DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus V to VI Semester

Outcome Based Education

(Academic Year 2025-2026)

Department of CSE-Cyber Security Engineering

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

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.

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

5th SEMESTER PROPOSED UG SCHEME

Sl. No	Course Code	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	(Hrs/week)					
1	B**501	IPCC	MAT	MAT	3	0	2	-	5	4	3	50	50	100
2	B**502	IPCC	CSE-CY	CSE-CY	3	0	2	-	5	4	3	50	50	100
3	B**503	PCC	CSE-CY	CSE-CY	3	0	-	-	3	3	3	50	50	100
4	B**504	PEC-1	CSE-CY	CSE-CY	3	0	-	-	3	3	3	50	50	100
5	B**505	PBL	CSE-CY	CSE-CY	-	2	-	4	6	3	3	50	50	100
6	B**506	PCCL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
7	B88507	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**

6th SEMESTER PROPOSED UG SCHEME

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total (Hrs/ week)		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	B**601		IIPCC	MAT	MAT	3	-	2	-	5	4	3	50	50	100
2	B**602		IIPCC	CSE-CY	CSE-CY	3	-	2	-	5	4	3	50	50	100
3	B**603		PCC	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
4	B**604	Professional Elective Course	PEC-2	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
5	B**605	Course Open Elective Course	OEC-1	CSE-CY	CSE-CY	3	-	-	-	3	3	3	50	50	100
6	B**606	Project Work Phase-1	PWP-1	CSE-CY	CSE-CY	-	-	-	4	4	2	3	50	50	100
7	B**607		PCCL/PBL	CSE-CY	CSE-CY	-	2	2	-	4	2	2	50	50	100
8	B**608		AEC	BSC	BSC	1	-	-	-	1	1	2	50	50	100

9	B**K609		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

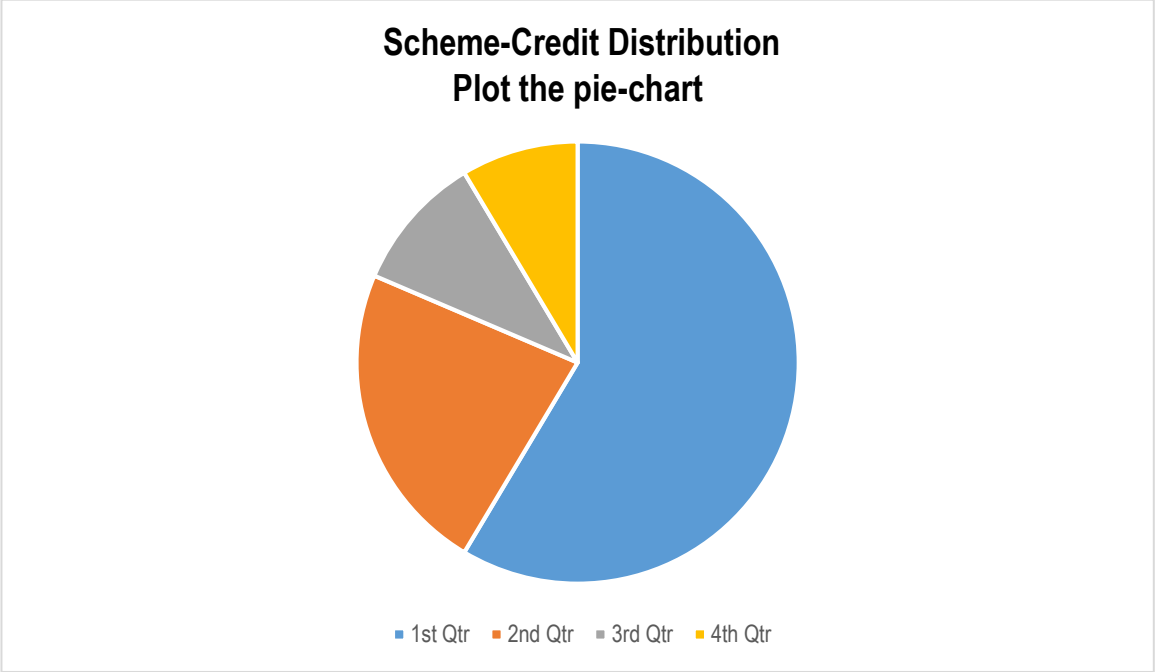
5th Sem & 6th Sem

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
	1st	2nd	3rd	4th	5th	6th	7th	8th	
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

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 2024-25)

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	0	5	4	03	50	50	100
2	BCY502	Computer Networks	IPCC-2	CSE-CY	CY	3	0	2	0	5	4	03	50	50	100
3	BCY503	Software Engineering & Project Management	PCC	CSE-CY	CY	3	0	0	0	3	3	03	50	50	100
4	BCY504X	Professional Elective Course	PEC-1	CSE-CY	CY	3	0	0	0	3	3	03	50	50	100
5	BCY505	Mobile Application Development	PBL	CSE-CY	CY	0	2	0	4	6	3	03	50	50	100
6	BCY506	Advanced Cyber Security Lab	PCCL	CSE-CY	CY	0	2	2	0	2	2	02	50	50	100
7	BCY507	Research Methodology and IPR	AEC	ISE	ISE	2	0	0	0	2	2	02	50	50	100
8	BCY508	Environmental Studies and E-waste Management	HSMS	CSE-CY	CY	1	0	0	0	1	1	02	50	50	100
9	BYOK509	Yoga, NSS, Physical Education	NCMC*					2		2	0		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

Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25)

6th SEMESTER: 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	BCY601	Machine Learning	IPCC1	CSE-CY	MAT	3	0	2	0	5	4	3	50	50	100
2	BCY602	Cryptography and Network Security	IPCC-2	CSE-CY	CSE-CY	3	0	2	0	5	4	3	50	50	100
3	BCY603	Digital Forensic	PCC	CSE-CY	CSE-CY	3	0	0	0	3	3	3	50	50	100
4	BCY604X	Professional Elective Courses	PEC	CSE-CY	CSE-CY	3	0	0	0	3	3	3	50	50	100
5	BCY605X	Open Elective	AEC	CSE-CY	CSE-CY	1	0	2	0	2	3	3	50	50	100
6	BCY606	Project Phase I	OEC	Concerned Department	CSE-CY	3	0	0	2	3	2	3	50	50	100
7	BCY607	Digital Forensic Lab	PCCL/PBL	CSE-CY	CSE-CY	0	0	0	4	4	2	3	50	50	100
8	BUHK608X	Ability Enhancement Course	AEC	BSC	Any Dept.	0	0	2	0	2	1	-	50	50	100
9	BYOK609 / BNSK609 / BPEK609	Yoga, NSS, Physical Education, Indian Knowledge System	NCMC*		PD / NSS / PD	1	0	0	0	1	0	0	100	-	100
					Total	**15**	**2**	**8**	**2**	**25**	**21**		**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			
BCY605A	AI & IOT Enabled Smart Buildings	BCY605B	AI in Project Management

6th Sem Ability Enhancement Course			
BCY608A	Industrial Cyber Security	BCY608B	CCNA

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

5th 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)

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

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

CIE + SEE	100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**V**				
Course Title	**:**	**Elements of Cyber Security**				
Course Code	**:**	**BCY501**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC-1**				
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 Duration**	**:**	**3 Hours**
Credits	**:**	**04**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to 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	Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.	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.	CO5
2	Perform basic network scanning using the Nmap tool (Zenmap on Windows). Identify services, open ports, active hosts, operating systems, and vulnerabilities.	CO5
3	Phishing simulations (Google, LUCY and GoPhish).	CO5
4	Packet Analysis using Wireshark	CO5
5	Perform SQL injection using BurpSuite	CO5
6	Ransomware tabletop exercise on insider threat.	CO5
7	Crypt analysis of symmetric ciphers using Cryptool.	CO5
8	Crypt analysis of asymmetric ciphers using Cryptool.	
9	Pwning machines (HackTheBox). - Demonstration	CO5
Open ended Programs		
1	Design and deploy a basic honeypot to detect unauthorized access and analyze attacker behavior.	CO4
2	Design a Cyber Security Policy for a Small Organization	CO4
3	Simulate a Real-World Cyber Attack & Defense Scenario	CO4

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

Reference Books	
1	Hacking: The Art of Exploitation ,2nd Edition, *Jon Erickson, No Starch Press*
2	he Web Application Hacker's Handbook: Finding and Exploiting Security Flaws ,2nd Edition, *Dafydd Stuttard and Marcus Pinto, Wiley Publishing*

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** encryption-based secure systems using modern cryptographic 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

Weblinks and Video Lectures (e-Resources)	
1	https://www.cybrary.it
2	

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%
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-2**				
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 Duration**	:	**3 Hours**
Credits	:	**4**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: 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	Introduction to Application Layer: Introduction, Client-Server Programming, Standard Client Server Protocols: World Wide Web and HTTP, FTP, Electronic Mail, Domain Name System (DNS), TELNET, Secure Shell (SSH)	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
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	Study the TCP/IP protocol suite, switching criteria and Medium Access Control protocols for reliable and noisy channels	U	L1
CO2	Learn network layer services and IP versions	K	L1
CO3	Discuss 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	E	L5

Mapping of Course Outcomes to Program Outcomess:

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

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

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	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

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%
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

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

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

Dayananda Sagar Academy of Technology & Management

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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 + 20h Practical**		**SEE Duration**	:	**3 Hours**
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)**.

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Software and Software Engineering: The nature of Software, The unique nature of WebApps, Software Engineering, The software Process, Software Engineering Practice, Software Myths. Process Models: A generic process model, Process assessment and improvement, Prescriptive process models: Waterfall model, Incremental process models, Evolutionary process models, Concurrent models, Specialized process models. Unified Process , Personal and Team process models Textbook 1: Chapter 1: 1.1 to 1.6, Chapter 2: 2.1 to 2.5	8
Pedagogy		
2	Understanding Requirements: Requirements Engineering, Establishing the ground work, Eliciting Requirements, Developing use cases, Building the requirements model, Negotiating Requirements, Validating Requirements. Requirements Modeling Scenarios, Information and Analysis classes: Requirement Analysis, Scenario based modeling, UML models that supplement the Use Case, Data modeling Concepts, Class-Based Modeling. Requirement Modeling Strategies : Flow oriented Modeling , Behavioral Modeling. Textbook 1: Chapter 5: 5.1 to 5.7, Chapter 6: 6.1 to 6.5, Chapter 7: 7.1 to 7.3	8
Pedagogy		
3	Agile Development: What is Agility?, Agility and the cost of change. What is an agile Process?, Extreme Programming (XP), Other Agile Process Models, A tool set for Agile process . Principles that guide practice: Software Engineering Knowledge, Core principles, Principles that guide each framework activity. Textbook 1: Chapter 3: 3.1 to 3.6, Chapter 4: 4.1 to 4.3	8
Pedagogy		
4	**Introduction to Project Management**: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices. Project Evaluation: Evaluation of Individual projects, Cost–benefit	8

	Evaluation Techniques, Risk Evaluation Textbook 2: Chapter 1: 1.1 to 1.17 , Chapter 2: 2.4 to 2.6 .	
Pedagogy		
5	**Software Quality: Introduction**, The place of software quality in project planning, Importance of software quality, Defining software quality, Software quality models, product versus process quality management. Software Project Estimation: Observations on Estimation, Decomposition Techniques, Empirical Estimation Models. Textbook 2: Chapter 13: 13.1 to 13.5, 13.7, 13.8, Text Book 1: Chapter 26: 26.5 to 26.7	**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	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
2	Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 6th Edition, McGraw Hill Education, 2018.
Reference Books	
1	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India.
2	"Software Engineering: Principles and Practice", Hans van Vliet, Wiley India, 3rd Edition, 2010.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Differentiate software process models to select the appropriate one for a given scenario	L4	Compare, Differentiate,
CO2	Derive both functional and non-functional requirements from given case studies	L3	Apply, Derive,
CO3	Analyze the importance of various software testing methods and Agile methodologies	L4	Analyze, Critique,
CO4	Understand working of ERP or inventory management systems and prepare an SDLC-phase-wise project repo	L3	Implement, Prepare,
CO5	Evaluate software quality parameters, estimate effort using models, and	L5	Evaluate,

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

Weblinks and Video Lectures (e-Resources)	
1	NPTEL :: Computer Science and Engineering - NOC:Software Engineering

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-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 Hours**
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 2024-25)

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 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=mOOIv8-IuEo

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

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	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 Hours**
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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: Information retrieval, IR problem, IR System, The web. User interfaces for search: Introduction, How people search, Search interfaces today, Visualization on search interfaces, Design and evaluation of search interfaces Textbook: Chapter 1: 1.1 to 1.4, Chapter 2: 2.1 to 2.5	8
Pedagogy	**Problem Solving**	
2	Modeling: IR models, Classic information retrieval, Alternative set theoretic models, Alternative algebraic models, Alternative probabilistic models, Other models. Textbook: Chapter 3: 3.1 to 3.6	8
Pedagogy	**Seminar Presentation**	
3	Retrieval Evaluation: Retrieval metrics, Reference Collections, User-based evaluation Relevance feedback and Query expansion: A framework for feedback methods, Explicit relevance feedback, Explicit feedback through clicks, Implicit feedback through local analysis, Implicit feedback through global analysis Documents - Languages and Properties: Metadata, Document formats, Text properties, Document preprocessing, Organizing documents, Text compression Textbook : Chapter 4: 4.3 to 4.5, Chapter 5: 5.2 to 5.6, Chapter 6: 6.2 to 6.3, 6.5 to 6.8	8
Pedagogy	**Poster Presentation**	
4	Indexing and Searching: Inverted indexes, Signature files, Suffix trees and suffix arrays, Sequential searching, Multi-dimensional indexing. Textbook: Chapter 9: 9.2 to 9.6	8
Pedagogy	**Collaborative Learning**	
5	Web retrieval: The web, Search engine architectures, Search engine ranking, Managing web data, Search engine user interaction. Structured Text Retrieval: Structuring Power, Early text retrieval models, XML retrieval, XML retrieval evaluation. Textbook: Chapter 11: 11.2 to 11.7, Chapter 13: 13.2 to 13.5	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	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, Peasrson 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	Apply of text based operations for information retrieval from the documents.	**A**	**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=dXHxPvAIwcI
3	https://www.youtube.com/playlist?list=PLpwnR8mPhhf8m7L_b9cSRLdjPW2soerAd
4	https://www.youtube.com/watch?v=m0oiAOgSQFw
5	https://www.youtube.com/watch?v=yluvahNq3wk
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:

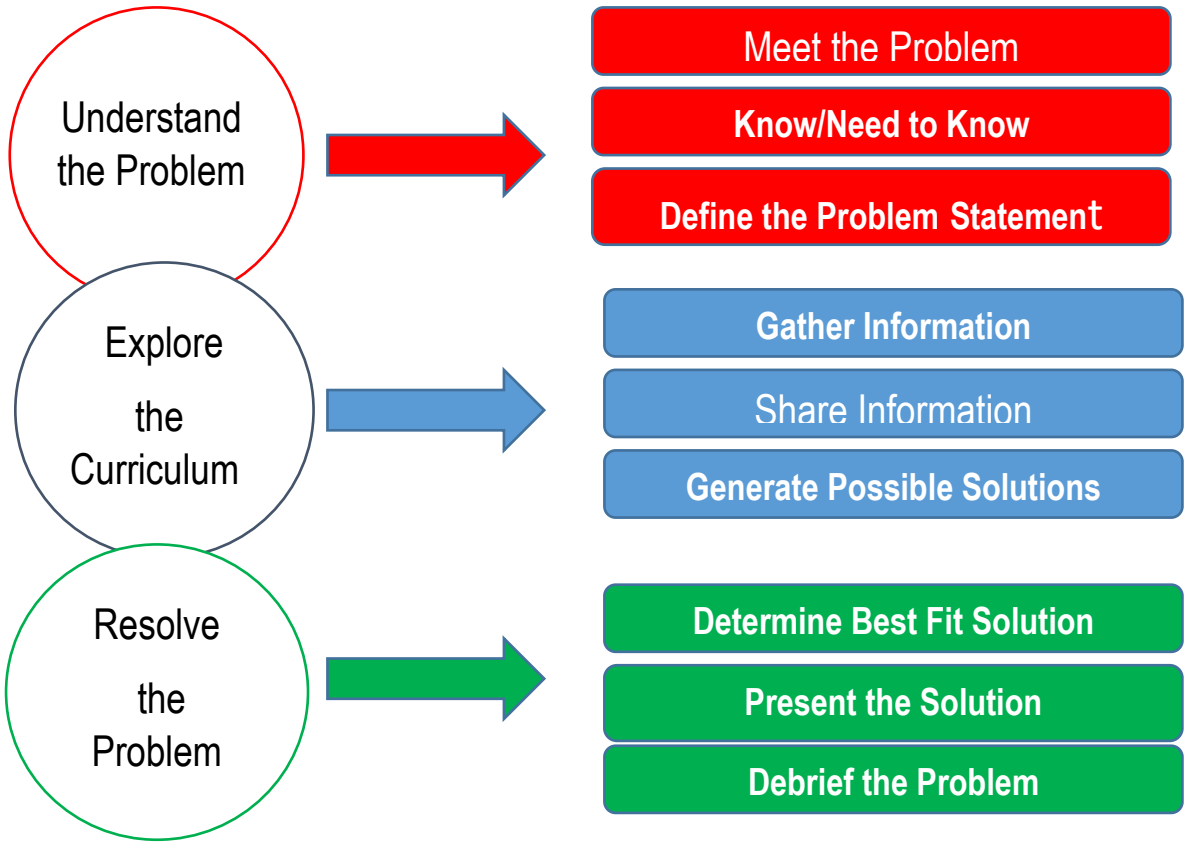
1. Phase 2 is for 11 Weeks

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.

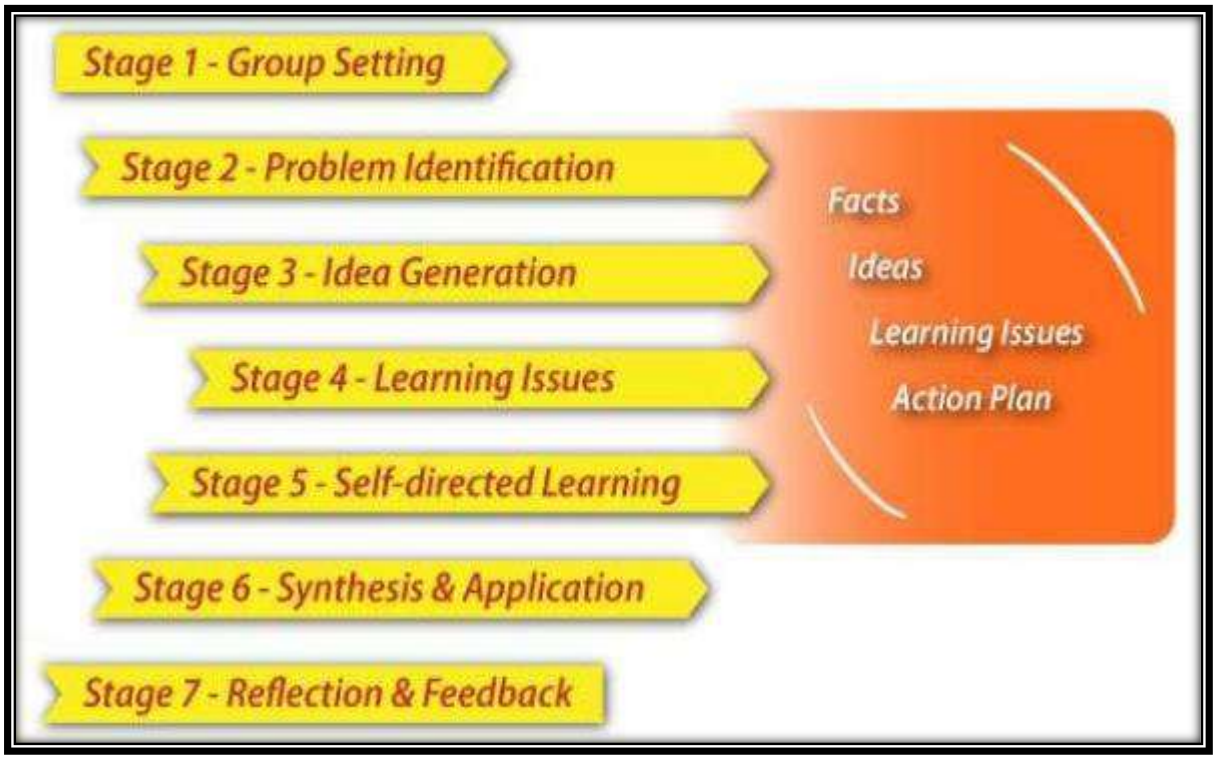
10. Obstacles/Gaps

- 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	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	V
Subject Identified for PBL	Mobile application development
Prerequisite	Prior knowledge of Java programming
Justification for the selected subject	To enable students to learn Android application development
List of possible projects	Any mobile application related to problems in cyber security

Signature of the Guide **Signature of HOD**

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 Hours**
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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	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	Android.Development.A.Brain-Friendly.Guide.
2	
Reference Books	
1	
2	

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)	
1	https://developer.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/ *(Operating System and System Programming – IIT Kharagpur)*
8	https://nptel.ac.in/courses/106/106/106106144/ *(Advanced Operating Systems – IIT Madras)*
9	https://www.coursera.org/learn/linux-command-line-basics *(Linux Command Line Basics – Coursera)*
10	https://www.edx.org/course/introduction-to-linux *(Introduction to Linux – edX / Linux Foundation)*

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	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

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

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

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

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

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

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

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**

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

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

Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET

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

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

Project Based Learning Outcomes

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

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	:	**BCY506**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PCCL**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**25 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn concepts of web application pen testing
2	To identify and exploit vulnerabilities
3	To understand the OWASP top 10 vulnerabilities and other common web security threats
4	To learn concept of digital forensics

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)**.

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**

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- 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	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

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)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	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	:	**Research Methodology and IPR**				
Course Code	:	**BCY507**				
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**	:	**3 Hours**
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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	.Introduction: Meaning of Research, 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.	8
Pedagogy		
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, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet. 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, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments	8
Pedagogy		
3	Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, 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: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. 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. Process of Patenting. Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained? Do I Need First to File a Patent in India? Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.	8

Pedagogy		
4	Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. @#@26092024 Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases. Trademarks: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.	**8**
Pedagogy		
5	Industrial Designs: Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co. Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India. Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent. IP Organizations In India. Schemes and Programmes	**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.
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

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**	:	**1 Hours**
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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	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, 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	3

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 to understand the topics easily visually. ● **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,3rd 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_bnGkviWOUhttps://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_bnGkviWOUhttps://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

Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25)

6th SEMESTER: 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	BCY601	Machine Learning	IPCC1	CSE-CY	MAT	3	0	2	0	5	4	3	50	50	100
2	BCY602	Cryptography and Network Security	IPCC-2	CSE-CY	CSE-CY	3	0	2	0	5	4	3	50	50	100
3	BCY603	Digital Forensic	PCC	CSE-CY	CSE-CY	3	0	0	0	3	3	3	50	50	100
4	BCY604X	Professional Elective Courses	PEC	CSE-CY	CSE-CY	3	0	0	0	3	3	3	50	50	100
5	BCY605X	Open Elective	AEC	CSE-CY	CSE-CY	1	0	2	0	2	3	3	50	50	100
6	BCY606	Project Phase I	OEC	Concerned Department	CSE-CY	3	0	0	2	3	2	3	50	50	100
7	BCY607	Digital Forensic Lab	PCCL /PBL	CSE-CY	CSE-CY	0	0	0	4	4	2	3	50	50	100
8	BUHK608X	Ability Enhancement Course	AEC	BSC	Any Dept.	0	0	2	0	2	1	-	50	50	100
9	BYOK609	Yoga, NSS, Physical Education, Indian Knowledge System	NCMC*		PD	1	0	0	0	1	0	0	100	-	100
	BNSK609				NSS										
	BPEK609				PD										
					Total	**15**	**2**	**8**	**2**	**25**	**21**		**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	CCNA

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

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

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

Newly introduced subjects in the syllabus

		6th Semester
1.	List of Existing Elective Courses	
2.	List of New Existing Elective Courses	
3.	List of New Industry Aligned Courses	
4.	Name of subject changed to IPPC	

Percentage of Change in the Syllabus

6th Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**

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, o 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. o The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report Total score for CCA is **10 Marks** Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks** **Possible Continuous and Comprehensive Assessment (CCA):** • Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, • The assessment of these techniques shall be in rubrics. • The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

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

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

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

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

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

Dayananda Sagar Academy of Technology & Management

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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 Duration**	:	**3 Hours**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Describe the machine learning techniques, their types and data analysis framework.
2	Apply mathematical concepts for feature engineering and perform dimensionality reduction to enhance model performance.
3	Develop similarity-based learning models and regression models for solving classification and prediction tasks.
4	Build probabilistic learning models and design neural network models using perceptrons and multilayer architectures
5	Utilize clustering algorithms to identify patterns in data and implement reinforcement 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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: 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 Methods,	8

	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 Principal Component Analysis (PCA) for reducing the dimensionality 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 generated. 1. Label the first 50 points {x1,……,x50} as follows: if ($x_i \leq 0.5$), then $x_i \in$ Class1,	CO3

	else xi ∈ Class1 2. Classify the remaining points, x51,……,x100 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?	**CO4**

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 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	Describe the machine learning techniques, their types and data analysis framework.	1	R
CO2	Apply mathematical concepts for feature engineering and perform dimensionality reduction to enhance model performance.	3	A
CO3	Develop similarity-based learning models and regression models for solving classification and prediction tasks.	3	A
CO4	Build probabilistic learning models and design neural network models using perceptrons and multilayer architectures	4	AN
CO5	Utilize clustering algorithms to identify patterns in data and implement reinforcement learning techniques	5	E

Mapping of Course Outcomes to Program Outcomes:

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

4	Other links https://www.universitiespress.com/resources?id=9789393330697

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	:	**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 Duration**	:	**3 Hours**
Credits	:	**04**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	A 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. Chapter 1: 1.8 Chapter 3: 3.1, 3.2, 3.5 Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5	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, Elliptic Curve Encryption/Decryption, Security of Elliptic Curve Cryptography. Chapter 8: 8.2 Chapter 9: 9.1, 9.2 Chapter 10: 10.1, 10.4	8
Pedagogy		
3	Applications of Cryptographic Hash functions, Two simple Hash functions, Key management and distribution: Symmetric key distribution using symmetric encryption, Symmetric key distribution using asymmetric encryption, Distribution of public keys, X.509 Certificates, Public Key Infrastructures. Chapter 11: 11.1, 11.2 Chapter 14: 14.1, 14.2, 14.3, 14.4, 14.5	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. Chapter 15: 15.1, 15.3, 15.4 Chapter 17: 17.1, 17.2 Chapter 19: 19.3, 19.4, 19.5	8
Pedagogy		

5	Domainkeys Identified Mail. IP Security: IP Security overview, IP Security Policy, Encapsulating Security Payload, Combining security associations, Internet key exchange. Chapter 19: 19.9 Chapter 20: 20.1, 20.2, 20.3, 20.4, 20.5	**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	**CO3**
2	Build a Secure Messaging App Prototype using RSA and AES Hybrid Encryption	**CO3**

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.
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
CO1	Understand the basic concepts of Cryptography and Security aspects	U	L2
CO2	Apply different Cryptographic Algorithms for different applications	A	L3
CO3	Analyze different methods for authentication and access control.	AN	L4
CO4	Explain key management, key distribution and Certificates	U	L2
CO5	Explain Electronic mail and IP Security.	U	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								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**VI**				
Course Title	**:**	**Digital Forensic**				
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 Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction** 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. Chapter 1: 1.1, 1.2 and 1.3	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 Chapter 2: 2.1,2.2 and 2.3	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 Chapter 2: 2.4 and 2.5	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 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 Chapter 3: 3.3 and 3.4	**8**
Pedagogy		
5	Digital Forensic Readiness Law Enforcement versus Enterprise Digital Forensic Readiness A Rationale for Digital Forensic Readiness Cost Usefulness of Digital Evidence Existence of Digital Evidence Evidentiary Weight of Digital Evidence Enterprise Digital Forensic Readiness Legal Aspects Policy, Processes, and Procedures Risk-Based Approach Incident Response versus Digital Forensics Policy Processes and Procedures People Roles and Responsibilities Skills, Competencies, and Training Awareness Training Technology: Digital Forensic Laboratory Accreditation and Certification Organizational Framework Security Policy or Framework Control of Records Processes, Procedures, and Lab Routines Chapter 4: 4.3, 4.5, 4.6 and 4.7	**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
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	Describe Forensic science and Digital Forensic concepts	**U**	**L2**
CO2	Determine various digital forensic Operandi and motive behind cyber attacks	**A**	**L3**
CO3	Interpret the cyber pieces of evidence, Digital forensic process model and their legal perspective.	**AN**	**L4**
CO4	Demonstrate various forensic tools to investigate the cybercrime and to identify	**A**	**L3**
CO5	Analyse the digital evidence used to commit cyber offences.	**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	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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**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	**Cloud Programming and Software Environments:**	

	Features of Cloud and Grid Platforms, Parallel and Distributed Computing Paradigms, Programming Support for Google App Engine, Programming on Amazon AWS and Microsoft, Emerging Cloud Software Environments. **Textbook 1: Chapter 6: 6.1 to 6.5**	
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
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, 2nd 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	Describe various cloud computing platforms and service providers.	U	L1
CO2	Illustrate the significance of various types of virtualizations.	A	L2
CO3	Identify the architecture, delivery models and industrial platforms for cloud computing-based applications	A	L3
CO4	Analyze the role of security aspects in cloud computing.	C	L4
CO5	Demonstrate 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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Classification of data, Characteristics, Evolution and definition of big data, what is Big data, Why Big data, Traditional Business Intelligence Vs Big Data, Typical data warehouse and Hadoop environment. **Big Data Analytics**: What are 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, Why Hadoop, Why not RDBMS, 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**: What is MongoDB, Why 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**: What is 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**: Spark, Introduction to Data Analysis with Spark.2 Text, Web Content and Link Analytics: Introduction, Text Mining, Web Mining, Web Content and Web Usage Analytics, Page Rank, Structure of Web and Analyzing a Web Graph. **TB2**: Ch5: 5.2,5.3, Ch 9: 9.1-9.4	**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.
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	Identify and list various Big Data concepts, tools and applications.	U	L1
CO2	Develop programs using HADOOP framework.	A	L2
CO3	Make Use of Hadoop Cluster to deploy Map Reduce jobs, PIG, HIVE and Spark programs.	A	L3
CO4	Analyze the given data set and identify deep insights from the data set.	C	L4
CO5	Demonstrate Text, 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	:	**Penetration Testing**				
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 penetration testing in cybersecurity.
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 2024-25)

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	Explain the ethical, legal, and procedural aspects of penetration testing.	**U**	**L2**
CO2	Apply reconnaissance and vulnerability assessment tools to identify system flaws.	**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.

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:

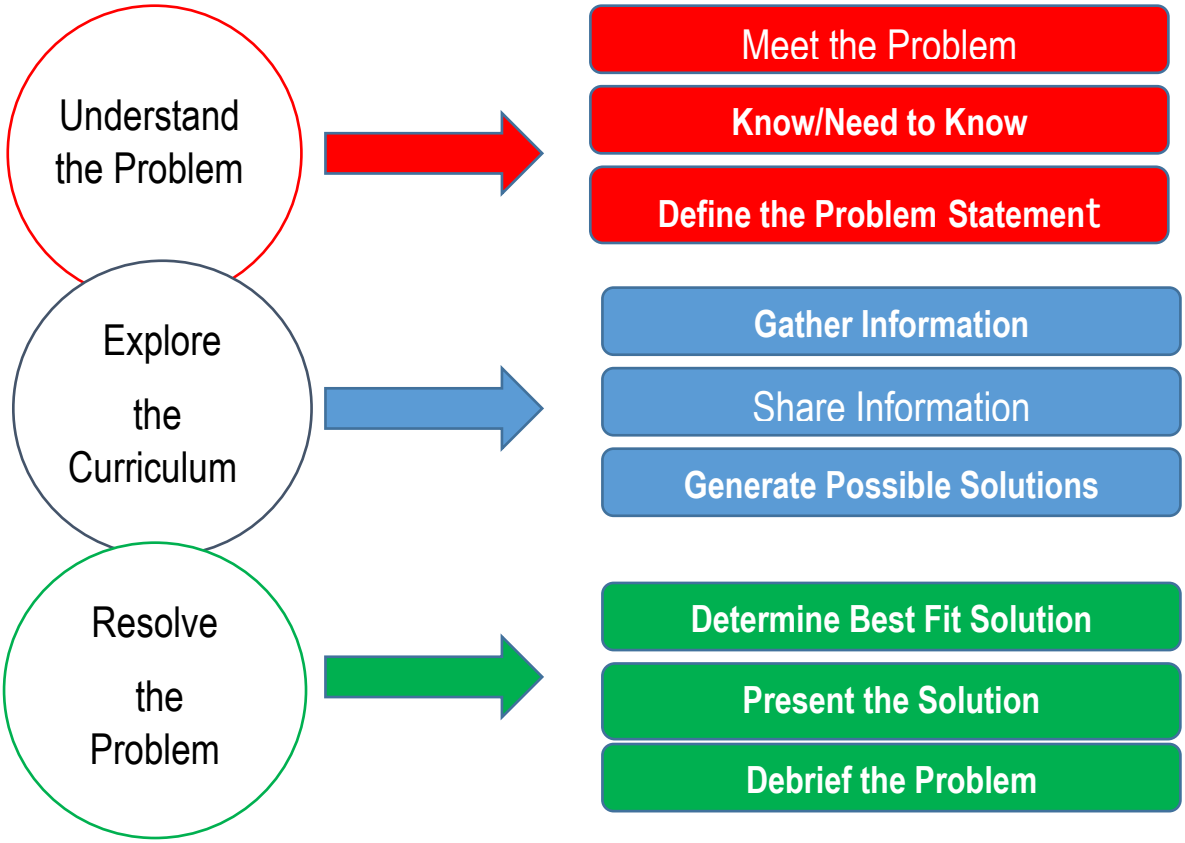
1. Phase 2 is for 11 Weeks

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:

8. Phase 1 – 25 Marks
9. 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.

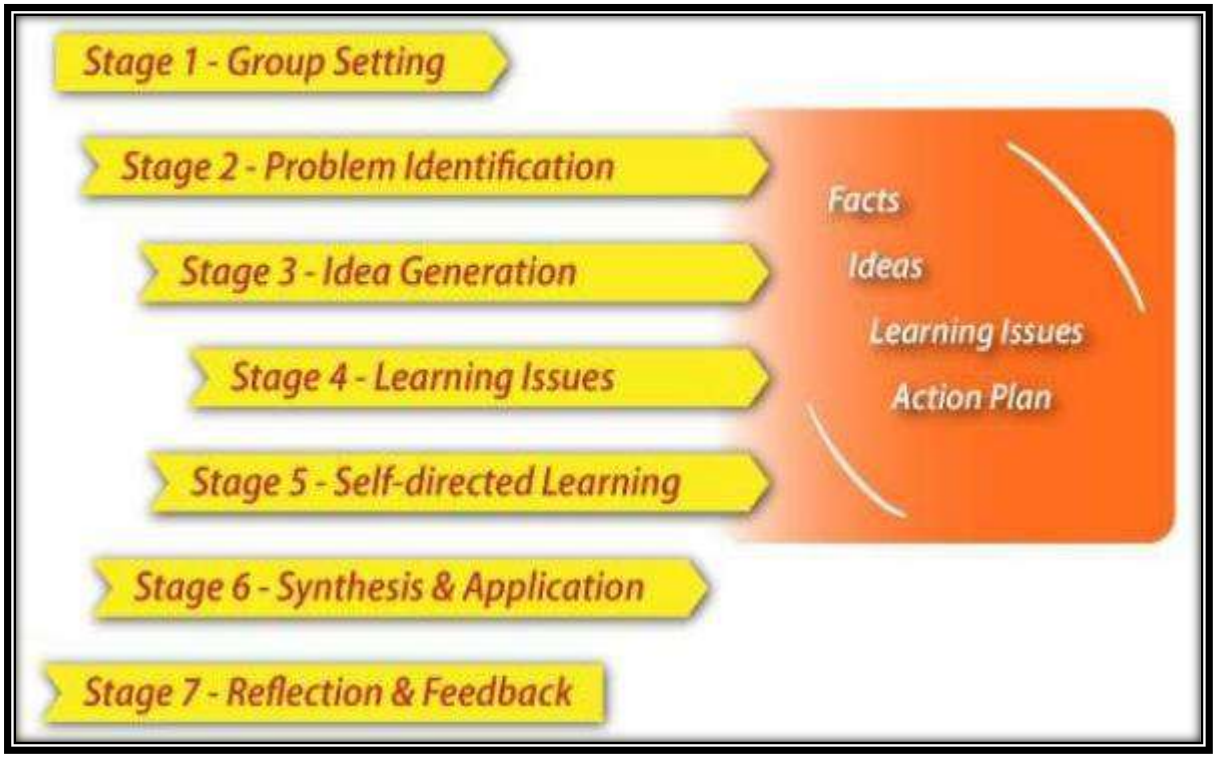
10. Obstacles/Gaps

- 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**
15.	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 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	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	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	:	**BCY607**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PBL**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:2**		**SEE**	:	**50**
Total Hours	:	**30 Hours**		**SEE Duration**	:	**2 Hours**
Credits	:	**2**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	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- 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	Not Applicable			
Understand				
Apply				
Analyse				
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

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

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

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

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

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

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

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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

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

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

Project Based Learning Outcomes

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

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	:	**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 Duration**	:	**2 Hours**
Credits	:	**1**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	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	

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- 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	Not Applicable			
Understand				
Apply				
Analyse				
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VI**				
Course Title	:	**CCNA**				
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 Duration**	:	**2 Hours**
Credits	:	**1**				

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 -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to 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) 4th 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

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

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=H8W9oMNSuwo&list=PLxbwE86jKRgMpuZuLBivzlM8s2Dk5lXBQ
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&gclsrc=aw.ds

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	Not Applicable			
Understand				
Apply				
Analyse				
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	Not Applicable							
CO2								
CO3								
CO4								
CO5								
Total								

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.

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

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

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

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

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

Signature of the Guide **Signature of 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

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

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

Project Based Learning Outcomes

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

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

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