apply	20	25	20	20	25
Analyse	10	10		10	

Evaluate	10	10		5	
Create				15	

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	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	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	5		5	5	10	10%	5
CO2	5	10	10	10	5	40	10%	5
CO3		5		5		10	40%	
CO4		10	5	5		20	10%	
CO5	2	2	2	2	2	10	20%	2
Total	12	32	17	27	12	100	10%	12

**PROFESSIONAL CORE
COURSE (PCC)**

IPCC Course – Integrated 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 (CIE) :

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for the 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 continuous and comprehensive assessments (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

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

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	---	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI			
Course Title	:	Digital Forensics			
Course Code	:	BCY603			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	IPCC			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Theory		SEE	: 3 Hours
Credits	:	3		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce students to the principles of forensic science, digital forensics processes, and foundational legal concepts.
2	To develop understanding of computer architecture, storage systems, and forensic acquisition methods in investigations.
3	To familiarize students with digital forensic models, cybercrime scene documentation, evidence integrity, and reporting.
4	To train students on the use of forensic tools for identifying, recovering, and analyzing digital evidence from devices.
5	To understand the legal, ethical, and procedural aspects of cybercrime investigations, including case studies and standards.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction Forensic Science: History of Forensic Science, Locard's Exchange Principle, Crime Reconstruction, Investigations, Evidence Dynamics. Digital Forensics: Crimes and Incidents, Digital Devices, Media, and Objects, Forensic Soundness and Fundamental Principles, Crime Reconstruction in Digital Forensics Digital Evidence: Layers of Abstraction, Metadata , Error, Uncertainty, and Loss, Online Bank Fraud A Real World.	8
Pedagogy		
2	The Digital Forensics Process Principles of a Forensics Process, Finding the Digital Evidence, The Identification Phase, Preparations and Deployment of Tools and Resources The First Responder At the Scene of the Incident, Preservation, Dealing with Live and Dead Systems Chain of Custody The Collection Phase Sources of Digital Evidence Systems Physically Tied to a Location Multiple Evidence Sources Reconstruction Evidence Integrity and Cryptographic Hashes Order of Volatility Dual-Tool Verification Remote Acquisition External Competency and Forensics Cooperation	8
Pedagogy		
3	The Examination Phase Initial Data Source Examination and Preprocessing Forensic File Formats and Structures Data Recovery Data Reduction and Filtering Timestamps Compression, Encryption and Obfuscation Data and File Carving The Analysis Phase Layers of Abstraction Evidence Types String and Keyword Searches Anti-Forensics Computer Media Wiping Analysis of Encrypted and Obfuscated Data Automated Analysis Timelining of Events Graphs and Visual Representations Link Analysis Contents	8
Pedagogy		
4	Digital Crime – Substantive Criminal Law General Conditions for Criminal Liability Real-Life Modus Operandi Offenses against the Confidentiality, Integrity, and Availability of Computer	8

	Data and Systems Illegal Access and Illegal Interception Data and System Interference Misuse of Devices Computer-Related Offenses Content-Related Offenses Offenses Related to Infringements of Copyright and Related Rights Racist and Xenophobic Speech Investigation Methods for Collecting Digital Evidence The Digital Forensic Process in the Context of Criminal Procedure	
Pedagogy		
5	Intelligent Cloud Computing and Distributed Systems examines the integration of AI with cloud platforms and distributed computing paradigms to enable predictive resource allocation, automated scaling, and efficient processing of large-scale data in environments like Google App Engine, AWS, and Microsoft Azure. AI-Powered Big Data, Text, and Web Analytics focuses on using AI techniques such as Natural Language Processing, machine learning, and graph analysis with tools like Apache Spark to extract insights from text data, analyze web structures, improve PageRank algorithms, and deliver personalized recommendations.	8
	Pedagogical Initiatives (Not limited to): ● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another ● Problem Solving: encourages cognitive thinking and enables creative problem solving ● Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. ● Case studies: maps different domains in real time applications ● Demonstration: exhibits the implementation process	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Digital Forensics Edited by André Årnes Norwegian University of Technology and Science (NTNU), Norway and Telenor Group, Norway
2	AI-Integrated Digital Forensic Readiness

Reference Books

1	The basics of digital Forensics (Latest Edition) – The primer for getting started in digital forensics by John Sammons – Elsevier Syngress Imprint
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2	Cybersecurity – Understanding of cybercrimes, computer forensics and Legal perspectives by Nina Godbole and Sunit Belapure – Wiley India Publication
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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Compare Forensic science and Digital Forensic concepts	U	L2
CO2	Apply various digital forensic Operandi and motive behind cyber attacks	A	L3
CO3	Interference the cyber pieces of evidence, Digital forensic process model and their legal perspective.	AN	L4
CO4	Determine various forensic tools to investigate the cybercrime and to identify the digital pieces of evidence	E	L3
CO5	Combine the digital evidence used to commit cyber offences.	C	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	3	2	1	0	1	1	1	1	0	1	0	1	2	1	2
CO2	3	3	2	2	2	2	1	1	0	1	1	1	3	3	2
CO3	2	3	2	1	1	3	2	2	1	1	1	1	3	3	3
CO4	2	2	3	2	3	2	1	1	2	2	1	2	3	3	2
CO5	3	3	3	3	3	2	1	1	2	2	1	2	3	3	2

Weblinks and Video Lectures (e-Resources)

1	https://nptel.ac.in/
2	https://www.coursera.org/
3	Ministry of Electronics and Information Technology (MeitY) – Govt of India – Information Security Project - https://www.infosecawareness.in/

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.
- The 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 continuous and comprehensive assessments (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 the 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).

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	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	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	5		5	5	10	10%	5
CO2	5	10	10	10	5	40	10%	5
CO3		5		5		10	40%	
CO4		10	5	5		20	10%	
CO5	2	2	2	2	2	10	20%	2
Total	12	32	17	27	12	100	10%	12

**PROFESSIONAL ELECTIVE
COURSE (PEC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI				
Course Title	:	Cloud Computing & Security				
Course Code	:	BCY604A				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Category	:	Professional elective				
Stream	:	Cyber Security		CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	:	50
Total Hours	:	40 Theory		SEE Duration	:	3 Hours
Credits	:	3				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Introduce the rationale behind the cloud computing revolution and the business drivers
2	Understand various models, types and challenges of cloud computing
3	Understand the design of cloud native applications, the necessary tools and the design
4	Realize the importance of Cloud Virtualization, Abstraction's, Enabling Technologies and cloud security

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	Distributed System Models and Enabling Technologies: Scalable Computing Over the Internet, Technologies for Network Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency. Textbook 1: Chapter 1: 1.1 to 1.5	8
Pedagogy		
2	Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structure/Tools and Mechanisms, Virtualization of CPU/Memory and I/O devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation. Textbook 1: Chapter 3: 3.1 to 3.5	8
Pedagogy		
3	Cloud Platform Architecture over Virtualized Datacenters: Cloud Computing and Service Models, Data Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS and Azure, Inter-Cloud Resource Management. Textbook 1: Chapter 4: 4.1 to 4.5	8
Pedagogy		
4	Cloud Security: Top concern for cloud users, Risks, Privacy Impact Assessment, Cloud Data Encryption, Security of Database Services, OS security, VM Security, Security Risks Posed by Shared Images and Management OS, XOAR, A Trusted Hypervisor, Mobile Devices and Cloud Security. Cloud Security and Trust Management: Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques, Reputation-Guided Protection of Data Centers. Textbook 2: Chapter 11: 11.1 to 11.3, 11.5 to 11.8, 11.10 to 11.14 Textbook 1: Chapter 4: 4.6	8
Pedagogy		

5	Emerging cloud software environments include technologies like serverless computing, containerization, and edge computing, which improve flexibility and efficiency in application deployment. AI plays a significant role in these environments by enabling real-time decision-making at the edge, automating DevOps processes (AIOps), and enhancing system reliability through predictive analytics. Overall, the integration of AI with cloud computing transforms traditional systems into intelligent, adaptive, and highly scalable platforms suitable for modern applications.	
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	Kai Hwang, Geoffrey C Fox, and Jack J Dongarra, Distributed and Cloud Computing, Morgan Kaufmann,Elsevier 2012
2	Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, 2nd Edition, Elsevier 2018
3	AI-Integrated Cloud Programming & Software Environments

Reference Books

1	Rajkumar Buyya, Christian Vecchiola, and Thamrai Selvi, Mastering Cloud Computing McGrawHill Education, 1st Edition, 2017
2	Toby Velte, Anthony Velte, Cloud Computing: A Practical Approach, McGraw-Hill Education, 2017.
3	George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Publication, 1st Edition, 2009
4	John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press, 2 nd Edition, 2009.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Classify various cloud computing platforms and service providers.	U	L1
CO2	Identify the significance of various types of virtualizations.	A	L2
CO3	Analyze the architecture, delivery models and industrial platforms for cloud computing-based applications	An	L3
CO4	Decide the role of security aspects in cloud computing.	E	L4
CO5	Build cloud applications in various fields using suitable cloud platforms.	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	2	2	1	1	2	1	1	0	1	2	1	2	2	2	1
CO2	3	2	2	2	3	0	0	0	1	1	1	2	2	3	1
CO3	3	3	3	2	3	1	0	0	2	2	2	2	3	3	2
CO4	2	3	2	3	3	2	2	2	2	2	2	2	3	3	3
CO5	3	2	3	3	3	1	1	1	2	3	3	3	3	3	2

Weblinks and Video Lectures (e-Resources)

1	https://freevideolectures.com/course/4639/nptel-cloud-computing/1 .
2	https://www.youtube.com/playlist?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
3	https://www.youtube.com/watch?v=EN4fEbcFZ_E
4	https://www.youtube.com/watch?v=RWgW-CgdIk0
5	https://www.geeksforgeeks.org/virtualization-cloud-computing-types/
6	https://www.javatpoint.com/cloud-service-provider-companies

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	15	10		
Apply	25	25		
Analyse	5	15		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	36	54%
CO3	0	3	3	5	10	15	34	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	25%
Apply	35%
Analyse	35%
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	54	54%
CO3	0	3	3	5	10	15	36	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI				
Course Title	:	Big Data Analytics				
Course Code	:	BCY604B				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Category	:	Professional elective				
Stream	:	Cyber Security		CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	:	50
Total Hours	:	40 Theory		SEE Duration	:	3 Hours
Credits	:	3				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To implement MapReduce programs for processing big data.
2	To realize storage and processing of big data using MongoDB, Pig, Hive and Spark.
3	To analyze big data using machine learning techniques.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27
Outcome Based Education and Choice Based Credit System (CBCS)
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COURSE CURRICULUM

Module No.	Topics	Hours
1	Classification of data, Characteristics, Evolution and definition of big data, Introduction to Big data, Need for Big data, Traditional Business Intelligence Vs Big Data, Typical data warehouse and Hadoop environment. Big Data Analytics: Introduction to Big data Analytics, Classification of Analytics, Importance of Big Data Analytics, Technologies used in Big data Environments, Few Top Analytical Tools, NoSQL, Hadoop. TB1: Ch 1: 1.1, Ch2: 2.1-2.5,2.7,2.9-2.11, Ch3: 3.2,3.5,3.8,3.12, Ch4: 4.1,4.2	8
Pedagogy		
2	Introduction to Hadoop: Introducing Hadoop, RDBMS Vs Hadoop, History of Hadoop, Hadoop overview, Use case of Hadoop, HDFS (Hadoop Distributed File System), Processing data with Hadoop, Managing resources and applications with Hadoop YARN (Yet Another Resource Negotiator). Introduction to Map Reduce Programming: Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression. TB1: Ch 5: 5.1-,5.8, 5.10-5.12, Ch 8: 8.1 - 8.8	8
Pedagogy		
3	Introduction to MongoDB: Introduction to MongoDB, Need for MongoDB, Terms used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language. TB1: Ch 6: 6.1-6.5	8
Pedagogy		
4	Introduction to Hive: Introduction to Hive, Hive Architecture, Hive data types, Hive file formats, Hive Query Language (HQL), RC File implementation, User Defined Function (UDF). Introduction to Pig: What is Pig, Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use case for Pig, Pig Latin. Overview, Data types in Pig, Running Pig, Execution Modes of Pig, HDFS Commands, Relational Operators, Eval Function, Complex Data Types, Piggy Bank, User Defined Function, Pig Vs Hive. TB1: Ch 9: 9.1-9.6,9.8, Ch 10: 10.1 - 10.15, 10.22	8
Pedagogy		

5	Spark and Big Data Analytics, Apache Spark, Introduction to Data Analysis with Spark, Text Analytics, Web Content Analytics, Link Analytics, Text Mining, Web Mining, Web Content Mining, Web Usage Mining, PageRank Algorithm, Structure of the Web, and Analyzing a Web Graph, along with the integration of Artificial Intelligence techniques for large-scale data processing, pattern recognition, and intelligent decision-making.	8
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	Seema Acharya and Subhashini Chellappan "Big data and Analytics" Wiley India Publishers, 2nd Edition, 2019.
2	Rajkamal and Preeti Saxena, "Big Data Analytics, Introduction to Hadoop, Spark and Machine Learning", McGraw Hill Publication, 2019.
3	AI-Integrated Spark & Big Data Analytics with Text and Web Mining

Reference Books

1	Adam Shook and Donald Mine, "MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems" - O'Reilly 2012
2	Tom White, "Hadoop: The Definitive Guide" 4th Edition, O'reilly Media, 2015.
3	Thomas Erl, Wajid Khattak, and Paul Buhler, Big Data Fundamentals: Concepts, Drivers & Techniques, Pearson India Education Service Pvt. Ltd., 1st Edition, 2016
4	John D. Kelleher, Brian Mac Namee, Aoife D'Arcy -Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, MIT Press 2020, 2nd Edition

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Contrast and list various Big Data concepts, tools and applications.	U	L1
CO2	Develop programs using HADOOP framework.	A	L2
CO3	Analyse the given data set and identify deep insights from the data set.	A	L3
CO4	Decide the use of Hadoop Cluster to deploy Map Reduce jobs, PIG, HIVE and Spark programs.	E	L4
CO5	CreateText, Web content and link analytics.	C	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	0	0	0	1	2	1	2	2	2	1
CO2	3	2	3	2	3	0	0	0	1	2	1	2	2	3	1
CO3	3	3	3	2	3	0	0	0	1	2	1	2	3	3	2
CO4	3	3	3	3	3	1	0	1	2	2	2	2	3	3	2
CO5	2	2	3	2	3	1	1	1	2	2	2	2	3	3	2

Weblinks and Video Lectures (e-Resources)

1	https://archive.nptel.ac.in/courses/106/104/106104189/
2	https://nptel.ac.in/courses/106104189
3	https://www.youtube.com/watch?v=yTq2qc_eaTk

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	15	10		
Apply	25	25		
Analyse	5	15		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	36	54%
CO3	0	3	3	5	10	15	34	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	25%
Apply	35%
Analyse	35%
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	54	54%
CO3	0	3	3	5	10	15	36	36%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%

PROJECT PHASE 1
(PWP-1)

PBL Course – Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:0:2
Total Hours of Pedagogy	25 hours
Credits:	02
Each Module	5 modules/ 5Hrs each
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project-Based



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI				
Course Title	:	Project Phase- I				
Course Code	:	BCY606				
Course Type (Theory/ Practical/ Integrated)	:	Mini Project Phase I				
Category	:	PWP-1				
Stream	:	Cyber Security		CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	0:0:0:2		SEE	:	50 Marks
Total Hours	:	Project		SEE Duration	:	
Credits	:	2				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the core principles, ethics, and legal implications of cybersecurity project.
2	Develop skills to plan, configure, and execute penetration tests in a controlled lab environment using industry-standard tools.
3	Analyze vulnerabilities, simulate attack scenarios, and document findings for effective remediation planning.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Chapter 1: Introduction 1.1 Background of the Study 1.2 Motivation for the Project 1.3 Problem Statement. 1.4 Objectives of the Project 1.5 Scope and Limitations	5
Pedagogy		
2	Chapter 2: Literature Review 2.1 Overview of Penetration Testing 2.2 Existing Tools and Frameworks 2.3 Related Research and Industry Practices 2.4 Gaps Identified in Literature	5
Pedagogy		
3	Chapter 3: Methodology 3.1 Pentesting Approach 3.2 Tools Selected and Justification 3.3 Lab Environment Setup 3.4 Ethical Considerations	5
Pedagogy		
4	Chapter 4: Phase 1 Execution – Reconnaissance 4.1 Passive Reconnaissance 4.2 Active Reconnaissance (Non-intrusive) 4.3 Documentation of Findings 4.4 Risk Categorization (STRIDE or CVSS basic)	5
Pedagogy		
5	Chapter 5: Conclusion and Future Work (Phase 1) 5.1 Summary of Findings in Phase 1 5.2 Challenges Faced	5

	5.3 Next Steps for Project Phase 2 5.4 Expected Outcomes	
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	

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Identify and define real-world problems relevant to the domain, demonstrating problem-solving and analytical thinking skills.	U	L2
CO2	Apply domain-specific tools, technologies, and frameworks to design and develop a viable technical solution.	A	L3

Mapping of Course Outcomes to Program Outcomes:

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

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:2:2
Total Hours of Pedagogy	25 hours – Theory + Project
Credits:	02
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		SEE	
	Project Weekly Assessment		Final Project Evaluation	
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.

- **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.

- **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.

4. 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.

5. 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:

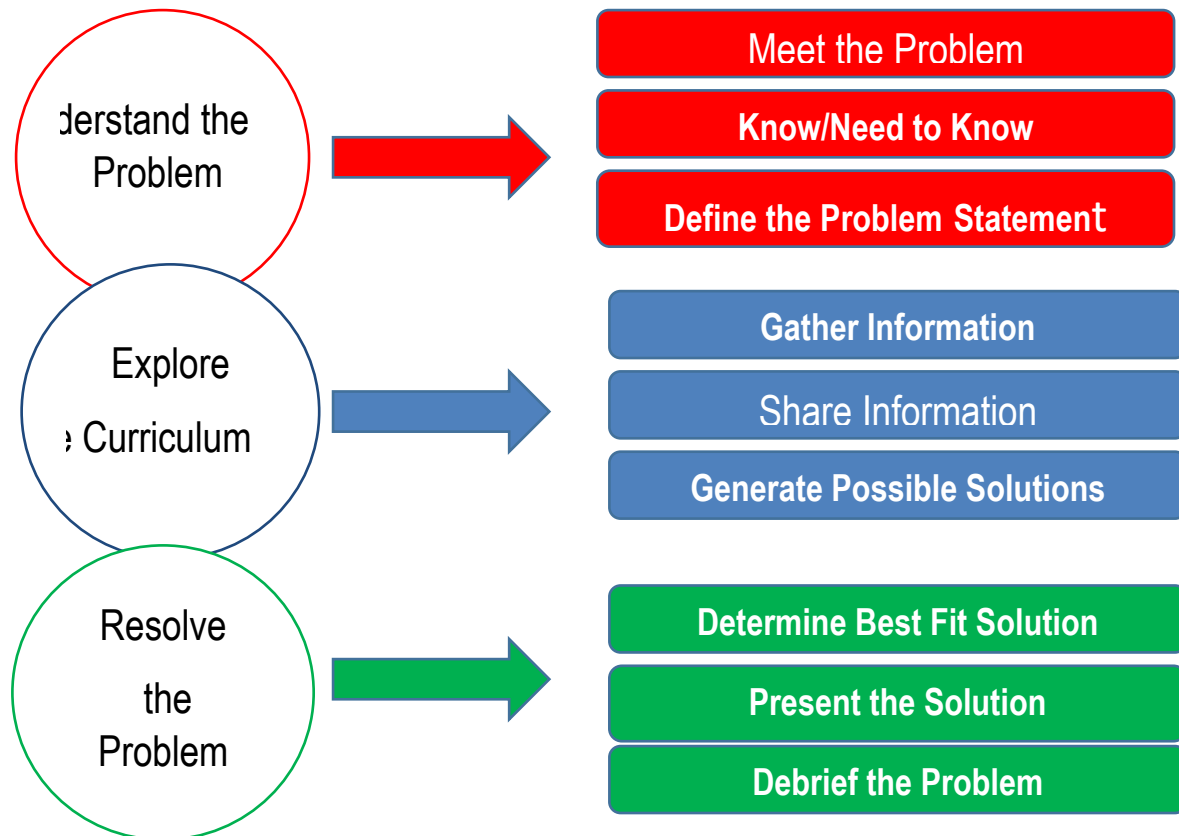
1. Phase 2 is for 11 Weeks
2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

6. Phase 1 – 25 Marks

7. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template

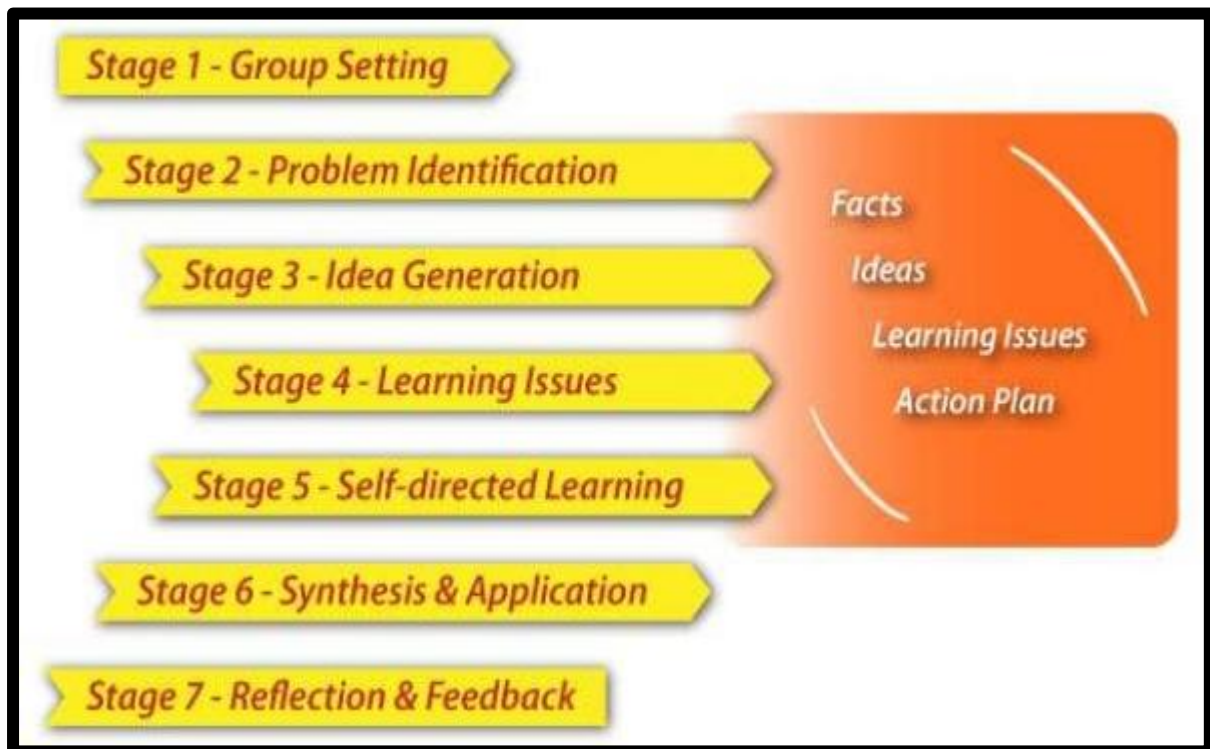


9. Practice

- 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.
- **Obstacles/Gaps**
 - Lack of student's interest
 - Lack of assessment
 - Lack of Basic knowledge

- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management
- **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.

10. Block diagram of PBL



11. 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.

12. 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 plan	3 Weeks
2.	Literature review	1 Week
13.	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.

- **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 the audience's 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 the audience's 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 ▪ Has some factual errors or inconsistencies	▪ 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. ▪ Information loosely supports the solution.	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention. ▪ Presentation is loosely organized.

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.
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Subject Identified for Project Based Learning

Semester	VI
Subject Identified for PBL	Machine Learning
Prerequisite	Python Programming, Data Structures using C/C++, Discrete Mathematics, Probability and Statistics, Network and Information Security.
Justification for the selected subject	Machine Learning is a rapidly evolving field with wide applications in cybersecurity such as intrusion detection, anomaly detection, spam filtering, and malware classification. As cybersecurity threats become more sophisticated, ML equips students with the analytical tools and algorithmic thinking necessary to build adaptive and intelligent security systems. Integrating Project-Based Learning (PBL) into the Machine Learning subject enables: 1. Practical, hands-on experience with real-world datasets 2. Application of mathematical concepts to algorithm design 3. Exposure to model evaluation and performance tuning 4. Strengthening problem-solving, teamwork, and research skills.
List of possible projects	1. Intrusion Detection System using Random Forest 2. Phishing URL Detection using Logistic Regression 3. Email Spam Filter using Naive Bayes 4. Malware Classification using SVM 5. Ransomware Behavior Analysis using K-Means Clustering 6. Credit Card Fraud Detection using Isolation Forest 7. Keylogger Detection using PCA + ML 8. Social Media Sentiment Analysis for Cyberbullying Detection 9. Botnet Traffic Detection with LSTM 10. Zero-Day Attack Prediction using Ensemble Learning

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI			
Course Title	:	Digital Forensic Lab			
Course Code	:	BCY607L			
Course Type (Theory/ Practical/ Integrated)	:	Practical			
Category	:	PBL			
Stream	:	Cyber Security		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:2:2:0		SEE	: 50
Total Hours	:	30 Hours		SEE	: 2 Hours
Credits	:	2		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce students to digital forensic tools and techniques for identifying, collecting, analyzing, and reporting digital evidence.
2	To enable hands-on experience in examining artifacts from email headers, file systems, registries, and browser history using industry tools.
3	To build competence in applying forensic procedures, validating digital evidence integrity, and compiling legally admissible forensic reports.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	Email Header Analysis and Source Tracing	3
Pedagogy		
2	Investigating Web Browser Artifacts (History, Cache, Cookies)	3
Pedagogy		
3	RAID Disk Acquisition and Analysis	3
Pedagogy		
4	Windows Registry Examination for Forensic Artifacts	3
Pedagogy		
5	Social Media Forensics: Metadata Extraction and Evidence Collection	3
Pedagogy		
6	File System Forensics: Deleted File Recovery using FTK/Autopsy	3
Pedagogy		
7	Analyzing Hibernation and Restore Point Data	3
Pedagogy		
8	Analysis of Recycle Bin Operations and Timestamp Validation	3
Pedagogy		
9	Conducting Hash-Based Integrity Verification of Digital Evidence	3
Pedagogy		
10	Creating Forensic Report from Acquired Evidence	3
	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	Digital Forensics Edited by André Årnes Norwegian University of Technology and Science (NTNU), Norway and Telenor Group, Norway
Reference Books	
1	The basics of digital Forensics (Latest Edition) – The primer for getting started in digital forensics by John Sammons – Elsevier Syngress Imprint
2	Cybersecurity – Understanding of cybercrimes, computer forensics and Legal perspectives by Nina Godbole and Sunit Belapure – Wiley India Publication

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Examine email headers and web browser artifacts to identify potential sources of digital evidence.	L4	AN
CO2	Apply forensic tools to acquire, recover, and analyze data from various file systems and RAID setups.	L3	A
CO3	Investigate Windows registry, hibernation data, and restore points for critical forensic traces.	L4	AN
CO4	Evaluate digital evidence by validating file timestamps, hash values, and deleted data recovery.	L5	E
CO5	Construct a comprehensive forensic investigation report based on analyzed digital artifacts.	L6	C

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	0	1	2	2	1	1	3	2	2
CO2	2	2	3	2	3	1	1	1	2	2	1	1	3	3	2
CO3	2	3	2	2	2	1	1	1	2	2	1	2	3	3	2
CO4	2	3	3	3	2	2	1	1	2	2	1	2	3	3	3
CO5	2	2	3	2	2	2	1	1	3	3	2	3	3	3	3

Weblinks and Video Lectures (e-Resources)

1	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview
2	https://www.youtube.com/watch?v=SEzeyvqgHzc&t=1373s

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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								



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6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

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 Cyber Security Engineering



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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



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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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Project Based Learning – Review

CONTINUOUS INTERNAL ASSESSMENT

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

[illegible]

**ABILITY ENHANCEMENT
COURSE (AEC)**

AEC Course – Ability Enhancement Course

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

1 Credit Course – Practical

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.

- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

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

SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
- The minimum duration of SEE is 02 hours.



Dayananda Sagar Academy of Technology & Management

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Semester	:	VI				
Course Title	:	Industrial Cyber Security				
Course Code	:	BCY608A				
Course Type (Theory/ Practical/ Integrated)	:	Practical				
Category	:	Ability Enhancement Course				
Stream	:	Cyber Security		CIE	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		SEE	:	50
Total Hours	:	28 Hours		SEE	:	2 Hours
Credits	:	1		Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the architecture and vulnerabilities of industrial control systems (ICS) and SCADA networks.
2	Gain practical skills in using packet analyzers, intrusion detection systems, and industrial security tools.
3	Analyze security threats and simulate cyberattacks in ICS environments for better incident response.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Network Traffic Analysis in ICS/SCADA Systems Scenario: A manufacturing plant experiences intermittent communication issues between its SCADA system and field devices. IT suspects abnormal traffic patterns are overwhelming the network. Objective: Use Wireshark to capture and analyze network traffic to detect anomalies such as unauthorized Modbus commands or excessive network scanning. Tools : Wireshark Deliverables: A detailed report of the traffic analysis, highlighting malicious or unusual traffic patterns and recommendations for mitigation.	3
Pedagogy		
2	Configuring and Testing an Intrusion Detection System (IDS) Scenario: An oil refinery has deployed an IDS in its control room but has not tested its effectiveness. Simulated attacks are needed to evaluate the IDS's detection capability. Objective: Configure Snort with custom rules to detect unauthorized login attempts, PLC command injections, or DoS attacks on the refinery's network. Tools: Snort Deliverables: A configured IDS, attack simulation results, and a performance evaluation report	3
Pedagogy		
3	Vulnerability Assessment of a Simulated ICS Network Scenario: A power plant is transitioning to a new ICS network. The cybersecurity team must perform a vulnerability assessment before the network goes live. Objective: Scan the simulated ICS network for open ports, outdated software, and misconfigurations. Tools: Nmap, OpenVAS Deliverables: A vulnerability assessment report listing critical issues, potential exploitation risks, and suggested fixes.	3
Pedagogy		
4	Securing a PLC Environment Scenario: A water treatment facility reports unauthorized access to its PLCs, leading to erroneous water treatment settings. Students are tasked to secure the PLC environment. Objective: Simulate unauthorized PLC access, implement	3

	secure configurations, and monitor PLC traffic for anomalies. Tools: OpenPLC, Wireshark Deliverables: A secured PLC configuration and a log of identified unauthorized commands.	
Pedagogy		
5	Simulating Cyber Attacks on ICS and Designing Defences Scenario: An attacker compromises an engineering workstation and uses it to issue malicious commands to ICS devices. Students must simulate this attack and propose defences. Objective: Perform simulated attacks such as PLC logic manipulation and denial-of-service, then implement measures like firewall rules or intrusion prevention systems. Tools: Metasploit Framework, Security Onion Deliverables: A report describing the attack, its impact, and the defence mechanisms implemented	4
Pedagogy		
6	Incident Response Simulation in an ICS Environment Scenario: A simulated ransomware attack encrypts critical ICS files at a gas distribution station. Students act as the incident response team. Objective: Detect the ransomware, isolate affected systems, and recover operations using backup and monitoring tools. Tools: Security Onion, GRR Deliverables: An incident response report, including root cause analysis and recovery steps	4
Pedagogy		
7	Firewall and Access Control Configuration for ICS Scenario: An unauthorized laptop connects to the ICS network at a steel factory and issues shutdown commands to operational systems. Objective: Implement access control policies and configure firewalls to block unauthorized devices and restrict communication to trusted sources. Tools: pfSense, ModSecurity Deliverables: Firewall and access control configuration files, along with a report on unauthorized device mitigation.	4
Pedagogy		
8	Risk Assessment and Mitigation Planning for ICS Scenario: A renewable energy plant wants to evaluate cybersecurity risks before connecting its wind turbines to the grid. Objective: Conduct a risk assessment considering hardware vulnerabilities, communication protocols, and environmental factors. Propose a mitigation plan. Tools: Custom scripts, risk assessment frameworks Deliverables: A comprehensive risk assessment report and a prioritized mitigation strategy.	4
	Pedagogical Initiatives (Not limited to): ● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another	

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

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	P. Ackerman, Industrial Cybersecurity: Efficiently Secure Critical Infrastructure Systems. Packt Publishing, 2021
2	T. Macaulay and B. Singer, Cybersecurity for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS. CRC Press, 2012.

Reference Books

1	C. Bodungen, B. Singer, A. Shbeeb, K. Wilhoit, and S. Hilt, Hacking Exposed Industrial Control Systems: ICS and SCADA Security Secrets & Solutions. McGraw-Hill, 2017.
2	P. A. Craig Jr., Practical Industrial Cybersecurity: IT and OT Convergence. Wiley, 2021.
3	Ginter, SCADA Security: What's Broken and How to Fix It. Waterfall Security Solutions, 2016

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Identify and analyze network anomalies in ICS/SCADA environments using packet capture tools like Wireshark.	A	L3
CO2	Configure and evaluate the performance of intrusion detection systems (IDS) for industrial control networks.	AN	L4
CO3	Perform vulnerability assessments on simulated ICS networks and recommend appropriate mitigation strategies.	E	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	3	1	0	1	1	2	1	2	3	3	2
CO2	2	3	2	2	3	1	0	1	2	2	2	2	3	3	2
CO3	2	3	3	2	3	2	1	1	2	2	2	3	3	3	3

Weblinks and Video Lectures (e-Resources)

1	https://www.netacad.com/courses/introduction-to-cybersecurity?courseLang=en-US
2	https://www.cisco.com/site/us/en/learn/training-certifications/certifications/cybersecurity/index.html

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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	VI			
Course Title	:	Network Administration			
Course Code	:	BCY608B			
Course Type (Theory/ Practical/ Integrated)	:	Practical			
Category	:	Ability Enhancement Course			
Stream	:	Cyber Security	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	:	50
Total Hours	:	25 Hours	SEE	:	2 Hours
Credits	:	1	Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To provide foundational knowledge of computer networking concepts and Cisco Packet Tracer simulation tools.
2	To develop practical skills in IP addressing, subnetting, and basic network configuration.
3	To enable students to configure and troubleshoot routing protocols such as RIP and OSPF.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

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



DSATM

Scheme of Teaching and Examinations for BE Programme -2026-27

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Networking and Cisco Packet Tracer	5
Pedagogy	Demonstration using Packet Tracer, Group Discussion, Problem-Based Learning	
2	. OSI and TCP/IP Models, IP Addressing and Subnetting	5
Pedagogy	Think-Pair-Share, Hands-on IP configurations, Case Study on subnet planning	
3	Routing Basics – Static and Dynamic Routing (RIP, OSPF)	5
Pedagogy	Live simulation in Packet Tracer, HOTS questions, Peer Learning sessions	
4	Switching – VLANs, Trunking, STP, Intr-VLAN Routing	5
Pedagogy	Poster Presentation of VLAN architecture, Interactive Lab Practice	
5	Network Security Basics – ACLs, Port Security, Password Policies	5
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	Wondell Odom, CISCO CCNA 200 – 301, Official cert guide, volume 1 pearson edition, (2020).	
Reference Books		
1	Andrew S. Tanenbaum., Computer Networks, prentice Hall, (2011) 4 th Edition.	

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 computer networks and network models.	L2	U
CO2	Apply IP addressing techniques and subnetting in practical network scenarios.	L3	A
CO3	Configure and troubleshoot basic routing protocols (RIP, OSPF) in simulations.	L4	AN

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=H8W9oMNSuwo&list=PLxbwE86jKRgMpuZuLBivzIM8s2Dk5IXBQ
2	https://www.ciscopress.com/
3	https://learningnetwork.cisco.com/s/ccna-training-videos?utm_campaign=sem&utm_source=mediabuy&utm_medium=sem&gad_source=1&gad_campaignid=18382557355&gclid=CjwKCAjw3_PCBhA2EiwAkH_j4hdG1ivOgCaNaLqGygUqXSqT-amZGd4V-hWLfmfh0byYE5ej2cKf_hoCG8UQAvD_BwE&gclidsrc=aw.ds

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	0	2	0	0	0	1	2	0	1	2	1	1
CO2	3	2	2	1	3	0	0	0	1	1	1	1	2	2	1
CO3	2	3	3	2	3	1	0	0	1	2	1	2	3	3	2

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		
C01	Not Applicable							
C02								
C03								
C04								
C05								
Total								



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6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

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 Cyber Security Engineering



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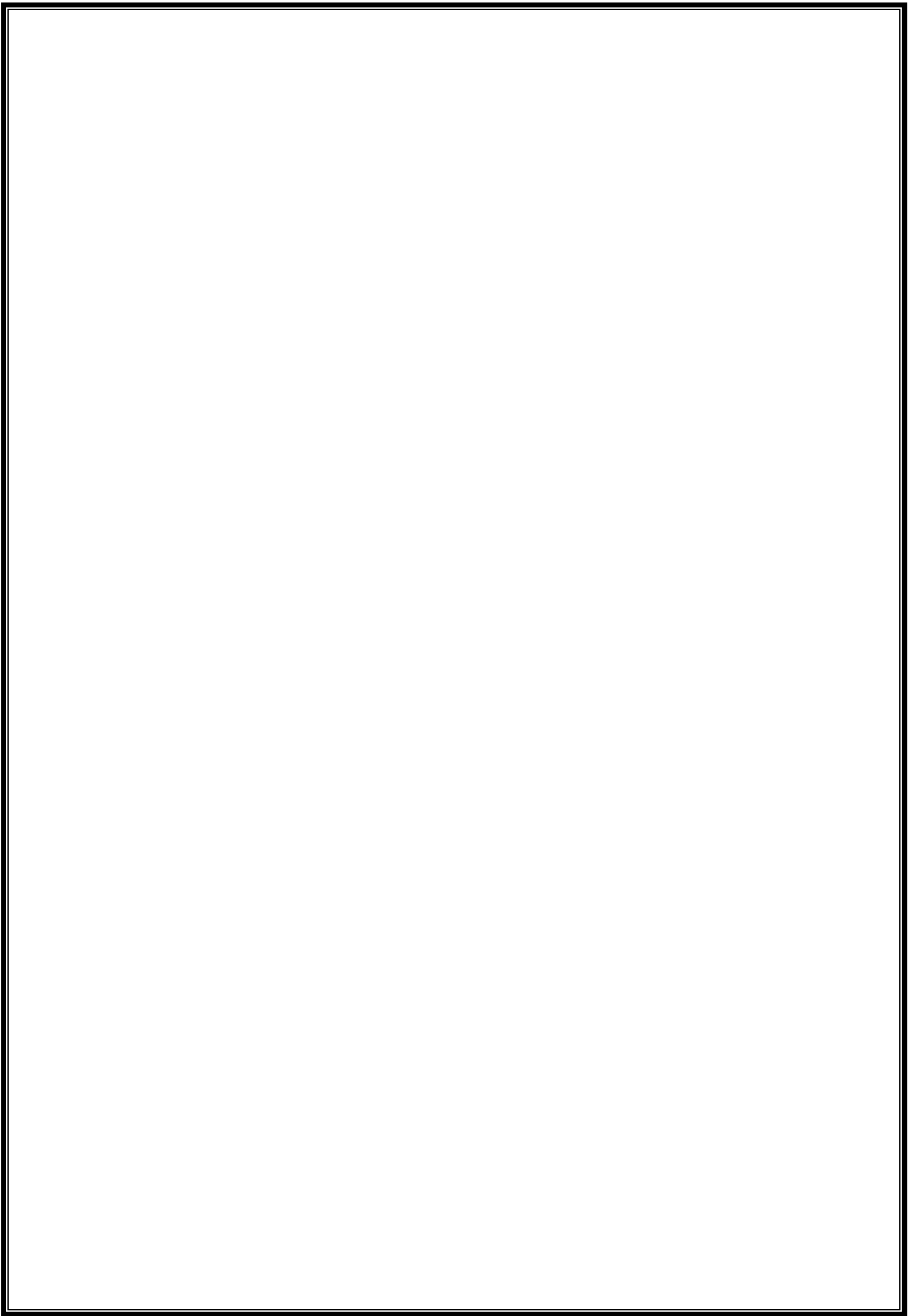
Project Based Learning– Student(s) – Guide – Interaction

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 EL Coordinator

Signature of HOD





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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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Project Based Learning – Review

CONTINUOUS INTERNAL ASSESSMENT

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

[illegible]

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 : CCNA

[illegible]

