DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus VII to VIII Semester

Outcome-Based Education

(Academic Year 2026-2027)

Department of CSE-Cybersecurity Engineering

7th & 8th Semester B.E

ABOUT THE INSTITUTE

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

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

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

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

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

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

QUALITY POLICY

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

ABOUT THE DEPARTMENT

Year of Establishment: 2023

Intake of the Department = 60

About the Course

“Security is the chief enemy of mortals.”

By William Shakespeare

In today’s, economy organizations are using more and more digitization for all their financial transactions and other data communication and due to this, organizations are more prone to attack; thus, we need a to secure our transaction. Cyber-Security is a process to secure all our transactions and assure the privacy, confidentiality and integrity for organizations as well as personal information. Cybersecurity is the practice of protecting critical systems and sensitive information from digital attacks. Also known as information technology (IT) security, cybersecurity measures are designed to combat threats against networked systems and applications, whether those threats originate from inside or outside of an organization. As per the survey done by IBM in 2020, the average cost of a data breach was USD 3.86 million globally and USD 8.64 million in the United States. A strong cybersecurity strategy has layers of protection to defend against cybercrime, including cyber- attacks that attempt to access, change, or destroy data; extort money from users or the organization; or aim to disrupt normal business operations. The 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)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: 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.

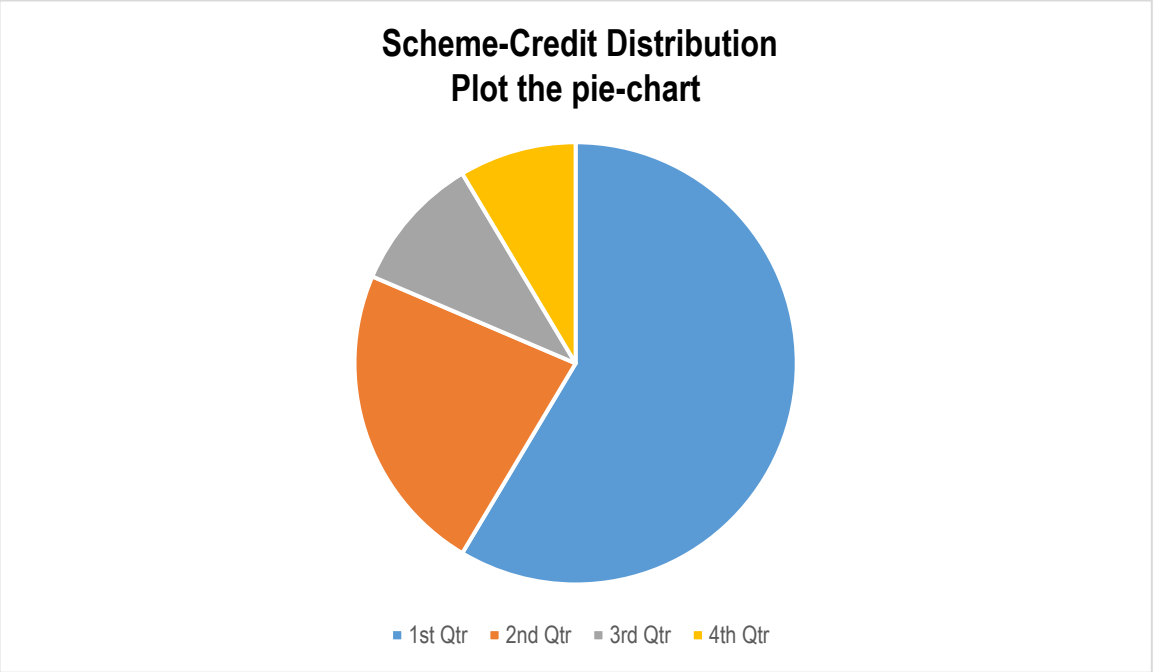
PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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**

Scheme Distribution

Department of Computer Science & Engineering - Cybersecurity

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)		
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	-	-	-	2
Ability Enhancement Course (AEC)			1	1	1	1	-	-	4
Universal Human Values (UHV)			1	1	-	-	-	-	2
Professional Core Courses (PCC)			6	6	3	3	3	-	18
Integrated Professional core Course (IPCC)			8	8	8	8	4	-	36
Professional Elective Course (PEC)			-	-	3	3	3		12
Institutional Open Elective Courses (IOE)			-	-	-	3	3		6
Internship (INT)			-	-	-	-	-	6	6
Mini Project / Project Work (PW)			2	2	3	4	7	8	26
Non-credit Mandatory Courses (NCMC)			-	-	-	-	-		
Total Credits			21	21	22	22	20	14	120

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

7th SEMESTER: Computer Science & Engineering (CSE - Cybersecurity)

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	BCY701	Vulnerability Assessment and Penetration Testing	IPCC	CSE-CY	CSE-CY	3	0	2	0	5	**4**	3	50	50	100
2	BCY702	Cyber Security Management, Compliance and Governance	PCC	CSE-CY	CSE-CY	3	0	0	0	3	**3**	3	50	50	100
3	BCY703X	Professional Elective Course	PEC	CSE-CY	CSE-CY	3	0	0	0	3	**3**	3	50	50	100
4	BXX704X	Open Elective Course	OEC	CSE-CY	CSE-CY	3	0	0	0	3	**3**	3	50	50	100
5	BCY705	Capstone Project – Phase-2	PROJ	CSE-CY	CSE-CY	0	0	0	7	7	**7**	3	50	50	100
6	BYOK706	Indian Knowledge System	NCMC	CSE-CY	CSE-CY	1	0	0	0	1	0	1.5	50	50	100
7		AICTE Activity Points	Details of 80 AICTE Activity Points Earned												
					Total	**12**	**0**	**9**	**0**	**22**	**20**	**15**	**300**	**300**	

7th Semester Professional Elective Course	
BCY703A	Natural Language Intelligence
BCY703B	AI Compliant Semantic Web

8th SEMESTER: Computer Science & Engineering (CSE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BCY801	Capstone Project- Phase 3 (Publication and Patent)	PROJ			0	0	0	10	10	**10**	3	50	100 Converted to 50	100
2	BCY802	Internship	INT			0	0	0	4	4	**4**	NA	100	100	100
		AICTE Activity Points	Details of 100 AICTE Activity Points Earned												
					Total						**14**		100	100	200

IPCC: Integrated Professional Core Course,

PEC: Professional Elective Course

OEC: Open Elective Course

PROJ: Project Work,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

INT: Internship (Industry/Research)

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

		7th Semester
1.	List of Core Courses	Cyber Security Management, Compliance and Governance
2.	List of New Existing Elective Courses	AI Compliant Semantic Web Natural Language Intelligence
3.	List of New Industry Aligned Courses	Vulnerability Assessment and Penetration Testing

7th 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 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)/2 and scaled down to **10 Marks**.

- CCA1 after the 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

Semester	:	**VII**				
Course Title	:	**Vulnerability Assessment & Penetration Testing**				
Course Code	:	**BCY701**				
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	:	**40 hours Theory + 20 Lab slots**		**SEE Duration**	:	**3**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Introduce Vulnerability Assessment and Penetration Testing
2	To be familiar with the Penetration Testing and Tools
3	To get an exposure to Metasploit exploitation tool, Linux exploit and Windows exploit
4	To gain knowledge on Web Application Security Vulnerabilities, Vulnerability analysis and Malware analysis

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	.**Introduction to Ethics of Ethical Hacking**: Why You Need to Understand Your Enemy's Tactics, Recognizing the Gray Areas in Security, Vulnerability Assessment and Penetration Testing. **Penetration Testing and Tools**: Social Engineering Attacks: How a Social Engineering Attack Works, Conducting a Social Engineering Attack, Common Attacks Used in Penetration Testing, Preparing Yourself for Face-to-Face Attacks, Defending Against Social Engineering Attacks. Textbook1: Ch. 1, Ch. 3, Ch. 4 Ch. 5 Ch. 10	8
Pedagogy		
2	**Physical Penetration Attacks**: Need of Physical Penetration, Conducting a Physical Penetration, Common Ways into a Building, Defending Against Physical Penetrations. Insider Attacks: Conducting an Insider Attack, Defending Against Insider Attacks. **Metasploit:** The Big Picture, Getting Metasploit, Using the Metasploit Console to Launch Exploits, Exploiting Client-Side Vulnerabilities with Metasploit, Penetration Testing with Metasploit's Meterpreter, Automating and Scripting Metasploit, Going Further with Metasploit. Textbook-1: Ch. 5, Ch. 6, Ch. 8,	8
Pedagogy		
3	**Managing a Penetration Test**: Planning a Penetration Test, Structuring a Penetration Testing Agreement, Execution of a Penetration Test, Information Sharing During a Penetration Test, Reporting the Results of a Penetration Test. **Basic Linux Exploits**: Stack Operations, Buffer Overflows, Local Buffer Overflow Exploits, Exploit Development Process. Windows Exploits: Compiling and Debugging Windows Programs, Writing Windows Exploits, Understanding Structured Exception Handling (SEH), Understanding Windows Memory Protections (XP SP3, Vista 7 And Server 2008), Bypassing Windows Memory Protections. Textbook-1: Ch. 9, Ch. 11, Ch. 15.	8
Pedagogy		
4	**Web Application Security Vulnerabilities:** Overview of Top Web Application Security Vulnerabilities, Injection Vulnerabilities, Cross-Site Scripting Vulnerabilities, The Rest of the OWASP Top Ten, SQL Injection Vulnerabilities, Cross-Site Scripting Vulnerabilities.	8

	Vulnerability Analysis: Passive Analysis: Source Code Analysis, Binary Analysis. Textbook-1: Ch. 17, Ch. 20.	
Pedagogy		
5	Client-Side Browser Exploits: Why Client-Side Vulnerabilities are Interesting, Internet Explorer Security Concepts, History of Client- Side Exploits and Latest Trends, Finding New Browser-Based Vulnerabilities, Heap Spray to Exploit, Protecting Yourself from Client-Side Exploit. **Malware Analysis**: Collecting Malware and Initial Analysis Malware, Latest Trends in Honeynet Technology, Catching Malware: Setting the Trap, Initial Analysis of Malware. Textbook-1: Ch. 23, Ch. 28.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Monitoring Network Traffic Objective: To analyze and capture network traffic to identify patterns, detect anomalies and assess overall network performance and security.	**CO3**
2	Host & Services Discovery using Nmap Objective: To identify active hosts and the services they are running within a network using Nmap, enabling a comprehensive understanding of the network environment.	**CO3**
3	Vulnerability Scanning using OpenVAS Objective: To perform a systematic assessment of networked systems using OpenVAS to identify potential vulnerabilities that could be exploited by attackers.	**CO3**
4	Internal Penetration Testing a. Mapping b. Scanning c. Gaining Access through CVEs d. Sniffing POP3/FTP/Telnet Passwords e. ARP Poisoning f. DNS Poisoning Objective: To perform a thorough internal penetration test that systematically assesses the security of the organization's network infrastructure by mapping network resources, scanning for vulnerabilities, exploiting known weaknesses and demonstrating attack techniques, including credential sniffing and poisoning attacks, in order to identify and mitigate potential security risks effectively	**CO3**

5	External Penetration Testing a. Evaluating External Infrastructure b. Creating Topological Map & Identifying IP Address of Target c. Lookup Domain Registry for IP Information d. Examining Use of IPv6 at Remote Location Objective: To conduct a comprehensive external penetration test aimed at evaluating the security of the organization's external infrastructure by assessing vulnerabilities, mapping the network topology, gathering IP and domain registry information, and examining the implementation of IPv6, ultimately identifying potential entry points and recommending measures to strengthen defenses against external threats.	**CO3**
6	Different Types of Vulnerability Scanning Objective: To explore and compare various vulnerability scanning techniques and tools, assessing their effectiveness in identifying and prioritizing security risks.	**CO3**
7	Vulnerability Scanning with Nessus Objective: To utilize Nessus for comprehensive vulnerability scanning, identifying security weaknesses in systems and providing recommendations for remediation.	**CO3**
8	Web Application Assessment with Nikto & Burp Suite Objective: To evaluate web applications for security vulnerabilities using Nikto and Burp Suite, identifying issues such as misconfigurations and common vulnerabilities in web applications.	**CO4**
Open ended Programs		
1	**Social Engineering Attack Simulation** Design a simple phishing or social engineering scenario, analyze user response, and suggest basic prevention measures	**CO5**
2	**Automated Network Reconnaissance and Service Mapping Tool** Develop a Python/bash-based tool that integrates Nmap to automatically discover hosts, identify open ports, and map services in a given network. Extend the tool to generate a visual network topology and risk summary report.	**CO5**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Gray Hat Hacking - The Ethical Hackers Handbook, Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams, 3rd Edition, Tata McGraw-Hill.
2	Hands-On Artificial Intelligence for Cybersecurity" – Soma Halder & Sinan Ozdemir (Packt)
Reference Books	
1	The Web Application Hacker's Hand Book - Discovering and Exploiting Security flaws, Dafydd Suttard, Marcuspinto,1st Edition, Wiley Publishing
2	Penetration Testing: Hands-on Introduction to Hacking, Georgia Weidman, 1st Edition, No Starch Press.

3	The Pen Tester Blueprint - Starting a Career as an Ethical Hacker, L. Wylie, Kim Crawly,1st Edition, Wiley Publications.

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 concepts of ethical hacking, vulnerability assessment, penetration testing, and social engineering attacks.	U	L2
CO2	Apply penetration testing methodologies and security tools such as Metasploit to identify and exploit system vulnerabilities.	A	L3
CO3	Analyze Linux and Windows exploitation techniques including buffer overflow and memory protection bypass mechanisms.	An	L4
CO4	Design Applications to access client-side exploits and perform basic malware analysis to identify security threats and recommend mitigation strategies.	E	L5
CO5	Evaluate web application security vulnerabilities such as SQL injection and cross-site scripting using vulnerability analysis techniques.	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	0	1	1	0	0	2	0	0	0	0	2	1	0
CO2	2	3	2	2	3	0	0	1	0	1	0	0	3	2	0
CO3	1	3	3	3	3	0	0	1	0	1	0	0	3	3	0
CO4	0	2	3	3	3	0	0	1	0	2	0	0	3	3	0
CO5	0	2	2	3	3	0	0	2	0	3	0	0	3	3	0

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=fgdcE4kfQBc
2	https://www.youtube.com/watch?v=bQh-nhhYcS4
3	https://www.youtube.com/watch?v=i5GLg9XWJg4
4	https://ieeexplore.ieee.org/document/8463920
5	https://qualysec.com/penetration-testing-and-vulnerability-assessment/

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				
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 3	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 ELECTIVE COURSE (PEC)

PEC Course - Professional Elective Course

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

3 Credit Course – Professional Elective Course (PEC)

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this condition shall not be applicable to cases where the admission to the program is less than 10.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
- The first test will be administered after 40-50% of the syllabus has been covered, and
- The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.

- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

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

Semester-End Examination:

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

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

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

Possible Continuous and Comprehensive Assessment (CCA):

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

Professional Elective Course (PEC) – 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	:	**VII**				
Course Title	:	**Cyber Security Management, Compliance and Governance**				
Course Code	:	**BCY702**				
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	:	**40**		**SEE Duration**	:	**3 Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand the fundamentals of Governance, Risk, and Compliance (GRC) and their role in strategic cyber security planning.
2	To explore risk management life cycles, NIST frameworks, and best practices for cyber security program management.
3	To develop proficiency in utilizing cyber security metrics, frameworks, and risk assessment methodologies.
4	To analyse and apply cyber security controls, architectures, and risk mitigation strategies to secure organizational assets.
5	To examine emerging trends in cyber security, including cloud security, AI-powered solutions, and the impact of quantum computing.

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)**.

COURSE CURRICULUM

Module No.	Topics	Hours
1	Governance, Risk, and Compliance Fundamentals Governance, Risk Management, and Compliance: Understanding GRC and its intersection. GRC frameworks, standards, tools, and culture. Role of GRC in strategic planning. Cybersecurity Program and Project Management: Fundamentals of program and project management. Agile project management in cybersecurity. Communication and collaboration 2 in cybersecurity projects. Textbook:1 ch-1,2,3	**8**
Pedagogy		
2	Risk Management and NIST Frameworks Risk Management: Understanding risk management life cycle. Third party risk management and compliance expectations. Monitoring, reporting, and risk approvals. NIST Risk Management Framework (RMF): Steps in the NIST RMF authorization process. Integrating NIST RMF into organizational risk management. Challenges and best practices in implementing RMF. Textbook:1 ch-6,7,8	**8**
Pedagogy		
3	Metrics, Assessments, and Cybersecurity Frameworks Cybersecurity Metrics: KPIs and KRIs in cybersecurity. Role of metrics in decision making, compliance, and strategy. Risk Assessments: Conducting cybersecurity risk assessments. NIST, FFIEC approaches, and best practices. Cybersecurity Frameworks: ISO/IEC 27001, COBIT, CMMC, and PCI DSS. Comparing and integrating multiple frameworks. Future trends in cybersecurity frameworks. Textbook:1 ch-9,10,11,12	**8**
Pedagogy		
4	Cybersecurity Controls and Architecture NIST SP 80053: Overview and structure of NIST SP 80053 controls. Control families and their applications. Cybersecurity Architecture: Components and layers of cybersecurity architecture. Security reference models and adapting to emerging threats. Risk Mitigation: Basics of risk mitigation and security controls. Policies, user security controls, and physical security measures. Textbook:1 ch-13,14,15	**8**
Pedagogy		

5	Emerging Trends in Cybersecurity Cloud Security: Cloud computing services, challenges, and best practices. Security tools, techniques, and future trends in cloud security. Artificial Intelligence in Cybersecurity: AI powered cybersecurity solutions. CISO's AI preparation checklist and its role in cyber defense. Quantum Computing: Quantum cryptography and its impact on cybersecurity. Strategic and security implications of quantum computing. Textbook:1 ch-13,14, 15,16,17	**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	J. Edwards and G. Weaver, The Cybersecurity Guide to Governance, Risk, and Compliance. Wiley, May 2024
Reference Books	
1	P. Trim and Y.-I. Lee, Cyber Security Management: A Governance, Risk and Compliance Framework, 1st ed. Routledge, 2014.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Implement GRC principles and frameworks to enhance organizational cybersecurity and compliance.	**U**	**L2**
CO2	Apply risk management strategies and integrate NIST RMF processes into organizational workflows.	**A**	**L3**
CO3	Utilize metrics, assessments, and international frameworks like ISO/IEC 27001 and COBIT for effective cyber security decision-making.	**An**	**L4**
CO4	Design and evaluate cyber security architectures and controls to mitigate risks and address evolving threats.	**E**	**L5**
CO5	Assess emerging cyber security technologies and trends, leveraging AI and quantum computing to address future challenges.	**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	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0
CO2	1	3	3	1	2	0	0	0	0	0	0	0	0	0	0
CO3	0	2	3	3	2	0	0	0	1	0	0	0	0	0	0
CO4	0	1	3	3	3	0	0	0	1	1	0	0	0	0	0
CO5	0	1	2	2	3	0	0	0	2	2	0	0	0	0	0

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	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	:	**VII**				
Course Title	:	**Natural Language Intelligence**				
Course Code	:	**BCY703A**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Describe the linguistic background, morphological analysis, and mathematical foundations of semantic similarity measures.
2	To apply pre-processing workflows including tokenization, stemming, lemmatization, and POS tagging on unstructured text data.
3	To make use of WordNet-based similarity, shallow parsing, and knowledge graphs (RDFs) for structured semantic representation.
4	To examine information extraction techniques, named entity recognition (NER), and probabilistic models like n-grams and HMMs.
5	To architect and build text analytics applications using NLTK and OpenNLP for recommendation systems and semantic reasoning.

Teaching-Learning Process To

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, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Natural Language Processing–Linguistic Background—Mathematical Foundations-Semantic Similarity and Word Similarity Measures- Lin Similarity, Lesk Similarity, Jaccard Similarity, Cosine Similarity- Tversky's Similarity, Mutual Information, Normalized Pointwise Mutual Information Morphological Analysis-Tokenization-Stemming-Lemmatization-Boundary Determination. (Book1: Chapter 2, Book 4: Chapters 2,6 and 15)	8
Pedagogy		
2	Reading unstructured data-Representing text data-Part of speech tagging-Syntactic representation-Text similarity-WordNet based similarity-Shallow Parsing-Semantic representation- Ontologies, Knowledge Graphs, RDFs-Crowdsourced Knowledge Repositories-NELL, YAGO, CYC, Googles KGAPI, Wikidata, Open Linked Data Project. (Book 1: Chapters 2,8, Book 3:Chapters 2,7)	8
Pedagogy		
3	Information retrieval and Information Extraction-Named Entity Recognition-Relation Identification-Template filling- Generic Recommendation System Architectures- Web Page Recommenders, Architectural Design for Annotation Driven Video and Image Recommendation, Interdomain Recommendation Architectures- Architectures for Co-reference resolution(Book 1: Chapters 17, 21)	8
Pedagogy		
4	Language model-Probabilistic Models-n-gram language models-Hidden Markov Model-Topic Modelling-Graph Models-Feature Selection and classifiers-Rule-based Classifiers-Maximum entropy classifier–Clustering- Word and Phrase-based Clustering. (Text Book 1, Chapters 3,4 and TextBook, Text Book 4: Chapters: 6,9,14)	8
Pedagogy		
5	Tools–Natural Language Toolkit, Apache Open NLP, Applications of Text Analytics–Applications in social media-Life Science-Legal Text–Visualization- Building and Design of Architectures in Several Applications of Natural Language, Architectures Driven through Semantic Reasoning, Word Embedding, Microformats and RDF driven Architectures	8

	(Text Book 1: Chapters 6, 15, 17, Text Book 3: Chapters 3,8, RF1:Chapters 1, 2)	
	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	Jurafsky, D.Martin, J. H. (2023). Speech and language processing (3rd ed. draft). Pearson.
2	Heath, T. Bizer, C. (2011). Linked data: Evolving the web into a global data space. Morgan & Claypool.
3	Allemang, D., Hendler, J., & Gandon, F. (2020). Semantic web for the working ontologist: Effective modeling in RDFS and OWL (3rd ed.). ACM Books.
4	Manning, C. D Schütze, H. (1999). Foundations of statistical natural language processing. MIT Press.
Reference Books	
1	Commentary on THE INFORMATION TECHNOLOGY ACT, 2000" by Pavan Duggal: An exhaustive guide to the IT Act, which includes rules and regulations relevant to CERT-In
2	Heath, T., & Bizer, C. (2011). Linked data: Evolving the web into a global data space. Morgan & Claypool.

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Describe the linguistic background, mathematical foundations of semantic similarity, and morphological analysis frameworks.	**1**	**U**
CO2	Apply pre-processing techniques like tokenization, stemming, lemmatization, and POS tagging to represent unstructured text data and arrive at intelligent architectures	**3**	**A**
CO3	Make use of word similarity, shallow, and Semantic Representations for natural language understanding.	**3**	**A**

CO4	Analyse probabilistic models (n-grams, HMM), Topic Modeling, and Named Entity Recognition (NER) for information extraction and language modeling	**4**	**AN**
CO5	Demonstrate real-time application development using NLTK/OpenNLP tools for recommendation systems, semantic reasoning, and domain-specific text analytics	**5**	**E**

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

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	Natural language processing specialization [Online specialization].Coursera. https://www.coursera.org/specializations/natural-language-processing
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/

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	:	**VII**				
Course Title	:	**Artificial Intelligence Compliant Semantic Web**				
Course Code	:	**BCY703B**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PEC**				
Stream	:	**CSE-Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand fundamentals and classifications of intelligent agents.
2	Analyze agent architectures and multi-agent systems in distributed environments.
3	Explore integration of software agents in cooperative and user-centric systems.
4	Examine AI models and Semantic Web concepts including knowledge graphs and embeddings using BERT and GPT.
5	Apply LLM-based agent systems for intelligent coordination, automation, and semantic applications.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Comparing the Syntactic Web and Semantic Web-Limitations of Today's Web-Goal of the Semantic Web-How the Semantic Web will work-What Semantic Web is Not-A Layered Approach: Architecture of the Semantic Web-Logic on the Semantic Web- What is an Ontology-From Ontology Towards Ontology Engineering- Types and Categorization of Ontologies- Categorizing Ontologies based on richness of their structure.	8
Pedagogy		
2	Ontological Commitments-Principles for the Design of Ontologies- RDF: Overview, Syntax Structure, Semantics, Pragmatics-RDF Schema Representations-Frame Ontology and OKBC Ontology-OIL Representation of an Ontology-Ontology Markup Languages: OWL-Building Ontologies-Architectures on Semi-Automatic and Automatic Generation of Ontologies.	8
Pedagogy		
3	Domain Ontologies: Building Chemistry Ontologies -Modeling Medical Ontologies- Building Engineering Ontologies, Linguistic Ontologies: WordNet and EuroWordNet- The Standard Upper Ontology-Software and Semantic Agents-The Cyc Method-Uschold and King's method-The KACTUS Approach-SENSUS Based Method, Methontology- Ontology Re-engineering, Methods of Ontology Learning-Applications of Ontologies in Bioinformatics.	8
Pedagogy		
4	Intelligent Agents: Software Agents Fundamentals- Agent as a Description- Agent as an Ascription-Scope of Intelligent Agents-Nwana's Topology- Franklin and Graesser's Agent - Taxonomy-Agents in Simplifying Distributed Computing-Agent Enabled System Architecture-Agents and User Experience -Semantic Networks--Blackboard System- Agent 0 and KAoS Architecture-Multi-Agent Systems- The Structure of Agents- Adaptive Functionality: Three Design Issues, The Agent Metaphor, The Agent Conceptual Model.	8
Pedagogy		
5	**AI in Agents and Semantic Web:** Role of LLMs in Semantic Web-Semantic search and question answering, Ontology population and enrichment, Knowledge graph completion, AI	8

	Models in Semantic Web, Symbolic AI and Knowledge Graphs, Architectures on Machine Learning for semantic data processing, Embeddings for semantic similarity using AI Models- AI Integration in Agents- Agent Driven LLM-based Application Architectures-Intelligent coordination using AI agents	
	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	Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez "Ontological Engineering: with examples from the areas of Knowledge Management, eCommerce and the Semantic Web" Springer, Revised 2015
2	Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, Reprint 2015.
3	Jeffrey M Bradshaw (2010). Software Agents, MIT Press (1997), Cambridge, PHI Learning Private Limited (Reprint)
4	Russell, S. J. (2010). Artificial intelligence a modern approach. Pearson Education, Inc..
Reference Books	
1	Alexander Maedche, "Ontology Learning for the Semantic Web", Springer; 1 edition, 2002
2	John Davies, Dieter Fensel, Frank Van Harmelen, "Towards the Semantic Web: Ontology – Driven Knowledge Management", John Wiley & Sons Ltd., Reprint 2013.
3	John Davies (Editor), Rudi Studer (Co-Editor), Paul Warren (Co-Editor) "Semantic Web Technologies: Trends and Research in Ontology-based Systems"Wiley Publications, Reprint 2015
4	Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, "Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential", The MIT Press, 2012 revised edition.

5	Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management", Wiley, 2008 reprint.
6	Steffen Staab (Editor), Rudi Studer, "Handbook on Ontologies (International Handbooks on Information Systems)", Springer, 2008 reprint.
7	Dean Allemang (Author), James Hendler (Author) "Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL" (Paperback), Morgan Kaufmann, 2008
8	1.H. Xu (Ed.) Practical Applications of Agent-Based Technology. London, United Kingdom, IntechOpen, 2012.

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 concepts of semantic web, limitations of the traditional web, ontology basics and the roles of software agents in intelligent systems.	**1**	**R**
CO2	Apply ontology engineering principles, including ontology types development methodology and semantic representation techniques such as RDF and OWL for knowledge modelling.	**3**	**A**
CO3	Apply semantic web technologies and ontology languages to represent, store and process structured knowledge in real world applications.	**3**	**A**
CO4	Analyze agent architecture, including reactive, deliberative and hybrid agents along with agent communication, coordination and multi-agent system behaviors.	**4**	**AN**
CO5	Design and develop intelligent applications using software agents and semantic technologies to solve complex problems involving knowledge representation, reasoning and distributed environments.	**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	2	2	2	1	2	0	0	0	1	1	1	1	2	2	1
CO2	1	2	3	2	3	0	0	0	2	1	1	1	3	2	2
CO3	0	2	3	3	3	0	0	0	2	2	2	1	3	3	2
CO4	0	1	3	3	3	0	0	0	3	3	3	2	3	3	3
CO5	0	1	2	2	3	0	0	0	3	3	3	3	3	3	3

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%

OPEN ELECTIVE COURSE (OEC)

OEC – Open Elective Course

Open Elective Courses: Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator / Advisor / Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10. Project Phase – I: Students have to discuss with the mentor / guide and with their help he / she has to complete the literature survey and prepare the report and finally define the problem statement for the project work.

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours – Theory
Credits:	03
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Open Elective Course (OEC)

Open Elective Courses (OEC): A open elective course (OEC) is a course offered by departments other than a student's parent department. These interdepartmental /interdisciplinary courses allow students to explore disciplines beyond their core area of study. These courses are intended to promote interdisciplinary learning, broad-based education, thereby enhancing a student's overall knowledge, creativity, and employability. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor/Proctor.

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).

Open Elective Course (OEC) – 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	:	**VII**				
Course Title	:	**Introduction to DBMS**				
Course Code	:	**BCY704A**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**OEC**				
Stream	:	**Open to Non CS clusters**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To Provide a strong foundation in database concepts, technology, and practice.
2	To Practice SQL programming through a variety of database problems.
3	To Understand the relational database design principles.
4	To Demonstrate the use of concurrency in databases.
5	To Design and build database applications for real world problems.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6	8
Pedagogy		
2	Conceptual Data Modeling using Entities and Relationships: Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams, Specialization and Generalization. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping Textbook 1: Ch 3.1 to 3.10, 9.1 & 9.2	8
Pedagogy		
3	Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Textbook 1: Ch 5.1 to 5.3, Ch 8.1 to 8.5	8
Pedagogy		
4	SQL: SQL data definition and data types, Schema change statements in SQL, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Textbook 1: Ch 6.1 to 6.5,14.1 to 14.7	8
Pedagogy		

5	SQL: Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL. Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. Textbook 1: Ch 7.1 to 7.3, 21.1 to 21.5	**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	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2	Database System Concepts – Abraham Silberschatz, Henry F. Korth, S. Sudarshan
Reference Books	
1	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Demonstrate the basic elements of a database management system.	**U**	**L2**
CO2	Design entity relationship and convert entity relationship diagrams into RDBMS.	**A**	**L3**
CO3	Use Structured Query Language (SQL) for database manipulation	**An**	**L4**
CO4	Apply normalization to increase the efficiency of database design.	**E**	**L5**
CO5	Illustrate the concepts of concurrency control techniques.	**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	2	1	0	2	0	0	0	0	0	0	0	0	2	1
CO2	3	2	2	0	2	0	0	0	0	0	0	0	0	2	2
CO3	2	3	3	0	3	0	0	0	0	0	0	0	0	3	3
CO4	2	3	2	2	3	0	0	0	0	0	1	0	0	3	3
CO5	1	3	2	2	2	0	1	0	0	0	0	0	0	2	3

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc23_cs29/preview
2	https://www.youtube.com/watch?v=OMwgGL3lHII
3	https://www.youtube.com/watch?v=c5HAwKX-suM
4	https://www.youtube.com/watch?v=nFfDNFrhW7A

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%

Semester	:	**VII**				
Course Title	:	**Introduction to Algorithms**				
Course Code	:	**BCY704B**				
Course Type (Theory/ Practical/ Integrated)	:	**PCC**				
Category	:	**OEC**				
Stream	:	**Open to non CS Clusters**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn the methods for analyzing algorithms and evaluating their performance
2	To demonstrate the efficiency of algorithms using asymptotic notations.
3	To solve problems using various algorithm design methods, including brute force, greedy, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking, and branch and bound.
4	To learn the concepts of P and NP complexity classes.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	INTRODUCTION: What is an Algorithm?, Fundamentals of Algorithmic Problem Solving, Important problem Types, Fundamental Data Structures, Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, ,Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Chapter 1 (Sections 1.1 to 1.4), Chapter 2 (2.1, 2.2)	8
Pedagogy		
2	FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY: Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of Recursive Algorithms. BRUTE FORCE APPROACHES: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching. Chapter 2(Sections 2.3,2.4), Chapter 3(Section 3.1,3.2)	8
Pedagogy		
3	Exhaustive Search (Travelling Salesman problem and Knapsack Problem). Depth First search and Breadth First search. DECREASE-AND-CONQUER: Insertion Sort, Topological Sorting. DIVIDE AND CONQUER: Merge Sort, Binary Tree Traversals. Chapter 3(3.4,3.5), Chapter 4 (Sections 4.1,4.2), Chapter 5 (Section 5.1,5.3)	8
Pedagogy		
4	TRANSFORM-AND-CONQUER: Balanced Search Trees (AVL Trees), Heaps and Heapsort. SPACE-TIME TRADEOFFS: Sorting by Counting: Comparison counting sort, Input Enhancement in String Matching: Horspool's Algorithm, Hashing. Chapter 6 (Sections 6.3,6.4), Chapter 7 (Sections 7.1,7.2, 7.3)	8
Pedagogy		
5	The Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation. The Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy. Textbook: Ch. 13, Ch.14	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	Introduction to Algorithms and Problem Solving – Anany Levitin, Pearson
2	The Ethical Hack: A Framework for Business Value Penetration Testing – James S. Tiller, Auerbach Publications, CRC Press.
Reference Books	
1	Introduction to Algorithms – Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, MIT Press.
2	Algorithm Design – Jon Kleinberg, Éva Tardos, Pearson.

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 algorithm design steps and computational problem types	**U**	**L2**
CO2	Apply the asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.	**A**	**L3**
CO3	Apply the asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.	**An**	**L4**
CO4	Make use of the transform & conquer design approach to solve the given real-world or complex computational problems.	**E**	**L5**
CO5	Create greedy and dynamic programming to solve graph and string problems efficiently.	**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	2	1	0	1	0	0	1	0	0	0	0	2	1	0
CO2	2	3	2	1	3	0	0	1	0	1	0	0	3	2	0
CO3	1	3	3	3	3	0	0	1	0	1	0	0	3	3	0

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=fNzpcB7ODxQ
2	https://www.youtube.com/watch?v=uHU2uajL1EE
3	. https://www.youtube.com/watch?v=K6V7fc5Hj2s
4	https://archive.nptel.ac.in/courses/106/105/106105217/

CO4	0	2	3	3	3	0	0	1	1	2	1	0	3	3	1
CO5	0	2	2	3	3	1	1	2	1	3	2	1	3	3	2

CIE- Continuous Internal Evaluation (50 Marks)

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	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
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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	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%

MAJOR PROJECT
(Phase-2)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VII**				
Course Title	:	**Capstone Project Phase 2**				
Course Code	:	**BCY705**				
Course Type (Theory/ Practical/ Integrated)	:	**Project**				
Category	:	**PWP-2**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:0:7**		**SEE**	:	**50% Weightage**
Total Hours	:	**Project**		**SEE Duration**	:	**2 Hours**
Credits	:	**7**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To encourage independent learning and innovative attitude among students.
2	To develop interactive attitude, communication skills, organisation, time management and presentation skills.
3	To impart flexibility and adaptability
4	To train students to present project work confidently in seminars, enhance communication skills and participate in discussions to exchange ideas.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

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

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

1. **Literature Survey**
   Conduct an in-depth review of existing research papers, journals, and technologies related to the project domain. Analyze current methodologies, identify research gaps, and justify the proposed solution. AI tools can be used for efficient literature analysis, summarization, and trend identification.

2. **Implementation and System Development**
   Develop the proposed solution into a working system through coding, modeling, simulation, or prototype building. Implement the design using suitable tools and technologies, integrating AI techniques for automation, prediction, and intelligent decision-making.

3. **Integration, Testing, and Validation**
   Integrate all modules into a complete system and perform testing to ensure correctness, reliability, and performance. This includes unit testing, integration testing, and validation using real or simulated data. AI-based testing methods such as anomaly detection and automated validation may be applied.

4. **Data Analysis and Performance Evaluation**
   Analyze collected data using statistical and computational methods to evaluate system performance based on metrics such as accuracy, efficiency, scalability, and cost. AI techniques can be used for predictive analysis and optimization of results.

5. **Documentation, Results, and Presentation**
   Prepare a detailed report covering methodology, implementation, results, and analysis. Present findings using graphs, tables, and visualizations, and demonstrate the project through presentations and viva, highlighting technical and communication skills.

6. **Application, Challenges, and Future Scope**
   Explain real-world applications of the project, discuss challenges faced and system limitations, and address ethical considerations such as data privacy and security. Suggest future enhancements and improvements, especially using AI and emerging technologies.

Problem Analysis

This phase focuses on understanding and clearly defining the problem that the project aims to solve. It involves identifying the current challenges, limitations of existing systems, and user requirements.

- Study the existing system and identify inefficiencies or gaps
- Define the problem statement clearly and precisely
- Analyze user needs and system requirements
- Identify constraints such as cost, time, and technology
- Evaluate feasibility (technical, economic, operational)

- Justify the need for the proposed solution

Paper Writing (Research Paper Preparation)

This phase involves documenting the project in a structured research paper format suitable for mandatory SCOPUS Indexed Conference Publication.

Structure of the Paper:

- **Title** – Clear and concise project title
- **Abstract** – Brief summary of the problem, methodology, and results
- **Introduction** – Background, problem statement, and objectives
- **Literature Review** – Summary of existing work
- **Methodology** – Explanation of proposed approach and system design
- **Implementation** – Tools, technologies, and development process
- **Results and Discussion** – Analysis of outcomes and performance
- **Conclusion** – Final findings and contributions
- **Future Scope** – Suggested improvements
- **References** – List of research papers and sources

	Pedagogical Initiatives (Not limited to): • **Think–Pair–Share (Blended Learning):** Promotes collaborative analysis of implementation challenges, peer evaluation of solutions, and AI-supported interactive learning for deeper understanding. • **Advanced Problem Solving:** Focuses on optimization, debugging, and performance improvement using critical thinking and AI-driven techniques such as predictive modeling and data analysis. • **Technical Poster Presentation:** Enhances visual communication of system architecture, workflows, and results using advanced visualization tools and AI-based data representation. • **Case Study Analysis:** Applies real-world scenarios to evaluate system performance, scalability, and feasibility using AI-assisted insights and domain-based comparisons. • **Demonstration:** Showcases complete system implementation with real-time execution, including AI-based features like automation, intelligent decision-making, and analytics.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Identify and define real-world problems relevant to the domain, demonstrating problem-solving and analytical thinking skills.	**U**	**L2**
CO2	Apply domain-specific tools, technologies, and frameworks to design and develop a viable technical solution.	**A**	**L3**
CO3	Analyze system performance, data, and results to identify patterns, issues, and areas for improvement in the developed solution.	**AN**	**L4**
CO4	Evaluate the effectiveness, efficiency, and feasibility of the proposed system using appropriate metrics, testing methods, and comparisons with existing solutions.	**E**	**L5**
CO5	Design and develop an optimized, innovative, and scalable solution by integrating advanced techniques such as AI, automation, or emerging technologies.	**C**	**L5**

Mapping of Course Outcomes to Program Outcomes:

CEE

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

Component	**Weightage**
Project Report	30%
Paper Publication	30%
Project Presentation Skill	20%
Question & Answer Session	20%

SEE

Component	**Weightage**
Project Report	40%
Viva voice	60%

Note: One Publication indexed in Scopus or Web of Science is Mandatory from Students Projects

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VII**				
Course Title	:	**Indian Knowledge System**				
Course Code	:	**BCY706**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**NCMC**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**1:0:0:0**		**SEE**	:	**50**
Total Hours	:	**15**		**SEE Duration**	:	**2 Hours**
Credits	:	**0**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To encourage independent learning and innovative attitude among students.
2	To develop interactive attitude, communication skills, organisation, time management and presentation skills.
3	To impart flexibility and adaptability
4	To train students to present project work confidently in seminars, enhance communication skills and participate in discussions to exchange ideas.

Teaching-Learning Process

Pedagogical Initiatives:

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

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- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

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

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Indian Knowledge Systems (IKS):** Overview, Vedic Corpus, Philosophy, Character scope and importance, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge vs. western knowledge.	5
Pedagogy		
2	**Traditional Knowledge in Humanities and Sciences**: Lingistics, Number and measurements- Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.	5
Pedagogy		
3	**Traditional Knowledge in Professional domain:** Town planning and architecture-Construction, Health, wellness and Psychology-Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals.	5
Pedagogy		
	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	

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Provide and overview of the concept of the Indian knowledge system and its importance.	U	L2

CO2	Appreciate the need and importance of protecting traditional knowledge.	**A**	**L3**
CO3	Recognize the relevance of traditional knowledge in different domains.	**AN**	**L4**
CO4	Establish the significance of Indian Knowledge system in the contemporary world.	**E**	**L5**

Reference Books	
1	**Introduction to Indian Knowledge System- concepts and applications**, B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, 2022, PHI Learning Private Ltd, ISBN-978-93-91818-21-0
	Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,
2	**Knowledge Traditions and Practices of India**, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,
	Suggested Web Links:
1.	**https://www.youtube.com/watch?v=LZP1StpYEPM**
2.	**http://nptel.ac.in/courses/121106003/**
3.	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4.	https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5.	https://unctad.org/system/files/official-document/ditcted10_en.pdf
6.	http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7.	https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE

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

8th SEMESTER

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Internship refers to the position of a student as trainee or a temporary (or unconfirmed) employee, who

Semester	:	**VIII**				
Course Title	:	**Internship**				
Course Code	:	**BCY802**				
Course Type (Theory/ Practical/ Integrated)	:	**Internship**				
Category	:	**INT**				
Stream	:	**Cyber Security**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:2:12**		**SEE**	:	**50**
Total Hours	:	**15**		**SEE Duration**	:	**2 Hours**
Credits	:	**12**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Apply theoretical knowledge in real-world professional settings through hands-on experience.
2	Develop essential professional skills such as communication, time/stress management, and presentations.
3	Interact with industry professionals to enhance practical understanding and career awareness.
4	Understand responsibilities including planning, budgeting, risk management, and emergency handling.

Teaching-Learning Process

- Participate actively in internship activities under internal and external guidance to gain practical knowledge.
- Present internship experience through seminar (oral/PPT).
- Engage in discussions, answer queries, and contribute to debates.
- Submit a certified internship report and develop confidence through interactive learning.

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand practical experience within industry in which the internship is done.	U	L2
CO2	Apply knowledge of the industry in which the internship is done.	A	L3
CO3	Analyse knowledge and skills learned to classroom work.	AN	L4
CO4	Determine a greater understanding about career options while more clearly defining personal career goals.	E	L5

works in an organization, with or without pay, in order to gain work experience or satisfy requirements for

a qualification. It is a structured, supervised professional experience in an industry, research organization, or community setting. Students taking up internship may be with or without stipend. Internships play a vital role in bridging the gap between theoretical education and professional practice. In general, engineering internships serve as a crucial component of professional education by providing experiential learning, industry readiness, and holistic skill development, ultimately producing competent engineers or entrepreneurs. Apart from these, it develops professional ethics, work culture awareness and communication skills. Some of the common types of internships are as follows:

i. Industry Internship: Carried out in the engineering industry, companies, manufacturing units, startups, business, IT industry. The topic involved may be technical, managerial, production-related tasks, live projects, or innovative activities.
ii. Research Internship: Carried out at universities, research labs, or R and D departments or organisations. The internship may involve literature review, data analysis, and experimental work leading to publications, prototypes, technical reports or innovations. The research internship may induce students to plan for higher studies or academic careers.
iii. Academic or Teaching Internship: Carried out at educational institutions. The students assist in academic activities, laboratory sessions or content development, and prepare or present report, presentation and student evaluation. The internship encourages interest in academia and pedagogy, develops new skills, helps to gain a competitive edge on the job market or for post-baccalaureate studies.
iv. Community or Societal Internship: Carried out with government schemes, or rural development projects, Non-Governmental Organisations (NGOs). The internship focused on social and community development activities promotes social responsibility, sustainable development awareness, encourages civic responsibility and ethical engagement.
v. Entrepreneurship Internship: Undertaken in association with start-ups, or entrepreneurship cells or launching own idea in Preincubations/Incubation centres. The internship offers exposure to business planning, prototype product development, and promotes innovation, risk-taking, and entrepreneurial mindset.
vi. Virtual or Remote or Online Internship: Undertaken using online tools and digital collaboration platforms. Such internships are common in content writing, data science, marketing, and software development. It offers flexible learning environments and access to global opportunities, and allows participation in real projects without being physically present, from anywhere and anytime.
vii. Government Internship: Ministries, public sector units, or civic bodies offer such internships in policy research, administrative tasks, or public service projects. This internship is for students interested in governance or public administration.
viii. Post-Placement Internship: Refers to the internship offered to students after they receive a confirmed job offer (placement) from a company, but before formally joining as full-time employees. This internship

(on-site, virtual, or hybrid) ensures that students are groomed to be professionally ready, technically competent, and culturally aligned with the organization even before official induction.

ix. Skill Enhancement Internship: Carried out at reputed organisations in offline or online mode. The aim of the internship is to expose to real-world tools, technologies, and professional environments to improve a student's employability by offering hands-on experience, application of theoretical concepts, and skill development aligned with current industry and technical trends. Skill Enhancement Internships, depending on focus area and scope, can be carried out at various organisations such as, Academic and Research Institutions, Industry and Corporate Settings, Government and Public Sector, NGOs and Social Enterprises. For Skill Enhancement Internship topics refer to https://online.vtu.ac.in/category/courses/Skill-Enhancement-Course.

x. Internship will be evaluated based on the Marks Provided by the internal guide in consultation with the external internship Manager.

CEE

Component	**Weightage**
Seminar Report	20%
Paper Publication	40%
Seminar Skill	20%
Question & Answer Session	20%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**VIII**				
Course Title	:	**Capstone Project- Phase 3 (Publication and Patents)**				
Course Code	:	**BCY801**				
Course Type (Theory/ Practical/ Integrated)	:	**Project**				
Category	:	**PROJ**				
Stream	:	**Cyber Security**		**CIE**	:	**100**
Teaching hours/ week (L: T:P:S)	:	**0:0:0:2**		**SEE**	:	**NA**
Total Hours	:	**2**		**SEE Duration**	:	**NA**
Credits	:	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To develop research skills by identifying, analyzing, and studying contemporary topics in the relevant domain.
2	To enhance technical writing ability by organizing ideas and presenting them in a structured academic format.
3	To cultivate literature survey skills through the review and analysis of research papers, journals, and technical documents.
4	To improve critical thinking by evaluating existing solutions and identifying research gaps.
5	To build presentation and communication skills through seminar delivery and discussion.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand and interpret contemporary research problems and concepts through comprehensive literature survey.	U	L2
CO2	Apply appropriate methodologies, tools, and techniques to study and address the selected research problem.	A	L3
CO3	Analyze and compare existing research works to identify gaps, limitations, and potential improvements.	AN	L4
CO4	Develop a well-structured paper with proper technical content, formatting, and academic writing standards.and publish them in a suitable conference and Patent the same.	E	L5
CO5	Design and deliver an effective seminar presentation using suitable visual aids and communication strategies.	C	L6

Course Description – Term Paper Writing & Seminar

The Term Paper Writing & Seminar course is designed to provide students with an opportunity to explore, analyze, and present contemporary topics in their respective domains. The course focuses on developing research aptitude, technical writing skills, and effective oral communication, which are essential for academic excellence and professional growth.

Students are required to identify a relevant and emerging topic, followed by an extensive literature survey using credible sources such as journals, conference proceedings, and technical reports. Through this process, students gain a deeper understanding of current research trends, methodologies, and challenges in the selected area. They are encouraged to critically analyze existing work, identify research gaps, and propose possible improvements or solutions.

A key component of this course is the preparation of a structured term paper that adheres to standard academic formats. The paper typically includes sections such as abstract, introduction, literature review, methodology, results and discussion, and conclusion. Students must follow proper citation practices and maintain academic integrity by avoiding plagiarism.

Publishing of a research paper as a group is mandatory, encouraging collaborative learning and exposure to real-world research practices. Students work in teams to prepare a quality research manuscript and submit it to recognized journals or conferences. This process helps them understand the publication lifecycle, including paper writing, formatting, peer review, and revision.

In addition, the seminar component requires students to present their work effectively using appropriate visual aids. This enhances their ability to communicate technical content clearly, engage the audience, and confidently respond to queries.

Overall, the course fosters independent learning, teamwork, critical thinking, and professional skills, preparing students for higher education, research careers, and industry roles.

*One paper publication is mandatory either based on the internship work or based on the Outcome of the Project Phase 1 or a detailed comprehensive survey or Case Justifications using Modern Tool Usage.

CEE

Component	**Weightage**
Seminar Report	20%
Paper and Patent Publication	40%
Seminar Skill	20%
Question & Answer Session	20%