SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada),
PEDATADEPALLI, TADEPALLIGUDEM-534 101

A.Y: 2023-24

VI SEM CST Handbook

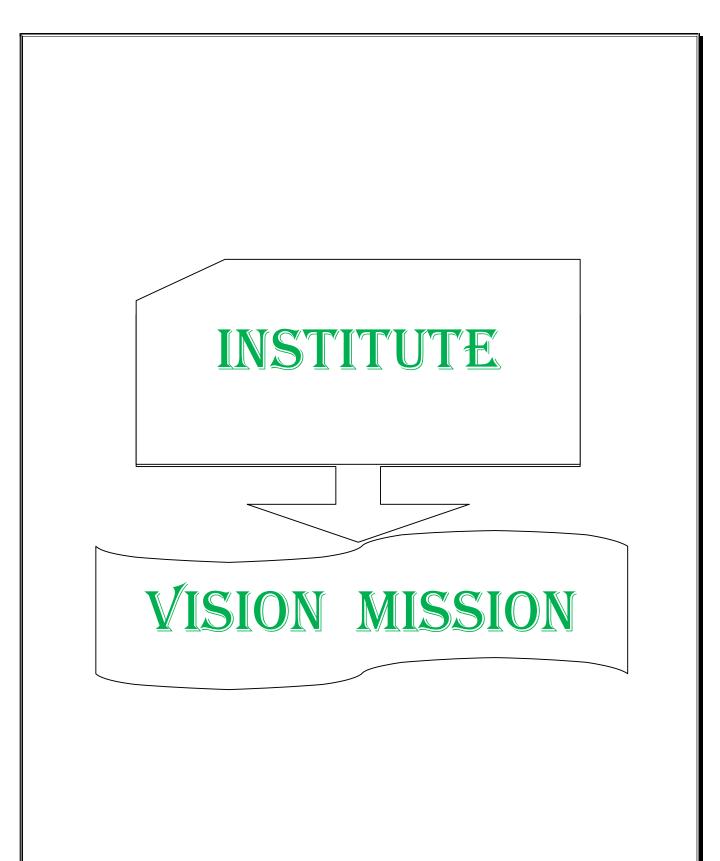## (V20 Regulation)

Department of Computer Science and Technology

Pedatadepalli, Tadepalligudem-534101, A.P

INDEX

INSTITUTE

VISION MISSION

INSTITUTE VISION AND MISSION

VISION

To be a premier technological institute striving for excellence with global perspective and commitment to the nation.

MISSION

- ➢ To produce engineering graduates of professional quality and global perspective through Learner Centric Education.
- ➢ To establish linkages with government, industry and research laboratories to promote R&D activities and to disseminate innovations.
- ➢ To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

DEPARTMENT

VISION

MISSION

DEPARTMENT
VISION AND MISSION

Vision:

- To evolve as a centre of academic and research excellence in the area of Computer Science and Technology.

Mission :

- To utilize innovative learning methods for academic improvement.

- To encourage higher studies and research to meet the futuristic requirements of Computer Science and Technology.

- To inculcate Ethics and Human values for developing students with good character

PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

Program Educational Objectives (PEOs)

Graduates of this programme will :

PEO 1: Adapt to evolving technology.

PEO 2: Provide optimal solutions to real time problems.

PEO 3: Demonstrate his/her abilities to support service activities with due consideration for Professional and Ethical Values.

Programme Specific Outcomes (PSO s):

A graduate of the Computer Science and Technology Program will be able to:

PSO 1: Use Mathematical Abstractions and Algorithmic Design along with Open Source Programming tools to solve complexities involved in Programming. [K3]

PSO 2: Use Professional engineering practices and strategies for development and maintenance of software. [K3]

Program Outcomes (POs):

Computer Science Technology Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of Mathematics, Science, Engineering Fundamentals and Concepts of Computer Science Engineering to the solution of complex Engineering problems. **[K3]**

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of Mathematics, Natural Sciences and Computer Science. **[K4]**

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specific needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations. **[K5]**

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. **[K5]**

5. **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**. [K3]**

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. **[K3]**

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. **[K3]**

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice. **[K3]**

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **[K6]**

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. **[K2]**

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. **[K6]**

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. **[K1]**

ACADEMIC CALENDAR

Principal's Office
Date: 15-07-2023

Academic Calendar
For III B.Tech (V and VI Semesters), Academic Year 2023-24

V Semester			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	31.07.2023		
I Unit of Instructions	31.07.2023	23.09.2023	8 W
I Mid Examinations	25.09.2023	30.09.2023	1 W
II Unit of Instructions	03.10.2023	25.11.2023	8 W
II Mid Examinations	27.11.2023	02.12.2023	1 W
Preparation & Practicals	04.12.2023	09.12.2023	1 W
End Examinations	11.12.2023	23.12.2023	2 W
Commencement of Next Semester Class Work (VI Semester)	26.12.2023		
VI Semester			
I Unit of Instructions	26.12.2023	17.02.2024	8 W
I Mid Examinations	19.02.2024	24.02.2024	1 W
II Unit of Instructions	26.02.2024	20.04.2024	8 W
II Mid Examinations	22.04.2024	27.04.2024	1 W
Preparation & Practicals	29.04.2024	04.05.2024	1 W
End Examinations	06.05.2024	18.05.2024	2 W

PRINCIPAL

Copy to : ALL

Vision
To be a premier technological institute striving for excellence with global perspective and commitment to the nation.
Mission
• To produce Engineering graduates of professional quality and global perspective through learner-centric education.
• To establish linkages with government, industry and Research laboratories to promote R&D activities and to disseminate innovations.
• To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

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Department Of Computer Science & Technology

CLASS CONSOLIDATED TIME TABLE

Class: VI Semester   w.e.f.27-12-2022

Section: A   **Class Coordinator:** Mr. M S Kumar Reddy   Room No : G-204

Periods	1	2	3	4	1:00PM 2:00PM	5	6	7
Time / Day	(09.30 AM-10.30 AM)	(10.30 AM-11.20 AM)	(11.20 AM-12.10 PM)	(12.10 PM-01.00 PM)		(02.00 PM-02.50 PM)	(02.50 PM-03.40 PM)	(03.40 PM-04.30 PM)
MON	ACD	CN	CN	CNS		UML Lab		
Tue	CNS	ACD	ACD	ML		ML Lab		
Wed	ML	MCCP-II(JOE-II)			LUNCH BREAK	CN	ACD	PE&HM
THU	CN	ML	CNS	CNS		CN Lab		
Fri	PE&HM	MCCP-II(JOE-II)				ML	ACD	LIBRARY
Sat	ACD	UML	CN	CNS		ML	CNS	SPORTS

Staff Details:

S. No.	Course Code	Course Name	Section
1.	V20CST13	Computer Networks(CN)	Mrs. D S L Manikanteswari
2.	V20CST14	Machine Learning(ML)	Mr. M S Kumar Reddy
3.	V20CST15	Automata and Compiler Design(ACD)	Mr. P Uma sankar
4.	V20CSTJE02	*Job Oriented Elective-II:* Master Coding in Competitive Programming(MCCP-II)	Dr. V Venkateswara Rao / Ms.T Pranusha
5.	V20CSTPE 08	*Professional Elective-II* Cryptography & Network Security**(CNS)**	Mrs. G Prasanthi
6.	V20CSL11	Computer Networks Lab (CN Lab)	Mrs. D S L Manikanteswari / Mr. G Sriram Ganesh
7.	V20CSL12	Machine Learning Lab using Python(ML Lab)	Mr. M S Kumar Reddy / Mrs. G Prashanthi
8.	V20CSL13	Unified Modeling Language Lab(UML Lab)	Mr.A Rajesh / Mr. P Rishikesh Sri Tanay
9.	V20CEMC02	Professional Ethics & Human Values(PE&HM)	Dr. K Rambabu

Lab Venues:

S.No.	Name of the Lab Course	Lab Venue
1	Computer Networks Lab(CN Lab)	Linus Torvalds Lab
2	Machine Learning Lab using Python(ML Lab)	Linus Torvalds Lab
3	Unified Modeling Lab(UML Lab)	PG CPLab
4	JOE (MCCP-II)	Yellow Seminar Hall

NOTE: Part of Curriculum you have to study **Skill Oriented Course-IV** (V20SOC04) also, It will be conducted **any 1 Week** during the semester.

Head of the Department

COURSE STRUCTURE

VI Semester

S.No.	Course Code	Name of the Course		L	T	P	C
1	V20CST13	Computer Networks	PCC	3	0	0	3
2	V20CST14	Machine Learning	PCC	3	0	0	3
3	V20CST15	Automata and Compiler Design	PCC	3	0	0	3
4		**Open Elective -II / Job Oriented Elective-II**	OEC	3	0	0	3
			JOE	0	0	6	
5	**Professional Elective-II**		PEC	3	0	0	3
	V20CSTPE05	Object Oriented Software Engineering					
	V20CSTPE06	Advanced Data Structures					
	V20CSTPE07	Data Science					
	V20CSTPE08	Cryptography &Network Security					
6	V20CSL11	Computer Networks Lab	PCC	0	0	3	1.5
7	V20CSL12	Machine Learning Lab using Python	PCC	0	0	3	1.5
8	V20CSL13	Unified Modeling Language Lab	PCC	0	0	3	1.5
9	V20SOC04	Skill Oriented Course-IV*	SOC	1	0	2	2
10	V20CEMC02	Professional Ethics & Human Values	MNC	2	0	0	0
			Total	**15**	**0**	**17**	**21.5**

Total Contact Hours: 32   Total Credits: 21.5

LESSON PLANS

Computer Networks

LESSON PLAN

Academic Year: 2023-24   **Programme: B.Tech**
Year/ Semester: VI   **Section: A,B,C& D**
Name of the Course: Computer Networks   **Course Code: V20CST13**

COURSE OUTCOMES (Along with Knowledge Level):
After completion of this course, the students will be able to:

S. No.	CO No.	Course Outcome
1	C311	Discuss fundamentals of network concepts and Reference Models. (K2]
2	C311	Discuss Communication media and switching techniques .[K2]
3	C311	Demonstrate Error control and Data link layer protocols.[K3]
4	C311	Apply Routing algorithms and congestion control algorithms [K3]
5	C311	Discuss Transport layer protocols and Application layer protocols [K2]

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Ed, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Targeted Proficiency Level (For each course Outcome):

Cos		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		60	60	60	60	60
Targeted level of Attainment	Level 3	60	60	60	60	60
	Level 2	50	50	50	50	50
	Level 1	40	40	40	40	40

Lesson Plan:

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 1	Dissemination of Vision, Mission of the Dept. and PEOs, Pos, & PSOs of the Programme	K1	1	Lecture	BB+ICT
2		Describe Reference models- The OSI Reference Model	K1	2	Lecture	BB+ICT
3		Discuss TCP/IP Reference Model	K2	2	Lecture with Discussion	BB+ICT
4		Examples of Networks: Novell Networks, ARPANET, INTERNET	K2	2	Lecture	BB+ICT
5		Describe Network Topologies WAN, LAN, MAN.	K1	2	Lecture	ICT
Total				09		

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 2	Describe Physical Layer – Transmission Media	K1	1	Lecture	ICT
2		Explain Different Kinds of Transmission Media	K2	2	Lecture	ICT
3		Describe Multiplexing Techniques: Frequency Division Multiplexing and Wavelength Division Multiplexing	K1	2	Lecture	ICT
4		Discuss Time Division Multiplexing	K2	1	Lecture with Discussion	ICT
5		Explain Circuit Switched Networks	K2	1	Lecture with Discussion	ICT
6		Explain Datagram Networks and Virtual Circuit Networks	K2	2	Lecture with Discussion in class Assignment	ICT
Total				09		

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		Describe The Data Link Layer - Services Provided to the Network Layer	K1	2	Lecture	ICT
2		Explain Data Link Layer Design Issues	K2	1	Lecture	ICT
3		Illustrate Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting code	K3	2	Lecture with Discussion and in class Assignment	ICT
4	CO 3	Discuss MAC Protocols: ALOHA, CSMA	K2	2	Lecture with Discussion	ICT
5		Explain Elementary Data Link Protocols- A Utopian Simplex Protocol	K2	1	Lecture with Discussion	ICT
6		Discuss A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel.	K2	2	Lecture	ICT
7		Demonstrate Sliding Window Protocols	K3	3	Lecture with Discussion	ICT
8		Discuss HDLC, PPP and Piggybacking	K2	2	Lecture	ICT
		Total		15		

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 4	Describe The Network Layer - Design Issues and Services Provided to Transport Layer	K1	2	Lecture	ICT
2		Discuss Implementation of Connectionless Service-Implementation of Connection Oriented Service.	K2	2	Lecture with Discussion	ICT
3		Construct Shortest Path algorithm	K3	1	Lecture with Discussion	ICT
4		Describe Flooding	K2	1	Lecture	ICT
5		Illustrate Distance Vector Routing, Link State Routing, and Hierarchical Routing	K3	2	Lecture and in class Assignment	ICT
6		Differentiate Broadcast and Multicast Routing	K2	1	Lecture	ICT
7		Discuss Congestion Control Algorithms	K2	2	Lecture with Discussion	ICT
8		Demonstrate IP Addressing and Subnet Masking	K3	1	Lecture with Discussion and in class Assignment	ICT
9		Describe Quality of Service	K2	1	Lecture	ICT
10		Discuss QoS Improving Techniques: Leaky Bucket and Token Bucket Algorithms	K2	2	Lecture	ICT
Total				15		

S. No	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 5	Describe Transport Layer – Services, Primitives and Sockets	K1	2	Lecture	ICT
2		Discuss Elements of Transport Protocols	K2	2	Lecture	ICT
3		Discuss The Internet Transport Protocols: TCP Segment Header and Primitives	K2	2	Lecture with Discussion	ICT
4		Discuss The Internet Transport Protocols: UDP, RPC, RTP, and RTCP Segment Headers and Primitives	K2	2	Lecture with Discussion	ICT
5		Discuss Congestion Control in TCP	K2	1	Lecture with Discussion	ICT
6		Discuss Application Layer – DNS: The DNS Name Space, Resource Records, Name servers.	K2	1	Lecture	ICT
7		Describe Electronic Mail Message Transfer Agent: SMTP and Message Access Agent: POP	K2	2	Lecture	ICT
8		Discuss FTP: Control Connection and Data Connection	K2	1	Lecture with Discussion	ICT
9		Discuss HTTP: Connections, Methods, Message Headers, and Caching	K2	1	Lecture with Discussion	ICT
10		Explain Cryptography	K2	2	Lecture	ICT
11		Differentiate Public Key(RSA) and Private Key(DES) Cryptographic Algorithms	K2	2	Lecture with Discussion	ICT
Total				18		

Total No. of Classes: 66

Machine Learning

LESSON PLAN

Academic Year: 2023-24   **Programme: B.Tech**
Year/ Semester: VI   **Section: A,B,C& D**
Name of the Course: Machine Learning   **Course Code: V20CST14**

COURSE OUTCOMES (Along with Knowledge Level):
After completion of this course, the students will be able to:

S. No.	C. No.	Course Outcome
1	C312	Explain the Basics of Machine Learning.[K2]
2	C312	Demonstrate Classification and Clustering Techniques. [K3]
3	C312	Construct Decision Trees and Random Forest. [K3]
4	C312	Illustrate the Working of Neuron and Perceptron Algorithm. [K2]
5	C312	Demonstrate the working of Multi-Layer Perceptron algorithm. [K3]

Text Books:

1. Machine Learning: An Algorithmic Approach, StephenMarshland, 2nd Edition, CRC press.
2. A First Course in Machine Learning, Machine Learning and Pattern Recognition Series,Simon Rogers, Mark Girolami, 2nd Edition, CRC Press.

Reference Books:

1. Machine Learning: The art and Science of Algorithms that Make sense of Data, Peter Flach, Cambridge.
2. Machine Learning, Tom Mitchel, McGraw Hill Learning.

Targeted Proficiency Level (For each course Outcome):

COs		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		60	60	60	60	60
Targeted level of Attainment	Level 3	60	60	60	60	60
	Level 2	55	55	55	55	55
	Level 1	50	50	50	50	50

Lesson Plan:

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		Dissemination of Vision, Mission of the Dept. and PEOs, Pos, & PSOs of the Programme		1	Lecture	ICT Chalk &Talk
2		Introduction to Machine Learning and Types of Machine Learning	K1	2	Lecture	ICT Chalk & Talk
3		Supervised Learning:Regression and Classification	K1	2	Lecture	ICT Chalk & Talk
4	CO 1	The Machine Learning Process	K2	2	Lecture with Discussion	ICT
5		Terminology of ML: Weight Space, The Curse Of Dimensionality	K1	2	Lecture	Chalk & Talk
6		Knowing What You Know: Testing Machine Learning Algorithms	K2	2	Lecture with Discussion	Chalk & Talk
7		Some Basic Statistics. Averages Variance And Covariance, The Bias-Variance Trade-off	K2	2	Lecture with Discussion	Chalk & Talk
8		The General Problem, Probabilistic Classifiers: Bayes Classifier, Logistic Regression	K2	2	Lecture with Discussion	Chalk & Talk
9	CO 2	Non-Probabilistic Classifiers: K-Nearest Neighbor, SVM	K2	3	Lecture with Discussion	ICT
10		Classifier performance: Accuracy, 0/1 loss, Sensitivity & Specificity	K2	1	Lecture with Discussion	ICT
11		Decision Trees:Construction of Decision Trees: Entropy, ID3	K2	3	Lecture with Discussion	ICT Chalk & Talk
12		Classification And Regression Trees (CART)	K2	3	Lecture with Discussion	ICT Chalk & Talk
13	CO 3	Ensemble Learning: Boosting - Adaboost, Stumping	K2	3	Lecture with Discussion	Chalk & Talk
14		Bagging	K2	2	Lecture with Discussion	ICT
15		Random Forests	K2	2	Lecture with Discussion	ICT

		The Brain & The Neuron: Hebb's Rule, Mcculloch And Pitts Neurons & It's Limitations.	K1	3	Lecture	Chalk &Talk
16						
17		Neural Networks, Perceptron:The Learning Rate,The Bias Input	K1	2	Lecture	Chalk &Talk
18	CO 4	The Perceptron Learning Algorithm	K2	2	Lecture with Discussion	ICT Chalk & Talk
19		An Example Of Perceptron Learning: Logic Functions Implementation	K2	2	Lecture with Discussion	ICT Chalk & Talk
20		Linear Separability	K2	1	Lecture with Discussion	ICT Chalk &Talk
21		Linear Regression	K2	2	Lecture with Discussion	ICT Chalk &Talk
22		Multi-layer Perceptron: Going forward - Biases	K1	2	Lecture	ICT
23		Going backward – Back propagation of error:	K2	2	Lecture with Discussion	ICT Chalk &Talk
24		The MLP algorithm, Initializing the weights, Activation functions.	K2	3	Lecture with Discussion	ICT Chalk &Talk
25	CO 5	Sequential and batch training, Local Minima, Picking up momentum.	K2	3	Lecture with Discussion	ICT Chalk &Talk
26		Minibatches and Stochastic Gradient Decent, Other improvements.	K2	3	Lecture with Discussion	ICT Chalk &Talk
27		MLP in practice – Amount of training data, Number of hidden layers, when to stop learning	K2	3	Lecture with Discussion	ICT

Total No. of Classes: 60

Automata and Compiler Design

LESSON PLAN

Academic Year: 2023-24   **Programme: B.Tech**
Year/ Semester: VI   **Section: A,B,C& D**
Name of the Course: Automata and Compiler Design   Course Code:V20CST15

COURSE OUTCOMES (Along with Knowledge Level):
After completion of this course, the students will be able to:

S. No.	CO No.	Course Outcome
1	C313	Construct Finite Automata and Regular Expressions. (K3]
2	C313	Describe the compilation process and lexical analyzer [K2]
3	C313	Construct top down and Bottom up parsing Techniques. [K3]
4	C313	Produce intermediate code generation process and run time environments.[K3]
5	C313	Explain the code optimization and code generation process. [K2]

Text Books:

1. IntroductiontoAutomataTheory,LanguagesandComputationJ.E.Hopcroft,

   Motwani andJ.D.Ullman,3rdEdition,Pearson,2008.

2. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi,

   Jeffrey D. Ullman,2nded, Pearson,2007.

Reference Books:

1. Louden:―CompilerConstruction,Principles&Practice‖,1stEdition,ThomsonPress,2006

   .

2. TremblayJP,SorensonGP:―TheTheory&PracticeofCompilerwriting‖,1stE

   dition,BSPPublication,2010.

3. Theory of Computation,V.Kulkarni,Oxford UniversityPress,2013

Targeted Proficiency Level and Attainment level (For each Course Outcome):

Cos		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		60	60	60	60	60
Targeted level of Attainment	Level 3	55	55	55	55	55
	Level 2	50	50	50	50	50
	Level 1	45	45	45	45	45

UNIT – I

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching aids
		Dissemination of Vision, Mission, PEOs, POs,PSOs		**1**		BB
1.		Describe Alphabet, Strings and Languages	K1	1	Lecture with discussion	BB
2.		Explain Finite Automata	K2	2	Lecture with discussion	BB
3.		Construct DFA's & NFA's	K3	3	Lecture with demonstration	PPT
4.		Explain Equivalence between NFA and DFA	K2	1	Lecture with demonstration	PPT
5.	CO1	Demonstrate Equivalence between NFA and ϵ-NFA	K3	2	Lecture with demonstration	PPT
6.		Construct Regular Expressions	K3	1	Lecture with demonstration	PPT
7		Explain Equivalence between Regular Expressions and Finite Automata.	K3	2	Lecture with demonstration	BB
8		Demonstrate Chomsky's Hierarchy	K3	1	Lecture with demonstration	PPT
Total Hours				**14**		

UNIT-II

S. No	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching aids
1.		Describe Compiler	K1	1	Lecture with discussion	BB
2.		Explain the Structure of a Compiler	K2	2	Lecture with discussion	PPT
3.		Explain The Role of the Lexical Analyzer	K2	2	Lecture with demonstration	PPT
4.		Define Specification of Tokens	K1	1	Lecture with demonstration	BB
5.		Describe Recognition of Tokens	K1	1	Lecture with demonstration	BB
6.	CO2	Describe Lexical-Analyzer Generator Lex	K2	2	Lecture with demonstration	PPT
7		Define Context Free Grammar	K1	1	Lecture with discussion.	BB
8		Explain Derivation and types	K2	2	Lecture with demonstration	BB
9		Explain Derivation Trees	K2	1	Lecture with demonstration	BB
10		Describe Ambiguous Grammar	K1	1	Lecture with demonstration	BB
11		Explain Elimination of Left Recursion and Left Factoring	K2	2	Lecture with demonstration	BB
	Total Hours			16		

UNIT-III

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching aids
1.		Construct Top-Down Parsing: Recursive Descent Parsing	K3	2	Lecture with discussion	BB
2.		Construct First and Follow	K3	2	Lecture with demonstration	BB
3.		Construct LL(1) Grammars	K3	2	Lecture with demonstration	BB
4.		Construct Bottom-Up Parsing	K3	2	Lecture with demonstration	BB
5.	CO3	Demonstrate Error Recovery in Predictive Parsing.	K3	1	Lecture with demonstration	BB
6.		Explain Bottom-Up Parser Classifications	K2	1	Lecture with demonstration	PPT
7		Explain Handle Pruning	K2	1	Lecture with demonstration	BB
8.		Explain Shift-Reduce Parsing	K2	1	Lecture with demonstration	BB

S. No		Intended Learning Outcome	Knowledge Level	No. of Hours	Pedagogy	Teaching aids
9.		Construct SLR Parsing Tables	K3	2	Lecture with demonstration	PPT
10		Construct CLR (1)	K3	2	Lecture with demonstration	BB
11		Construct LALR Parsing Tables	K3	2	Lecture with demonstration	BB
12		Complete comparison of all Bottom-up approaches	K3	1	Lecture with demonstration	BB
Total Hours				**19**		

UNIT – IV

S. No	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teachi ng aids
1.		Define Semantic Analysis: Syntax Directed Definitions	K2	1	Lecture with discussion	BB
2.		Explain Evaluation Orders for SDD's	K2	1	Lecture with discussion	BB
		Describe Intermediate Code Generation	K2	1	Lecture with demonstration	BB
5.		Explain Variants of Syntax Trees	K2	2	Lecture with discussion	BB
6.	CO4	Explain Three-Address Code	K2	1	Lecture with demonstration	BB
7.		Explain Basic Blocks and Flow Graph.	K2	2	Lecture with demonstration	BB
9.		Demonstrate Control Flow	K3	1	Lecture with demonstration	BB
10.		Explain Run-Time Environments: Storage Organization	K2	1	Lecture with demonstration	BB
11.		Illustrate Stack Allocation of Space	K3	1	Lecture with demonstration	BB
12		Illustrate Heap Management	K3	1	Lecture with demonstration	BB
				12		

UNIT-V

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching aids
1.		Explain Machine Independent Optimization	K2	1	Lecture with discussion	PPT
2.		Explain the Principal Sources of Optimizations	K2	1	Lecture with discussion	PPT
3		Describe the optimization of Basic blocks.	K1	1	Lecture with discussion	BB
4		Explain Peephole Optimization	K2	1	Lecture with discussion	PPT
5	CO5	Describe Data flow Analysis	K1	1	Lecture with discussion	BB
6.		Explain the Issues in design of code generation.	K2	1	Lecture with discussion	PPT
7.		Explain target Language and Address in the target code	K2	2	Lecture with demonstration	PPT
8.		Describe a Simple Code generation	K2	1	Lecture with demonstration	PPT
Total Hours				**09**		

Total No. of classes: 70

Cryptography & Network Security

Academic Year: 2023-24   Programme: B.Tech

Year/ Semester: VI   Section: A,B , C & D

Name of the Course: Cryptography & Network Security   Course Code: V20CSTPE08

COURSE OUTCOMES (Along with Knowledge Level):
After completion of this course, the students will be able to:

S. No.	CO No.	Course Outcome
1	C315 - E4	Discuss fundamentals and mathematical support of Cryptography and Network Security [K2]
2	C315 - E4	Discuss symmetric and asymmetric cryptosystems. [K2]
3	C315 - E4	Discuss about HASH functions & Digital Signatures to provide authentication and integrity. . [K2]
4	C315 - E4	Demonstrate various methods of Mutual trust and mail security.(K3]
5	C315 - E4	Review the Network& Internet Security Scenarios. [K2]

TEXT BOOKS:
1. William Stallings, "Cryptography and Network Security, Principles and Practices",   Pearson Education, Sixth Edition.
2. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.

REFERENCE BOOKS:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security – Private Communication in a Public World" Pearson/PHI.

Targeted Proficiency and attainment Levels (for each Course Outcome):

Cos		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		60	60	60	60	60
Targeted level of Attainment	Level 3	60	60	60	60	60
	Level 2	55	55	55	55	55
	Level 1	45	45	45	45	45

Lecture Plan

UNIT-1

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		Dissemination of Vision, Mission, PEOs, POs,PSOs		1	Lecture	ICT
2		Classify Security Attacks	K2	1	Lecture	ICT
3		Explain about Security Services and Mechanisms	K2	1	Lecture with Discussion	BB
4		Explain OSI Security Architecture	K2	1	Lecture	BB
5	CO1	Explain Model for Network Security	K2	1	Lecture	BB
6		Classify Classical Encryption Techniques	K2	1	Lecture with Discussion	BB
7		Classify Substitution ciphers	K2	2	Lecture	ICT
8		Classify Transposition Techniques	K2	2	Lecture	BB
9		Describe Prime and Relatively Prime Numbers	K1	1	Lecture	BB
10		Illustrate about Fermat's and Euler's Theorems	K2	2	Lecture	BB
11		Explain The Chinese Remainder theorem	K2	2	Lecture	BB
Total				**15**		

UNIT-2

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		Discuss Block Cipher principles	K2	1	Lecture	BB
2		Explain about DES and strength of DES	K2	1	Lecture	BB
3		Explain AES	K2	2	Lecture	ICT
4	CO 2	Explain block cipher modes of operation	K2	2	Discussion	BB
5		Discuss principles of public key crypto systems	K2	2	Discussion	BB
6		Illustrate RSA Algorithms	K2	2	Discussion	BB
7		Illustrate Diffie Hellman Key Exchange	K2	2	Discussion	BB
Total				**12**		

UNIT-3

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		Explain the applications of Cryptographic Hash Functions	K2	1	Lecture	BB
2		Explain the Requirements And Security	K2	1	Lecture	BB
3		Explain SHA-512	K2	2	Lecture	BB
4		Explain about Message Authentication Functions	K2	1	Lecture	BB
5	CO 3	Explain about Message Authentication Requirements	K2	1	Discussion	BB
6		Explain HMAC	K2	1	Lecture	BB
7		Explain about Properties, Attacks & Forgeries and Requirements of Digital Signatures	K2	1	Lecture	BB
8		Explain about Digital Signature Standards, NIST	K2	2	Lecture	BB
Total			**10**			

UNIT-4

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1		**Key Management and Distribution**: Explain Symmetric Key Distribution Using Symmetric Encryption	K3	2	Lecture	BB
2		Explain Symmetric Key Distribution Using Asymmetric Encryption	K3	1	Lecture	BB
3		Explain Distribution of Public Keys	K3	2	Lecture	BB
4	CO 4	Discuss X.509 certificate	K3	2	Lecture	BB
5		Discuss Remote User Authentication Principles	K3	1	Lecture With Discussion	BB
6		Explain Kerberos	K3	2	Lecture With Discussion	BB
7		Explain Electronic Mail Security: Pretty Good Privacy (PGP)	K3	2	Lecture	BB&ICT
8		Demonstrate about S/MIME	K3	2	Discussion	ICT
Total			**14**			

UNIT-5

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 5	Explain two IP Security modes	K2	1	Lecture With Discussion	ICT
2		Explain two security protocols Authentication Header, Encapsulating Security Payload.	K2	2	Lecture With Discussion	BB
3		**Transport Level Security:** Explain about Secure Socket Layer (SSL)	K2	2	Lecture	ICT
4		Explain Transport Layer Security(TLS)	K2	2	Discussion	ICT
5		**HTTPS:** Explain Connection Initiation Connection Closure.	K2	2	Lecture	ICT
	Total			**9**		

Total No. of Classes: 60

COMPUTER NETWORKS LAB

Academic Year: 2023-24   **Programme:** B.Tech
Year/ Semester: VI   **Section:** A,B,C,D
Name of the Course: COMPUTER NETWORKS LAB   **Course Code: V20CSL11**

Course Outcomes (Along with Knowledge Level):
After Completing the course Student will be able to:

S. No.	CO No.	Course Outcome
1	C316	Illustrate the working of network commands and configuration commands. (K3)
2	C316	Implement the datalink layer services and protocol (K3)
3	C316	Implement network layer protocols. (K3)
4	C316	Implement transport layer congestion control. (K3)
5	C316	Illustrate the working of application layer protocol (K3)

Targeted Proficiency and Attainment Levels (for each Course Outcome):

COs		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		75	75	75	75	75
Targeted level of Attainment	Level 3	70	70	70	70	70
	Level 2	65	65	65	65	65
	Level 1	55	55	55	55	55

Lecture Plan:

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 1	Study of basic network commands and Network configuration commands. a) Ping b) Tracert/Traceroute c) Ipconfig/ifconfig d) Hostname e) Nslookup f) Netstat	K3	3	Lecture With Discussion	ICT
2	CO 2	Construct Detecting error using CRC-CCITT.	K3	3	Lecture With Discussion	ICT
3		Implementation of Bit Stuffing.	K3	3	Lecture With Discussion	ICT
4		Implementation of Character Stuffing.	K3	3	Lecture With Discussion	ICT
5		Implementation of stop and wait protocol	K3	3	Lecture With Discussion	ICT
6	CO 3	Implementation of Dijkstra's algorithm	K3	3	Lecture With Discussion	ICT
7		Implementation Distance vector algorithm	K3	3	Lecture With Discussion	ICT
8	CO 4	Implementation of Congestion control using leaky bucket algorithms	K3	3	Lecture With Discussion	ICT
9	CO 5		K3	3	Lecture With Discussion	ICT
10			K3	3	Lecture With Discussion	ICT

Total No. of Classes: 30

Machine Learning using Python Lab

Academic Year: 2023-24   **Programme**:B.Tech.

Year/Sem: VI   **Course Code**: V20CSL12

Name of the Course: Machine Learning using Python Lab

Course Outcomes (Along with Knowledge Level): After Completing the course Student will be able to:

S. No.	CO. No.	Course Outcome
1	C317	Identify various Python libraries used in Machine Learning. (K2)
2	C317	Implement probabilistic classifiers using Python Programming. (K3)
3	C317	Construct non-probabilistic classifiers using Python Programming. (K3)
4	C317	Demonstrate the process of clustering using the K-Means algorithm.. (K3)
5	C317	Illustrate the working of a Multi-layer perceptron network. (K3)

Targeted Proficiency and Attainment Levels (for each Course Outcome):

COs		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		75	75	75	75	75
Targeted level of Attainment	Level 3	70	70	70	70	70
	Level 2	60	60	60	60	60
	Level 1	50	50	50	50	50

Lecture Plan:

S. No.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours	Pedagogy	Teaching aids
1	CO 1	Dissemination of Department Vision, Mission, PEOs, POs, PSOs	-	1	Lecture With Discussion	ICT
		Working with Numpy & Pandas libraries	K2	4	LectureWith Discussion	ICT
2		Working with Scipy, Matplotlib & sklearn libraries	K2	4	LectureWith Discussion	ICT
3		Importing, preprocessing and slitting datasets	K2	3	LectureWith Discussion	ICT
4	CO 2	Bayes classifier implementation	K3	3	Lecture With Discussion	ICT
5		Logistic regression implementation.	K3	3	Lecture With Discussion	ICT
6	CO 3	KNN algorithmimplementation.	K3	3	Lecture With Discussion	ICT
7		SVM classifierimplementation.	K3	3	Lecture With Discussion	ICT
8		Decision tree classifier implementation.	K3	3	Lecture With Discussion	ICT
9		Random forest algorithm implementation.	K3	3	Lecture With Discussion	ICT
10		Adaboost algorithm implementation.	K3	3	Lecture With Discussion	ICT
11	CO 4	Demonstration of K-means clustering algorithm	K3	3	Lecture With Discussion	ICT
12	CO 5	Demonstration of Multi-layer perceptron	K3	3	Lecture With Discussion	ICT

Total No. of Classes: 36

Unified Modeling Language Lab

Academic Year: 2023-24   **Programme: B.Tech**
Year/ Semester: VI   **Section: A,B,C& D**
Name of the Course:Unified Modeling Language Lab   **Course Code: V20CSL13**

After completion of this course, the students will be able to:

S.No.	CO. No.	Course Outcome
1	C318	Develop Class diagrams [K3]
2	C318	Develop Use case diagrams. [K3]
3	C318	Construct Interaction diagrams [K3]
4	C318	Develop State chart, Activity diagrams [K3]
5	C318	Develop Component and Deployment diagrams. [K3]

TEXT BOOKS:
1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education**.**

REFERENCE BOOKS:
1. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt.Ltd.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
3. Modeling Software Systems Using UML2, Pascal Roques, WILEY- Dreamtech India Pvt. Ltd.

Targeted Proficiency and Attainment Levels (for each Course Outcome):

COs		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		75	75	75	75	75
Targeted level of Attainment	Level 3	70	70	70	70	70
	Level 2	65	65	65	65	65
	Level 1	55	55	55	55	55

Lecture Plan:

S. NO.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours required	Pedagogy	Teaching aids
1	CO1	Construct the Class Diagram for Library management System, Railway reservation System.	K3	3	Lecture With Discussion	BB
		Construct the Class Diagram for Hospital Management system	K3	3	Lecture With Discussion	ICT
2	CO2	Construct the Usecase Diagram for Library management System, Railway reservation System	K3	3	Lecture With Discussion	BB
		Construct the Usecase Diagram for Hospital Management system	K3	3	Lecture With Discussion	ICT
3	CO3	Construct the Interaction Diagrams for Library management System, Railway reservation System	K3	3	Lecture With Discussion	BB
		Construct the Interaction Diagrams for Hospital Management system	K3	3	Lecture With Discussion	ICT
4	CO4	Construct the Activity diagrams for Library management System, Railway reservation System	K3	3	Lecture With Discussion	BB
		Construct the Activity diagramfor Hospital Management system	K3	3	Lecture With Discussion	ICT
5	CO4	Construct the State chart for Library management System, Railway reservation System	K3	3	Lecture With Discussion	BB
		Construct the State chart Diagram for Hospital Management system	K3	3	Lecture With Discussion	ICT
6	CO5	Construct the Component Diagram for Library management System, Railway reservation System	K3	3	Lecture With Discussion	BB
		Construct the Component Diagram for Hospital Management system	K3	3	Lecture With Discussion	BB
7	CO5	Construct the Deployment Diagram for Library management System, Railway reservation System	K3	3	Lecture With Discussion	ICT
		Construct the Deployment Diagram for Hospital Management system	K3	3	Lecture With Discussion	ICT

Total Hours: 45

Mastering Coding and Competitive Programming

Academic Year: 2023-24   **Programme**: B.Tech.

Year/Sem: VI

   Name of the Course: **Mastering Coding and Competitive Programming**

                                        Course Code: **V20CSTJE02**

Course Outcomes (Along with Knowledge Level):

After Completing the course Student will be able to:

S. No.	Course Outcome
1	Apply Divide and Conquer algorithm technique to solve complex in logarithmic time. [K3]
2	Apply Greedy method to solve Optimization and decision making problems. [K3]
3	Apply Backtracking Algorithm technique to find combinatorial problems. [K4]
4	Experiment with Dynamic Programming Algorithm technique to solve Problems that uses Optimal substructures. [K3]
5	Develop programs using Linked List Graphs, DFS and BFS techniques. [K3]

Text Books:

1.   Introduction to Algorithms, Second Edition, Thomas H. Cormen Charles E. Leiserson.
2.   Data Structures and Algorithms Made Easy: Narasimha Karumanchi
3.   The Algorithm Design Manual, Springer series, Steven Skiena.

Tools:
   1. practice.geeksforgeeks.com
   2. leetcode.com
   3. codingninjas.com
   4. hackerrank.com
   5. interviewbit.com

Targeted Proficiency and Attainment Levels (for each course Outcome):

Cos		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		80%	80%	80%	80%	80%
Targeted level of	Level 3	80%	80%	80%	80%	80%

	Attainment	Level 2	70%	70%	70%	70%	70%
		Level 1	60%	60%	60%	60%	60%

Lecture Plan:

S. NO.	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours required	Pedagogy	Teaching aids
1	CO1	Develop Programs to solve problems based on Divide and Conquer Algorithm Technique	K3	10	Lecture With Discussion	ICT
2	CO2	Develop programs using two pointer and sliding window algorithms	K3	10	Lecture With Discussion	ICT
3	CO3	Problem Solving using Greedy Algorithm technique.	K4	16	Lecture With Discussion	ICT
		Problem Solving using Backtracking.				
4	CO4	Develop programs using Dynamic Programming and Kadane Algorithm.	K3	8	Lecture With Discussion	ICT
5	CO5	Develop programs using Linked List and its applications	K3	16	Lecture With Discussion	ICT
		Develop programs using Graphs and Graph Searching Techniques.	K3			

Professional Ethics &Human values

Academic Year: 2023-24   **Programme**:B.Tech.

Year/Sem: VI   **Course Code**: V20CEMC02

Name of the Course: Professional Ethics &Human values

Course Outcomes (Along with Knowledge Level):

After Completing the course Student will be able to:

S.No.	CO. No.	Course Outcome
1	C320	Discuss the importance of human values and their context [K2]
2	C320	Generalize the professional ethics and norms of engineering practice [K2]
3	C320	Review the contextual knowledge of engineering practice [K2]
4	C320	Identify the engineer's responsibility for safety and Risks [K2]
5	C320	Clarify the professional rights & responsibilities at global level [K2]

Text Books:

1. "Engineering Ethics and Human Values" by M. Govindarajan, S.Natarajan and V.S.Senthil Kumar- PHILearningPvt.Ltd-2009.

2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.

3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.

References:

1. "Professional Ethics and Human Values"by Prof.D.R.Kiran.

2. "Indian Culture,Values and Professional Ethics"by PSRMurthy-BS Publication.

3. "Ethics in Engineering" by Mike W.Martin and Roland Schinzinger–TMH.

Proficiency and Attainment Levels for Course Outcomes in Percentages

Targeted Proficiency and attainment Levels (for each Course Outcome):

Cos		CO1	CO2	CO3	CO4	CO5
Targeted Proficiency Level		50%	50%	50%	50%	50%
Targeted level of	Level 3	60%	60%	60%	60%	60%

		Attainment	Level 2	50%	50%	50%	50%	50%
			Level 1	40%	40%	40%	40%	40%

LESSON PLAN

S. No	Course Outcome	Intended Learning Outcomes (ILO)	Knowledge Level of ILO	No. of Hours Required	Pedagogy	Teaching Aids
UNIT–I: Human Values
1	Discuss the importance of human values and their context(K2)	Definitions of ethics, values and morals.	K1	1	Lecture with Discussion	PPT
		Learn Integrity and Trustworthiness	K2	1	Lecture with Discussion	PPT
		Explaining Work Ethics and Service Learning	K2	1	Lecture	PPT with Discussions
		Explain the concept of Civic Virtue , Respect for others and Living Peacefully	K2	1	Lecture	PPT
		Discuss about Caring, Sharing, Honesty , Courage and Value Time	K2	1	Lecture	PPT with Discussions
		Discuss about Co-operation, Commitment, Empathy, Self-confidence, character and Spirituality.	K2	1	Lecture with Discussion	PPT
	**Number of hours required**		**6**		
UNIT–II: Engineering Ethics
2	Generalize the professional ethics and norms of engineering practice	History of Ethics and Need of Engineering Ethics	K1	1	Lecture with Discussion	PPT
		Understanding Senses of Engineering Ethics and differentiate Profession and Professionalism	K2	1	Lecture with Discussion	PPT
		Explain Self Interest and Moral Autonomy, different types of Inquiry and Dilemma	K2	1	Lecture	PPT
		Understanding ethical theories like Utilitarianism, Virtue Theory -Kohlberg's Theory and Gilligan's Argument	K2	1	Lecture	PPT
	**Number of hours required**		**4**		
UNIT–III: Engineering as Social Experimentation

3	contextual engineering the of knowledge practice (K2) Review	Comparison with Standard Experiments, Knowledge gained, Conscientiousness.	K2	1	Lecture with Discussion	PPT
		Learning from the Past– Engineers as Managers, Consultants, and Leaders	K2	1	Lecture with Discussion	PPT
		Interpret Engineer as responsible experimenters	K2	1	Lecture	PPT
		Discuss Codes of ethics and Experimental Nature of Engineering.	K2	1	Lecture	PPT
		Number of hours required	**4**			

UNIT–IV: Engineers' Responsibilities towards Safety and Risk

4	Identify the engineer's responsibility for safety and Risks (K2)	Understand the Concept of Safety and Risk	K2	1	Lecture with Discussion	PPT
		Understand different Types of Risks –and differentiate Voluntary and Involuntary Risk and Consequences of risks	K2	1	Lecture with Discussion	PPT
		Discuss Risk Assessment, Accountability ,Liability and Threshold Levels of Risk	K2	1	Lecture	PPT
		Determine Delayed and Immediate Risk and the Engineer Designing for Safety	K2	1	Lecture	PPT
		Understand the concept of Risk-Benefit Analysis and Accidents	K2	1	Lecture with discursion	Blackboard & white chalk
		Number of hours required	5			

UNIT–V: Engineers' Responsibilities, Rights and Global issues

5	Clarify the professional rights & responsibilities at global level (K2)	Explain the basic concept of Collegiality, Senses of Loyalty, professionalism and Loyalty, Professional Rights & Responsibilities– confidential and	K2	2	Lecture with Discussion	PPT
		Discuss about Confidentiality , Gifts, Bribes and occupational Crimes, Industrial Espionage, Price Fixing and Whistle Blowing.	K2	1	Lecture with Discussion	PPT
		Understand Globalization-Cross-culture Issues, Environmental Ethics, Computer Ethics, Weapons Development Ethics and Research Ethics.	K2	2	Lecture	PPT
		Explain Intellectual Property Rights.	K2	1	Lecture	PPT

Number of hours required	**6**		
Total Number of Hours Required	**25**		