SCHEME OF INSTRUCTION & EXAMINATION
(Semester System)

(R-24 Regulation)

Schema (w.e.f. 2024-2025)

4 Year B.Tech. Program

of

CSE (Cyber Security)

DEPARTMENT OF CYBER SECURITY

BAPATLA ENGINEERING COLLEGE :: BAPATLA

(AUTONOMOUS UNDER ACHARYA NAGARJUNA UNIVERSITY)
(SPONSORED BY BAPATLA EDUCATION SOCIETY)
BAPATLA - 522102 GUNTUR DISTRICT, A.P.
www.becbapatla.ac.in

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)

Summary

S. No.	Category	AICTE Recommended Credits (%)	# of Courses	# of Credits	Breakup of Credits (Total-160)
1.	Humanities and Social Sciences, including Management (HM)	5–8%	6	9	5.6
2.	Basic Science Courses (BS)	12 – 16%	8	20	12.5
3.	Engineering Science Courses (ES)	10 – 18%	11	24	15
4.	Professional Core Courses (PC)	30 – 36%	21	51.5	32.3
5.	**Electives** – Professional Electives (PE); Job-Oriented Electives (JOE); Open Electives (OE); Skill Enhancement Courses (SEC)	19 – 27%	5+6+1+4 =16	15+ 13.5+3+8 =39.5	24.6
6.	Internships & Project Work (PR)	8–11%	4	16	10
7.	Mandatory Courses (MC)	-	4		Non-credit
		Total	**70**	**160**	

Semester Wise Courses and Credits

Semester	# of Theory Courses	Skill-Enhanced Courses	# of Lab Courses	Mandatory Courses	Other Courses	Total Courses	Credits	With Honor Credits
Semester-I	4	0	5	0	0	9	18	18
Semester-II	5	0	4	0	0	9	21	21
Semester-III	5	1	2	1	1	10	20.5	20.5
Semester-IV	5	1	3	1	1	11	22.5	26.5
Semester-V	5	1	2	1	SI1	10	22	28
Semester-VI	5	1	2	1	0	09	20	24
Semester-VII	3	1	4	0	SI2	09	21	26
Semester-VIII	2	0	1	0	0	03	15	12
Total	**34**	**5**	**23**	**4**	**4**	**70**	**160**	**176**

SCHEME OF INSTRUCTION & EXAMINATION(Semester System)
For
CSE(Cyber Security)
First Year B.Tech.(SEMESTER–I)W.E.F. A.Y.2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB101	BS	Linear Algebra and Ordinary Differential Equations	2	1	0	3	40	60	100	3
24CB102	BS	Semiconductor Physics and Nano Materials	3	0	0	3	40	60	100	3
24CB103	HM	Communicative English	2	0	0	2	40	60	100	2
24CB104	ES	Introduction to Programming	3	0	0	3	40	60	100	3
24CBL101	ES	Engineering Graphics Lab	1	0	3	4	40	60	100	2.5
24CBL102	BS	Semiconductor Physics Lab	0	0	2	2	40	60	100	1
24CBL103	HM	English Communication skills Lab	0	0	2	2	40	60	100	1
24CBL104	ES	Introduction to Programming Lab	0	0	3	3	40	60	100	1.5
24CBL105	ES	IT Workshop	0	0	2	2	40	60	100	1
Induction Program		**First Three Weeks** (Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Familiarization to Dept./Branch & Innovations)								
TOTAL			**11**	**1**	**12**	**24**	**360**	**540**	**900**	**18**

L: Lecture T: Tutorial P: Practical
CIE: Continuous Internal Evaluation SEE: Semester End Examination

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)
First Year B.Tech. (SEMESTER–II) W.E.F.A.Y.2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB201	BS	Numerical Methods & Advanced Calculus	2	1	0	3	40	60	100	3
24CB202	BS	Engineering Chemistry	3	0	0	3	40	60	100	3
24CB203	ES	Basic Electrical & Electronics Engineering	3	0	0	3	40	60	100	3
24CB204	ES	Programming for Problem-Solving	3	0	0	3	40	60	100	3
24CB205	BS	Discrete Mathematics	3	1	0	3	40	60	100	3
24CBL201	ES	Engineering Mechanics Lab	1	0	2	3	40	60	100	2
24CBL202	BS	Engineering Chemistry Lab	0	0	2	2	40	60	100	1
24CBL203	ES	Basic Electrical & Electronics Engineering Lab	0	0	3	3	40	60	100	1.5
24CBL204	ES	Programming for Problem Solving Lab	0	0	3	3	40	60	100	1.5
TOTAL			**15**	**2**	**10**	**26**	**360**	**540**	**900**	**21**

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)
Second Year B.Tech. (SEMESTER–III) W.E.F.A.Y.2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB301	BS	Probability Statistics	2	1	0	3	40	60	100	3
24CB302	ES	Digital Logic & Computer Organization	3	0	0	3	40	60	100	3
24CB303	PC	Data Structures	2	1	0	3	40	60	100	3
24CB304	PC	Object Oriented Programming	2	1	0	3	40	60	100	3
24CB305	PC	Introduction to Cyber Security	3	0	0	3	40	60	100	3
24CBL301/ SEC01	SEC	Python Programming (Skill Enhancement Course-I)	1	0	2	3	40	60	100	2
24CBL302	PC	Data Structures Lab	0	0	3	3	40	60	100	1.5
24CBL303	PC	Object Oriented Programming Lab	0	0	3	3	40	60	100	1.5
24CBL304	HM	Health and Wellness, Yoga and Sports	0	0	1	1	-	100	100	0.5
24CB306/ MC02	MC	Constitution of India	2	0	0	2	40	0	40	0
TOTAL			**15**	**3**	**9**	**27**	**360**	**580**	**940**	**20.5**

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)
Second Year B.Tech.(SEMESTER– IV) W.E.F. A.Y. 2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB401	PC	Computer Networks	3	0	0	3	40	60	100	3
24CB402	PC	Operating Systems	2	1	0	3	40	60	100	3
24CB403	PC	Client-Side Web Technologies	3	0	0	3	40	60	100	3
24CB404	PC	Database Management Systems	3	0	0	3	40	60	100	3
24CB405	PC	Design and Analysis of Algorithms	2	1	0	3	40	60	100	3
24CBL401/ SEC02	SEC	Kali Linux Virtual Lab Setup(Skill Enhancement Course-II)	1	0	2	3	40	60	100	2
24CBL402	ES	Design Thinking & Innovation Lab	1	0	2	3	40	60	100	2
24CBL403	PC	Client-Side Web Technologies Lab	0	0	3	3	40	60	100	1.5
24CBL404	PC	RDBMs Lab	0	0	3	3	40	60	100	1.5
24CBL405	HM	NSS/NCC/Scouts & Guides/ Community Service	0	0	1	1	-	100	100	0.5
24CB406/ MC01	MC	Environmental Science	2	0	0	2	40	0	40	0
TOTAL			**17**	**02**	**11**	**30**	**400**	**640**	**1040**	**22.5**
24CBH4_/ 24CBM4_	**Honors/Minor Course**		**3**	**0**	**2**	**5**	**40**	**60**	**100**	**4**

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)
Second Year B.Tech. (SEMESTER–V) W.E.F.A.Y.2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB501	PC	Automata Theory & Compiler Design	3	0	0	3	40	60	100	3
24CB502	PC	Cryptography & Network Security	3	0	0	3	40	60	100	3
24CB503	PC	Ethical Hacking & Social Engineering	3	0	0	3	40	60	100	3
24CB504/ PE01_	PE	Professional Elective – I	3	0	0	3	40	60	100	3
24CB505/ JOE01_	JOE	Job Oriented Elective – I	3	0	0	3	40	60	100	3
24CBL501	SEC	Vulnerability Assessment & Penetration Testing Lab (Skill Enhancement Course - III) Lab	1	0	2	3	40	60	100	2
24CBL502	PC	Ethical Hacking & Social Engineering Lab	0	0	3	3	40	60	100	1.5
24CBL503	JOE	Job Oriented Elective – I Lab	0	0	3	3	40	60	100	1.5
24CBL504/ INT01	PR	Summer Internship - I*	0	0	0	0	0	100	100	2
24CB506/ MC04	MC	Campus Recruitment Training	2	0	0	2	40	0	40	0
TOTAL			**18**	**0**	**8**	**26**	**360**	**580**	**940**	**22**
24CBH5_/ 24CBM5_	**Honors/Minor Course**		**3**	**0**	**2**	**5**	**40**	**60**	**100**	**4**

Job-Oriented Elective – I

1A	Full Stack Development
	Full Stack Development Lab
1B	Cloud Programming
	Cloud Programming Lab
1C	Enterprise Programming
	Enterprise Programming Lab

Professional Elective – I

1A	Introduction to Information Security and Cyber Laws
1B	Artificial Intelligence
1C	Parallel Algorithms

*Summer Internship - I (PR01) need to be completed after 4th semester and it is evaluated by the end of 5th Semester.

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE(Cyber Security)
Second Year B.Tech. (SEMESTER–VI) W.E.F.A.Y.2024-25(R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB601	HM	Industrial Management & Entrepreneurship Development	3	0	0	3	40	60	100	3
24CB602	PC	Cyber Crime Investigation and Digital Forensics	3	0	0	3	40	60	100	3
24CB603/ PE02_	PE	Professional Elective – II	3	0	0	3	40	60	100	3
24CB604/ PE03_	PE	Professional Elective – III	3	0	0	3	40	60	100	3
24CB605/ JOE2_	JOE	Job Oriented Elective – II	3	0	0	3	40	60	100	3
24CBL601	HM	Soft Skills (Skill Enhancement Course - IV)	1	0	2	3	40	60	100	2
24CBL603	PC	Cyber Crime Investigation and Digital Forensics Lab	0	0	3	3	40	60	100	1.5
24CBL604	JOE	Job Oriented Elective - II Lab	0	0	3	3	40	60	100	1.5
24CB606	MC	Technical paper writing & IPR	2	0	0	2	40	0	40	0
TOTAL			**18**	**0**	**8**	**26**	**360**	**480**	**840**	**20**
24CBH5_/ 24CBM5_	**Honors/Minor Course**		**3**	**0**	**2**	**5**	**40**	**60**	**100**	**4**

Job Oriented Elective – II	
2A	Machine Learning
	Machine Learning Lab
2B	Mobile Application Development
	Mobile Application Development Lab
2C	Industrial IOT
	Industrial IOT Lab

Professional Elective – II	
2A	Software Engineering
2B	Design patterns & Frameworks
2C	Quantum Computing

Professional Elective – III	
3A	Block Chain Technology
3B	Distributed Systems
3C	Digital Image Processing

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CSE (Cyber Security)
Fourth Year B.Tech. (SEMESTER – VII) W.E.F. A.Y. 2024-25 (R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB701	PC	Incident Response and Threat Intelligence	3	0	0	3	40	60	100	3
24CB702	OE	Open Elective	3	0	0	3	40	60	100	3
24CB703/ JOE03_	JOE	Job Oriented Elective – III	3	0	0	3	40	60	100	3
24CBL701	SEC	DevOps (Skill Enhancement Course - V)	1	0	2	3	40	60	100	2
24CBL701	PC	Incident Response and Threat Intelligence Lab	0	0	3	3	40	60	100	1.5
24CBL702	PC	Security Operation Centre and Security Information & Event Management Lab	0	0	3	3	40	60	100	2
24CBL703	JOE	Job Oriented Elective – III Lab	0	0	3	3	40	60	100	1.5
24CBL704	PR	Term Paper	0	0	6	6	40	60	100	3
24CBL704	PR	Summer Internship – II*	0	0	0	0	0	100	100	2
TOTAL			**10**	**0**	**17**	**27**	**320**	**580**	**900**	**21**
	Honors/Minor Courses (MOOCs - 1)		**0**	**0**	**0**	**0**	**40**	**60**	**100**	**2**
	Honors/Minor Courses (MOOCs - 2)		**0**	**0**	**0**	**0**	**40**	**60**	**100**	**2**

Job Oriented Elective – III	
3A	Incident Response and Threat Intelligence
	Incident Response and Threat Intelligence Lab
3B	Natural Language Processing
	Natural Language Processing Lab
3C	Web & Social Media Analytics
	Web & Social Media Analytics Lab

Internship – II (PR02) need to be completed after 6th semester and it is evaluated by the end of 7th semester.

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

CSE (Cyber Security)

Fourth Year B.Tech. (SEMESTER – VIII) W.E.F. A.Y. 2024-25 (R24)

Course Code	Category	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total	
24CB801/ PE04__	PE	Professional Elective – IV	3	0	0	3	40	60	100	3
24CB802/ PE05__	PE	Professional Elective – V	3	0	0	3	40	60	100	3
24CBL801	PR	Project Work	0	0	24	24	40	60	100	9
Total			**0**	**0**	**24**	**24**	**40**	**60**	**100**	**15**

Professional Elective – IV	
4A	Wireless Networks
4B	Exploratory Data Analytics
4C	Data Stream Mining

Professional Elective – V	
5A	Prompt Engineering & AI Tools
5B	Large Language Models
5C	Quantum Computing

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

CSE (Cyber Security)

Honor Course List W.E.F. A.Y. 2024-25 (R24)

Course Code	Course Title	Scheme of Instruction (Hours per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total	
24CBH4A	Advanced Data Structures & Algorithms	3	0	2	5	50	50	100	4
24CBH5A	Advanced Database Management Systems	3	0	2	5	50	50	100	4
24CBH6A	Realtime Operating Systems	3	0	2	5	50	50	100	4
24CBH7A	Agentic AI	3	0	2	5	50	50	100	4

AUTOMATA THEORY & COMPILER DESIGN

III B. Tech. – V Semester (Code: 24CB501)

Lectures:	3 Hours/week	Tutorial:	0 Hours/week	Practical:	0 Hours/week
CIE Marks:	40	SEE Marks:	60	Credits:	3

Pre-Requisite: Basic Mathematics, Programming.

Course Objectives: Students will be able to

➢	To design and analyze finite automata and regular expressions to define and process formal languages.
➢	To equip with the fundamentals of compiler design, covering lexical analysis, language processing structures, and the formal properties of CFGs.
➢	To master the principles and implementation of syntax analysis, predictive parsing, and the fundamentals of LR bottom-up parsing techniques.
➢	To understand the transformation of source code into machine-executable instructions by designing intermediate representations and implementing efficient back-end code generation strategies.

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

CO1	Employ finite state machines to solve problems in computing and classify machines by their power to recognize languages.
CO2	Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.
CO3	Ability to implement semantic rules into a parser that performs attribution while parsing and apply error detection and correction methods
CO4	Apply the code optimization techniques to improve the space and time complexity of programs while programming

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	POs											PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	3	-	-	-	-	-	2	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	2	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	2	3	3	3

UNIT-1 (12 Hours)

Finite Automata: Introduction to finite automata, Deterministic finite automata(DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Transition function, the language of DFA, Non deterministic finite automata (NFA) – Definition ofNFA, Transition function, the language of NFA, ϵ – transition

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions

UNIT-2 (12 Hours)

Context Free Grammars: Context Free Grammars, Parse Trees, ambiguous grammars, Normal forms.

Introduction: Language Processors, The Structure of a Compiler.

Lexical Analysis: The Role of the Lexical Analyser, Input Buffering, Specification of Tokens,

Recognition of Tokens.	
UNIT-3	**(12 Hours)**
Syntax Analysis: Introduction, Writing a Grammar: elimination of left recursion, left factoring, Top-Down Parsing: FIRST and FOLLOW, LL (1) Grammars, Non-recursive Predictive Parsing. **Bottom-Up Parsing:** Introduction to LR Parsing, Simple LR	
UNIT-4	**(12 Hours)**
Intermediate-Code Generation: Intermediate code representation, Syntax-Directed Translation schemes for Arithmetic, Boolean expressions. **Code Generation:** Issues in the Design of a Code Generator, Basic Blocks and Flow Graphs, A Simple Code Generator.	
Text Books :	1. John E.Hopcroft, Rajeev Motwani, & Jeffery D. Ullman, "Introduction to Automata Theory Languages and Computations", Pearson Education, 2008, Third Edition. 2. Alfred V.Aho, RaviSethi, JD Ullman, "Compilers Principles, Techniques and Tools", Pearson Education, Second Edition, 2013
References :	1. KLP Mishra & N.Chandrasekharan, -"Theory of Computer Science: Automata, Languages and Computation", PHI,2006,Third Edition 2. Alfred V.Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa publishing. 3. Andrew N. Appel, "Modern Compiler Implementation in C", Cambridge University Press.

Cryptography & Network Security III B. Tech. – V Semester (Code: 24CB502)					
Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Computer Networks (24CB401)

Course Objectives:

- know about security services, attacks and various encryption techniques.
- understand the concept of public key cryptography and study about message authentication and hash functions.
- Understand the digital signature, key management and email security mechanisms.
- impart knowledge on Transport layer & Network layer security

Course Outcomes: Students will be able to:

CO1	Classify the symmetric encryption techniques.
CO2	Illustrate various Public key cryptographic techniques.
CO3	Evaluate the authentication and hash algorithms.
CO4	Understand authentication applications.

Course Outcomes, Program Objectives & Program Specific Objectives Mapping

CO	Pos												PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	2	3	3	-	-	-	-	-	-	-	-	-	3	2	2
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	2	2
CO4		2	3	-	-	-	-	-	-	-	-	-	-	2	2

UNIT-1 (12 Hours)

Introduction: Security Goals, Attacks, Service and Mechanism, Techniques
Traditional symmetric key ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers
Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES
Encipherment using Modern Symmetric Key Ciphers: Use of Modern Block Ciphers

UNIT-2 (12 Hours)

Advanced Encryption Standard: Introduction, Transformations, Key Expansion, Ciphers.
Asymmetric Key Cryptography: Introduction, RSA Cryptosystem, Robin Cryptosystem,

Elgamal Cryptosystem. **Message Integrity and Message Authentication:** Message Integrity, Message Authentication. **Cryptographic Hash Functions:** Introduction, SHA-512.	
UNIT-3	**(12 Hours)**
Digital Signatures: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Standard. **Key Management:** symmetric key distribution, Kerberos, Symmetric Key Agreement, Public Key Distribution. **Security at the Application Layer:** E-Mail, PGP.	
UNIT-4	**(12 Hours)**
Security at the Transport Layer: SSL Architecture, Four Protocols, SSL Message Format, Transport Layer Security. **Security at the Network Layer:** Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange, ISAKMP.	
Text Books :	Cryptography and Network Security - Behrouz A. Forouzan
References :	1. William Stallings "Cryptography and Network Security" 4th Edition, (Pearson Education/PHI). 2. Kaufman, Perlman, Speciner, "NETWORK SECURITY", 2nd Edition, (PHI / Eastern Economy Edition) 3. Trappe & Washington, "Introduction to Cryptography with Coding Theory", 2/e, Pearson.

ETHICAL HACKING & SOCIAL ENGINEERING

III B. Tech. – V Semester (Code: 24CB503)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Operating Systems(24CB402), Kali Linux Virtual Lab Setup(24CBL401)

Course Objectives: Students will be able to

➢	Learn about hacking, ethical hacking and footprinting tools
➢	Know the Installations of (VMWare, Kali Linux, Windows OS, Veil framework), concepts for hacking a system and information of a system using metasploit framework and meterpreter shell commands.
➢	Learn the Installations of DVWA & LOIC, know how to perform cyber security attacks on web application & prevention.
➢	Know the Social Engineering, attacks & prevention methods.

Course Outcomes: Students will be able to

CO1	Understand hacking, ethical hacking, hackers and use the footprinting tools
CO2	Install the (VMWare, Kali Linux, Windows OS, Veil framework), practice the hacking & gathering information of a system using metasploit frame work and meterpreter shell commands
CO3	Install the (DVWA & LOIC), Practice the cyber security attacks on web application & prevention
CO4	Practice the Social Engineering attacks & understand prevention methods.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos												**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	2	3	-	-	2	1	-	-	3	2	-	1
CO2	-	-	2	2	3	-	-	2	1	-	-	3	3	-	1
CO3	-	-	-	-	3	-	-	2	1	-	-	3	3	-	1
CO4	-	-	1	1	-	-	-	2	-	-	-	3	2	-	1

UNIT-1 (12 Hours)

Introduction:- Hacking, Ethical Hacking, Types of hacking, Benefits of Hacking, Limitations of Hacking, Purpose of Hacking, Key terms of Hacking, Hackers classification, Phases involved in hacking, Hacker Mind set.

Footprinting and Reconnaissance: Introduction to footprinting, footprinting types, footprinting objectives, tools.

UNIT-2	**(12 Hours)**
Malware & Exploits: Virus, worm, trojan, ransomware, keyloggers, Exploit kits, payloads, backdoors, Threat intelligence basics. **Metasploit Tutorial:** Metasploit overview, picking an exploit, Setting exploit options, Picking a payload, Setting payload options, Running the exploit. **Meterpreter Shell:** Basic Meterpreter Commands, Core commands, File system Commands, Network Commands, System Commands, Capturing Webcam Video, Screen shots.	
UNIT-3	**(12 Hours)**
Security of Applications: Improper data / Input validation, Authentication and Authorization attacks, Security misconfiguration, Information disclosure, Buffer overflow issues, Broken session management **Attack Vectors:** Network-based attacks, Web attacks, System attacks, Cloud security threats **Cyber security attacks:** SQL injection attack (sqlmap), cross-site scripting, denial of service, session hijacking on a web application. **Web application security:** Importance and usage of mod_security.	
UNIT-4	**(12 Hours)**
Social Engineering: Social Engineering Overview, Definition(s) of Social Engineering. **The Social Engineering Life Cycle:** Foot printing, Establishing Trust, Psychological Manipulation, The Exit. **Social Engineering Attack Cycle**: Research, Developing Rapport and Trust, Exploiting Trust Factor, Exploiting Trust Factor, Recruit & Cloak, Evolve/Regress. **Different Types of Social Engineering**: Physical Social Engineering, Remote Social Engineering, Computer-based Social Engineering, Social Engineering by Email, Phishing & Social Engineering Prevention	

Text Books:	1. Michael T. Simpson, "Hands-On Ethical Hacking and Network Defense", Cengage, Fourth Edition, 2022. 2. Basic Security Testing with Kali Linux -Daniel W. Dieterle
References:	1. Hacking exposed web applications - JOEL SCAMBRAY MIKE SHEMA 2. W. Stallings and L. Brown, Computer Security: Principles and Practice, 4th ed. Pearson, 2018.

INTRODUCTION TO INFORMATION SECURITY AND CYBER LAWS

(Professional Elective -I)

III B.Tech – V Semester (Code: 24CB504/PE1A)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None

Course Objectives: Students will be able to

➢	Comprehend Information systems and importance of security
➢	Gain knowledge of application security and counter measures for the threats
➢	Understand the architecture and design of security governance and risk management
➢	Learn security policies and cyber laws

Course Outcomes: Students will be able to

CO1	Know the importance of Information systems and importance of security
CO2	Gain knowledge of application security and counter measures for the threats
CO3	Understand the architecture and design of security governance and risk management
CO4	Learn security policies and cyber laws

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos												**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	1	-	-	-	3	-	3	-	-	-	2	3	2	3
CO2	1	1	-	-	-	3	-	3	-	-	-	2	3	2	3
CO3	1	1	-	-	-	3	-	3	-	-	-	2	3	2	3
CO4	1	1	-	-	-	3	-	3	-	-	-	2	3	2	3

UNIT-1 **(12 Hours)**

Introduction to Information Systems and Security: Information Systems, Types of IS, Development of IS, Introduction to Information Security, Need for Information Security, Threats to Information Systems, Information Assurance, Cyber Security, Security Risk Analysis.

UNIT-2 **(12 Hours)**

Introduction to Application Security and Counter Measures: Introduction to Application Security, Data Security Considerations, Security Technologies, Security Threats, Security Threats to E-Commerce, E-Cash and Electronic Payment System, Credit/Debit/Smart Cards, Digital Signature, Cryptography and Encryption.

UNIT-3	**(12 Hours)**
Introduction to Security Measures: Secure Information System Development, Application Development Security, Information Security Governance and Risk Management, Security Architecture and Design, Security Issues in Hardware, Data Storage, and Downloadable Devices, Physical Security of IT Assets, Backup Security Measures.	
UNIT-4	**(12 Hours)**
Introduction to Security Policies and Cyber Laws: Need for an Information Security Policy, Information Security Standards – ISO, Introducing Various Security Policies and Their Review Process, Introduction to Indian Cyber Law Objective and Scope of the IT Act, 2000, Intellectual Property Issues, Overview of Intellectual-Property- Related Legislation in India, Patent, Copyright, Law Related to Semiconductor Layout and Design, Software License.	
Text Books:	"Introduction to Information Security and Cyber Laws" by Dr. Surya Prakash Tripathi, Ritendra Goel, Praveen K. Shukla, Kogent Learning Solutions Inc. and Dreamtech Press., 2021
References:	Information Security and Cyber laws by Aatif Jamshed

ARTIFICIAL INTELLIGENCE

(Professional Elective – I)

III B.Tech – V Semester (Code: 24CB504/PE1B)

Lectures	3 Hours	Tutorial	0	Practical	0	Credits	3
Continuous Internal Evaluation			40	Semester End Examination			60

Pre-Requisite: Data Structures(24CB303), Design and Analysis of Algorithms (20CB405), Discrete Mathematics (24CB205).

Course Objectives: Students will be able to

➢	Understand the fundamentals of Artificial Intelligence, intelligent agents, and problem-solving using uninformed and informed search strategies.
➢	Understand the knowledge representation using propositional and first-order logic, and reasoning through inference mechanisms.
➢	Develop the ability to model knowledge using structured representations and apply planning techniques to solve complex problems.
➢	Familiarize with basic learning techniques and the design of expert systems for intelligent decision-making.

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

CO1	Comprehend the underlying ideas of artificial intelligence, as well as their environment and different search methods.
CO2	Represent and reason about knowledge using propositional logic and first-order logic, including inference mechanisms.
CO3	Apply knowledge representation methods and planning techniques to model and solve real-world problems.
CO4	Analyze and design basic learning systems and expert systems for an intelligent decision-making.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos											PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	3	3	-	2	2	-	-	-	-	-	2	3	1	2
CO2	3	3	-	3	2	-	-	-	-	-	2	3	1	2
CO3	3	3	2	2	2	-	-	-	-	-	2	3	2	2
CO4	3	3	3	3	2	-	-	1	1	-	2	3	3	3

UNIT-I (12 Hours)

Introduction to AI: What is AI? , Foundations of AI, History of AI, State of the Art. **Intelligent Agents**: Agents and Environments, Good Behavior: Concept of Rationality, The Nature of Environments And The Structure of Agents.

Solving Problems by Searching: Problem Solving Agents, Searching for Solutions, **Uninformed Search Strategies:** Breadth First Search, Uniform Cost Search, Depth First Search, Iterative Deepening DFS and Bi-directional Search.

Informed (Heuristics) Search Strategies: Greedy BFS, A*Algorithm, AND-OR Search trees.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Local Search

in CSP.	
UNIT-II	**(12 Hours)**
Logical Agents: Knowledge Based Agents, The Wumpus World, Logic and Propositional Logic. **Propositional Theorem Proving:** Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and Backward chaining. **First Order Logic:** Representation, Revisited Syntax and Semantics of First Order Logic, Using First Order Logic, Knowledge Engineering in First Order Logic. **Inferences in First Order Logic:** Propositional vs. First Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.	
UNIT-III	**(12 Hours)**
Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information. **Slot and Filler Structures:** Semantic Nets, Conceptual Dependency, Scripts. **Planning:** Overview - An Example Domain, The Blocks World, Component of Planning Systems, Goal Stack Planning, Hierarchical planning, Reactive systems.	
UNIT-IV	**(12 Hours)**
Learning: Introduction to learning, Rote learning, Learning by taking advice, Learning in problem solving, Learning from examples, Induction Learning, Explanation Based Learning. **Expert Systems:** Representing and using domain knowledge, Expert system shells, Explanation, Knowledge Acquisition.	
Text Books :	1. Stuart Russel and Peter Norvig, Artificial Intelligence – A Modern Approach, 3rd Edition, Pearson Education/ PHI.. 2. Elaine Rich & Kevin Knight, Artificial Intelligence, 3rd Edition, (TMH).
References :	1. Patrick Henry Winston. Artificial Intelligence. Pearson Education, 3 edition, 2007. ISBN 81317 15051 2. Saroj Kaushik. Artificial Intelligence. CENGAGE Learning, 1 edition, 2020. ISBN 9788131510995.

PARALLEL ALGORITHMS

(Professional Elective – I)

III B. Tech. – V Semester (Code: 24CB504/ PE1C)

Lectures:	3 Hours/week	Tutorial:	0 Hours/week	Practical:	0 Hours/week
CIE Marks:	40	SEE Marks:	60	Credits:	3

Pre-Requisite: Programming, Design and Analysis of Algorithms (24CB405)

Course Objectives: Students will be able to

➢	Realize the use basic sequential algorithms and Describe about basic parallel algorithms.
➢	Describe and use basic data structures; know about the existence of advanced data structures.
➢	Describe and use the main design techniques for sequential algorithms
➢	Analyze message-passing based parallel algorithms in C using the MPI library.

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

CO1	Elucidate the parallel computing models, and differentiate between sequential and parallel algorithms.
CO2	Analyze the parallel algorithms for CRCW, CREW, EREW models.
CO3	Identify the correctness and analyze the computational complexity of sequential algorithms.
CO4	Differentiate among several algorithms solving the same problem under different conditions.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos											**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	3	3	3	-

UNIT-I (12 Hours)

Introduction to Parallel Algorithms: Models of Computation – Analyzing Algorithms, Selection-The Problem and a lower Bound, A Sequential algorithm, Desirable Properties of Parallel algorithm, An algorithm for parallel Selection.

Merging: A Network for Merging, Merging on the CREW and EREW Models – A better Algorithm for the EREW model.

UNIT-II (12 Hours)

Sorting: A network for Sorting, sorting on a Linear Array, Sorting on CRCW, CREW, EREW Models

Searching: Searching a Sorted Sequence – Searching a Random Sequence, Searching on a tree, searching on Mesh.

UNIT-III (12 Hours)

Generating Permutations and Combinations: Sequential Algorithms, generating permutations in Parallel, generating combinations in Parallel.

Matrix Operations: Transpositions, Matrix by Matrix Multiplications, Matrix by Vector

multiplication.		
UNIT-IV		**(12 Hours)**
Graph Theory: Computing the Connectivity Matrix, Finding Connected Components; All Pairs Shortest Paths, Computing Minimum Spanning Trees. **Applications:** Job Sequencing with Deadlines, Knapsack Problem.		
Text Books :	1. Selim G. Akl, The Design and Analysis of Parallel Algorithms, Prentice Hall, New Jersey, 1989.	
References :	1. Michael J. Quinn, Parallel Computing: Theory & Practice, Tata McGraw Hill Edition, 2003. 2. Justin R. Smith, the Design and Analysis of Parallel Algorithms, Oxford University Press, USA, 1993. 3. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.	

FULL STACK DEVELOPMENT
(Job Oriented Elective -I)
III B. Tech. – V Semester (24CB505/ JOE1A)

Lectures	:	4 hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Client Side Web Technologies (24CB403)

Course Objectives: Students will be able to

- Understand full stack architecture and MERN stack concepts
- Develop interactive user interfaces using React and component-based design
- Build backend applications using Node.js and Express
- Design and implement RESTful APIs
- Manage data using MongoDB and NoSQL concepts
- Apply authentication, validation, and security techniques
- Use Git and GitHub for version control
- Deploy full stack applications using free cloud platforms

Course Outcomes: Students will be able to

CO1	Develop responsive frontend applications using React with hooks and routing
CO2	Design backend services using Node.js and Express with proper architecture
CO3	Build and integrate RESTful APIs using JSON and external services
CO4	Perform database operations using MongoDB including CRUD and aggregation
CO5	Apply authentication, validation, and security practices in applications
CO6	Manage code using GitHub and deploy full stack applications

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CLO1	3	2	3	1	3	-	-	-	2	1	-	2	1	3	1
CLO2	3	2	3	2	3	-	-	-	2	1	-	2	2	3	1
CLO3	3	3	3	2	3	-	-	-	2	2	-	2	3	3	2
CLO4	3	3	2	3	3	-	-	-	1	1	-	2	2	2	2
CLO5	3	2	3	2	3	-	-	-	2	2	-	2	2	3	2
CLO6	3	2	3	1	3	-	-	-	2	2	-	2	3	3	3

UNIT-1 **(12 Hours)**

Frontend Development using React: Introduction to full-stack development, MERN stack architecture, React fundamentals, JSX, components, props, state, Functional components and hooks: useState, useEffect, Event handling and form handling, Component communication, React Router for navigation, Context API for basic state management, Introduction to TypeScript with React, Building responsive UI applications

UNIT-2 **(12 hours)**

Backend Development using Node.js and Express: Introduction to Node.js, runtime environment,
Asynchronous programming: callbacks, promises, async and await, Node.js modules and npm,

Express.js framework, routing, middleware, MVC architecture basics, Handling HTTP requests and responses, Building REST APIs, Error handling and logging, Input validation using express-validator	
UNIT-3	**(12 hours)**
Database and API Integration: REST architecture principles and API design standards, HTTP status codes, pagination techniques, Introduction to NoSQL databases and MongoDB, MongoDB Atlas setup and tools, CRUD operations and schema design, Data modeling techniques, Integration of Node.js with MongoDB, Authentication using JSON Web Tokens, API testing using Postman	
UNIT-4	**(12 hours)**
Advanced Topics and Deployment: Application security fundamentals, password hashing using bcrypt, authorization and protected routes, file handling basics, performance optimization techniques, introduction to testing using Jest, version control using Git, GitHub workflows, branching and merging, deployment of frontend using Vercel or Netlify, deployment of backend using Render or Railway, environment variables and configuration management.	
Text Books :	1. Alex Young, Bradley Meck, Mike Cantelon, Tim Oxley, Marc Harter, T.J. Holowaychuk, and Nathan Rajlich. **Node.js in Action**. Manning, 2 edition, 2017. ISBN 9789386052049. 2. Evan M. Hahn, **Express in Action**, Manning Publications 2nd Edition., ISBN: 9781617292422. 3. Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, and Tim Hawkins. **MongoDB in Action**. Manning, 2 edition, 2016. ISBN 9789351199359.
References :	**1. Node.js, MongoDB and Angular Web Development** (Second Edition), Brad Dayley, Brendan Dayley Caleb Dayley, Addison-Wesley Professional., 2017, ISBN: 978-0134655536.

CLOUD PROGRAMMING

(Job Oriented Elective -I)

III B. Tech. – V Semester (24CB505/ JOE1B)

Lectures	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Problem Solving using Programming (24CB204), Object Oriented Programming (20C4B304), Operating Systems (24CB402),Client-Side Web Technologies (24CB403),Computer Networks (20CS502)

Course Objectives: Students will be able to

- Understand the Cloud Computing environment, Windows Azure platform, and Azure websites service.
- Configure Visual Studio with Azure SDK, develop applications to demonstrate Azure storage services – Blob, Table, Queue and Files. Learn the concept of Azure storage Security.
- Demonstrate the concepts of Azure Virtual Machines and Azure Virtual Networks, Azure SQL.
- Learn Service Bus, Azure Active Directory, Azure Key Vault.

Course Outcomes: Students will be able to

CO1	Configure visual studio with Azure SDK. Understand the basics of cloud computing, design and deploy ASP .NET web forms and MVC web sites to Azure cloud environment using VS.
CO2	Design cloud service applications to demonstrate Azure storage services-Blob table queue and files.
CO3	Create and configure Azure virtual machines, Azure virtual networks and Azure SQL.
CO4	Write c# applications to access service bus.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos												PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-1 (12 Hours)

Introduction to Cloud Computing & Windows Azure Platform – What is Azure?, Overview of Cloud Computing, Comparison of on-premises versus Azure, Service models, Deployment models, Azure services, Azure Resource Manager, Azure subscriptions, Azure registration, Exploring Management portal.

Windows Azure Websites – Visual Studio – Introduction to .NET Framework, Introduction to ASP.NET, Razor syntax, Forms and validation, Working with data, Creating and publishing simple and database driven ASP.NET web sites.

UNIT-2	**(12 Hours)**
Cloud Applications - Software Development Kits, Windows Azure Tools for Visual Studio, Cloud Project with a Web Role, Deployment to Windows Azure, Configuration and Upgrading, Service Definition File, Service Configuration File and Role Properties. Cloud applications using ASP.NET. Windows Azure Storage - Local Storage Vs Azure Storage, Windows Azure Storage Account, Windows Azure Management Tool, Blobs, Tables, Queues, Files. Worker Roles - Queue Service. Security and Azure Storage - Securing your storage account, Securing access to your data, Securing your data in transit, Encryption at rest, Using Storage Analytics to audit access, Using Cross-Origin Resource Sharing (CORS).	
UNIT-3	**(12 Hours)**
Virtual Machines – Introduction to Azure Virtual Machine, Virtual machine models, Virtual machine components, Virtual Machine creation, connecting to a virtual machine, configuring and managing virtual machine, scaling Azure virtual machine, Installing SQL server and J2EE Platform, Connecting to SQL Server on Virtual Machine. **Azure Virtual Networks –** Introduction, Network Security Groups, Cross-premises connection options, Point-to-site network. **Azure SQL** – Azure SQL Features, Database Server Creation in the Cloud, Azure SQL Relational Engine Features, Azure SQL Access, Existing Database Migration, Applications connecting to SQL Azure.	
UNIT-4	**(12 Hours)**
Service Bus - Service Bus, Relayed messaging, Brokered Messaging- Queues, Topics. **Azure Active Directory** - Overview of Azure Active Directory, Creating a directory, Users and groups, Multi-Factor Authentication, Application gallery. **Azure Key Vault** - Basic concepts, Terminology used in Azure Key Vault, Ways to access Keys and Secrets in a Key Vault, Steps to authenticate an application with the Key Vault, Benefits of using Azure Key Vault.	
Text Books :	1. Windows Azure Technical Documentation Library-MSDN-Microsoft. (msdn.microsoft.com/en-us/library/windowsazure) 2. Lydford, Steve. Building ASP. NET web pages with Microsoft WebMatrix. Apress, 2012. 3. Collier, Michael, and Robin Shahan. Microsoft Azure Essentials-Fundamentals of Azure. Microsoft Press, 2015. 4. https://www.encryptionconsulting.com/introduction-to-azure-key-vault/
References :	1. C# 4.0 The Complete Reference by Herbert Schildt, Tata McGraw Hill, 2010. 2. Beginning ASP.NET 4.5 in C#‖, Matthew MacDonald, Apress Publishing Company. 3. Moroney, Laurence. Introducing Microsoft® WebMatrixTM. " O'Reilly Media, Inc.", 2011. 4. Brunetti, Roberto. Windows Azure step by step. Microsoft Press, 2011. 5. Krishnan, Sriram. Programming Windows Azure: Programming the Microsoft Cloud. " O'Reilly Media, Inc.", 2010.

ENTERPRISE PROGRAMMING

(Job Oriented Elective -I)

III B. Tech. – V Semester (24CB505/ JOE1C)

Lectures	:	3 Hours /week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: Object Oriented Programming(20CB304), Client-Side Web Technologies (24CB403)

Course Objectives: Students will be able to

- Develop an application using servlets and JDBC.
- Design an application using JSP and JSF.
- Create an application on web services and web sockets.
- Code an enterprise application using EJBs and Persistence API.

Course Outcomes: Students will be able to

CO1	Understand J2EE as an architecture and platform for building and deploying web-based enterprise applications. Learn how to build database-driven, Web applications using Java. Demonstrate the functionality of Java Servlets.
CO2	Demonstrate the functionality of JSP and JSF applications
CO3	Develop Web Service and Socket applications.
CO4	Understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos												**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-1 (12 Hours)

The Big Picture: Java EE Architecture, The Many Variations of Java EE Applications, Packaging and Deploying the Java EE Application, Java EE Platform and Implementations.

Classic Memories - JDBC: Introduction to JDBC, Structured Query Language, The JDBC APIs.

Java Servlets and Web Applications - Foundations of the Web Tier: The HTTP Protocol, Introducing Java Servlets, Understanding the Java Servlet API, Web Applications, Java Servlets: The Good and the Bad.

UNIT-2	(12 Hours)

Dynamic Web Pages - JSP: JSP Runtime Architecture, JSP Syntax, The Java Environment for JSPs, JSP Standard Tags, Custom Tag Libraries, Expression Language.

Assembling Dynamic Web Pages - JavaServer Faces: Architecture of a JSF Application, JavaServer Faces Tags, Java EE Managed Beans, f: Core Tags, JSTL Core Tags, Extensibility and Modularity.

UNIT-3	(12 Hours)

Web Sites for Non-browsers - JAX-RS: What Are RESTful Web Services, The Java API for RESTful Web Services, Deploying JAX-RS Resources, Content Production, Content Consumption, Accessing Web Service Context, Exception Mapping, Number of Instances of Resource Classes, Path Mapping.

JSON Processing : Streaming API : Consuming JSON Using the Streaming API, Producing JSON Using the Streaming API; **Object Model API :** Consuming JSON Using the Object Model API , Producing JSON Using the Object Model API.

Adding Sparkle - Java WebSockets: Introduction to the WebSocket Protocol, The WebSocket Lifecycle, Overview of the Java WebSocket API, Java WebSocket Encoders and Decoders, Message Processing Modes, Path Mapping, Deployment of Server Endpoints.

UNIT-4	(12 Hours)

The Fundamentals of Enterprise Beans: Introduction to Enterprise Beans, Hello Enterprise Beans, Flavors of Enterprise Beans, Exposing Enterprise Beans, Finding Enterprise Beans, EJB Lifecycle, Packaging Enterprise Beans.

Advanced Thinking with Enterprise Beans: Multi-threading and Enterprise Beans, Asynchronous Enterprise Beans, Enterprise Bean Contexts, The Timer Service, Transactions and Enterprise Beans, Interceptors.

Modern Memories - The Java Persistence API: Persistence Entities, The Entity Manager, Java Persistence Query Language, Configuring JPA Applications.

Text Books :	1. Dr. Danny Coward, "Java EE 7: The Big Picture", oracle press. 2. Arun Gupta "Java EE 7 Essentials" O'Reilly.
References :	Antonio Goncalves "Beginning Java EE 7" apress.

VULNERABILITY ASSESSMENT & PENETRATION TESTING LAB
(Skill Enhancement Course-III)
III B. Tech. –V Semester (Code: 24CBL501/SEC3)

Practicals	:	5Hours/Week (2T+3P)	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Pre-Requisite: Operating Systems (24CB304), Kali Linux Virtual Lab Setup(24CBL401/SEC2)

Course Objectives: Students will be able to:

CO1	Introduce Vulnerability Assessment and Penetration Testing
CO2	To be familiar with the Penetration Testing and Tools
CO3	To get an exposure to Metasploit exploitation tool, Linux exploit and Windows exploit
CO4	To gain knowledge on Web Application Security Vulnerabilities, Vulnerability analysis and Malware analysis

Course Outcomes:

CO1	Apply the concepts of vulnerability assessment and penetration testing
CO2	Implement penetration and security test
CO3	Schedule security and counterattack in network
CO4	make use of web application testing

LIST OF EXPERIMENTS

1. Perform reconnaissance to find all the relevant information on selected website using Kali Linux.
2. Verify to check the robustness of application to sustain in SQL Injection attack
3. Verify the application for Cross-Site Scripting.
4. Verify the use of registry entries to check for the availability of sensitive data.
5. Check if the web application is able to identify spam attacks on contact forms used on the website.
6. Use password guessing tools to guess a password. Use password strengthening tools to strengthen the password. Try guessing the password and tabulate the enhanced difficulty due to length of password and addition of special characters.
7. Set up Kali Linux in a Virtual machine to find the DNS info.
8. Verify if the system or network is secured from DoS (denial-of-service) attacks.
9. Check for an uncontrolled format string attack.
10. Verify if the error page is displaying any information which is vulnerable.

Text Books :	
References :	

ETHICAL HACKING & SOCIAL ENGINEERING LAB

III B. Tech. –V Semester (Code: 24CBL502)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Operating Systems (24CB304), Kali Linux Virtual Lab Setup**(**24CBL401/SEC2)

Course Objectives: Students will be able to

➢	Learn about footprinting tools.
➢	Know the Installations of (VMWare, Kali Linux, Windows OS, Veil framework), concepts for hacking a system and information of a system using metasploit framework and meterpreter shell commands.
➢	Learn the Installations of DVWA & LOIC, know how to perform cyber security attacks on web application & prevention.
➢	Know the Social Engineering attacks & prevention methods.

Course Outcomes: Students will be able to

CO1	Practice the footprinting tools for information gathering.
CO2	Install the (VMWare, Kali Linux, Windows OS, Veil framework), practice the hacking & gathering information of a system using metasploit frame work and meterpreter shell commands
CO3	Install the (DVWA & LOIC), Practice the cyber security attacks on web application & prevention
CO4	Practice the Social Engineering attacks & understand prevention methods.

	Pos												**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	3	-	-	3	2	-	-	3	3	-	-
CO2	-	-	2	-	3	-	-	3	2	-	-	3	3	-	-
CO3	-	-	2	-	3	-	-	3	2	-	-	3	3	-	-
CO4	-	-	-	-	3	-	-	3	2	-	-	3	3	-	-

LIST OF EXPERIMENTS

1. Foot printing and Reconnaissance tools.
2. Installations:- VM-ware, kali, windows OS, Veil frame work.
3. Hacking any windows OS by using Metasploit Frame work.
4. Installations:- DVWA, LOIC .
5. Web application penetration testing with Burp Suite.
6. Cyber security attacks:-
   a) Sql-injection,
   b) XSS attack
   c) Denial of service attack
   d) Session hijacking.
7. Installation and usage of mod_security for web application security.
8. Phishing attacks with Setoolkit.
9.

References :	1. Basic Security Testing with Kali Linux -Daniel W. Dieterle 2. Hacking exposed web applications - JOEL SCAMBRAY MIKE SHEMA

FULL STACK DEVELOPMENT LAB

(Job Oriented Elective -I Lab)
III B. Tech. – V Semester (24CBL503/JOEL-1A)

Lectures	:	4 hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Client Side Web Technologies Lab (24CBL403)

Course Objectives: Students will be able to

➢	Develop practical skills in building full stack applications using modern technologies
➢	Implement server-side logic and client-side interfaces
➢	Integrate APIs and databases in real-time applications
➢	Deploy applications and manage source code using version control

Course Outcomes: Students will be able to

CO1	Develop Node.js applications demonstrating asynchronous programming and file handling
CO2	Build dynamic web applications using Express and REST APIs
CO3	Integrate MongoDB database operations in applications
CO4	Develop and deploy complete full stack applications using MERN stack

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	1	3	-	-	-	1	1	-	2	2	3	2
CO2	2	3	3	2	3	-	-	-	2	2	1	2	2	3	2
CO3	3	3	3	2	3	-	-	-	1	2	-	2	3	3	2
CO4	3	3	3	2	3	-	-	-	1	2	1	2	2	2	2

List of Experiments

1. Develop a Node.js program to demonstrate synchronous and asynchronous operations
2. Build a server-side application to store and manage book ratings and reviews using in-memory data
3. Develop a Node.js web server for file handling and streaming
4. Demonstrate MongoDB operations using MongoDB Compass
5. Demonstrate MongoDB operations using MongoDB Shell
6. Develop a Node.js application to perform CRUD operations
7. Design and implement a REST API and use it in an Express application such as a notes system
8. Create a Blog Management System using Express routing
9. Build a Social Media Posts API using Express with features such as like, share, and comment

10. Build a Student Records System using MongoDB query operators
11. Develop a mini e-commerce application using Express with session and cookie handling
12. Create a Sales Report System using aggregation operations such as group, sum, and average
13. Develop a Library Management System with proper data validation and integrity

Each student shall complete one end-to-end full stack project including frontend, backend, database, authentication, and deployment using GitHub.

Text Books :	1. Alex Young, Bradley Meck, Mike Cantelon, Tim Oxley, Marc Harter, T.J. Holowaychuk, and Nathan Rajlich. **Node.js in Action**. Manning, 2 edition, 2017. ISBN 9789386052049. 2. Evan M. Hahn, **Express in Action**, Manning Publications 2nd Edition., ISBN: 9781617292422 3. Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, and Tim Hawkins. **MongoDB in Action**. Manning, 2 edition, 2016. ISBN 9789351199359 4. **Node.js, MongoDB and Angular Web Development** (Second Edition), Brad Dayley, Brendan Dayley Caleb Dayley, Addison-Wesley Professional., 2017, ISBN: 978-0134655536.
References :	1. **Node.js, MongoDB and Angular Web Development** (Second Edition), Brad Dayley, Brendan Dayley Caleb Dayley, Addison-Wesley Professional., 2017, ISBN: 978-0134655536.

CLOUD PROGRAMMING LAB

(Job Oriented Elective-1-Lab)
IV B. Tech. – VII Semester (Code: 24CBL502/JOEL1-B)

Practicals	:	3 Hours/Week	Continuous Assessment	:	30
Final Exam	:	3 hours	Final Exam Marks	:	70

Pre-Requisite: Problem Solving using Programming Lab (20CBL203), Object Oriented Programming Lab (20CBL303)

Course Objectives: Students will be able to

- Understand the Cloud Computing environment, Windows Azure platform, and Azure websites service.
- Configure Visual Studio with Azure SDK, develop applications to demonstrate Azure storage services – Blob, Table, Queue and Files. Learn the concept of Azure storage Security.
- Demonstrate the concepts of Azure Virtual Machines and Azure Virtual Networks, Azure SQL.
- Learn Service Bus, Azure Active Directory, Azure Key Vault.

Course Outcomes: Students will be able to

CO1	Configure Visual Studio with Azure SDK. Understand the basics of Cloud computing, design and deploy ASP.NET Razor Pages websites to Azure Cloud Environment using Visual Studio.
CO2	Design Cloud Service applications to demonstrate Azure storage services – Blob, Table, Queue and Files.
CO3	Create and configure Azure Virtual Machines, Azure Virtual Networks, and Azure SQL.
CO4	Write C# applications to access Service Bus.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos												PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Create Azure Student subscription and explore the Azure management portal.
2. Design an ASP.NET MVC website to perform CRUD operations on a SQL Server database with search option and validation.
3. Design Cloud Service with WebRole to demonstrate Windows Azure Blob Storage.
4. Design Cloud Service with WebRole to demonstrate Windows Azure Table Storage.
5. Design Cloud Service with WebRole and WorkerRole to demonstrate Windows Azure Queue Storage.
6. Design Cloud Service to demonstrate Windows Azure Files Storage.

7. Create Azure Virtual Machine and configure with Microsoft SQL Server, and J2EE platform to host web applications.
8. Design a Cloud service (or) C# Console Application to access Virtual Machine SQL Server database.
9. Design Cloud Service (or) C# Console Application to access Azure SQL.
10. Write C# Console Application to implement Service Bus Relayed Messaging.
11. Write C# Console Application to implement Service Bus Brokered Messaging using Queues.
12. Write C# Console Application to implement Service Bus Brokered Messaging using Topics.

Text Books :	1. Windows Azure Technical Documentation Library-MSDN-Microsoft. (msdn.microsoft.com/en-us/library/windowsazure) 2. Lydford, Steve. Building ASP. NET web pages with Microsoft WebMatrix. Apress, 2012. 3. Collier, Michael, and Robin Shahan. Microsoft Azure Essentials-Fundamentals of Azure. Microsoft Press, 2015.
References :	1. C# 4.0 The Complete Reference by Herbert Schildt, Tata McGraw Hill, 2010. 2. Beginning ASP.NET 4.5 in C#‖, Matthew MacDonald, Apress Publishing Company. 3. Moroney, Laurence. Introducing Microsoft® WebMatrixTM. " O'Reilly Media, Inc.", 2011. 4. Brunetti, Roberto. Windows Azure step by step. Microsoft Press, 2011. 5. Krishnan, Sriram. Programming Windows Azure: Programming the Microsoft Cloud. " O'Reilly Media, Inc.", 2010.

ENTERPRISE PROGRAMMING LAB

(Job Oriented Elective – I Lab)

III B.Tech – V Semester (Code: 24CBL503/JOEL1-C)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Evaluation			40	Semester End Examination			60

Pre-Requisite: Object Oriented Programming Lab (24CBL303), Client Side Web Technologies Lab (24CBL403) and RDBMS Lab (24CBL404)

Course Objectives:

- Develop an application using Servlets and JDBC.
- Design an application using a RESTful Web Service.
- Create an application on Enterprise Beans.
- Code an enterprise application using Spring Boot and Quarkus.

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

CO1	Develop an application using Servlets and JDBC.
CO2	Design an application using a RESTful Web Service.
CO3	Create an application on Enterprise Beans.
CO4	Code an enterprise application using Spring Boot and Quarkus.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	Pos											PSOs		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write a JDBC application to implement DDL and DML commands.
2. Write an application to demonstrate HTTP Servlets.
3. Write an application to demonstrate cookie & Sessions.
4. Write an application to demonstrate RESTful Web Services.

5. Write an application to demonstrate Jakarta Context and Dependency Injection**.**
6. Write an application to demonstrate a Session Bean.
7. Write an application to demonstrate an Entity Bean (persistence).
8. Write an application to demonstrate a Message-Driven Bean.
9. Write an application to implement a CRUD application with Spring Boot.
10. Write an application to implement a CRUD application with Quarkus.

Text Books :	1. Jakarta EE for Java Developers - Build Cloud-Native and Enterprise Applications Using a High-Performance Enterprise Java Platform Rhuan Rocha. 2. Java real-world projects - a pragmatic guide for building modern java applications.
References :	1. Jakarta application development develop enterprise applications using the latest versions of cdi-jakarta-restful-web-services-jakarta-json-binding-jakarta-persistence-security-and-more-2nd-edition. 2. Cloud native applications with jakarta EE build-design-and-deploy-cloud-native-applications-and-microservices-with-jakarta EE.

SUMMER INTERNSHIP-1 III B.Tech – V Semester (Code: 24CBL504/INT01)					
Lectures:	0 Hours/week	Tutorial:	0 Hours/week	Practical:	0 Hours/week
CIE Marks:	00	SEE Marks:	100	Credits:	2

Pre-Requisite: None.

Course Objectives: To make the students

- To enable students to apply academic concepts to practical, real-world computer science problems.
- To cultivate essential professional competencies, including teamwork, communication, critical thinking, problem-solving, and time management.
- To provide a realistic understanding of industry practices, work culture, and the day-to-day operations of a technology company.
- To expose students to ethical considerations and professional conduct in a corporate setting.

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

CO1	To apply and adapt industry knowledge to solve practical problems in a professional setting.
CO2	Demonstrate improved teamwork, communication, problem-solving, and time management skills.
CO3	Build a professional network by interacting with industry professionals and peers.
CO4	Real projects to add to their portfolio, providing tangible evidence of their abilities.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	POs											**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	3	3	2	2	2	-	2	3	3	-	3	3	2	2
CO2	3	3	2	2	2	-	2	3	3	-	3	3	2	2
CO3	3	3	2	2	2	-	2	3	3	-	3	3	2	2
CO4	3	3	2	2	2	-	2	3	3	-	3	3	2	2

Guidelines and Evaluation of Internship Program

As per R24 guidelines, every student has to undergo internship twice, once between IV and V semester, the other between VI and VII Semester. The first internship is for duration of 4 weeks and the second internship is for duration of 6 weeks.

There shall be a departmental internship committee consisting of the Head of the Department and two faculty members nominated by the HOD. The committee shall identify the potential

organizations which can provide internship opportunity to the students. The department shall enter into an MOU with the concerned organization and the details will be shared with the students.

The students shall be informed to apply for undergoing internship in the specified proforma. The details and consent of the organization in which he/she is seeking for internship are to be furnished. Further, the student along with the parent must submit an undertaking form. The committee shall scrutinize the applications and approve the same. If a student fails to acquire internship, he/she may be permitted to undergo equivalent work (mini project, research project, fabrication work, field work, research paper, etc.,) in the department under the guidance of a faculty member.

After the completion of the internship, the student must submit the report and attend a departmental internal assessment for award of grade and credits.

Weightage for Evaluation: The various stages of evaluation and weightage at each stage are given below.

Stage	Marks	Remarks
Internship Certificate	20M	Company Supervisor will assess the interns in the internship company premises. Company supervisor assesses the intern and provide certificate
Report Submission	30M	After the completion of the internship, the student must submit the report along with certificate.
Final Assessment – in the college premises	50M	The HOD of the concern department acts as convener of the committee and two faulty members are members to assess the intern's performance

CAMPUS RECRUITMENT TRAINING III B. Tech. – V Semester (Code: 24CB506/MC03)					
Lectures:	2 Hours/week	Tutorial:	0 Hours/week	Practical:	0 Hours/week
CIE Marks:	40	SEE Marks:	00	Credits:	0.0

Pre-Requisite: None

Course Objectives: Students will be able to

➢	Develop a clear understanding of the fundamentals of communication, including types, barriers, and effective communication principles (7C's).
➢	Enhance vocabulary and grammar skills to improve accuracy and clarity in both spoken and written English.
➢	Build proficiency in listening, speaking, and reading skills for academic and professional contexts.
➢	Acquire essential writing and soft skills required for professional excellence, including leadership, teamwork, and time management.

Course Outcomes: Students will be able to

CO1	Demonstrate effective communication skills by applying verbal, non-verbal, and business communication techniques.
CO2	Use appropriate vocabulary and grammatical structures to communicate clearly and accurately in different contexts.
CO3	Exhibit improved listening, speaking, and reading abilities for comprehension, interaction, and presentation.
CO4	Apply writing and soft skills such as teamwork, leadership, problem-solving, and time management in academic and professional environments.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	POs											**PSOs**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	-	-	-	-	-	2	-	2	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	2	1	2	3	3	2	-	-	-

UNIT-1 8 Hours

Definition of Communication, Types- Formal & Informal, Technical Verbal & Non-Verbal, Business Communication, 7C's of communication.

Vocabulary - Active and Passive Vocabulary, Etymology, Industrial terminology, Idioms, Phrasal

Verbs, Adverbs, corporate vocabulary.	
UNIT-2	8 Hours
Grammar Skills - Parts of speech, Subject-Verb agreement, Modal Verbs, Wh- Questions, Yes/No Questions, Question tags, Spotting errors. **Listening Skills** - Short Lecture, Recipe, Telephone conversation, Interview, Self-Introduction, Description of Objects	
UNIT-3	8 Hours
Speaking Skills - Self-Introduction, Picture Description, Narration, Event Management, Role Plays, Interview Preparation, Corporate English, Oral Presentation, Panel Discussions. **Reading Skills** - Reading Strategies, Skimming and Scanning, Reading Poetry, Extracts from Fiction, Reading Comprehension Techniques, Pre-While-Post Reading Techniques, Inference and Summarizing.	
UNIT-4	8 Hours
Writing Skills -Business Communication, E-mails, Notices, Reports, Minutes of a Meeting, Business Correspondence. **Professional Excellence Skills**- Negotiating Skills, Networking skills, Critical Thinking and Creativity, Inter personal Skills, Intra Personal Skills.	
Text Books :	1. Biswajit Das and Ipseeta Satpathy 2009. "Business Communication and Personality Development". Excel Books, New Delhi. 2. Jaidka, Kuldip. 2015. Rich "Vocabulary Made Easy" Mahindra Capital Publishers, Chandigarh. 3. Murphy, Raymond. 2018. "Intermediate English Grammar", Cambridge University Press.
References :	1. Shoba, K.N. and Lourdes Jovani Rayen. 2018. "Communicative English: A Workbook", Cambridge University Press, New Delhi. 2. Rajiv K. Mishra 2004. "Personality Development, Transform Yourself". Rupa Publications, India. 3. Barun K. Mitra 2016. "Business Correspondence and Report Writing". Tata McGraw-Hill Publishing Company Limited, New Delhi. 4. Pushpa Lata 2015. "Communication skills". Oxford University Press, New Delhi.
NPTEL:	https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed67