Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur 440033

Scheme and Syllabus for

Bachelor of Technology (Computer Science & Engineering (Cyber Security))

Submitted by

Board of Studies in CSE/CT/IT/CE Engineering

13/9/24 13/9/24 13/09/24 13/9/24 13/09/24 13-09-24 13/09

Vision

To create globally competent engineers in Computer Science & Engineering and cyber security areas that extend the scope of Computer Science Engineering to benefit humanity.

Mission

- To prepare students to excel in Computer Science and Engineering through quality education and enable them to succeed in computing and cyber security.
- To nurture the individual to become leaders and innovators in industry and other allied areas and enhance their entrepreneurship skills.
- To imbibe holistic education to promote ethics, lifelong learning and contribute to the social well-being.

Program Educational Objectives (PEOs):

PEO 1: Core Competency Graduates will demonstrate strong foundational knowledge in Computer Science and Cyber Security, enabling them to analyse, design, and develop secure computing systems and solutions.

PEO 3: Innovation & Research Graduates will engage in innovative research and development activities that contribute to advancements in cyber security technologies and methodologies.

PEO 5: Societal Impact Graduates will address cyber security issues at a global level and contribute towards securing digital assets, ensuring privacy, and safeguarding critical infrastructures.

Program Specific Outcomes (PSOs):

PSO 1: Threat Identification & Mitigation Graduates will be able to identify, assess, and mitigate potential cyber threats using state-of-the-art tools and techniques.

PSO 2: Secure Systems and Management Graduates will possess the ability to manage and respond to cyber incidents, including detection, response, and recovery processes, while minimizing the impact on the organization

PSO 3: Regulatory & Ethical Compliance Graduates will ensure that cyber security practices comply with legal, regulatory, and ethical standards, understanding their importance in protecting information and privacy.

Program Outcomes

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. 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.

PO3. 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.

PO4. 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.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. 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.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and demonstrate the knowledge of, and need for sustainable development.

PO10. 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.

PO11. 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.

PO12. 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.

CREDIT FRAMEWORK STRUCTURE

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	3 * 2 = 6	4 * 2 = 8	--	--	--	--	--	--	14
Engineering Science Course		4 * 2 = 8	04	--	--	--	--	--	--	12
Programme Core Course (PCC)	Program Courses	--	02	4 * 2 = 8	4 * 2 = 8	4 * 2 + 2 = 10	4 * 2 = 8	0	4+4=8	44
Programme Elective Course (PEC)		--	--	--	--	04	4 * 2 = 8	02	3 * 2 = 6	20
Multidisciplinary Minor (MDM)	Multidisciplinary Courses	--	--	02	02	04	02	02	02	14
Open Elective (OE) Other than a particular program		--	--	04	02	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--	--	02	02	--	--	--	--	04
Indian Knowledge System (IKS)		--	02	--	--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--	04	--	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	--	--	02
Project		--	--	--	--	--	--	--	04	04
Internship/ OJT		--	--	--	--	--	--	12	--	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02	--	--	--	--	--	--	04
Total Credits (Major)		20	20	20	20	20	20	20	20	160

B. Tech. Sem -III (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			BOS
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	CS
1	PCC-II	Data Structure and Algorithms	BCSEC3T09	3	-	-	3	3	70	30	45	-	-	-	CS
2	PCC-II	Data Structure and Algorithms Lab	BCSEC3P09	-	-	2	1	-	-	-	-	25	25	25	CS
3	PCC-III	Computer Network	BCSEC3T10	3	-	-	3	3	70	30	45	-	-	-	CS
4	PCC-III	Computer Network Lab	BCSEC3P10	-	-	2	1	-	-	-	-	25	25	25	CS
5	MDM-I	Cyber Laws and Ethics	BMD3T11	2	-	-	2	3	70	30	45	-	-	-	CS
6	OE-I	Refer Open Elective – I Basket	BOE3T01	3	-	-	3	3	70	30	45	-	-	-	
7	OE-I	Refer Open Elective – I Basket	BOE3P01	-	-	2	1	-	-	-	-	-	50	25	
8	HSSM-I	Mathematics for Cyber Security	BHM3T01	3	-	-	3	3	70	30	45	-	-	-	CS
9	VEC-i	Constitution of India	BVE3T01	2	-	-	2	3	70	30	45	-	-	-	AS&H
10	CEP	Community Engagement Project	BCE3P01	-	-	4	2	-	-	-	-	-	100	50	AS&H
Total				**16**	**-**	**10**	**21**	**18**	**420**	**180**	**270**	**50**	**200**	**125**	**850**

B. Tech. Sem-IV (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	BOS
1	PCC-IV	Operating System	BCSEC4T12	3	-	-	3	3	70	30	45	-	-	-	CS
2	PCC-IV	Operating System Lab	BCSEC4P12	-	-	2	1	-	-	-	-	25	25	25	CS
3	PCC-V	Cryptography	BCSEC4T13	3	-	-	3	3	70	30	45	-	-	-	CS
4	PCC-V	Cryptography Lab	BCSEC4P13	-	-	2	1	-	-	-	-	25	25	25	CS
5	PCC-VI	Introduction to Cyber Security	BCSEC4T14	2	-	-	2	3	70	30	45	-	-	-	CS
6	OE-II	Refer Open Elective-II Basket	BOE4T02	2	-	-	2	3	70	30	45	-	-	-	
7	VSC-II	Networking and Fire wall	BVE4P02	-	-	4	2	-	-	-	-	50	50	50	CS
8	AEC-II	Technical Report Writing	BAE4T02	2	-	-	2	3	70	30	45	-	-	-	AS&H
9	HSSM-II	Environmental Science	BHM4T02	2	-	-	2	3	70	30	45	-	-	-	Civil
10	VEC-II	Universal Human Values	BVE4T02	2	-	-	2	3	70	30	45	-	-	-	AS&H
Total				**16**	**-**	**08**	**20**	**210**	**490**	**210**	**315**	**100**	**100**	**100**	**900**

Exit option: Award of UG Diploma in Major and Minor with 80 credits and an additional 8 credits as per exit basket

B. Tech. Sem-V (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	BOS
1	PCC-VI	Database management System	BCSEC5T15	3	-	-	3	3	70	30	45	-	-	-	CS
2	PCC-VI	Database management System Lab	BCSEC5P15	-	-	2	1	-	-	-	-	25	25	25	CS
3	PCC-VII	Computer Security	BCSEC5T16	3	-	-	3	3	70	30	45	-	-	-	CS
4	PCC-VII	Computer Security Lab	BCSEC5P16	-	-	2	1	-	-	-	-	25	25	25	CS
5	PCC-VIII	Theory of Computation	BCSEC5T17	2	-	-	2	3	70	30	45	-	-	-	CS
6	PEC-I	Elective – I (Refer Elective Basket)	BCSEC5T18	3	-	-	3	3	70	30	45	-	-	-	CS
7	PEC-I	Elective – I	BCSEC5P18	-	-	2	1	-	-	-	-	-	50	25	CS
8	MDM-III	Basic of Ethical Hacking	BCSECT19	3	-	-	3	3	70	30	45	-	-	-	CS
9	MDM-III	Basic of Ethical Hacking Lab	BCSECP19	-	-	2	1	-	-	-	-	-	50	25	CS
10	OE-III	Refer Open Elective Basket-III	BOE5T03	2	-	-	2	3	70	30	45	-	-	-	
Total				**16**	**-**	**08**	**20**	**18**	**420**	**180**	**270**	**50**	**150**	**100**	**800**

B. Tech. Sem-VI (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	BOS
1	PCC-IX	Introduction to Cloud Security	BCSEC6T20	3	-	-	3	3	70	30	45	-	-	-	CS
2	PCC-X	Design and Analysis of Algorithm	BCSEC6T21	2	-	-	2	3	70	30	45	-	-	-	CS
3	PCC-X	Design and Analysis of Algorithm Lab	BCSEC6P21	-	-	2	1	-	-	-	-	25	25	25	CS
4	PCC-XI	Compiler Design	BCSEC6T22	3	-	-	3	3	70	30	45	-	-	-	CS
5	PEC-II	Elective – II (Refer Basket for Elective)	BCSEC6T23	3	-	-	3	3	70	30	45	-	-	-	CS
6	PEC-II	Elective – II	BCSEC6P23	-	-	2	1	-	-	-	-	-	50	25	CS
7	PEC-III	Elective – III (Refer Basket for Elective)	BCSEC6T24	3	-	-	3	3	70	30	45	-	-	-	CS
8	MDM-IV	Digital Forensics	BMD6T25	2	-	-	2	3	70	30	45	-	-	-	CS
9	SEC-II	Refer to SEC Basket	BSE6P02	-	-	4	2	-	-	-	-	50	50	50	CS
Total				**16**	**-**	**8**	**20**	**18**	**420**	**180**	**270**	**75**	**125**	**100**	**800**

**** Exit option: Award of UG Degree B. Voc. /B.Sc. in Major with 120 credits and an additional 8 credits in skill-based courses, internship, mini projects etc.**

SEC Basket

S.No.	Semester	Course code	Course Name
1	6th sem	BSE6P02-A	Vulnerability Assessment and penetration Testing
2	6th sem	BSE6P02-B	Networking and security simulation tools

B. Tech. Sem-VII (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	BOS
1	PEC-IV	Elective – IV# (Refer Basket for Elective)	BCSEC7T26	2	-	-	2	3	70	30	45	-	-	-	CS
2	MDM-V	Robotics & Automation #	BMD7T27	2	-	-	2	3	70	30	45	-	-	-	Mech
3	OJT	Internship	BOJ7P01	-	-	24	12	-	-	-	-	200	200	200	CS
4	RM	Research Methodology#	BCSEC8T28	3	-	-	3	3	70	30	45	-	-	-	CS
5	RM	Research Methodology#	BCSEC8P28	-	-	2	1	3	-	-	-	-	50	25	CS
Total				**7**	**-**	**26**	**20**	**12**	**210**	**90**	**135**	**200**	**250**	**225**	**750**

 # Indicates that Online Courses to be done from NPTEL. Examination will be conducted by NPTEL/ RTMNU.

B. Tech. Sem-VIII (Computer Science and Engineering (Cyber Security) - Major)

Sr. No.	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
								Theory				Practical			
				Th	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	BOS
1	PCC-XII	Network Security Administration	BCSEC8T29	3	-	-	3	3	70	30	45	-	-	-	CS
2	PCC-XII	Network Security Administration Lab	BCSEC8P29	-	-	2	1	-	-	-	-	25	25	25	CS
3	PCC-XIII	Data Analytics	BCSEC8T30	3	-	-	3	3	70	30	45	-	-	-	CS
4	PCC-XIII	Data Analytics	BCSEC8P30	-	-	2	1	-	-	-	-	25	25	25	CS
5	PEC-V	Elective – V (Refer Basket for Elective)	BCSEC8T31	3	-	-	3	3	70	30	45	-	-	-	CS
6	PEC-VI	Elective – VI (Refer Basket for Elective)	BCSEC8T31	3	-	-	3	3	70	30	45	-	-	-	CS
7	MDM-VI	Operational Research	BMD8T32	2	-	-	2	3	70	30	45	-	-	-	CS
8	Project	Project	BPR8P01	-	-	8	4	-	-	-	-	100	100	100	CS
Total				**14**	**-**	**12**	**20**	**15**	**350**	**150**	**225**	**150**	**150**	**200**	**800**

4-Years Bachelor's degree (B.Tech.) in Engg./Tech. with Multidisciplinary Minor

LIST OF OPEN ELECTIVE OFFERED BY COMPUTER SCIENCE & ENGG ENGINEERING BOS

(Students of CSE/CT/IT/CE and related branches will not be able to opt these OE courses)

Open Elective-I (T+P)

S. No	Code	Name of Subject
1	BOE3T01+BOEP01-A	Python Programming
2	BOE3T01+BOEP01-B	Fundamentals of Algorithms
3	BOE3T01+BOEP01-C	Database Management System

Open Elective-II (T)

S .No	Code	Name of Subject
1	BOE4T02-A	Object Oriented Concepts
2	BOE4T02-B	Cyber Laws
3	BOE4T02-C	Operating System

Open Elective-III (T)

S. No	Code	Name of Subject
1	BOE5T03-A	Data Visualization
2	BOE5T03-B	Data Science
3	BOE5T03-C	Computer Networks

Program Electives

	PEC-1	PEC-2	PEC-3	PEC-4	PEC-5	PEC-6
Cyber Crime Investigator	Operating System for Cyber Security	Wireless and Mobile Device Security	Managing Risk in Information System	Cyber Security and Privacy	CFLP: Computer Forensics and Data Recovery	Testing Cyber Crime Investigation and Digital Forensic
Social Security	Security Policies and Implementation	Security strategies in Windows & Linux	Application Security	Cyber Security, Tools, Techniques and Counter Measures	Mobile Application Security Testing	Security in Social Network
AI & Cyber Forensic	ML: Machine Learning	DL: Deep Learning	DVT: Data Visualization Techniques	Practical Cyber Security for Cyber Security Practitioners	AI for Cyber fraud	Cyber Security System Management
Cyber Security & Management	TMA: Threat and Malware Analysis	IHR: Incident Handling and Response	IS: IOT Security	Blockchain Technology	DRBCM: Disaster Recovery & Business Continuity Management	EGMIS: Executive Governance and Management in IT Security

Abbreviations:

- Generic/ Open Electives: OE
- Vocational Skill and Skill Enhancement Courses: VSEC
- Vocational Skill Courses: VSC
- Skill Enhancement Courses: SEC
- Ability Enhancement Courses: AEC
- Indian Knowledge System: IKS
- Value Education Courses: VEC
- On Job Training: Internship/ Apprenticeship: OJT
- Field Projects: FP
- Community Engagement Project: CEP
- Co-curricular Courses: CC
- Research Methodology: RM
- Research Project: RP
- Liberal Learning Course: Lib. Learn
- Courses on Humanities, Social Science, and Management: HSSM
- Semester End Examination: SEE
- Continuous Internal Evaluation: CIE