

**R22**

# **M.Tech. (COMPUTER NETWORKS AND INFORMATION SECURITY)**

**M.Tech. R22 CBCS Curriculum**



**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**

An Autonomous, ISO 9001:2015 & QS I-Gauge Diamond Rated Institute, Accredited by NAAC with 'A++' Grade

NBA Accreditation for B.Tech. CE, EEE, ME, ECE, CSE, EIE, IT Programmes

Approved by AICTE, New Delhi, Affiliated to JNTUH, NIRF 113 Rank in Engineering Category

Recognized as "College with Potential for Excellence" by UGC

Vignana Jyothi Nagar, Pragathi Nagar, Nizampet (S.O), Hyderabad – 500 090, TS, India.

Telephone No: 040-2304 2758/59/60, Fax: 040-23042761

E-mail: [postbox@vnrvjiet.ac.in](mailto:postbox@vnrvjiet.ac.in), Website: [www.vnrvjiet.ac.in](http://www.vnrvjiet.ac.in)

**DEPARTMENT OF**

**INFORMATION**

**TECHNOLOGY**

## VISION OF THE DEPARTMENT

To impart quality technical education that fosters critical thinking, dynamism and innovation to transform students into globally competitive IT professionals.

## MISSION OF THE DEPARTMENT

- To provide quality education through innovative teaching and learning process that yields advancements in state-of-the-art information technology.
- To provide a learning environment that promotes quality research.
- To inculcate the spirit of ethical values contributing to the welfare of the society.

**M.TECH.  
(COMPUTER NETWORKS & INFORMATION  
SECURITY)**

# M.TECH. (CNIS)

## PROGRAM EDUCATIONAL OBJECTIVES

**PEO-I:** Apply the necessary mathematical tools and fundamental & advanced knowledge of computer science & engineering and computer networks.

**PEO-II:** Develop computer network & security systems understanding the importance of social, business, technical, environmental, and human context in which the systems would work

**PEO-III:** Articulate fundamental concepts, design underpinnings of network & security systems, and research findings to train professionals or to educate post engineering students.

**PEO-IV:** Contribute effectively as a team member/leader, using common tools and environment, in computer networks & security projects, research, or education.

**PEO-V:** Pursue life-long learning and research in computer networks and contribute to the growth of that field and society at large.

# M.TECH. (CNIS)

## PROGRAM OUTCOMES

**PO-1:** Ability to independently carry out research/investigation and development work to solve practical problems.

**PO-2:** Ability to write and present a substantial technical report/document.

**PO-3:** Able to demonstrate a degree of mastery over the area as per the specialization of the program.

**PO-4:** Demonstrate advanced knowledge of Wired and Wireless Networks, Network Security, Ethical Hacking, Cyber Laws and Network Protocols.

**PO-5:** Analyze and Develop solutions for complex problems in computer Networks and Information security domain.

**PO-6:** Apply advanced knowledge to identify research challenges, and contribute individually or in teams to the development of Computer Networks and Information security domain

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD**  
**M.TECH. I YEAR COURSE STRUCTURE AND SYLLABUS**

**(COMPUTER NETWORKS & INFORMATION SECURITY)**

**I SEMESTER**

**R22**

Course Type	Course Code	Name of the Course	L	T	P	Credits
Professional Core-I	22PC1CN01	Advanced Computer Networks	3	0	0	3
Professional Core-II	22PC1CN02	Principles of Information Security	3	0	0	3
Professional Core-III	22PC1CN03	Advanced Programming	3	0	0	3
Professional Elective-I	22PC1CP05	Internet of Things	3	0	0	3
	22PE1CN01	Mobile Application Development				
	22PE1CN02	Data Mining				
	22PE1CN03	Data Structures and Algorithms				
	22PE1CN04	Internet Technology and Services				
Professional Elective-II	22PE1CN05	Distributed Systems	3	0	0	3
	22PE1CN06	Data Science				
	22PE1CN07	Operating Systems Security				
	22PE1CN08	Artificial Intelligence				
	22PE1CP04	Information Retrieval Systems				
Professional Core Lab-I	22PC2CN01	Networks and Information Security Laboratory	0	0	2	1
Professional Core Lab-II	22PC2CN02	Advanced Programming Laboratory	0	0	2	1
Communication Skills	22SD5HS01	Communication Skills for Academic and Research Writing	0	0	2	1
Project	22PW4CN01	Technical Seminar	0	0	4	2
Mandatory	22MN6HS01	Research Methodology and IPR	2	0	0	0
<b>Total</b>			<b>17</b>	<b>0</b>	<b>10</b>	<b>20</b>

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD**  
**M.TECH. I YEAR COURSE STRUCTURE AND SYLLABUS**

**(COMPUTER NETWORKS & INFORMATION SECURITY)**

**II SEMESTER**

**R22**

<b>Course Type</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
Professional Core-IV	22PC1CN04	Wireless Networks	3	0	0	3
Professional Core-V	22PC1CN05	Vulnerability Analysis and Hacking	3	0	0	3
Professional Core-VI	22PC1CN06	Machine Learning and Security	3	0	0	3
Professional Elective-III	22PE1CN09	Computer Forensics and Cyber Security	3	0	0	3
	22PE1CN09	Information Systems Security and Risk Management				
	22PE1CN10	Mobile Computing				
	22PE1CN11	IT Security Metrics				
	22PE1CN12	Advanced Network Security				
Professional Elective-IV	22PE1CN13	Intrusion Detection	3	0	0	3
	22PE1CN14	Cloud Security				
	22PE1CN15	Cryptanalysis				
	22PE1CN16	Deep Learning				
	22PE1CN17	Information Systems Control and Audit				
Professional Core Lab-III	22PC2CN03	Wireless Networks and Ethical Hacking Laboratory	0	0	2	1
Professional Core Lab-IV	22PC2CN04	Machine Learning and Security Laboratory	0	0	2	1
Industry Engagement	22SD5CN01	Industry Engagement	0	0	2	1
Project	22PW4CN02	Mini-Project	0	0	4	2
Mandatory	22MN6HS02	Ancient Wisdom	2	0	0	0
<b>Total</b>			<b>17</b>	<b>0</b>	<b>10</b>	<b>20</b>



**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD**  
**M.TECH. II YEAR COURSE STRUCTURE AND SYLLABUS**

**(COMPUTER NETWORKS & INFORMATION SECURITY)**

**III SEMESTER**

**R22**

Course Type	Course Code	Name of the Course	L	T	P	Credits
Professional Elective-V	22PE1CP21	Blockchain Technology	3	0	0	3
	22PE1SE08	Software Defined Networks				
	22PE1CN18	Big Data				
	22PE1CN19	Network Design				
	22PE1CN20	TCP/IP Protocol Suite				
Open Elective	22OE1CN01	Business Analytics	3	0	0	3
	22OE1AM01	Industrial Safety				
	22OE1AM02	Operations Research				
	22OE1AM03	Entrepreneurship and Start-ups				
	22OE1PS01	Waste to Energy				
Project	22PW4CN03	Project Part - I	0	0	16	8
<b>Total</b>			<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>

**IV SEMESTER**

**R22**

Course Type	Course Code	Name of the Course	L	T	P	Credits
Project	22PW4CN04	Project Part - II	0	0	28	14
<b>Total</b>			<b>0</b>	<b>0</b>	<b>28</b>	<b>14</b>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PC1CN01) ADVANCED COMPUTER NETWORKS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To explore basic metrics to evaluate the performance of a computer network and network management frameworks
- To various services offered by key layers such as application layer, transport layer and network layer
- To explore link management strategies

**COURSE OUTCOMES:** After completion of the course, the student should be able to

- CO-1:** Understand basic terminology and concepts for a computer network  
**CO-2:** Explore how packet is transmitted from source system to destination system  
**CO-3:** Explore different applications that are supported by the computer network  
**CO-4:** Understand basic concepts involved in computer communication especially in wireless and mobile networks  
**CO-5:** Explore various security technologies for networks

### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	3	2	3	2	1
CO-2	3	2	3	3	3	1
CO-3	3	2	2	2	3	2
CO-4	3	2	3	2	3	2
CO-5	3	2	2	3	3	2

### UNIT – I:

**Computer Networks and the Internet:** What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models, Networks Under Attack

**Application Layer:** Principles of Network Applications, Electronic Mail in the Internet, DNS—The Internet's Directory Service

### UNIT – II:

**Transport Layer:** Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented, Principles of Congestion Control and Congestion Control in TCP.

### **UNIT – III:**

**The Network Layer:** Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router? The Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing.

**Links, Access Networks, and LANs:** Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking.

### **UNIT – IV:**

**Wireless and Mobile Networks:** Introduction, Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs, Cellular Internet Access, Mobility Management: Principles, Mobile IP, Managing Mobility in Cellular Networks, Wireless and Mobility: Impact on Higher-Layer Protocols.

### **UNIT – V:**

**Network Management:** What is Network Management? The Infrastructure for Network Management, The Internet-Standard Management Framework

**Security in Computer Networks:** What is Network Security? Principles of Cryptography, Message Integrity and Digital Signatures, Securing Email, Securing TCP Connections-SSL, Network Layer Security – IPSec and Virtual Private Networks

### **TEXT BOOKS:**

1. Computer Networking: A Top Down Approach, James F. Kurose, Keith W. Ross, 6<sup>th</sup> Edition
2. Data Communications and Networking, Behrouz A. Forouzan, 4<sup>th</sup> Edition, Tata McGraw Hill
3. High Speed Networks and Internets – Performance and Quality of Service, William Stallings, 2<sup>nd</sup> Edition, Pearson Education

### **REFERENCES:**

1. Computer Networks, Mayank Dave, Cengage
2. Guide to Networking Essentials, Greg Tomsho, Ed Tittel, David Johnson, 5<sup>th</sup> Edition, Thomson
3. Computer Networks, Andrew S. Tanenbaum, 4<sup>th</sup> Edition, Prentice Hall
4. An Engineering Approach to Computer Networking, S. Keshav, Pearson Education
5. Computer Communications Networks, Mir, Pearson Education

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PC1CN02) PRINCIPLES OF INFORMATION SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To understand the computer security concepts
- To differentiate symmetric / asymmetric cryptographic techniques
- To analyze various security mechanisms using cryptographic primitives
- To discriminate of security mechanism at various levels of computer networking and to be familiar with security defensive devices e.g., firewalls, intrusion detection etc.
- To apply algorithms used for secure transactions in real world applications

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Remember the overview of security principles

**CO-2:** Understand cryptographic algorithms and network security related issues and mitigating mechanisms

**CO-3:** Analyze different Authentication algorithms and other security tools

**CO-4:** Evaluate security at layers to meet the skills required for industrial need

**CO-5:** Identify and investigate vulnerabilities and security threats and mechanisms to counter them

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	3	3	2
CO-2	3	2	2	3	3	2
CO-3	3	2	3	3	3	2
CO-4	3	2	3	3	3	3
CO-5	3	2	3	3	3	2

#### UNIT-I:

**Information Security:** Introduction, History of Information security, What is Security, Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, CNSS Security Model, Components of Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle.

#### UNIT-II:

**Cryptography:** Concepts and Techniques, symmetric and asymmetric key cryptography, steganography. Symmetric key Ciphers: DES structure, DES Analysis,

Security of DES, variants of DES, Block cipher modes of operation, AES structure, Analysis of AES, Key distribution

**Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange

#### **UNIT-III:**

**Message Authentication and Hash Functions:** Authentication requirements and functions, MAC and Hash Functions, MAC Algorithms: Secure Hash Algorithm, HMAC, Digital signatures, X.509, Kerberos

#### **UNIT-IV:**

**Security at layers (Network, Transport, Application):** IPsec, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Electronic Transaction (SET), Pretty Good Privacy (PGP), S/MIME

#### **UNIT-V:**

**Intruders, Virus, and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

#### **TEXT BOOKS:**

1. Principles of Information Security, Michael E. Whitman, Herbert J. Mattord, 4<sup>th</sup> Edition, Cengage Learning
2. Cryptography and Network Security, William Stallings, 4<sup>th</sup> Edition, Pearson Education
3. Cryptography and Network Security, Forouzan Mukhopadhyay, 2<sup>nd</sup> Edition, McGraw Hill

#### **REFERENCES:**

1. Cryptography and Network Security, C. K. Shyamala, N. Harini, T. R. Padmanabhan, 1<sup>st</sup> Edition, Wiley India
2. Network Security and Cryptography, Bernard Menezes, Cengage Learning
3. Cryptography and Network Security, Atul Kahate, 2<sup>nd</sup> Edition McGraw Hill
4. Principles of Computer Security, W. M. Arthur Conklin, Greg White, TMH
5. Handbook of Security of Networks, Yang Xiao, Frank H Li, Hui Chen, World Scientific, 2011

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PC1CN03) ADVANCED PROGRAMMING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Knowledge on programming

### COURSE OBJECTIVES:

- To understand the basic concepts of Python
- To demonstrate the use of files, object-oriented programming in Python
- To familiarize with GUI based application development
- To familiarize with the PHP concepts, files
- To familiarize with database connectivity

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Comprehend Python Programming Fundamentals

**CO-2:** Understand Python files, Exceptions & Object-Oriented Programming concepts

**CO-3:** Applying the Tkinter for GUI development

**CO-4:** Learn PHP basics, files

**CO-5:** Learn PHP Database Connectivity

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	2	2	3
CO-2	3	1	1	2	2	3
CO-3	3	1	1	2	2	3
CO-4	3	1	1	2	2	3
CO-5	3	1	2	2	2	3

### UNIT-I:

**Python:** Basic features of Python-Interactive execution, comments, types, variables, operators, expressions, Statements-assignment, input, print, Control flow-Conditionals, Loops, break statement, continue statement, pass statement, Functions, definition, call, scope and lifetime of variables, keyword arguments, default parameter values, variable length arguments, recursive functions, Functional programming, namespaces and modules-import statement, Sequences-Strings, Lists and Tuples-basic operations and functions, iterating over sequences, List comprehensions, Packing and Unpacking of Sequences, Sets and Dictionaries operations, regular expressions, Python program examples.

### UNIT-II:

**Python Files:** Files-operations-opening, reading, writing, closing, file positions, file names and paths, functions for accessing and manipulating files and directories on disk, OS

module, Exceptions: Raising and handling exceptions, try/except statements, finally clause, standard exceptions & Modules and Packages.

Python Object oriented programming- classes, constructors, objects, class variables, class methods, static methods, Inheritance-is-a relationship, composition, polymorphism, overriding, multiple inheritance, abstract classes, multithreaded programming, time and calendar modules, Python program examples.

#### **UNIT-III:**

**GUI Programming With Tkinter:** Widgets(Buttons, Canvas, Frame, Label, Menu, Entry, Text, Scrollbar, Combo box, List box, Radio Button, event driven programming-events, creating GUI based applications in Python.

#### **UNIT-IV:**

**Introduction To PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, reading data from web form controls like text boxes, radio buttons, lists etc., PHP object-oriented programming.

**PHP Files:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files.

Listing directories, Handling File Uploads, PHP Regular Expressions, PHP Error Handling, Handling sessions and cookies

#### **UNIT-V:**

**Adv. PHP:** WAMP Server Installation, connecting to database (MySQL as reference), HTML using practical example along with PHP and MySQL, executing simple queries, working on with student information system, handling results.

#### **TEXT BOOKS:**

1. Exploring Python, Timothy A. Budd, McGraw Hill Publications
2. Python Programming, R. Thareja, Oxford University Press
3. Programming Python, Mark Lutz, 3<sup>rd</sup> Edition, SPD, O'Reilly

#### **REFERENCES:**

1. Introduction to Computer Science using Python, Charles Dierbach, Wiley India Edition
2. Fundamentals of Python, K. A. Lambert, B. L. Juneja, Cengage Learning
3. PHP: The Complete Reference, Steven Holzner, McGraw Hill Publications
4. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**M.Tech. I Semester**

### (22PC1CP05) INTERNET OF THINGS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE OBJECTIVES:**

- To introduce the terminology, technology, concept of M2M (machine to machine) and its applications
- To introduce the Python Scripting Language which issued in many IoT devices
- To introduce the IOT in different domains, System management with NETCONF-YANG
- To introduce the hardware and working principles of various sensors used for IoT
- To introduce the Raspberry PI platform, design and implementation of web application Frame work used in IoT applications

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the physical and logical design of the Internet of Things, IoT & M2M

**CO-2:** Analyze various applications of Internet of Things in various domain, NETCONF-YANG

**CO-3:** Create logical design of IoT systems using Python

**CO4:** Understand the hardware and working principles of various sensors used for IoT,

**CO5:** Create web application framework design using Raspberry PI platform and RESTful web API

**COURSE ARTICULATION MATRIX:**

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
<b>CO-1</b>	2	2	1	2	2	3
<b>CO-2</b>	3	1	2	2	3	3
<b>CO-3</b>	1	1	2	2	2	3
<b>CO-4</b>	2	2	2	2	2	2
<b>CO-5</b>	1	2	3	3	2	2

**UNIT-I:**

**Introduction to Internet of Things** –Definition and Characteristics of IoT, Physical Design of IoT –IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies –Wireless Sensor Networks, Cloud Computing, Bigdata analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

**IOT and M2M:** Introduction, M2M, Difference between IOT and M2M, SDN and NFV for IOT

**UNIT-II:**

**Domain Specific IoTs:** Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle



**System Management with NETCONF-YANG:** Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG

**UNIT – III:**

**Introduction To Python:** Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages -JSON,XML, HTTPLib, URLLib, SMTPLib

**UNIT-IV:**

**IoT Physical Devices and Endpoints:** Introduction to Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), and Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins. IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API

**UNIT-V:**

**Controlling Hardware:** Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, Using unipolar and bipolar Stepper motors  
Digital input- Sensing push switch, pull-up and pull-down resistors, Rotary encoder, Using keypad, Using RTC Sensors: Light sensor, temperature sensor with thermistor, voltage sensor, ADC and ADC, Temperature and Humidity Sensor DHT11, Read Switch, Distance Measurement with ultrasound sensor

**TEXT BOOKS:**

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014
3. Raspberry Pi Cookbook, Software and Hardware Problems and Solutions, Simon Monk, O'Reilly (SPD), 2016

**REFERENCES:**

1. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, Wiley, 2014
2. The Internet of Things, Samuel Greengard, MIT Press, Cambridge, 2015
3. Internet of Things: Principles and Paradigms, Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufman, 2016

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PE1CN01) MOBILE APPLICATION DEVELOPMENT

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To demonstrate their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Appreciate the Mobility landscape

**CO-2:** Understand the fundamentals of Android operating systems

**CO-3:** Familiarize with Android apps development aspects

**CO-4:** Debug programs running on mobile devices

**CO-5:** Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	-	2	1	2	2
CO-2	1	-	2	-	2	2
CO-3	2	-	2	-	2	3
CO-4	2	-	2	-	2	3
CO-5	3	2	2	1	3	3

#### UNIT-I:

**Introduction To Android Operating System:** Android OS Design and Features – Android development framework, SDK features, Installing and running applications, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

#### UNIT-II:

**Android User Interface Design Essentials:** Measurements – Device and pixel density independent measuring units Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editableText Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog, and pickersEvent Handling – Handling clicks or changes of various UI components, Drawing and Working with Animation

### **UNIT-III:**

**Intents and Broadcasts:** Intent – Using intents to launch Activities, explicitly starting new Activity, Implicit Intents, Passing data to Intents, getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications –Creating and Displaying notifications, Displaying Toasts

### **UNIT-IV:**

**Persistent Storage:** Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference Database – Introduction to SQLite database, creating and opening database, creating tables, inserting retrieving, and deleting data, Registering Content Providers, using content Providers (insert, delete, retrieve and update)

### **UNIT-V:**

**Common Android APIs:** Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World

### **TEXTBOOKS:**

1. Professional Android 4 Application Development, Reto Meier, Wiley India, 2012
2. Android Wireless Application Development, Lauren Darcey and Shane Conder, 2<sup>nd</sup> Edition, Pearson Education, 2011
3. Mobile Design and Development, Brian Fling, O'Reilly Media

### **REFERENCES:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India, 2013
2. Beginning Android, Mark L Murphy, Wiley India Pvt. Ltd.
3. Pro Android, Sayed Y. Hashimi and Satya Komatineni, Wiley India Pvt. Ltd.
4. Android Application Development All in One for Dummies, Barry Burd, 1<sup>st</sup> Edition
5. Teach Yourself Android Application Development in 24 Hours, 1<sup>st</sup> Edition, SAMS

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PE1CN02) DATA MINING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Linear Algebra, Optimization, Probability and Statistics, Statistical/Programming language

### COURSE OBJECTIVES:

- To familiarize to the concepts and techniques for real time applications
- To apply pre-processing techniques to extract information from raw data
- To understand the data mining skills for resolving practical problems
- To implement the algorithms in supervised and unsupervised learning

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Appraise raw input and process to generate relevant data for a range of data mining algorithms

**CO-2:** Extract and measure interesting patterns from heterogeneous databases

**CO-3:** Identify the appropriate data-mining algorithm for resolving the real-time applications

**CO-4:** Design and implement projects using Data Mining algorithms

### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	1	-	2	2	2
CO-2	1	2	1	-	-	2
CO-3	3	2	1	2	1	3
CO-4	2	2	2	3	3	1

### UNIT-I:

**Introduction:** Fundamentals of data mining- KDD process-Data Mining functionalities- Major issues in Data Mining.

**Data Preprocessing:** Need for data preprocessing- Data Cleaning-Data Integration and Transformation- Data Reduction-Discretization and Concept Hierarchy Generation.

### UNIT-II:

**Data Warehouse and OLAP Technology for Data Mining:** Data Warehouse- Multidimensional Data Model- Data Warehouse architecture- Data Warehouse implementation-From Data Warehousing to Data Mining-Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

**UNIT-III:**

**Association Rule Mining:** Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint- Based Association Mining.

**UNIT-IV:**

**Classification and Prediction:** Issues regarding Classification and Prediction- Classification by Decision Tree Induction- Bayesian Classification- Classification by Back propagation-Support Vector Machines (SVMs)- Other Classification Methods- Prediction, Classifier Accuracy.

**UNIT-V:**

**Cluster Analysis:** Types of Data in Cluster Analysis- Major Clustering methods- Partitioning Methods Density-Based methods- Grid-Based methods- Model Based Clustering methods.

**TEXT BOOKS:**

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2<sup>nd</sup> Edition, Elsevier, 2006
2. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley, 2005

**REFERENCES:**

1. Data Mining Techniques, Arun K. Pujari, University Press
2. Mining Introductory and Advanced Topics, Margaret H. Dunham, Pearson Education
3. Lecture Notes on Data Mining, Michael W. Berry, Murray Browne, World Scientific Publishing Co.
4. Data Warehousing in the Real World, Sam Anahory & Dennis Murray, Pearson Education Asia

**ONLINE RESOURCES:**

1. <https://www.coursera.org/specializations/data-mining>
2. <https://www.udemy.com/course>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PE1CN03) DATA STRUCTURES AND ALGORITHMS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To analyze algorithms and know abstract data types
- To experiment and Discriminate stack, queue and their applications
- To illustrate, Evaluate Searching and sorting techniques in real-world scenarios
- To summarize the knowledge of graphs and trees and their applications

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand various applications of Linear list

**CO-2:** Remember fundamental knowledge of data structures in real time scenarios

**CO-3:** Apply different sorting techniques in real time scenario

**CO-4:** Analyze various algorithms on tree data structures, including finding the minimum spanning tree and shortest path

**CO-5:** Analyze various algorithms on Graph data structures

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	-	-	2	1	1
CO-2	2	1	2	2	2	3
CO-3	2	1	3	3	2	3
CO-4	3	2	3	3	3	3
CO-5	2	1	3	3	3	3

#### UNIT-I:

**Data Structures:** Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, singly linked lists –insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists.

#### UNIT-II:

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap

#### UNIT-III:

**Searching:** Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hash table. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, comparison of sorting methods.

**UNIT-IV:**

**Trees:** Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT representations, recursive and non-recursive traversals, Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees.

**UNIT-V:**

**Graphs:** Graphs terminology, Graph ADT, representations, graph traversals/search methods dfs and bfs, graph traversals, Applications of Graphs

**TEXT BOOKS:**

1. Fundamental of Data Structure, Horowitz and Sahani, Galgotia Publication
2. Data Structure, Lipschutz, Schaum Series

**REFERENCES:**

1. Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition, Mark Allen Weiss, Addison-Wesley Publishing Company
2. How to Solve it by Computer, 2<sup>nd</sup> Impression, R. G. Dromey, Pearson Education

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PE1CN04) INTERNET TECHNOLOGIES AND SERVICES

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

Solutions using multi-tier architecture. S/he should have good understanding of different technologies on client and server-side components as Follows:

- Client Side: HTML5, CSS3, JavaScript, Ajax, jQuery and JSON
- Server Side: Servlets, JSP
- Database: MySQL with Hibernate and Connection Pooling
- Framework: Struts with validation framework, Internationalization (I18N)
- SOA: Service Oriented Architecture, Web services fundamentals, Axis framework for WS

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Explore Client-side scripting languages such as HTML, Java Script, JQuery

**CO-2:** Empower server-side scripting languages such as JSP, Servlets

**CO-3:** Enable asynchronous programming experience using AJAX

**CO-4:** Understand the importance of XML and how data XML is useful in organizing data

**CO-5:** Understand the concept of Service Oriented Architecture (SOA)

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	1	3	1	1	3	2
CO-2	1	-	-	3	3	2
CO-3	-	-	1	2	2	2
CO-4	1	3	1	2	2	2
CO-5	-	1	-	2	3	2

#### UNIT-I:

**Client-Side Technologies:** Overview of HTML - Common tags, XHTML, capabilities of HTML5 Cascading Style sheets, CSS3 enhancements, linking to HTML Pages, Classes in CSS. Introduction to JavaScripts, variables, arrays, methods and string manipulation, **BOM/DOM:** (Browser/Document Object Model), accessing elements by ID, Objects in JavaScript Dynamic HTML with JavaScript and with CSS, form validation with JavaScript, Handling Timer Events, Simplifying scripting with jQuery, JASON for Information exchange.

#### UNIT-II:

**Introduction to Java Servlets:** Introduction to Servlets: Lifecycle of a Servlet, reading request and initialization parameters, Writing output to response, MIME types in response, Session



**Tracking:** Using Cookies and Sessions, Steps involved in Deploying an application  
Database Access with JDBC and Connection Pooling

**UNIT-III:**

**Introduction to XML:** XML Parsing with DOM and SAX Parsers in Java Ajax -Ajax programming with JSP/Servlets, creating XML Http Object for various browsers, sending request, processing response data and displaying it. Introduction to Hibernate

**UNIT-IV:**

**Introduction to JSP:** JSP Application Development: Types of JSP Constructs (Directives, Declarations, Expressions, Code Snippets), Generating Dynamic Content, Exception Handling, Implicit JSP Objects, Conditional Processing, Sharing Data Between JSP pages, Sharing Session and Application Data, using user defined classes with jsp: use Bean tag, Accessing a Database from a JSP

**UNIT-V:**

**Introduction to Struts Framework:** Introduction to MVC architecture, Anatomy of a simple struts2 application, struts configuration file, Presentation layer with JSP, JSP bean, html and logic tag libraries, Struts Controller class, Using form data in Actions, Page Forwarding, validation framework, Internationalization

**Service Oriented Architecture and Web Services:** Overview of Service Oriented Architecture – SOA concepts, Key Service Characteristics, Technical Benefits of a SOA Introduction to Web Services– The definition of web services, basic operational model of web services, basic steps of implementing web services.

**TEXT BOOKS:**

1. Web Programming, Building Internet Applications, Chris Bates, 3<sup>rd</sup> Edition, Wiley Dreamtech
2. Java Server Pages, Hans Bergsten, SPD, O'Reilly
3. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers

**REFERENCES:**

1. Programming the World Wide Web, R.W. Sebesta, 4<sup>th</sup> Edition, Pearson
2. Core Servlets and Java Server Pages, Volume 1: Core Technologies, Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to Program, Dietel and Nieto, PHI/Pearson
4. Jakarta Struts Cookbook, Bill Siggelkow, SPD O'Reilly
5. Professional Java Server Programming, S. Allamaraju & others, Apress (Dreamtech)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PE1CN05) DISTRIBUTED SYSTEMS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OUTCOMES:

- To list the principles underlying the functioning of distributed systems
- To recognize design issues, interfaces for distributed systems
- To learn name service and clock synchronization mechanisms
- To explore the concurrency control and authentication in distributed systems
- To learn cryptography, authentication and key distribution

**COURSE OBJECTIVES:** After completion of the course, the student should be able to

**CO-1:** Familiarize to the concepts of distributed systems

**CO-2:** Learn about Kernel, processes, naming and Protection

**CO-3:** Understand the low synchronization mechanisms and transactions

**CO-4:** Understand the concurrency control in distributed systems

**CO-5:** Learn about authentication and consistency models

### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	1	1	1	1
CO-2	2	-	2	1	2	2
CO-3	2	-	2	2	1	1
CO-4	3	2	2	1	2	2
CO-5	3	-	2	2	3	3

### UNIT-I:

**Characterization of Distributed Systems:** Design Issues, User Requirement, Network Technologies and Protocols, IPC, Client-Server Communication, Group Communication, IPC in UNIX. Remote Procedure Calling, Design issues, Implementation, Asynchronous RPC

### UNIT-II:

Distributed OS, Its kernel, Processes and Threads, Naming and Protection, Communication and Invocation, Virtual Memory, File Service components, Design issues, Interfaces, implementation techniques, SUN network file systems

### UNIT-III:

SNS – a name service model, its design issues, Synchronizing physical clocks, Logical time and logical clocks, Distributed coordination. Replication and its architectural model, Consistency and request ordering, Conversation between a client and a server, Transactions, Nested Transactions.

**UNIT-IV:**

Concurrency control Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions and Nested Transactions, Atomic commit protocols. Concurrency control in distributed transactions, distributed Deadlocks, Transactions with replicated data, Transaction recovery, Fault tolerance, Hierarchical and group masking of faults.

**UNIT-V:**

Cryptography, Authentication and key distribution, Logics of Authentication, Digital signatures. Distributed shared memory, Design and Implementation issues, Sequential consistency and ivy, Release consistency and Munin, Overview of Distributed Operating systems Mach, Chorus.

**TEXT BOOK:**

1. Distributed Systems Concepts and Design, G. Coulouris, J. Dollimore and T. Kindberg, 3<sup>rd</sup> Edition, Pearson Education

**REFERENCES:**

1. Advanced Concepts in Operating Systems, M. Singhal, N. G. Shivarathri, Tata McGraw Hill Edition
2. Distributed Systems – Principles and Paradigms, A. S. Tanenbaum and M. V. Steen, Pearson Education

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PE1CN06) DATA SCIENCE

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To build the fundamentals of data science
- To learn techniques and tools for transformation of data
- To gain knowledge of statistical data analysis techniques utilized in business decision making
- To develop design skills and understanding purpose and working of machine learning algorithms
- To impart design thinking capability to handle big data problems

**COURSE OBJECTIVES:** After completion of the course, the student should be able to

**CO-1:** Demonstrate proficiency with statistical analysis of data

**CO-2:** Demonstrate skill in data management

**CO-3:** Develop the ability to build and assess data-based models

**CO-4:** Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

**CO-5:** Develop relevant programming abilities

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	3	3	1	2	2
CO-2	3	2	2	2	2	2
CO-3	2	3	2	2	2	2
CO-4	3	3	2	2	2	2
CO-5	2	2	2	2	2	2

### UNIT-I:

**Introduction:** Understanding relation between Artificial Intelligence, Machine learning, and Data Science; What is Data Science? - Extracting Meaningful Patterns, Building Representative Models, Combination of Statistics, Machine Learning, and Computing, Learning Algorithms, Associated Fields; Case for Data Science – Volume, Dimensions, Complex Questions; Data Science Classification; Data Science Algorithms; Data Science Tasks and Examples; Overview of Core algorithms

**Data Science Process:** Crisp data mining framework vs Data science process; Prior Knowledge – Objective, Subject Area, Data, Causation vs Correlation; Data Preparation, Modeling - Training and Testing Datasets, Learning Algorithms, Evaluation of the Model; Ensemble Modeling; Application

## **UNIT-II:**

**Data Exploration:** Objectives of data exploration; Datasets – Types of data; Descriptive statistics – Univariate Exploration, Multivariate Exploration; Data Visualization - Univariate Visualization (Histogram, Quartile, Distribution chart), Multivariate Visualization (Scatter plot, Scatter multiple, Scatter matrix, Bubble chart, Density chart); Visualizing High dimensional data (Parallel chart, deviation chart, and Andrews curves)

**Exploratory Data Analytics:** Descriptive Statistics – Mean Standard Deviation, dispersion, Skewness and Kurtosis, statistical-inference-Correlation Statistics – ANOVA.

## **UNIT-III:**

**Regression Methods:** Linear Regression; Multiple Linear Regression; Logistic Regression.

**Classification:** Decision trees; Rule Induction; k-NEAREST NEIGHBORS; Naïve Bayesian; ANN; SVM; Ensemble learners.

**Clustering:** Prototype-based clustering, Density clustering, Hierarchical clustering, Model-based clustering; K-MEANS CLUSTERING, Density-Based Spatial Clustering of Applications with Noise (DB SCAN)

**Model Evaluation:** Confusion matrix, ROC and AUC, Lift curves.

## **UNIT-IV:**

**Anomaly Detection:** Concepts - Causes of outliers, Anomaly detection techniques; Distance-Based outlier detection; Density-based outlier detection; Local outlier factor.

**Time Series Forecasting:** Taxonomy of time Series forecasting; Time series decomposition – Classical decomposition, Implementation, Smoothing based methods, Regression based methods, Machine learning methods – Windowing, Neural network autoregressive, Performance evaluation – Validation dataset (MAE, RMSE, MAPE, MASE), Sliding window validation.

## **UNIT-V:**

**Deep learning:** The AI Winter - Conceptual architecture of a perceptron, how it works - Regression Models as Neural Networks, Gradient Descent, Need for Backpropagation, Classifying More Than 2 Classes: Softmax, Convolutional Neural Networks, Dense Layer, Dropout Layer, Recurrent Neural Networks, Autoencoders, Related AI Models - Reinforcement Learning (RL) and Generative adversarial network (GAN).

## **TEXT BOOK:**

1. Data Science - Concepts and Practice, Vijay Kotu, Bala Deshpande, Data Science, 2<sup>nd</sup> Edition, Morgan Kaufmann, 2019

## **REFERENCES:**

1. Structural Analysis, Devdas Menon, Narosa Publishers, 2018
2. Data Science from Scratch - First Principles with Python, Joel Grus, O'Reilly Media, 2015
3. Foundations of Data Science, Avrim Blum, John Hopcroft, Ravindran Kannan, Cambridge University Press, 2020
4. Big Data and Analytics, Seema Acharya, Subhashini Chellappan, Wiley Publications, 2019

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PE1CN07) OPERATING SYSTEMS SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To learn and apply basic concepts and methodologies of System Administration and Security by building from the ground up a miniature corporate network
- To ensure that errant programs cause the minimal amount of damage possible
- To protect the OS from various threats, including malicious software such as worms, trojans and other viruses, misconfigurations, and remote intrusions
- To know some basic security measures to take in system administration
- To allow non-threatening traffic and prevent malicious or unwanted data traffic for protecting the computer from viruses

**COURSE OBJECTIVES:** After completion of the course, the student should be able to

**CO-1:** Understand computer system architecture and operating system functionalities

**CO-2:** Describe protection mechanisms

**CO-3:** Apply security measures to protect the OS itself from security breaches

**CO-4:** Apply security measures to take in system administration

**CO-5:** Analyze various networking technologies in Linux using case studies

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	1	1		
CO-2	2	2	1	1	1	1
CO-3	2	2	1	1	1	1
CO-4	2	2	1	1	1	1
CO-5	2	2	1	2	2	2

### UNIT – I:

**Overview of Operating Systems:** Introduction, Computer system organization and architecture, Operating system structure and operations, Process Management, Memory Management, file systems management, Protection and security, Scheduling Algorithms, Inter-process Communication (TBI)

### UNIT – II:

**Operating Systems Protection:** Protection Goals, Protection Threats, Access Control Matrix, Access Control Lists (ACL's), Capability Lists (C-lists), Protection systems, Lampton's access matrix, mandatory protection systems, Reference monitor, Secure operating system definition (TBI)

**UNIT – III:**

**Operating System Security:** Security Goals, Security Threats, Security Attacks- Trojan Horses, Viruses and Worms, Buffer Overflow attacks and Techniques, Formal Aspects of Security.(TBI), Encryption- Attacks on Cryptographic Systems, Encryption Techniques, Authentication and Password Security, Intrusion detection, malware defenses, UNIX and Windows security (TBI)

**UNIT – IV:**

**System Administration:** Security Basics, Securing the Server Itself, Maintenance and Recovery, Monitoring and Audit, Introduction to Linux Systems, Configuration Management, Log Auditing and Vulnerability Assessment. (TB2)

**UNIT – V:**

**Linux Networking:** Networking Technologies: DHCP, DNS, NFS/ISCSI, SMTP, SNMP, LAMP, Firewall/IDS/SSH, securing Linux. Case Studies: Security and Protection MULTICSA, UNIX, LINUX and Windows, Windows and Linux Coexisting. (TB3)

**TEXT BOOKS:**

1. Operating Systems: A Concept–Based Approach, Dhananjay M. Dhamdhere, 3<sup>rd</sup> Edition, McGraw-Hill, 2015
2. Windows Server 2003 Security, A Technical Reference, Roberta Bragg, Addison Wesley 4, Linux Administration Handbook, Evi Nemeth, Garth Snyder, Trent R. Hein, 2<sup>nd</sup> Edition, Prentice Hall

**REFERENCES:**

1. An Introduction to Operating Systems: Concepts and practice, Promod Chandra, P. Bhat, 4<sup>th</sup> Edition, Prentice Hall of India, 2014
2. Operating System: Internals and Design Principles, William Stalling, 7<sup>th</sup> Edition, Prentice Hall, 2014
3. Linux System Administration, Tom Adelstein and Bill Lubanovic, 1<sup>st</sup> Edition, O'Reilly Media Inc.

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PE1CN08) ARTIFICIAL INTELLIGENCE

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OUTCOMES:

- To learn the different nature of environments and problem solving agents
- To understand the knowledge and reasoning techniques
- To learn different learning techniques and natural language processing applications
- To understand the natural language processing and its applications
- To learn functions of robotics and AI based programming Tools

**COURSE OBJECTIVES:** After completion of the course, the student should be able to

**CO-1:** Familiarize to the concepts of Artificial Intelligence

**CO-2:** Learn about knowledge representation AI and reasoning

**CO-3:** Understand various types of learning

**CO-4:** Understand the importance of natural language processing in the real world

**CO-5:** Learn about AI based programming tools

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	1	1	1	1
CO-2	2	1	2	1	2	2
CO-3	3	1	2	2	-	-
CO-4	3	-	2	1	2	2
CO-5	2	-	2	2	3	3

#### UNIT – I:

**Introduction:** AI definition, Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies

#### UNIT – II:

**Knowledge and Reasoning:** Knowledge-based Agents, Representation, Reasoning and Logic, Propositional logic, First-order logic, Using First-order logic, Inference in First-order logic, forward and Backward Chaining

#### UNIT – III:

**Learning:** Learning from observations, Forms of Learning, Inductive Learning, Learning decision trees, why learning works, Learning in Neural and Belief networks



**UNIT – IV:**

**Practical Natural Language Processing:** Practical applications, Efficient parsing, Scaling up the lexicon, Scaling up the Grammar, Ambiguity, Perception. Image formation, Image processing operations for Early vision, Speech recognition and Speech Synthesis

**UNIT – V:**

**Robotics:** Introduction, Tasks, parts, effectors, Sensors, Architectures, Configuration spaces, Navigation and motion planning, Introduction to AI based programming Tools

**TEXT BOOKS:**

1. Artificial Intelligence: A Modern Approach, Stuart Russell, Peter Norvig, 2<sup>nd</sup> Edition, Pearson Education, 2007
2. Artificial Neural Networks, B. Yagna Narayana, PHI

**REFERENCES:**

1. Artificial Intelligence, E. Rich and K. Knight, 2<sup>nd</sup> Edition, TMH
2. Artificial Intelligence and Expert Systems, Patterson, PHI
3. Expert Systems: Principles and Programming, Giarrantana, 4<sup>th</sup> Edition, Riley, Thomson
4. PROLOG Programming for Artificial Intelligence, Ivan Bratka, 3<sup>rd</sup> Edition, Pearson Education
5. Neural Networks, Simon Haykin, PHI

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PE1CP04) INFORMATION RETRIEVAL SYSTEMS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To familiarize with Boolean and vector space retrieval models, evaluation and interface issues, text index construction and scoring
- To develop intelligent systems by applying the methods such as Prediction, Forecasting, Classification, Clustering and Optimization
- To build working systems that assist users in finding useful information on the Web

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the relationships between the Repository Systems

**CO-2:** Apply knowledge of data structures and indexing methods in information retrieval Systems

**CO-3:** Implement supervised and unsupervised algorithms on the Information systems

**CO-4:** Enhance the Search results applying Search techniques for better visualization to reducing the overhead of the user

**CO-5:** Explore the multimedia Information Retrieval to acquire the knowledge on audio, video and image data

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	3	2	2	2
CO-2	3	2	3	3	1	1
CO-3	2	3	3	3	2	3
CO-4	3	3	3	2	1	1
CO-5	2	2	2	1	1	1

#### UNIT – I:

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities – Search, Browse, Miscellaneous.

#### UNIT – II:

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N – gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

**UNIT-III:**

**Automatic Indexing:** Classes of automatic indexing, Statistical Indexing, Natural language, Concept indexing, Hypertext linkages. Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters  
Support vector machines and machine learning on documents. Flat clustering. Hierarchical clustering. Matrix decompositions and latent semantic indexing.

**UNIT-IV:**

**User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean Systems, Searching the Internet and hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems.

**UNIT-V:**

**Multimedia Information Retrieval:** Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.

Machine learning in IR, Introduction to Web search basics, Web crawling and indexes, Link analysis

**TEXT BOOKS:**

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T. Maybury, Springer
2. Modern Information Retrieval, Ricardo Baeza – Yates, Pearson Education, 2007
3. An Introduction to Information Retrieval, Cambridge University Press, Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge, England, 2009

**REFERENCES:**

1. Information Retrieval: Algorithms and Heuristics, David A. Grossman and Ophir Frieder, 2<sup>nd</sup> Edition, Springer
2. Information Retrieval Data Structures and Algorithms, Frakes W. B., Ricardo Baeza Yates, Prentice Hall, 1992
3. Modern Information Retrieval, Baeza-Yates & Ribeiro-Neto, Pearson Education, 2010

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22PC2CN01) NETWORKS AND INFORMATION SECURITY LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### A) NETWORKS LABORATORY:

##### COURSE OBJECTIVES:

- To describe about bit stuffing, character stuffing and CRC methods and to understand various routing algorithms and wireless LAN concepts
- To understand various algorithms to identify shortest path and various Network layer protocols

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Summarize data link layer framing methods, CRC, Dijkstra's algorithm and routing algorithms

**CO-2:** Demonstrate and simulate Ethernet, token ring, TCP and to configure VLAN and STP protocol

##### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	2	2	2	-
CO-2	3	1	2	3	2	1
CO-3	3	2	1	2	1	-
CO-4	3	-	-	3	3	-
CO-5	3	1	2	2	1	-

##### WEEK 1:

1. Implement the data link layer framing methods such as character stuffing and bit stuffing Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRCCCIP

##### WEEK 2:

1. Implement Dijkstra's algorithm to compute the Shortest path through a graph.
2. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.

##### WEEK 3:

1. Demonstrate the operation of Ethernet.
2. Demonstrate the implementation of a token ring network

**WEEK 4:**

1. Demonstrate the congestion control algorithms implemented by the Transmission Control Protocol (TCP).
2. Demonstrate the configuring a wireless LAN

**WEEK 5:**

1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.

**WEEK 6:**

1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterize traffic when the DNS server is up and when it is down.

**WEEK 7:**

1. Configuring VLAN protocol and analyzing results by using VTP protocol.

**WEEK 8:**

1. Configuring STP protocol and observing results for loop free topology.

**TEXT BOOKS:**

1. Routing Protocols & Concepts, Rick Graziani, Pearson Education
2. LAN Switching & Wireless, Wayne Lewis, Pearson Education
3. Accessing the WAN, Bob Vachon, Pearson Education

**REFERENCES:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, 5<sup>th</sup> Edition, Pearson Education, 2012
2. Computer Networks: A Systems approach, Larry L. Peterson & Bruce S. Davie, 5<sup>th</sup> Edition, Elsevier, 2012
3. An Introduction to Network Programming with Java, Jan Graba, Springer, 2010
4. TCP/IP Protocol Suite, Behrouz A. Forouzan, 4<sup>th</sup> Edition, Tata McGraw Hill, 2010
5. Network Fundamentals, Mark Dye, Pearson Education

**B) INFORMATION SECURITY LABORATORY****COURSE OBJECTIVES:**

- To classify symmetric encryption algorithms and analyze security aspects of symmetric and asymmetric algorithms
- To design and implement various digital signature algorithms

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-3:** Examine and implement symmetric and asymmetric algorithms

**CO-4:** Implement key generation and digital signature mechanisms

**WEEK 9:**

1. Write a Java program to perform encryption and decryption using the following algorithms
  - a) Ceasercipher

- b) Vigenerecipher
- c) HillCipher

**WEEK 10:**

1. Implement DES-2 algorithm logic using Java cryptography package.
2. Implement DES-3 algorithm logic using Java cryptography package.

**WEEK 11:**

1. Write a Java program to implement RSA algorithm.

**WEEK 12:**

1. Write a C/JAVA program to implement Diffie-Hellman algorithm for secure key exchange.

**WEEK 13:**

1. Consider the end user as one of the parties (Alice) and the JavaScript applications the other party (Bob). Calculate the message digest of a text using the SHA-1 algorithm and MD5 algorithm in JAVA.

**WEEK 14:**

1. Write a Java program to encrypt user's passwords before they are stored in a database table, and to retrieve them whenever they are to be brought back for verification.
2. Write a program in java, which performs a digital signature on a given text using Diffie-Hellmann algorithm.

**WEEK 15:**

1. Passive Information Retrieval –IP address, Domain identification of log entries using DNS,RIR tools and websites information gathering using WHOIS, ARIN tools.
2. Banner Grabbing through Netcat tool

**WEEK 16:** Lab Internal

**TEXT BOOKS:**

1. Build Your Own Security Lab, Michael Gregg, Wiley India
2. Cryptography and Network Security, Atul Kahate, TMH

**REFERENCES:**

1. Cyber Security Operations Handbook, J. W. Rittiaghouse and William M. Hancock, Elsevier

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. I Semester

## (22PC2CN02) ADVANCED PROGRAMMING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Knowledge on programming

### COURSE OBJECTIVES:

- To learn and implement basic concepts in Python
- To design GUI using Tkinter
- To obtain the knowledge of various concepts of PHP scripting language
- To obtain the knowledge of various concepts of files
- To gain the knowledge of using PHP to access database

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Understand and use basic concepts of Python

**CO-2:** Develop Graphical User Interface using Tkinter

**CO-3:** Explore basic concepts of PHP

**Co-4:** Explore concepts of files

**CO-5:** Establish database connectivity between frontend and backend using PHP-MySQL

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	2	2	3
CO-2	3	1	1	2	2	3
CO-3	3	1	1	2	2	3
CO-4	3	1	1	2	2	3
CO-5	3	1	1	2	2	3

### LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

Students are advised to do the following programs, but not limited to...

1. Write a python program for sum of squares of 1st n natural numbers.
2. Write a python program to print pyramid of numbers.
3. Write a python program to reverse a given number.
4. Write a python program for dictionary with keys having multiple in pairs.
5. Write a python program for linear search.
6. Write a python program to find largest and smallest element in the given array.
7. Write a python program for string concatenation and string split.
8. Write a python program for bubble sort.
9. Write a python program to convert time form 12hrs to 24hrs format.
10. Write a python program using functions for simple calculator.

11. Write a python program to check for leap year.
  12. Write a python program to print for multiplication table 1..10.
  13. Write a program for list with all methods available.
  14. Write a program for tuples with all methods available.
  15. Write a python program using functions to have options of 1) Selection sort 2) Binary search.
  16. Write a Python program that reads a list of names and ages, then prints the list sorted by age.
  17. Write a Python program that converts a fully parenthesized arithmetic expression from infix to postfix.
  18. Write a Python program that reads a postfix expression from standard input, evaluates it, and writes the value to standard output.
  19. Write a Python program that takes a command-line argument n and writes the number of primes less than or equal to n.
  20. Write a Python program that implements binary search method to search for a key in a sorted list.
  21. Write a Python program that counts the occurrences of words in a text file and displays the words in decreasing order of their occurrence counts.
  22. Suppose the password rules are as follows:
    - i) A password must have at least eight characters.
    - ii) A password must consist of only letters and digits.
    - iii) A password must contain at least two digits. Write a Python program that prompts the user to enter a password (string) and displays whether it is valid or invalid password.
  23. Write a Python program to compute n! for large values of n.
  24. Write to check if given number is prime or not using PHP and WAMP Server.
  25. Write a program to check greatest of 3 numbers using PHP and WAMP Server.
  26. Write a program to check if given number is palindrome using PHP and WAMP Server.
  27. Write a program for linear search using PHP and WAMP Server.
  28. Write a program to print pyramid of type 1,11,111, using PHP and WAMP Server.
  29. Write a PHP file programs for 1) Read 2)Write 3) Append data from a file.
  30. Write a PHP program for file upload.
  31. Write a PHP programs for 1) Cookies and 2)Sessions.
  32. Write a PHP program for Regular Expressions.
- Students are informed Practice on modules and packages.

### **Sample problems covering GUI application and Database applications:**

#### **GUI applications:**

33. Write a Python program that works as a simple calculator. Use a grid to arrange buttons for the digits and for the +, -,\*, % operations. Add a text field to display the result.
34. Develop a Python GUI application that receives an integer in one text field, and computes its factorial Value and fills it in another text field, when the button named Compute is clicked.
35. Write a Python program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer Num2 is Zero, the program should Display an appropriate message in the result field in Redcolor.



36. Write a Python program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.
37. Write a Python GUI application that takes a text file name as input and counts the characters, words and lines in the file. Words are separated with white space characters and lines are separated with new line character.

**Database Application:**

38. Write a program for executing query in object oriented for student information system using PHP and WAMP Server.
39. Write a program for inserting the data into the table for student information system using PHP and WAMP Server.
40. Write a program to select a particular student with id for student information system using PHP and WAMP Server.
41. Write a program to update the existing record for student information system using PHP and WAMP Server.
42. Write a program to delete the existing record for student information system using PHP and WAMP Server.

**TEXT BOOKS :**

1. Programming Python, Mark Lutz, 3<sup>rd</sup> Edition, SPD, O'Reilly
2. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly

**REFERENCES:**

1. Python Programming, A Modern Approach, Vamshi Kurama, Pearson
2. PHP: The Complete Reference, Steven Holzner, McGraw Hill Publications

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### (22SD5HS01) COMMUNICATION SKILLS FOR ACADEMIC AND RESEARCH WRITING

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### COURSE OBJECTIVES:

- To equip the students with an understanding of the mechanics and conventions of academic and research writing including cohesion and coherence to produce texts that demonstrate precision and clarity
- To enable students to present focused, logical arguments that support a thesis
- To empower the students to find, analyze, evaluate, summarize and synthesize appropriate source material for literature review
- To enable students to use appropriate language to analyze and interpret the data, and prepare an outline
- To enable students to become adept in the requirements and specifications of standard writing to produce academic and research papers

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply knowledge of academic language features, and text structure and ensure cohesion and coherence as connected to various text types

**CO-2:** Demonstrate the use of writing process strategies through outlining, reviewing, composing, and revising

**CO-3:** Evaluate sources and use summary, analysis, synthesis, and integration to construct a literature review on a topic chosen by the student

**CO-4:** Prepare an outline for Research Articles and Thesis

**CO-5:** Apply standard documentation style to produce academic and research papers that meet the demands of specific genres, purposes, and audiences

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	3	2	1	1	1
CO-2	3	3	3	1	1	1
CO-3	2	3	2	1	2	2
CO-4	2	3	2	1	1	1
CO-5	3	3	3	1	1	1

#### UNIT-I:

- a) Factors Influencing Effective Writing: Mechanics of Writing, Purpose of Writing, Audience/reader, Organisation- Cohesion, and Coherence
- b) Features of Academic Writing: Introduction, Complexity, Formality, Precision, Objectivity, Explicitness, Accuracy and Appropriacy, Relevance, Hedging

#### UNIT-II:

1. Academic Writing Forms:
  - a) Analysing arguments; Building an argument
  - b) Making a Counter Argument- Managing tone, and tenor
2. Types of Research: Primary and Secondary Research;
3. Research Design: Statement of the Problem, Survey of relevant literature, Writing Hypotheses, Developing Objectives; Research Tools

#### **UNIT-III:**

- a) Criteria of Good Research- Avoiding Plagiarism
- b) Data Interpretation
- c) Preparing an outline for Research Articles & Research Reports

#### **UNIT-IV:**

- a) Reference Skills -Paraphrasing (Change of parts of speech, word order, synonyms, using the passive form), -Summarizing (Steps in summarising)
- b) Documentation Format: APA style
- c) Documentation Format: MLA style

#### **UNIT-V:**

- a) Writing Article Reviews
- b) Report Writing: a) Writing Technical Reports b) Writing Proposals

#### **TEXT BOOKS:**

1. A Course in Academic Writing, Gupta R., Orient Black Swan, 2010
2. Academic Writing: Exploring Processes and Strategies, Leki I., CUP, 1998
3. Writing-up Research: Experimental Research Report Writing for Students of English, Weissberg R., & Buker S., Englewood Cliffs, Prentice Hall, 1990

#### **REFERENCES:**

1. English Academic Writing for Students and Researchers. Yakhontova T., 2003
2. Inside Track: Successful Academic Writing, Gillett A., Hammond A., Martala M., Pearson Education, 2009
3. English for Academic Research: Writing Exercises, Wallwork, Springer, 2013
4. The MLA Handbook for Writers of Research Papers, 7<sup>th</sup> Edition, Modern Language Association
5. Academic Writing for Graduate Students: A Course for Non-native Speakers of English, Swales J. M., & Feak C. B., University of Michigan Press, 1994

#### **ONLINE RESOURCES:**

1. <https://www.coventry.ac.uk/study-at-coventry/student-support/academic-support/centre-for-academic-writing/support-for-students/academic-writing-resources/>
2. <https://www.biz-e-training.com/resources-for-learners/academic-writing-online-resources/>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. I Semester

### RESEARCH METHODOLOGY AND IPR

#### TEACHING SCHEME

L	T/P	C
2	0	0

#### EVALUATION SCHEME

SE-I	SE-II	SEE	TOTAL
50	50	-	100

#### COURSE OBJECTIVES:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand research problem formulation

**CO-2:** Analyze research related information & Follow research ethics

**CO-3:** Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity

**CO-4:** Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular

**CO-5:** Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	3	2	1	2	1
CO-2	3	3	2	2	2	2
CO-3	3	3	2	1	2	2
CO-4	3	3	2	1	2	2
CO-5	3	3	2	1	2	1

#### UNIT – I:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

#### UNIT – II:

Effective literature studies approaches, analysis, Plagiarism, Research ethics

#### UNIT – III:

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

**UNIT – IV:**

**Nature of Intellectual Property:** Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**UNIT – V:**

**Patent Rights:** Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System.

New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs

**TEXT BOOKS:**

1. Research Methodology: An Introduction for Science & Engineering Students, Stuart Melville and Wayne Goddard
2. Research Methodology: An Introduction, Wayne Goddard and Stuart Melville
3. Research Methodology: A Step by Step Guide for beginners, Ranjit Kumar, 2<sup>nd</sup> Edition

**REFERENCES:**

1. Resisting Intellectual Property, Halbert, Taylor & Francis Ltd., 2007
2. Industrial Design, Mayall, McGraw Hill, 1992
3. Product Design, Niebel, McGraw Hill, 1974
4. Intellectual Property in New Technological Age, Robert P. Merges, Peter S. Menell, Mark A. Lemley, 2016
5. Intellectual Property Rights Under WTO, T. Ramappa, S. Chand, 2008

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PC1CN04) WIRELESS NETWORKS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Basics of computer networks, Protocols of computer networks

#### COURSE OBJECTIVES:

- To understand basic architecture of OSI model and wireless network architecture
- To know various modes of wireless communications
- To Implement wireless PAN and LAN networks
- To differentiate between time-driven and event-driven simulation
- To introduce the NS2 tool and its implementation in Unix operating system

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** To understand the basic concepts of wireless networks

**CO-2:** To identify appropriate communication channels for wireless networks

**CO-3:** To design and implement wireless PANs and LANs

**CO-4:** To analyze various network simulation tools

**CO-5:** To Implement NS2 tool in Unix operating system

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	3	2	2	3
CO-2	3	2	2	2	2	3
CO-3	2	3	3	2	2	3
CO-4	3	2	3	3	3	2
CO-5	2	3	3	2	3	2

#### UNIT-I

**Introduction To Wireless Networks and Architecture:** Introduction, Wireless networks Logical architecture: The OSI Network Model, Network Layer Technologies, Data Link Layer Technologies, Physical Layer Technologies, Operating System Considerations, Wireless Network Physical Architecture: Wired Network Topologies, Wireless Network Topologies, Wireless LAN Devices, Wireless PAN Devices, Wireless MAN Devices.

#### UNIT-II:

**Wireless Communication:** Introduction, Radio Communication Basics: The RF Spectrum, Spread Spectrum Transmission, Wireless Multiplexing and Multiple Access Techniques, Digital Modulation Technique, RF Signal Propagation and Reception, Ultra-Wideband Radio, MIMO Radio, Infrared Communication Basics: The Ir Spectrum, Infrared Propagation and Reception

**UNIT-III:**

**Wireless Pan Implementation:** Introduction, Wireless PAN Standards: Introduction, Bluetooth (IEEE 802.15.1), Wireless USB, ZigBee (IEEE 802.15.4), IrDA  
Implementing Wireless LANs: Evaluating Wireless LAN Requirements, Planning and Designing the Wireless LAN, Pilot Testing, Installation and Configuration, Operation and Support, Wireless LAN Security: The Hacking Threat, WLAN Security, WEP – Wired Equivalent Privacy Encryption.

**UNIT-IV:**

**Simulation of Computer Networks:** Basics of Computer Network Simulation, Simulation: The Formal Definition, Elements of Simulation, Time-Dependent Simulation: Time-Driven Simulation, Event-Driven Simulation. Tools for Network Simulation.

**UNIT-V:**

**Introduction to Network Simulator2 (NS2):** Introduction, Basic Architecture, Installation: Installing an All-In-One NS2 Suite on Unix-Based Systems, Installing an All-In-One NS2 Suite on Windows-Based Systems, Directories and Convention: Directories, Convention, Running NS2 Simulation: NS2 Program Invocation, Main NS2 Simulation Steps, A Simulation Example.

**TEXT BOOKS:**

1. Wireless Networking Technology from Principles to Successful Implementation, Steve Rackley
2. Introduction to Network Simulator NS2, Teerawat Issariyakul, Ekram Hossain

**REFERENCES:**

1. Wireless Networks, Dr. Manmohan Sharma
2. Simulation Modelling and Analysis, Averill M. Law, 5<sup>th</sup> Edition

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. II Semester

## (22PC1CN05) VULNERABILITY ANALYSIS AND HACKING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Basic knowledge of programming

### COURSE OBJECTIVES:

- To quantitatively assess and measure threats to information assets
- To evaluate the most vulnerable points in information systems
- To apply security plans designed for protecting data assets against attacks
- To perform buffer overflow attack in software and SQL injection attack in web application
- To perform penetration tests into secure networks for evaluation purposes

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand and experience the fundamentals in vulnerability analysis ethical hacking

**CO-2:** Create techniques to minimize risks of attacks

**CO-3:** Analyze different techniques and methods applied by hackers

**CO-4:** Apply SQL injection and buffer overflow attack methods

**CO-5:** Analyze penetration test methods

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	2	3	2	3
CO-2	2	2	2	3	3	3
CO-3	2	2	2	3	2	3
CO-4	2	2	3	3	2	3
CO-5	2	2	2	3	2	2

### UNIT-I:

**Introduction to Ethical Hacking, Ethics, and Legality:** Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks. Footprinting and Social Engineering Footprinting, Information Gathering Methodology, DNS Enumeration Who is and ARIN Lookups, Trace route, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures



## **UNIT-II:**

System Hacking Understanding Password-Cracking Techniques, Password-Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Non-electronic Attacks, Understanding Key loggers and Other Spyware Technologies Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Rootkits Planting, Understanding How to Hide Files, NTFS File Streaming NTFS Stream Countermeasures, Understanding Steganography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log

## **UNIT-III:**

**Trojans, Backdoors, Viruses, and Worms:** Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, Reverse Connecting Trojans, NetcatTrojan ,Indications of a Trojan Attack, Trojan Construction Kit and Trojan Makers , Countermeasure Techniques in Preventing Trojans, Difference between a Virus and a Worm, Types of Viruses, Understand Antivirus Evasion Techniques, Understand Virus Detection Methods Session Hijacking Denial of Service, Session Hijacking, Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Prevention of Session Hijacking

## **UNIT-IV:**

Hacking Web Servers, Web Application Vulnerabilities, and Web-Based Password Cracking Techniques, Hacking Web Servers, Types of Web Server Vulnerabilities, Attacks against Web Servers, Web Server Hardening Methods Web Application Vulnerabilities, Objectives of Web Application Hacking, Anatomy of an Attack, Web Application Threats, Google Hacking, Web Application Countermeasures. Web-Based Password Cracking Techniques, Authentication Types, Password Cracker, **Password Attacks:** Classification Password- Cracking Countermeasures

**SQL Injection and Buffer Overflows:** SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures Buffer Overflows, Types of Buffer Overflows and Methods of Detection, Stack-Based Buffer Overflows, Buffer Overflow Mutation Techniques

## **UNIT-V:**

Linux Hacking Linux Basics, Compile a Linux Kernel, GCC Compilation Commands, Install Linux Kernel Modules, Linux Hardening Methods

**Penetration Testing Methodologies:** Security Assessments, Penetration Testing Methodologies, Penetration Testing Steps, Pen-Test Legal Framework, Automated Penetration Testing Tools, Pen-Test Deliverables.

## **TEXT BOOKS:**

1. CEH Official Certified Ethical Hacking Review Guide, Wiley India Edition
2. Certified Ethical Hacker, Michael Gregg, Pearson Education
3. Certified Ethical Hacker, Matt Walker, TMH

## **REFERENCES:**

1. Computer Security, Concepts, Issues and Implementation, Alfred Basta Wolf Halton, Cengage Learning
2. Hacking Exposed Web 2.0, Rich Annings, Himanshu Dwivedi, Zane Lackey, Tata McGraw Hill Edition
3. Ethical Hacking & Network Defense, Michael T. Simpson, Cengage Learning

4. Hacking Exposed Windows, Joel Scambray, Stuart McClure, 3<sup>rd</sup> Edition, Tata McGraw Hill Edition
5. Hacking Exposed Window Server 2003, Joel Scabray Stuart McClure, Tata McGraw Hill Edition

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PC1CN06) MACHINE LEARNING AND SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To learn how machine learning has contributed to the success of modern spam filters
- To quickly detect anomalies, including breaches, fraud, and impending system failure
- To conduct malware analysis by extracting useful information from computer binaries
- To uncover attackers within the network by finding patterns inside datasets

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Identify the key elements of machine learning and security

**CO-2:** Understand the principles, advantages, limitations, and possible applications of machine learning

**CO-3:** Apply supervised and unsupervised learning to conduct malware analysis, and detect anomalies

**CO-4:** Develop the threat attackers pose to machine learning solutions

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	3	2	2	3
CO-2	3	2	2	2	2	3
CO-3	2	2	3	2	3	3
CO-4	2	2	3	3	3	3

#### UNIT-I:

**Introduction:** What Is Machine Learning, What Machine Learning Is Not, Adversaries Using Machine Learning, Real-World Uses of Machine Learning in Security, Spam Fighting: An Iterative Approach, Limitations of Machine Learning in Security.

#### UNIT-II:

**Classical Machine Learning Paradigms-1:** Supervised Classification Algorithms: Logistic Regression, Decision Trees, Support Vector Machines, Naive Bayes.

**Classical Machine Learning Paradigms-2:** Unsupervised Classification Algorithms: k-means clustering, Hierarchical clustering, Locality-sensitive hashing, k-d trees, DBSCAN, Evaluating Clustering Results.

**UNIT-III:**

**Anomaly Detection:** What is Anomaly Detection, Feature Engineering for Anomaly Detection, Anomaly Detection with Data and Algorithms, Challenges of Using Machine Learning in Anomaly Detection, Maintainability of Anomaly Detection Systems.

**UNIT-IV:**

**Malware Analysis:** Understanding Malware, Defining Malware Classification, Malware: Behind the Scenes, Feature Generation, Data Collection, Generating Features, Feature Selection, From Features to Classification, How to Get Malware Samples and Labels.

**UNIT-V:**

**Network Traffic Analysis:** Theory of Network Defense, Access Control and Authentication, Intrusion Detection, Detecting In-Network Attackers, Data-Centric Security, Machine Learning and Network Security, From Captures to Features, Threats in the Network, Building a Predictive Model to Classify Network Attacks.

**TEXT BOOKS:**

1. Machine Learning and Security: Protecting Systems with Data and Algorithms, Chio C., Freeman D., O'Reilly Media Inc., 2018

**REFERENCES:**

1. Machine Learning, Tom Mitchell, McGraw Hill, 1997
2. Machine Learning for Computer and Cyber Security: Principle, Algorithms, and Practices, Gupta Brij B., Quan Z. Sheng, Eds., CRC Press, 2019
3. Machine Learning: A Probabilistic Perspective, Murphy Kevin P., MIT Press, 2012
4. Data Mining and Machine Learning In Cyber Security, Dua Sumeet, Xian Du, CRC Press, 2016

**ONLINE RESOURCES:**

1. <https://www.udemy.com/course/the-complete-artificial-intelligence-for-cyber-security-2021/>
2. <https://www.sans.org/cyber-security-courses/applied-data-science-machine-learning/>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN09) COMPUTER FORENSICS AND CYBER SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Knowledge on Computer Networks

#### COURSE OBJECTIVES:

- To understand the fundamentals of computer forensics
- To examine various forensic tools to process the crime and incident scenes
- To learn how to collect and preserve digital evidence that resides on computer storage devices
- To understand the concepts of mobile and wireless devices
- To analyse how cyber-crimes take place and how these can be handled by LAW

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply appropriate skills and knowledge in solving computer forensics problems

**CO-2:** Analyze various Computer forensic tools and their importance

**CO-3:** Understand and apply new methods for collecting and preserving evidence

**CO-4:** Understand the concepts of Mobile and Wireless devices

**CO-5:** Evaluate the knowledge gained to investigate cybercrimes

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	3	3	1	1
CO-2	2	2	2	2	1	1
CO-3	2	2	2	2	1	1
CO-4	2	2	2	2	1	1
CO-5	2	3	3	2	1	1

#### UNIT-I:

**Computer Forensics Fundamentals:** What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists.

**Types of Computer Forensics Technology:** Types of Military Computer Forensics Technology, Types of Law Enforcement – Computer Forensic Technology – Types of Business Computer Forensics Technology.

#### UNIT-II:

**Processing Crime and Incident Scenes:** Identifying digital evidence, collecting evidence InPrivate-sector incident scenes, processing law enforcement crime scenes,

preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case, few Case studies.

**Current Computer Forensic Tools:** Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

#### **UNIT-III:**

**Evidence Collection and Data Seizure:** Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps –Controlling Contamination: The chain of Custody.

**Duplication and Preservation of Digital Evidence:** Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence.

**Computer Image Verification and Authentication:** Special Needs of Evidential Authentication – Practical consideration – Practical Implementation.

#### **UNIT-IV:**

**Introduction to Cyber Crime:** Cybercrime Definition and Origins of the World, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, Cybercrime and the Indian ITA 2000, Global perspective on Cybercrimes.

**Cyber Offenses:** How Criminals Plan Them: Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafé and Cybercrimes, Botnets, Attack Vector, Cloud Computing.

#### **UNIT-V:**

**Mobile and Wireless Devices:** Introduction, Proliferation of Mobile and wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges posed by Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organization, Organizational. Measures for handling Mobile Devices—Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

**Cyber Crime Investigation:** Firewalls and Packet Filters, password Cracking, Key loggers and Spyware, Virus and Worms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

#### **TEXT BOOKS:**

1. Computer Forensics, Computer Crime Investigation, John R. Vacca, Firewall Media, New Delhi
2. Computer Forensics and Investigations, Nelson, Phillips Enfinger Stuart, Cengage Learning
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunit Belpure, Wiley

#### **REFERENCES:**

1. Forensic Compiling, A Practitioners Guide, Tony Sammes and Brain Jenkinson, Springer International Edition
2. Computer Evidence Collection & Presentation, Christopher L. T. Brown, Firewall Media
3. Software Forensics Collecting Evidence from the Scene of a Digital Crime, Robert M. Slade, TMH, 2005

4. Computer Security: Principles and Practice, William Stallings and Lawrie Brown, Prentice Hall, 2008

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN10) INFORMATION SYSTEMS SECURITY AND RISK MANAGEMENT

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To explore the importance of information systems security
- To address disaster recovery, response for the IT infrastructure
- To explore various types of threats that will target different IT infrastructure from different corners
- To explore different access control mechanisms in order to protect IT resources from unauthorized persons
- To explore various Global Standards for Security

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand basic concepts of information systems security

**CO-2:** Understand the nature of different malicious attacks, threats, and vulnerabilities

**CO-3:** Explore different types of access control mechanisms

**CO-4:** Analyze risk, response, recovery, and getting awareness over various information security laws

**CO-5:** Explore various global standards for security

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	2	1	1
CO-2	2	2	3	1	2	2
CO-3	1	3	3	3	3	2
CO-4	2	3	3	2	3	2
CO-5	2	2	2	2	2	2

#### UNIT-I:

**Information Systems Security:** Information Systems Security: Introduction, Risks, Threats, and Vulnerabilities, Tenets of Information Systems Security, The Seven Domains of a Typical IT Infrastructure, Weakest Link in the Security of an IT Infrastructure, IT Security Policy Framework.

**Evolution of the Internet of Things:** IoT's Impact on Human and Business Life, Evolution from Bricks and Mortar to E-Commerce, IP Mobility, Mobile Applications, New Challenges Created by the IoT.

#### UNIT- II:

**Malicious Attacks, Threats, and Vulnerabilities:** Malicious Activity on the Rise, Attack Tools, Security Breach, Risks, Threats, and Vulnerabilities, Malicious Attack, Malicious Software, Common Types of Attacks, Countermeasure.



**The Drivers of the Information Security Business:** Defining Risk Management, implementing BIA, BCP, and DRP, Assessing Risks, Threats, and Vulnerabilities, Closing the Information Security Gap, Keeping Private Data Confidential, Mobile Workers and Use of Personally Owned Devices

#### **UNIT-III:**

**Access Controls:** Two Types of Access Controls, Authorization Policies, Policies and Procedures for Accountability, Formal Models of Access Control, Effects of Breaches in Access Control, Centralized and Decentralized Access Control

**Security Operations and Administration:** Security Administration, Compliance, Professional Ethics, The Infrastructure for an IT Security Policy, Data Classification Standards, Configuration Management, The Change Management Process, Application Software Security, Software Development and Security

#### **UNIT-IV:**

##### **Auditing, Testing, and Monitoring:**

**Security Auditing and Analysis:** Defining Your Audit Plan, Auditing Benchmarks, Audit Data Collection Methods, Post-Audit Activities, Security Monitoring, Types of Log Information to Capture, How to Verify Security Controls, Monitoring and Testing Security Systems

#### **UNIT-V:**

##### **Risk, Response, and Recovery:**

**Risk Management and Information Security:** The Risk Management Process, Business Continuity Management, Backing Up Data and Applications, Incident Handling, Recovery from a Disaster.

**Malicious Code and Activity:** The Risk Management Process, Business Continuity, The Main Types of Malware, A Brief History of Malicious Code Threats, Threats to Business Organizations, Anatomy of an Attack, Attack Prevention Tools and Techniques, Intrusion Detection Tools and Techniques

**Information Security Standards:** Standards Organizations, NIST, ISO, IEC, WWW, IETF, IEEE, ITUTS, ANSI, ETSICSTC, Payment Card Industry Data Security Standard.

#### **TEXT BOOKS:**

1. Fundamentals of Information Security, David Kim, Michael G. Solomon, 3<sup>rd</sup> Edition, Jones & Bartlett Learning, USA
2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices, Nina Godbole, 2018

#### **REFERENCES:**

1. IT Security Metrics: A Practical Framework for Measuring Security Protecting Data, Lance Hayden
2. An Information Governance Model for Information Security Management, Matthew Nicho, IGI-Global, 2013
3. Risk Management Guide for Information Technology Systems, Gary Stoneburner, Alice Goguen, Alexis Feringa

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. II Semester

## (22PE1CN11) MOBILE COMPUTING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** A Course on Computer Networks

### COURSE OBJECTIVES:

- To understand the wireless and mobile computing concepts
- To understand GSM telecommunication architecture
- To analyze various network layer protocols used in mobile computing
- To analyze various transport layer protocols used in mobile computing
- To understand security issues in mobile computing

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Remember the basic concepts of mobile computing and architecture

**CO-2:** Understand architecture of GSM mobile telecommunication system

**CO-3:** Evaluate network layer protocols

**CO-4:** Evaluate transport layer protocols

**CO-5:** Analyze security issues and security techniques in mobile computing

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	1	3	3	1	1
CO-2	3	1	2	3	1	1
CO-3	3	1	3	3	3	2
CO-4	3	1	3	3	3	2
CO-5	3	2	-	3	3	3

### UNIT-I:

**Mobile Computing:** Novel Applications, Limitations of Mobile Computing

Mobile Computing Architecture: Programming languages, Functions of Operating Systems, Functions of Middleware for mobile Systems, Mobile Computing Architectural layers, Protocols, Layers.

**Mobile Devices:** Handheld Mobile Smartphones with Multimedia Functionalities, Smartcards, Smart Sensors

### UNIT-II:

**Global System for Mobile Communications (GSM):** Mobile Services, System Architecture, Protocols, Localization & Calling, Handover, Security

GPRS: GPRS System Architecture, UMTS: UMTS System Architecture

**UNIT-III:**

**Mobile Network Layer:** Mobile IP: Goals, Assumptions, Entities and Terminology, IP Packet Delivery, Agent Discovery, Registration, Tunnelling and Encapsulation, Optimizations, Dynamic Host Configuration Protocol (DHCP)

**UNIT-IV:**

**Mobile Transport Layer:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time-out Freezing, Selective retransmission, Transaction oriented TCP, TCP over 2.5G/3G Wireless Networks

**UNIT-V:**

**Security Issues in Mobile Computing:** Introduction, Information Security, Security Techniques and Algorithms, Security Protocols, Security Models, Security Frameworks for mobile Environment

**TEXT BOOKS:**

1. Mobile Computing, Raj Kamal, Oxford University Press, 2007
2. Mobile Computing, Asoke K. Talukdar, Tata McGraw-Hill Education, 2010
3. Mobile Communications, Jochen Schiller, 2<sup>nd</sup> Edition, Addison Wisely, Pearson Education, 2008

**REFERENCES:**

1. Wireless Communications and Networks, William Stallings, Pearson Education, 2002
2. 802.11 Wireless Networks, Matthew S. Gast, SPD O'Reilly
3. Principles of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklons, Thomas Stober, Springer, 2003
4. Fundamentals of Mobile Computing, Pattnaik Prasant Kumar, Mall Rajib, 2<sup>nd</sup> Edition, PHI Learning Pvt. Ltd., 2015
5. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Reza B'Far, Cambridge University Press, 2005

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN12) IT SECURITY METRICS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVE:

- To understand important factors to be considered while evaluating security mechanisms for any network
- To able to design a secured and robust network
- To know different types of data needed for analyzing security
- To reduce the data transfer cost by considering security cost and value
- To analyse how the security can be improved continuously with change in requirements

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Learn security metrics and exploring various resources to be secured

**CO-2:** Understand Security Process Management Framework

**CO-3:** Explore various data sources for analyzing security

**CO-4:** Learn Measurements Security Operations, Security Cost and Value

**CO-5:** Learn The Security Improvement Program

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	1	3	1	-
CO-2	2	2	2	3	2	2
CO-3	3	3	3	2	3	2
CO-4	2	3	3	2	2	2
CO-5	1	2	2	-	1	1

#### UNIT-I:

**What is a Security Metric?** Metric and Measurement, Security Metrics Today, The Dissatisfying State of Security Metrics, Reassessing Our Ideas About Security Metrics. Designing Effective Security Metrics: Choosing Good Metrics, GQM for Better Security Metrics, More Security Uses for GQM, Summary.

#### UNIT-II:

**Understanding Data:** What Are Data? Data Sources for Security Metrics; We Have Metrics and Data -Now what, Summary, Case Study 1. The Security Process Management Framework: Managing Security as a Business Process, the SPM Framework, Before You Begin SPM, Summary. The Analysing Security Metrics Data: The Most Important Step, Analysis Tools and Techniques, Summary.

**UNIT-III:**

**Designing the Security Measurement Project:** Before the Project Begins, Phase One: Build a Project Plan and Assemble the Team, Phase two: Gather the Metrics Data, phase Three: Analyze the Metrics Data and Build Conclusions, phase Four: Present Results, Phase Five: Reuse the Results, Project Management Tools, Summary.

**UNIT-IV:**

**Measurements Security Operations:** Sample Metrics for Security Operations, Sample Measurement Project for Security Operations, Summary. **Measuring Compliance and Conformance:** The Challenges of Measuring Compliance, Sample Measurement Projects for Compliance and Conformance, Summary.

**UNIT-V:**

**Measuring Security Cost and Value:** Sample Measurement Projects for Compliance and Conformance, The Importance of Data to Measuring Cost and Value, Summary. **Measuring People, Organizations, and Culture:** Sample Measurement Projects for People, Organizations, and Culture, Summary.

**The Security Improvement Program:** Moving from Projects to Programs, Managing Security Measurement with a Security, Requirements for a SIP, Measuring the SIP, Summary.

**TEXT BOOKS:**

1. IT Security Metrics, Lance Hayden, Tata Mcgraw-Hill
2. Security Metrics, Caroline Wong, TATA Mcgraw-Hill

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN13) ADVANCED NETWORK SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To explore to advanced topics in network security issues
- To identify the lattice- based cryptanalysis and elliptic curves and pairings
- To understand birthday- based algorithms for functions and attacks on stream ciphers
- To apply the cryptographic techniques for secure transactions in real world applications

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Identify and investigate vulnerabilities and security threats and the mechanisms to counter them

**CO-2:** Explore more network security issues like authentication, anonymity, denial of service, encryption, forensics etc. in both wired and wireless networks

**CO-3:** Evaluate various intrusion detection and intrusion prevention mechanisms

**CO-4:** Apply cryptographic services to real-time web applications to defend against attacks

**CO-5:** Apply various web services techniques in real time scenario

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	2	2	2	-
CO-2	3	1	2	3	2	1
CO-3	3	2	1	2	1	-
CO-4	3	-	2	3	3	-
CO-5	3	1	1	2	2	1

#### UNIT-I:

**IEEE 802.11 Wireless Lan Security:** Background, Authentication Pre- WEP Authentication, Authentication in WEP, Authentication and key agreement in 802.11i, Confidentiality and Integrity: Data protection in WEP, Data protection in TKIP and CCMP

#### UNIT-II:

**Cell Phone Security:** Preliminaries, GSM(2G) Security – Entity authentication and key management, Encryption, Security in UMTS(3G)- Security enhancements, Authentication and key management, Integrity protection and encryption

**UNIT-III:**

**Non-Cryptographic Protocol Vulnerabilities:** DoS, DDoS, Session Hijacking and Spoofing, Pharming Attacks, Wireless LAN Vulnerabilities

**Software Vulnerabilities:** Phishing, Buffer Overflow, Format String Attacks, Cross-Site Scripting (XSS), SQL Injection

**UNIT-IV**

**Intrusion Prevention and Detection:** Introduction, Prevention versus Detection, Types of Intrusion Detection systems, DDoS Attack Prevention and Detection, Malware Defense

**UNIT-V:**

**Web Services Security:** Motivation, Technologies for Web Services, WS-Security, SAML, Other Standards

**TEXT BOOKS:**

1. Cryptography, Network Security, and Cyber Laws: Bernard L. Menezes, Ravinder Kumar, Cengage Learning
2. Network Security and Cryptography, Bernard Menezes, Cengage Learning

**REFERENCES:**

1. Cyber Security: Nina Godbole, Sunit Belapure, Wiley India
2. Network Security Hacks: Andrew Lockhart, O'Reilly, SPD
3. Cryptography and Network Security: Forouzan Mukhopadhyay, 2<sup>nd</sup> Edition, McGraw Hill
4. Principles of Computer Security, W. M. Arthur Conklin, Greg White, TMH
5. Wireless Security-Models, Threats, and Solutions, Randall K. Nichols, Panos C. Lekkas, TMH

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN14) INTRUSION DETECTION

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To compare alternative tools and approaches for Intrusion detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion
- To identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share
- To address various classes of Network attacks such as Dos, DDoS and Routing attacks
- To introduce approaches for misuse detection and anomaly detection
- To introduce SVM techniques for evaluation

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply knowledge of the fundamentals and history of Intrusion Detection to avoid common pitfalls in the creation and evaluation of new intrusion detection systems

**CO-2:** Understand the strategies and classes of attacks

**CO-3:** Evaluate the security of an enterprise and appropriately apply Intrusion Detection tools and techniques to improve their security posture

**CO-4:** Analyze zero-day detection-Insider Threat issues

**CO-5:** implement Fuzzy logic and SVM for increasing accuracy

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	2	2	2	3
CO-2	2	2	2	3	2	2
CO-3	2	2	3	2	3	2
CO-4	3	3	2	2	2	2
CO-5	2	2	2	2	2	3

#### UNIT-I:

**Introduction:** The state of threats against computers, and networked systems- Challenges in computer security Solutions-Vulnerability assessment, firewalls, VPN's- Intrusion Detection and Intrusion Prevention-Network and Host-based IDS, A General IDS model and taxonomy, what are signature based and anomaly-based IDS.

#### UNIT-II:

**Strategies of the Attacker:** Malicious Code Analysis, Classification of Infection Strategies, Basic Self Protection Strategies; Strategies of Computer worms, Exploits, Vulnerabilities and Buffer over flow attacks.



**UNIT-III:**

**Classes of Network Attacks:** Probes, Privilege Escalation Attacks, Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks, Worms Attacks, Routing Attacks

**UNIT-IV:**

**Detection Approaches:** Mis use Detection Pattern Matching, Rule based Techniques, State based Techniques, Techniques based on Data Mining; Anomaly Detection-Advanced Statistical Models, Rule based techniques, Biological Models, Learning Models; Specification based Detection; Hybrid Detection.

**UNIT-V:**

**Theoretical Foundations of Detection:** Taxonomy of Anomaly Detection Systems, Fuzzy Logic, Bayes Theory, Artificial Neural Networks, Support Vector Machines (SVM), Evolutionary Computation, Association Rules, Clustering; Evaluation Criteria- Accuracy, Performance, Completeness, Timely Response.

**TEXT BOOKS:**

1. The Art of Computer Virus Research and Defense, Peter Szor, Symantec Press
2. Network Intrusion Detection and Prevention, Concept and Techniques, Alia. Ghorbani, WeiLu Mahbod Tavallaee, Springer, 2010
3. Crimeware, Understanding New Attacks and Defenses, Markus Jakobsson and Zulfikar Ramzan, Symantec Press

**REFERENCES:**

1. Anomaly Detection Principles Algorithms, Kishan G. Mehrotra, Chilukuri K. Mohan, HuaMing Huang, Springer, 2017
2. Intrusion Prevention System – A Complete Guide, Gerardus Blokdyk, 5 Star Cokks, 2019
3. Implementing Intrusion Detection Systems, Crothers Tim, John Wiley & Sons, 2002

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN15) CLOUD SECURITY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OUTCOMES:

- To learn the basic concepts of cloud computing and security in cloud
- To learn access control mechanisms in cloud and how only legitimate persons or processes is having access to the data
- To ensure that the cloud meets cloud compliance
- To identify the need to explore disaster recovery mechanism
- To identify various Failure Detection and Prediction mechanisms

**COURSE OBJECTIVES:** After completion of the course, the student should be able to

**CO-1:** Understand the fundamentals of cloud computing and security issues

**CO-2:** Explore various access control mechanisms in cloud and addressing OS and network security related issues

**CO-3:** Preparing to meet security compliance requirements

**CO-4:** Exploring various methodologies for disaster recovery and various advanced security issues

**CO-5:** Understand various Failure Detection and Prediction mechanisms

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	3	1	1	1	2
CO-2	3	2	3	3	3	1
CO-3	2	3	3	2	2	2
CO-4	3	2	2	2	2	2
CO-5	2	2	2	2	2	2

#### UNIT-I:

**Introduction:** Cloud Computing Essentials. Cloud Security Baselines. Software as a Service (SaaS). Infrastructure as a Service (IaaS). Platform as a Service (PaaS). Desktop as a Service (DaaS). Software And Data Segregation Security.

Risk Analysis and Division of Responsibility. Managing Risks in the Cloud. Dividing Operational Responsibility and Visibility. Retaining Information Security Accountability. Managing User Authentication and Authorization. Negotiating Security Requirements with Vendors. Identifying Needed Security Measures. Establishing a Service Level Agreement (SLA). Ensuring SLAs Meet Security Requirements.

#### UNIT-II:

**Securing the Cloud Infrastructure:** Securing the Platform. Restricting Network Access through Security Groups. Configuring Platform-Specific User Access Control. Integrating

Cloud Authentication/Authorization Systems. Compartmentalizing Access To Protect Data Confidentiality and Availability. Securing Data in Motion and Data at Rest. Identifying Your Security Perimeter. Cloud Access Control and Key Management. Cloud Computing Architecture and Security Concepts. Secure Cloud Architecture. Designing Resilient Cloud Architectures.

#### **UNIT-III:**

**Operating System and Network Security:** Locking Down Cloud Servers. Scanning for and Patching Vulnerabilities. Controlling and Verifying Configuration Management. Leveraging Provider-Specific Security Options. Defining Security Groups to Control Access. Filtering Traffic by Port Number. Benefiting from the Provider's Built-In Security. Protecting Archived Data.

#### **UNIT-IV:**

**Meeting Compliance Requirements:** Managing Cloud Governance. Retaining Responsibility for the Accuracy of the Data. Verifying Integrity in Stored and Transmitted Data. Demonstrating Due Care and Due Diligence. Integrity Assurance for Data Outsourcing. Secure Computation Outsourcing. Integrity and Verifiable Computation. Independent Verification and Validation. Computation Over Encrypted Data. Trusted Computing Technology. Assuring Compliance with Government Certification and Accreditation Regulations. HIPAA. Sarbanes-Oxley. Data Protection Act. PCI DSS. Following Standards for Auditing Information Systems. Negotiating Third-Party Provider Audits.

#### **UNIT-V:**

**Preparing for Disaster Recovery:** Implementing a Plan to Sustain Availability. Distributing Data Across the Cloud to Ensure Availability and Performance. Addressing Data Portability and Interoperability for a Change in Cloud Providers. Exploiting the Cloud for Disaster Recovery Options. Achieving Cost-Effective Recovery Time Objectives. Employing a Strategy of Redundancy to Better Resist DoS. Secure Data Management Within and Across Data Centers. Availability, Recovery and Auditing. Advanced Failure Detection and Prediction. Advanced Secure Mobile Cloud. Future Directions in Cloud Computing Security—Risks and Challenges

#### **TEXT BOOKS:**

1. Cloud Computing Security Foundations and Challenges, John R. Vacca, CRC Press, 2020
2. Practical Cloud Security A Guide for Secure Design and Deployment, Chris Dotson, 2019, O'Reilly Publications

#### **REFERENCES:**

1. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly Publications, 2009
2. Building the Infrastructure for Cloud Security A Solutions View, Raghuram Yeluri, Enrique Castro-Leon, A Press Publications, 2014
3. Cloud Security Attacks, Techniques, Tools, and Challenges, Preeti Mishra, Emmanuel S. Pilli, R. C. Joshi, CRC Press, 2021
4. Cloud Security Concepts, Applications and Perspectives, Brij Gupta, CRC Press/Taylor & Francis Group, 2021

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. II Semester

## (22PE1CN16) CRYPTANALYSIS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** A Course on computer networks, Mathematics

### COURSE OBJECTIVES:

- To understand the importance of cryptanalysis in our increasingly computer-driven world
- To identify the Lattice- based cryptanalysis and elliptic curves and pairings
- To design birthday- based algorithms for functions and attacks on stream ciphers
- To apply the cryptographic techniques for secure transactions in real world applications

**COURSE OUTCOMES:** After completion of the course, the students should be able to

**CO-1:** Identify and investigate vulnerabilities and security threats and the mechanisms to counter them

**CO-2:** Apply cryptanalysis in system design to protect it from various attacks

**CO-3:** Analyze security of cryptographic algorithm against brute force attacks, birthday attacks

**CO-4:** Explore modern cryptanalysis methods using lattices and elliptic curve pairing

**CO-5:** Explore cryptographic application in the context of block wise security

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	1	1	1
CO-2	3	1	3	3	3	-
CO-3	3	-	2	2	2	-
CO-4	1	-	1	2	2	1
CO-5	1	1	-	-	1	1

### UNIT-I:

**Number Theory:** Integers and Rational numbers, Greatest common divisor in  $Z$ , Modular arithmetic, Modular arithmetic, Univariate polynomials, Rational fractions, Finite fields, Vector spaces and Linear maps.

**Linear Algebra:** Introduction, Matrix multiplication over  $F \rightarrow 2$ , Dense matrix multiplication, Gaussian elimination algorithms, Sparse linear algebra

**Sieve Algorithms:** Introduction, Eratosthenes's sieve, Sieving for smooth composites

### UNIT-II:

**Monoalphabetic Ciphers:** The Caesar Cipher, Solution of Additive alphabets, Multiplicative alphabets and Mixed alphabets, Solution of five-letter grouping.

**Polyalphabetic Substitution:** Polyalphabetic ciphers, Recognition of polyalphabetic ciphers, Determination of number of alphabets, Solution of additive subalphabets, Mixed plain sequences, Matching alphabets, Reduction to monoalphabet, Mixed ciphersequences

#### **UNIT-III:**

**Transposition:** Columnar transposition, Completely filled rectangles, Incompletely filled rectangles, Solution – Probable word method, General case, Identical length messages.

**Brute Force Cryptanalysis:** Introduction, Dictionary attacks , Brute force and the DES Algorithm, Brute force as a security mechanism, Brute force steps in advanced cryptanalysis, Brute force and parallel computers.

#### **UNIT-IV:**

**The Birthday Paradox:** Introduction, Birthday attacks on modes of operation, Analysis of birthday paradox bounds, Finding collisions, Application to discrete logarithms in generic groups.

**Birthday-based Algorithms for Functions:** Algorithmic aspects, Analysis of random functions, Number- theoretic applications, A direct cryptographic application in the context of blockwise security, Collisions in hash functions, Hellman's time memory tradeoff

#### **UNIT-V:**

**Lattice-Based Cryptanalysis:** Direct attacks using lattice reduction, Coppersmith's small roots attacks.

**Elliptic Curves and Pairings:** Introduction to elliptic curves, The Weil pairing, the elliptic curve factoring method.

#### **TEXT BOOKS:**

1. Algorithmic Cryptanalysis, Antoine Joux, Published CRC Press, 2009
2. Elementary Cryptanalysis Mathematical Approach, Abraham Sinkov, Mathematical Association of America, 2009

#### **REFERENCES:**

1. Algebraic Cryptanalysis, Bard Gregory, Springer, 2009
2. Cryptanalysis of Number Theoretic Ciphers, Sameul S. Wag Staff, Chapman & Hall/CRC
3. Cryptanalysis: A Study of Cipher and Their Solution, Helen F. Gaines, 1989
4. Applied Cryptanalysis, Mark Stamp, Richard M. Low, Wiley Interscience 2007

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN17) DEEP LEARNING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To understand foundation aspects of deep learning and the canonical workflow for solving data problems using deep learning
- To understand the design aspects of neural networks and build neural networks for building learning models
- To gain knowledge of deep learning techniques used for building prediction models
- To learn the working of deep learning methods, methodologies and techniques to gain
- To impact design thinking capability to handle big data problems

**COURSE OUTCOMES:** After completion of the course, the students should be able to  
**CO-1:** Demonstrate proficiency in understanding fundamentals of deep learning methods and relate them to real-world use cases

**CO-2:** Demonstrate skills in designing and building mathematical models

**CO-3:** Develop the ability to build and assess neural network based learning models

**CO-4:** Apply deep learning concepts and methods to solve problems in real-world context and will communicate these solutions effectively

**CO-5:** Develop relevant programming abilities

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	3	2	2	3
CO-2	2	2	2	1	2	3
CO-3	3	2	3	1	3	3
CO-4	2	2	2	2	2	3
CO-5	2	2	3	2	2	3

#### UNIT-I:

**Fundamentals of Deep Learning:** Essential context around artificial intelligence, machine learning and deep learning, learning representations from data, The deep in deep learning, Understanding how deep learning works, what deep learning has achieved so far, Don't believe the short-term hype, The promise of AI.

**Before Deep Learning:** Brief overview of classical machine learning approaches - Probabilistic modeling, early neural networks, Kernel methods, Decision trees, random forests and gradient boosting machines, back to neural networks, what makes deep learning different, The modern machine learning landscape. Why deep learning? Why now? – Hardware, Data, Algorithms, A new wave of investment, democratization of deep learning

## UNIT-II

**The Mathematical Building Blocks Of Neural Networks** : A first look at a neural network; Data representations for neural networks – Scalars, Vectors, Matrices, 3D tensors and higher-dimensional tensors, Key attributes such as rank, shape and data type, Manipulating tensors in Numpy, The notion of data batches, Real-world examples of data tensors, Vector data, Timeseries data or sequence data, Image data, Video data; **The Gears of Neural Networks:** tensor operations - Element-wise operations, Broadcasting, Tensor dot, Tensor reshaping, Geometric interpretation of tensor operations, A geometric interpretation of deep learning; The engine of neural networks: gradient-based optimization - What's a derivative? , Derivative of a tensor operation: the gradient, Stochastic gradient descent, Chaining derivatives: the Backpropagation algorithm.

## UNIT-III:

**Getting Started with Neural Networks:** Anatomy of a neural network - Layers, Models, Loss functions and optimizers; Introduction to Keras; Setting up a deep-learning workstation; Practical Keras examples - Classifying movie reviews: a binary classification example; Classifying newswires: a multiclass classification example, Predicting house prices: a regression example.

**Fundamentals of Machine Learning:** Four branches of machine learning - Supervised learning, Unsupervised learning, Self-supervised learning, Reinforcement learning; Evaluating machine-learning models - Training, validation, and test sets, Things to keep in mind when choosing evaluation protocol; Data preprocessing, feature engineering, and feature learning; Overfitting and underfitting; The universal workflow of machine learning.

## UNIT-IV:

**Deep Learning For Computer Vision:** Introduction to convnets - The convolution operation, The max-pooling operation; Training a convnet from scratch on a small dataset - The relevance of deep learning for small-data problems, Downloading the data, Building your network, Data preprocessing, Using data augmentation; Using a pretrained convnet - Feature extraction, Fast feature extraction without data augmentation, Feature extraction with data augmentation, Fine-tuning; Visualizing what convnets learn - Visualizing intermediate activations, Visualizing convnet filters, Visualizing heatmaps of class activation.

**Deep Learning for Text and Sequences:** Working with text data - One-hot encoding of words and characters, using word embeddings, from raw text to word embeddings; Understanding recurrent neural networks - A recurrent layer in Keras, Understanding the LSTM and GRU layers, A recurrent layer in Keras; Advanced use of recurrent neural networks - A temperature-forecasting problem, Preparing the data, A common-sense, non-machine-learning baseline, A basic machine-learning approach, A first recurrent baseline, Using recurrent dropout to fight overfitting, Stacking recurrent layers, Using bidirectional RNNs; Sequence processing with convnets - Understanding 1D convolution for sequence data, 1D pooling for sequence data, Implementing a 1D convnet, Combining CNNs and RNNs to process long sequences.

## UNIT-V:

**Advanced Deep-Learning Best Practices:** Going beyond the Sequential model (The Keras functional API); Inspecting and monitoring deep-learning models using Keras callbacks and Tensor Board; Advanced architecture patterns, Hyper parameter optimization; Model ensembling.

**Generative Deep Learning:** Text generation with LSTM; Major development in deep-learning-driven image modification – Deep Dream and Neural style transfer; Generating images with variational autoencoders; Introduction to generative adversarial networks; The limitations of deep learning - The risk of anthropomorphizing machine-learning models, Local generalization vs. extreme generalization; The future of deep learning - Models as programs, Beyond backpropagation and differentiable layers, Automated machine learning, Lifelong learning and modular subroutine reuse, The long-term vision.

**TEXT BOOKS:**

1. Deep Learning with Python, Francois Chollet, 2<sup>nd</sup> Edition, Manning Publications Co., 2021

**REFERENCES:**

1. Deep Learning: Methods and Applications, Li Deng, Dong Yu, Now, 2014
2. Deep Learning: Core Concepts, Methods and Applications, M. Gopal, Pearson Education, 1<sup>st</sup> Edition, 2022



# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1CN18) INFORMATION SYSTEMS CONTROL AND AUDIT

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** An idea of An information system (IS) audit or information technology (IT) audit in entity's Information technology infrastructure to achieve the organization's goals or objectives.

#### COURSE OBJECTIVES:

- To understand the foundations of information systems auditing
- To understand the management, application control framework
- To understand about the evidence collection and evidence evaluation process
- To understand about Information systems audit management

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the concepts of Information systems auditing and IT application in auditing

**CO-2:** Apply Management control and application control framework

**CO-3:** Analyze the evidence collection Evaluating the evidence

**CO-4:** Build towards Information system Audit Professionalism

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	1	1	2	2	2
CO-2	3	2	2	3	3	2
CO-3	3	2	3	2	3	2
CO-4	3	2	3	3	2	3
CO-5	3	2	2	2	3	2

#### UNIT-I:

**Introduction:** Overview of Information Systems & Auditing: Need for control and audit of computers, Effect of Computers on Internal Controls, Effects of Computers on Auditing, Foundations of information Systems Auditing, Conducting an Information Systems Audit.

#### UNIT-II:

**The Management Control Framework:** Introduction, Evaluating the planning Function, Organizing Function, Leading Function, Controlling Function, Systems Development Management Controls, Approaches to Auditing Systems Development, Normative Models of the Systems Development Process, Evaluating the Major phases in the Systems Development Process, Programming Management Controls, Data Resource Management Controls. Security Management Controls, Operations management Controls, Quality assurance Management Controls.

**UNIT-III:**

**The Application Control Framework:** Boundary Controls, Input Controls, Communication Controls, Processing Controls, Database Controls, output Controls.

**UNIT-IV:**

**Evidence Collection:** Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires, and Control Flowcharts. Performance Measurement tools.

**UNIT-V:**

**Evidence Evaluation & Information Systems Audit Management:** Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Evaluating System Efficiency. Planning function, Organizing function, Staffing function, Leading function, Controlling function, Towards Information Systems Audit Professionalism

**TEXT BOOKS:**

1. Information Systems Control and Audit, Ron Weber, Pearson Education, 2002

**REFERENCES:**

1. Systems Audit, M. Revathy Sriram, TMH, New Delhi, 2001
2. Software Project Management in Practice, Jalote, Pearson Education
3. Software Project Management, Royce, Pearson Education

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**M.Tech. II Semester**

### (22PC2CN03) WIRELESS NETWORKS AND ETHICAL HACKING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE OBJECTIVES:**

- To learn about cryptography, and basics of web application attacks
- To gain knowledge of the tools, techniques and ethical issues likely to face in the domain of ethical hacking

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the basics of network simulation and its tools

**CO-2:** Implement the RIP and OSPF protocols

**CO-3:** Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks

**CO-4:** Apply key management and distribution in cryptography

**CO-5:** Gain the knowledge on MANETS and system hacking

**COURSE ARTICULATION MATRIX:**

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	1	2	3	1	2	2
CO-2	2	1	2	2	2	3
CO-3	3	2	2	3	3	3
CO-4	2	2	3	3	3	3

**LIST OF EXPERIMENTS / EXERCISES:**

1. Installation of simulation tools in Linux/Windows environment
2. Introduction about discrete events simulation and its tools like NetSim, NS2, etc
3. Study the working of simple TCP and UDP protocols
4. Study how the Data Rate of Wireless LAN (IEEE 802.11b) Network varies as the distance between the Access Point and the wireless nodes is varied
5. Study the working and routing table formation of Interior routing table formation of interior routing protocol ,
6. i.e. Routing Information Protocol (RIP)
7. Study the working and routing table formation of Interior routing table formation of interior routing protocol ,
8. i.e. Open Shortest Path First(OSPF)
9. Analyze the performance of a MANET,(running CSMA/CA(802.11b) in MAC)with increasing node density
10. Analyze the performance of a MANET,(running CSMA/CA(802.11b) in MAC)with increasing node mobility
11. Study the working of BGP and formation of BGP Routing table

**ETHICAL HACKING LAB:**

1. Using Active and Passive Techniques for scanning Networks, Enumeration, sniffing to Enumerate Network Hosts.
2. Conducting Active and Passive Foot printing and Reconnaissance against Target.
3. Using NMAP Tool for discovery, security auditing and vulnerability checking
4. Using Armitage to Attack the Network.
5. Using Metasploit to Attack a Remote System - Scanning Networks, Enumeration, Sniffers, Evading IDS, Firewalls, and Honey pots.
6. Using Malware – Dark Comet for System Hacking, Trojans and Backdoors, Viruses and Worms.
7. Using the SHARK Remote Administration Tool for System Hacking, Trojans and Backdoors, Viruses and Worms.
8. Attacking a System- Using the SYSTEM account – System Hacking, Intrusion Detection – Evading IDS, Firewalls, and Honey pots.
9. Web-Based Hacking Servers and Applications for exploitation with IPv6 – System Hacking, Denial of Service, SQL Injection – Hacking Webservers, Hacking Web Applications, Launching Buffer Overflow – System Hacking, Buffer Overflow.
10. Cryptography - Breaking Windows Passwords – System Hacking, Using John the Ripper to Crack

**TEXT BOOKS:**

1. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition
2. Certified Ethical Hacker: Michael Gregg, Pearson Education
3. Certified Ethical Hacker: Matt Walker, TMH

**REFERENCES:**

1. Computer Security, Concepts, Issues and Implementation, Alfred Basta Wolf Halton, Cengage Learning
2. Hacking Exposed Web 2.0, Rich Annings, Himanshu Dwivedi, Zane Lackey, Tata Mcgraw Hill Edition
3. Ethical Hacking & Network Defense, Michael T. Simpson, Cengage Learning
4. Hacking Exposed Windows, Joel Scambray, Stuart McClure, 3<sup>rd</sup> Edition, Tata McGraw Hill Edition
5. Hacking Exposed Window Server 2003, Joel Scambray, Stuart McClure, Tata McGraw Hill Edition

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PC2CN04) MACHINE LEARNING AND SECURITY LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** This course requires a general understanding of machine learning algorithms for security data and an intermediate level of python coding ability

#### COURSE OBJECTIVES:

- To explore how machine learning has aided the success of modern spam filters
- To analyze malware by extracting useful information from real-world problems
- To observe network attackers by investigating patterns in datasets using machine learning algorithms
- To identify the threat which attackers pose to machine learning solutions

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the modern notions in machine learning methods and security issues

**CO-2:** Apply machine learning algorithms such as clustering, k-means, and Naive Bayes to solve real-world problems

**CO-3:** Learn how to use machine learning to combat malware, detect spam, and combat financial fraud to mitigate security issues

**CO-4:** Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	2	2	2	3
CO-2	3	2	2	2	3	3
CO-3	2	2	3	3	2	3
CO-4	3	3	3	3	3	3

#### LIST OF EXPERIMENTS:

1. Introduction to Python Programming: Learn the different libraries for Machine Learning applications –NumPy, Pandas, SciPy, Matplotlib, Scikit Learn.
2. Write a program to assess password security using machine learning techniques.
3. Write a program to implement a machine-learning algorithm for detecting malicious URLs.
4. Write a program to implement the Naïve Bayesian algorithm for SMS – Spam detection.
5. Write a program to implement a Decision Tree for Context-Based Malicious Event Detection.
6. Write a program that uses a logistic regression classifier to detect credit card fraud.

7. Implement the non-parametric Locally Weighted Regression Algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs.
8. Implement the EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.
9. Write a program to use k-means to implement efficient network anomaly detection.
10. Write a program for Intrusion Detection System with Machine learning.

**TEXT BOOKS:**

1. Hands-On Machine Learning for Cybersecurity: Safeguard your system, Halder, Soma, and Sinan Ozdemir, making your machines intelligent using the Python ecosystem, Packt Publishing Ltd, 2018

**REFERENCES:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning and Security: Prototyping Systems With Data and Algorithms, Chio C, Freeman. D, O'Reilly Media, 2018

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PW4CN02) MINI-PROJECT

#### TEACHING SCHEME

L	T/P	C
0	4	2

CIE	SEE	TOTAL
40	60	100

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the formulated industry / technical / societal problems

**CO-2:** Analyze and / or develop models for providing solution to industry / technical / societal problems

**CO-3:** Interpret and arrive at conclusions from the project carried out

**CO-4:** Demonstrate effective communication skills through oral presentation

**CO-5:** Engage in effective written communication through project report

#### COURSE OUTLINE:

- A student shall undergo a mini-project during II semester of the M.Tech. programme.
- A student, under the supervision of a faculty member, shall collect literature on an allotted project topic of his / her choice, critically review the literature, carry out the project work, submit it to the department in a prescribed report form and shall make an oral presentation before the departmental Project Review Committee.
- Evaluation of the mini-project shall consist of CIE and SEE and shall be done by a Project Review Committee (PRC) consisting of the Head of the Department, faculty supervisor and a senior faculty member of the specialization / department.
- CIE shall be carried out for 40 marks on the basis of review presentation as per the calendar dates and evaluation format.
- SEE shall be carried out at the end of semester for 60 marks on the basis of oral presentation and submission of mini-project report.
- Prior to the submission of mini-project report to the PRC, its soft copy shall be submitted to the PG Coordinator for PLAGIARISM check.
- The mini-project report shall be accepted for submission to the PRC only upon meeting the prescribed similarity index of less than 25%.

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22MN6HS02) ANCIENT WISDOM

#### TEACHING SCHEME

L	T/P	C
2	0	0

#### EVALUATION SCHEME

SE-I	SE-II	SEE	TOTAL
50	50	-	100

#### COURSE OBJECTIVES:

- To introduce the contribution from Ancient Indian system & tradition to modern science & Technology
- To trace, identify and develop the ancient knowledge systems
- To introduce the sense of responsibility, duties and participation of individual for establishment of fearless society

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Familiarize learners with major sequential development in Indian science, engineering and technology

**CO-2:** Understand eco-friendly, robust and scientific planning and architecture system of ancient India

**CO-3:** Trace, identify, practice and develop the significant Indian mathematic and astronomical knowledge

**CO-4:** Understand the importance of Indian aesthetics in individual realization of the truth arises by realizing the harmony within

#### UNIT-I:

**Indian Science & Technology:** Indian S & T Heritage, sixty-four art forms and occupational skills (64 Kalas)

#### Ancient Architecture:

**Scientific Achievements though Ancient Architect:** Musical Pillars of Vitthal temple, Sundial of konark temple, construction of eight shiva temple in straight line from Kedarnath to rameshwaram at longitude 79°E 41'54", Veerbhadra temple with 70 hanging pillars

#### UNIT-II:

**Foundation Concept for Science and Technology:** The Introduction to Ancient Mathematics & Astronomy Introduction to Brief introduction of inception of Mathematics & Astronomy from vedic periods. Details of different authors who has given mathematical & astronomical sutra (e.g. arytabhatta, bhaskara, brahmagupta, varamahira, budhyana, yajanvlkya, panini, pingala, 22 bharat muni, sripati, mahaviracharya, madhava, Nilakantha somyaji, jyeshthadeva, bhaskara-II, shridhara Number System and Units of Measurement, concept of zero and its importance, Large numbers & their representation, Place Value of Numerals, Decimal System, Measurements for time, distance and weight, Unique approaches to represent numbers (Bhūta Saṃkhyā System, Kaṭapayādi System), Pingala and the Binary system, Knowledge Pyramid

Indian Mathematics, Great Mathematicians and their contributions, Arithmetic Operations, Geometry (Sulba Sutras, Aryabhatiya-bhasya), value of  $\pi$ , Trigonometry, Algebra, Chandah Sastra of Pingala, Indian Astronomy, celestial coordinate system, Elements of the Indian Calendar Aryabhatiya and the Siddhantic Tradition Pancanga – The Indian Calendar System



### **UNIT-III:**

**Humanities & Social Sciences:** Health, Wellness & Psychology, Ayurveda Sleep and Food, Role of water in wellbeing Yoga way of life Indian approach to Psychology, the Triguna System Body-Mind-Intellect-Consciousness Complex. Governance, Public Administration & Management reference to ramayana, Artha Sastra, Kautilyan State

### **UNIT-IV:**

**Aspiration and Purpose of Individual and Human Society:** Aims of Human life; at individual level and societal level. At societal level; Four purusharthas Dharma, Artha, Kama, Moksha.

#### **Individual Level:**

#### **Program for Ensuring Human Purpose:**

**Fundamental Concept of Nitishastra:** Satyanishtha Aur Abhiruchi (Ethics, Integrity & aptitude). The true nature of self; Shiksha Valli, Bhriugu Valli (concept of Atman-Brahman (self, soul)).

**The True Constitution of Human:** Ananda Valli (Annamaya Kosha, Pranamaya Kosha, Manomaya Kosha, Vijnanamaya Kosha, Anandamaya Kosha). The four states of consciousness (Waking state, Dreaming state, Deep Sleep State, Turiya the fourth state), Consciousness (seven limbs and nineteen mouths), Prajna, Awareness. The Life Force Prana (Praana-Apaana-Vyaana-Udaana- Samaana

### **Ancient Indian Science (Ayurveda & Yoga)**

**Ayurveda for Life, Health and Well-being:** Introduction to Ayurveda: understanding Human body and Pancha maha bhuta, the communication between body & mind, health

**Introduction to Yoga:** Definition, Meaning and objectives of Yoga, Relevance of yoga in modern age. the six cleansing procedures of Yoga, understanding of Indian psychological concept, consciousness, tridosha & triguna.

### **UNIT-V:**

#### **Five Important Slokas for Enlightenment**

**Gayatri Mantram, Santi Mantram:** Asatoma Sadgamaya, Geeta (Yada Yadahi Dharmasya, Gnanirbhavati Bharata), Amanitwam Adambitwam..., Karmanyevadikarastu... Maa phaleshukadachana

### **TEXT BOOKS:**

1. Textbook on Indian Knowledge Systems, Prof. B Mahadevan, IIM Bengaluru
2. Indian Knowledge Systems, Kapur K. and Singh A. K., 2005

### **REFERENCES:**

1. Tatvabodh of Sankaracharya, Central Chinmay Mission Trust, Bombay, 1995
2. Value and Distribution System in India, B. L. Gupta, Gyan Publication House
3. Ancient Indian Culture and Civilization, Reshmi Ramdhoni, Star Publication, 2018
4. Ancient Indian Society, Maharaj Swami Chidatmanjee, Anmol Publication
5. Ancient Indian Classical Music, Lalita Ramkrishna, Shubhi Publications

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. III Semester

## (22PE1CP21) BLOCK CHAIN TECHNOLOGY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To familiarize the functional/operational aspects of cryptocurrency ecosystem
- To understand Blockchain Technology architecture and components
- To smart contracts and Bitcoins
- To understand Blockchain and other technologies

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand blockchain technology

**CO-2:** Understand the concept of distributed transactions and Bitcoin

**CO-3:** Remember the concept of Fault Tolerant Mechanisms

**CO-4:** Apply various security algorithms

**CO-5:** Understand Blockchain and Machine Learning

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	3	2	2	1	1
CO-2	3	3	2	2	2	2
CO-3	3	2	2	3	2	2
CO-4	3	2	3	1	1	2
CO-5	2	2	1	1	2	1

### UNIT-I:

**Basics of Blockchain:** Introduction, Concept of Blockchain, History, Definition of Blockchain, Fundamentals of Blockchain, P2P Network, Characteristics of Blockchain, Consensus in Trust-Building Exercise, Public, Private, and Hybrid Blockchains, Distributed Ledger Technologies, DLT Decentralized Applications and Databases, Architecture of Blockchain, Transactions, Chaining Blocks, Value Proposition of Blockchain Technology

### UNIT-II:

**Architecture of Blockchain:** Architecture of Blockchain, Transactions, Chaining Blocks, Value Proposition of Blockchain Technology, Consensus: Introduction, Consensus Approach, Consensus Algorithms, Byzantine Agreement Methods

### UNIT-III:

**Bitcoins:** Introduction, Working of Bitcoin, Merkle Trees, Bitcoin Block Structure, Bitcoin Address, Bitcoin Transactions, Bitcoin Network, Bitcoin Wallets, Bitcoin Payments, Bitcoin Clients, Bitcoin supply.

**UNIT-IV:**

**Blockchain Components:** Introduction, Ethereum, History, Ethereum Virtual Machine, Working of Ethereum, Ethereum Clients, Ethereum Key Pairs, Ethereum Addresses, Ethereum Wallets, Ethereum Transactions, Ethereum Languages, Ethereum Development Tools

**Smart Contracts:** Introduction, Smart Contracts, Absolute and Immutable, Contractual Confidentiality, Law Implementation and Settlement, Characteristics, Internet of Things

**UNIT-V:**

**Blockchain and Allied Technologies:** Blockchain and Cloud Computing, Characteristics of Blockchain Cloud, Blockchain and Artificial Intelligence, Blockchain and IoT, Blockchain and Machine Learning, Blockchain and Robotic Process Automation.

**TEXT BOOKS:**

1. Blockchain Technology: Concepts and Applications, Kumar Saurabh, Ashutosh Saxena, Wiley
2. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas Antonopoulos, O'Reilly, 2014

**REFERENCES:**

1. Blockchain Technology, Chandramouli Subramanian, Asha A. George, Abhilash K. A. and Meena Karthikeyan, Universities Press, 2020
2. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, 2017
3. The Basics of Bitcoins and Blockchains, Antony Lewis, Coral Gables, 2018

**ONLINE RESOURCES:**

1. J. A. Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT2015LNCSVOI9057,(VOLII),pp281310.(Alsoavailableateprint.iacr.org/2016/1048).(Seriousbeginningofdiscussionsrelatedtoformalmodelsforbitcoinprotocols)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. II Semester

### (22PE1SE08) SOFTWARE DEFINED NETWORKS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** This course requires a general understanding of machine learning algorithms for security data and an intermediate level of python coding ability

#### COURSE OBJECTIVES:

- To explore how software defined networking has aided the success in virtualization
- To analyze SDN design and operations in implementing
- To observe modern Programmatic Interfaces for controlling network
- To identify WAN utilization techniques and controller designs for scalability
- To familiarize with the SDN implementation, deployment and management

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the modern notions in software defined networks and virtualization

**CO-2:** Apply SDN design techniques and various operations to solve real-world problems

**CO-3:** Learn how to use SDN controllers for managing the Interface and network programming

**CO-4:** Be capable of confidently addressing scalability and design issues

**CO-5:** Handle implementation challenges using G-scale Network

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	2	2	2	3	1
CO-2	2	2	2	2	3	1
CO-3	2	2	2	2	3	1
CO-4	2	2	2	2	3	1
CO-5	2	2	2	2	3	1

#### UNIT-I:

**Introduction to Software Defined Networking:** Virtualization, Virtual Memory, Virtual Memory Operation, Virtual and Physical Memory Mapping, Server Virtualization, Network Function virtualization, Software Defined Networking, Network Limitations.

#### UNIT-II:

**SDN Implementation:** Introduction, SDN Implementation, SDN Design, Separation of the Control and Data Planes, Edge-Oriented Networking, SDN Operation, Service Providers and SDN, Benefits of SDN.

**UNIT-III:**

**SDN Controllers:** Network Programmability, The Management Interface, The Application-Network Divide Modern Programmatic Interfaces, Virtualization and Data Plane I/O, Services Engineered Path, Service Locations and Chaining.

**UNIT-IV:**

**SDN and Enterprise Networks:** SDN and Optical Transport Networks, Increasing WAN Utilization with SDN, SDN Scalability Issues, Controller Designs for Scalability, Potential SDN Scalability Issues such as controller placement issue.

**UNIT-V:**

**SDN Management:** Load Adaptation, Google and SDN, Google's G-Scale Network, Google's G-Scale Network Hardware, Google SDN Deployment, Implementation Challenges

**TEXT BOOKS:**

1. Software Defined Networking: Design and Deployment, Patricia A. Morreale, James M. Anderson, 1<sup>st</sup> Edition, CRC Press
2. SDN: Software Defined Networks, Thomas D. Nadeau, Ken Gray, Orielly Media

**REFERENCES:**

1. Software Defined Networking with Open Flow, Siamak Azodolmolky, Wiley
2. Software Defined Networks: A Comprehensive Approach, Paul Goransson, Chuck Black, Morgan Kaufmann

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**M.Tech. III Semester**

### (22PE1CN19) BIG DATA

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE OBJECTIVES:**

- To understand the need of Big Data and understanding of Hadoop Architecture and its ecosystems
- To understand the Hadoop file system storage
- To process the Big Data using Map Reduce and apache Pig
- Transfer of Big Data using Sqoop and analyze using Hive
- To understand HBaseNoSql data bas

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Discuss the challenges and their solutions in Big Data and Understand the concept of Hadoop and it's eco system

**CO-2:** Understand storage concept of HDFS and its components

**CO-3:** Analyze the processing of big data using Map Reduce Frame work and Apache Pig

**CO-4:** Understand the importance of Hive tool and Sqoop

**CO-5:** Analyze the importance of NoSql database i.eHBase

**COURSE ARTICULATION MATRIX:**

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
<b>CO-1</b>	3	3	2	3	3	3
<b>CO-2</b>	2	3	1	2	2	2
<b>CO-3</b>	3	3	2	3	3	3
<b>CO-4</b>	2	3	1	2	1	2
<b>CO-5</b>	2	3	2	2	1	1

**UNIT-I:**

**Big Data Introduction:** Types of Data (Structured, Semi Structured, Unstructured), Definition of Big Data, Characteristics of Big Data, Meet Hadoop, Comparison with other systems, A brief history of Hadoop and the Hadoop ecosystem.

**UNIT-II:**

**HDFS (Hadoop Distributed File System):** Significance of HDFS in Hadoop, HDFS Architecture, HDFS Concepts: Introduction about Blocks, Data replication, Name Node, Secondary Node, Data Node, Basic File System Operations, Data Flow – Anatomy of File Read, Anatomy of File Write.

**UNIT-III:**

**Map Reduce:** Map Reduce Frame work Introduction, Phases in Map Reduce, Map Reduce Input and Output Formats, Map Reduce Features, MapReduce Application – Hadoop Word Count Implementation.

**UNIT-IV:****HIVE, Sqoop:**

**HIVE:** Introduction, architecture, Integration with Hadoop, Hive Tables: Managed Tables, External Tables, Hive Query Language (Hive QL), load the data to Hive Tables, moving data from HDFS to Hive and vice versa. Sqoop :Sqoop Introduction, Architecture of sqoop, Example on Sqoop.

**UNIT-V:****Apache Pig, HBase:**

**Apache Pig:** Introduction to Apache Pig, Map Reduce Vs Apache Pig, SQL Vs Apache Pig, Pig Datatypes, Modes of Execution in Pig. Example using Apache Pig.

**HBase:** Introduction to HBase, HBase Use cases, HBase basics, HBase Architecture.

**TEXT BOOKS:**

1. Hadoop: The Definitive Guide, Tom White, 3<sup>rd</sup> Edition, O'Reilly Media, 2012
2. Big Data and Analytics, Seema Acharya, Subhasini Chellappan, Wiley, 2016

**REFERENCES:**

1. Big Data, Black Book T. M. , DreamTech Press, 2015
2. Big Data Glossary, Pete Warden, O'Reilly, 2011
3. BigData Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, MC Press, 2012
4. Making Sense of Data, Glen J. Myat, John Wiley & Sons, 2007

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. III Semester

## (22PE1CN20) NETWORK DESIGN

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To differentiate between packet switching and circuit switching techniques
- To know various network design methods
- To implement network design for backbone and convergence
- To introduce data network management systems and few case studies
- To introduce writing and implementation of test plan for network design

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the basic concepts of switching technologies

**CO-2:** Identify different network designs

**CO-3:** Implement network design for backbone and convergence

**CO-4:** Write and implement a test plan for network Design

**CO-5:** Build and test a network system

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	1	2	2	2	3	2
CO-2	3	2	2	3	2	2
CO-3	1	2	2	1	2	2
CO-4	3	3	2	3	3	1
CO-5	2	1	1	3	2	1

### UNIT-I:

**Introduction:** Switching technologies, multiplexing, circuit switching, packet switching X.25, frame relay, SMDs ATM, B-ISDN, traffic matrix, traffic pattern calculations, performance issues of packet networks, delay, availability and reliability

### UNIT-II:

**Network Design for Access:** Campus network design, leased line and radio modems, DDR & ISDN Access Network design, X.25 remote access network design, Frame-relay interfaces & traffic shaping VSAT & WLAN network design. Scaling access networks.

### UNIT-III:

**Network Design for Backbone:** Identification & selection of internetworking devices, CISCO routers & Nortel switches, EIGRP

**Network Design for Convergence:** UDP broadcasts, IP Networks for Voice, Data, Video, Fax, Soft & hard design examples for IP Technology networks, network design for digital video broadcast



**UNIT-IV:**

**Data Network Management Systems:** Managing IP, ICMP, TCP, UDP, X.25 reporting Ethernet traffic, managing bridges & routers. Microsoft & HP, NMS Tools. Case Studies: selected from design, architecture & topology areas of internetworks.

**UNIT-V:**

**Testing Network Design:** Testing Network Design, Building and Testing a Prototype Network System, Writing and Implementing a Test Plan for Your Network Design, Tools for Testing a Network Design.

**TEXT BOOKS:**

1. Data Network Design, D. L. Spolin, McGraw Hill, 1993

**REFERENCES:**

1. SNMP, Feit, McGraw Hill, 1995
2. Network Design & Case Studies, CISCO Systems Inc., CISCO Press, 1993

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. III Semester

## (22PE1CN21) TCP/IP PROTOCOL SUITE

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To describe how the TCP/IP protocol suite works
- To describe the functions of static and dynamic IP addresses
- To describe the major functions of networks with the TCP/IP model
- To Understand various protocols used in TCP/IP model
- To understand the management of a network

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Demonstrate the Layered Architecture TCP/IP reference models of Computer Networks

**CO-2:** Apply all the functions of static and dynamic addresses

**CO-3:** Implement various functions of networks with TCP/IP model

**CO-4:** Design and formulate new protocols for efficient working of networks

**CO-5:** Design or reproduce the existing protocols for efficient management of computer networks

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	1	3	-	2	-	-
CO-2	-	2	1	-	3	-
CO-3	1	-	-	2	-	1
CO-4	-	3	3	-	1	-
CO-5	2	2	3	1	-	1

### UNIT-I:

**Introduction:** to TCP/IP, The OSI Model and TCP/IP Protocol Suites, Underlying Technologies; IP Addressing, Sub netting and Super netting, CIDR, Delivery and Routing of IP Packets

### UNIT-II:

**Internet Protocol (IP):** ARP and RARP, Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP)

### UNIT-III:

User Datagram Protocol (UDP), Transmission Control Protocol (TCP) ; Routing Protocols (RIP, OSPF, HELLO and BGP)

**UNIT-IV:**

Application Layer and Client-Server Model, BOOTP and DHCP; Domain Name System (DNS), Telnet and Rlogin

**UNIT-V:**

File Transfer Protocol (FTP), Trivial File Transfer Protocol (SMTP), Simple Network Management Protocol (SNMP), Hyper Text Transfer Protocol (HTTP)

**TEXT BOOKS:**

1. Internetworking with TCP/IP, Principles, Protocols and Architectures, Vol. I, Douglas E. Comer, 4<sup>th</sup> Edition, PHI
2. TCP/IP Protocol Suite, Forouzan BA, TMH, 2000

**REFERENCES:**

1. TCP/IP Unleashed, Pearson Education

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. III Semester

### (22OE1CN01) BUSINESS ANALYTICS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To understand the role of business analytics within an organization and to analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making and to become familiar with processes needed to develop, report, and analyze business data
- To use decision-making tools/Operations research techniques and to manage business process using analytical and management tools
- To analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply knowledge of data analytics

**CO-2:** Think critically in making decisions based on data and deep analytics

**CO-3:** Use technical skills in predicative and prescriptive modeling to support business decision-making

**CO-4:** Translate data into clear, actionable insights

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	-	1	-	1	1
CO-2	3	-	2	-	1	2
CO-3	2	1	1	-	1	1
CO-4	1	2	1	-	1	1

#### UNIT-I:

**Business Analytics:** Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics.

**Statistical Tools:** Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

#### UNIT-II:

**Trendiness and Regression Analysis:** Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models

for Business analytics, problem solving, Visualizing and Exploring Data Business Analytics Technology.

### **UNIT-III:**

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.

Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

### **UNIT-IV:**

**Forecasting Techniques:** Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

**Monte Carlo Simulation and Risk Analysis:** Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

### **UNIT-V:**

**Decision Analysis:** Formulating Decision Problems, Decision Strategies without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

### **TEXT BOOKS:**

1. Business Analytics-Principles, Concepts, and Applications, Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press
2. Business Analytics, James Evans, Pearson Education
3. Business Analytics, Purba Halady Rao, PHI, 2013

### **REFERENCES:**

1. Business Analytics for Managers: Taking Business Intelligence Beyond Reporting, Gert H. N. Laursen, Jesper Thorlund, 2<sup>nd</sup> Edition, Wiley Publications
2. Business Analytics: Data Analysis & Decision Making, S. Christian Albright, Wayne L. Winston 5<sup>th</sup> Edition, 2015
3. Business Intelligence Guidebook: From Data Integration to Analytics, Rick Sherman Elsevier, 2014

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. III Semester

### (22OE1AM01) INDUSTRIAL SAFETY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Elements of Mechanical, Civil, Electrical and Industrial Engineering

#### COURSE OBJECTIVES:

- To achieve an understanding of principles, various functions and activities of safety management
- To communicate effectively information on Health safety and environment facilitating collaboration with experts across various disciplines so as to create and execute safe methodology in complex engineering activities
- To anticipate, recognize, and evaluate hazardous conditions and practices affecting people, property and the environment, develop and evaluate appropriate strategies designed to mitigate risk
- To develop professional and ethical attitude with awareness of current legal issues by rendering expertise to wide range of industries

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Apply risk management principles to anticipate, identify, evaluate and control physical, chemical, biological and psychosocial hazards

**CO-2:** Communicate effectively on health and safety matters among the employees and with society at large

**CO-3:** Demonstrate the use of state of the art occupational health and safety practices in controlling risks of complex engineering activities and understand their limitations

**CO-4:** Interpret and apply legislative / Legal requirements, industry standards, and best practices in accident prevention programmes in a variety of workplaces

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	3	2	2	3	1
CO-2	-	-	-	-	2	3
CO-3	3	1	2	1	-	-
CO-4	-	2	-	1	-	2

#### UNIT-I:

**Safety Management:** Evaluation of modern safety concepts – Safety management functions – safety organization, safety department – safety committee, safety audit - performance measurements and motivation – employee participation in safety and productivity.

**UNIT-II:**

**Operational Safety:** Hot metal Operation – Boiler, pressure vessels – heat treatment shop - gas furnace operation-electroplating-hot bending pipes – Safety in welding and cutting. Cold-metal Operation- Safety in Machine shop- metal cutting – shot blasting, grinding, painting – power press and other machines.

**Safe Handling and Storage:** Material Handling, Compressed Gas Cylinders, Corrosive Substances, Hydrocarbons, Waste Drums and Containers

**UNIT-III:**

**Safety Measures:** Layout design and material handling - Use of electricity – Management of toxic gases and chemicals – Industrial fires and prevention – Road safety– Safety of sewage disposal and cleaning – Control of environmental pollution – Managing emergencies in industrial hazards.

**UNIT-IV:**

**Accident Prevention:** Human side of safety – personal protective equipment – Causes and cost of accidents. Accident prevention programmes - Specific hazard control strategies - HAZOP – Training and development of employees – First Aid – Fire fighting devices – Accident reporting investigation.

**UNIT-V:**

**Safety, Health, Welfare & Laws:** Safety and health standards – Industrial hygiene – occupational diseases prevention - Welfare facilities – History of legislations related to safety–pressure vessel act- Indian boiler act- The environmental protection act – Electricity act - Explosive act.

**TEXT BOOKS:**

1. Safety Management, John V. Grimaldi and Rollin H. Simonds, All India Travellers Bookseller, New Delhi, 1989
2. Safety Management in Industry, Krishnan N. V., Jaico Publishing House, 1996

**REFERENCES:**

1. Occupational Safety Manual, BHEL
2. Industrial Safety and The Law, P. M. C. Nair Publisher's, Trivandrum
3. Managing Emergencies in Industries, Loss Prevention of India Ltd., Proceedings, 1999
4. Safety Security and Risk Management, U. K. Singh & J. M. Dewan, A. P. H. Publishing Company, New Delhi, 1996
5. Industrial Safety Management: Hazard Identification and Risk Control, L. M. Deshmukh, McGraw-Hill Education (India) Private Limited, 2005

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. III Semester

## (22OE1AM02) OPERATIONS RESEARCH

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To analyze linear programming models in practical and their practical use
- To apply the transportation, assignment and sequencing models and their solution methodology for solving problems
- To apply inventory and queuing, inventory models and their solution methodology for solving problems
- To evaluate the simulation models

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Evaluate the problems using linear programming

**CO-2:** Analyze assignment, transportation problems

**CO-3:** Apply inventory and queuing problems for real time problems

**CO-4:** Model the real-world problem and simulate it

### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	1	3	3	2	-	-
CO-2	1	3	3	3	-	-
CO-3	1	3	3	3	-	-
CO-4	1	3	3	3	-	-

### UNIT-I:

**Introduction to Operations Research:** Definitions of OR, Characteristics of OR, Scope of OR, Classification of Optimization Techniques, models in OR, General L.P Formulation, Graphical solution, Simplex Techniques.

**Allocation:** Linear Programming Problem Formulation- Graphical solution-Simplex method-Artificial variables technique-Two phase method, Big-M Method-Duality Principle.

### UNIT-II:

**Transportation Problem:** Formulation-Optimal solution-unbalanced transportation problem-Degeneracy. Assignment problem-Formulation-Optimal solution-Variations of Assignment Problem-Travelling Salesman Problem.

**Sequencing:** Introduction-Flow Shop sequencing-n jobs through two machines-n jobs through three machines-Job shop sequencing-two jobs through m machines.



**UNIT-III:**

**Waiting Lines:** Introduction-Single channel-Poisson arrivals-exponential service times-with infinite population and finite population models-Multichannel-Poisson arrivals-exponential service times with infinite population single channel Poisson arrivals.

**UNIT-IV:**

**Inventory Models:** Deterministic inventory, models - Probabilistic inventory control models

**UNIT-V:**

**Simulation:** Definition-Types of simulation models-phases of simulation-applications of simulation Inventory and Queuing problems-Advantages and Disadvantages-Brief Introduction of Simulation Languages.

**TEXT BOOKS:**

1. Operations Research, S. D. Sharma, Kedarnath Ramnath, Meerut, New Delhi
2. Engineering Optimization, S. S. Rao, New Age International Publications, 2014
3. Introduction to Genetic Algorithms, S. N. Sivanandam, Springer

**REFERENCES:**

1. Operations Research-An Introduction, H. A. Taha, PHI, 2008
2. Principles of Operations Research, H. M. Wagner, PHI, Delhi, 1982
3. Introduction to Optimization: Operations Research, J. C. Pant, Jain Brothers, Delhi, 2008

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## M.Tech. III Semester

### (22OE1AM03) ENTREPRENEURSHIP AND START-UPS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To motivate the engineers to inculcate the skills thereof in any professional role and to consider intrapreneurship or entrepreneurship as career choices for personal and societal growth
- To understand different Theories of Entrepreneurship and their Classification
- To create Feasibility Reports, Business, Project Plans and resolve Operational problems
- To understand the roles of Family, non-family entrepreneurs and learning about Startups' Opportunities, Corporate Legal and Intellectual Property related issues

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Understand the role of an entrepreneur in the economic development and discover societal problems as entrepreneurial opportunities and ideate to develop solutions through systematic and creative approaches to innovation and business strategy

**CO-2:** Learn different Theories of entrepreneurship, the role of Family and Non-Family entrepreneurs and problem-solving skills

**CO-3:** Create Marketing, Financial Plans and evaluate Structural, Financial and Managerial Problems

**CO-4:** Apply lean methodology to startup ideas using Business Model Canvas and be able to create Business Plans through establishing business incubators. Understand Corporate Legal and Intellectual Property related matters

#### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	2	1	3	2	-	3
CO-2	1	-	-	-	-	2
CO-3	1	-	-	-	-	2
CO-4	-	-	-	1	-	-

#### UNIT-I:

**Entrepreneurship:** Definition of Entrepreneur, Entrepreneurial motivation and barriers; Internal and external factors; Types of entrepreneurs, Personality and Skill Set of an Entrepreneur, Entrepreneurship as a career for engineers, scientists, and technologists.

#### UNIT-II:

**Theories of Entrepreneurship:** Classification of entrepreneurship. Creativity and Innovation: Creative Problems Solving, Creative Thinking, Lateral Thinking, Views of De Bono, Khandwala and others, Creative Performance in terms of motivation and skills.

**Family and Non-Family Entrepreneurs:** Role of Professionals, Professionalism vs. family entrepreneurs, Role of Woman entrepreneur, Sick industries, Reasons for Sickness, Remedies for Sickness, Role of BIFR in revival, Bank Syndications.

**UNIT-III:**

**Creativity and Entrepreneurial Plan:** Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical; Project Planning, Evaluation, Monitoring and Control, segmentation, Targeting and positioning of Product, Role of SIDBI in Project Management.

**UNIT-IV:**

**Operation Problems:** Incubation and Take-off, Problems encountered Structural, Financial and Managerial Problems, Types of Uncertainty. Institutional support for new ventures: Supporting organizations; Incentives and facilities; Financial Institutions and Small-scale Industries, Govt. Policies for SSIs.

**UNIT-V:**

Startups' Opportunity Assessment, Business Models, Entrepreneur talk, Clinical/Regulatory, Sector Specific Group Briefing by Advisory Committee, Corporate Legal and Intellectual Property, Pitching, Payers and Reimbursement, Pitch practice, Investors, Mistakes I Won't Repeat, Business Development and Exits, Finance, Budgeting, Team Building, Opportunities in Telangana State and India – incubators, schemes, accelerators.

**TEXT BOOKS:**

1. Understanding Enterprise: Entrepreneurship and Small Business, Bridge S. et al., Palgrave, 2003
2. Holt- Entrepreneurship: New Venture Creation, Prentice-Hall, 1998
3. Entrepreneurship Development, Robert D. Hisrich, Michael P. Peters, Tata McGraw Hill Edition

**REFERENCES:**

1. New Venture Creation: An Innovator's Guide to Entrepreneurship, Marc H. Meyer and Frederick G. Crane, 2<sup>nd</sup> Edition, Sage Publications
2. Technology Ventures: From Idea to Enterprise, Byers, Dorf, Nelson
3. Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist - Feld, Mendelson, Costolo
4. Breakthrough Entrepreneurship, Burgstone and Murphy
5. Business Model Generation, Alexander Osterwalder

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech. III Semester

## (22OE1PL01) WASTE TO ENERGY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

### COURSE OBJECTIVES:

- To create awareness in students of energy conservation
- To identify the use of different types of Bio waste energy resources
- To understand different types of bio waste energy conservations
- To detect different waste conversion into different forms of energy

**COURSE OUTCOMES:** After completion of the course, the student should be able to

**CO-1:** Find different types of energy from waste to produce electrical power

**CO-2:** Estimate the use of bio waste to produce electrical energy

**CO-3:** Understanding different types of bio waste and its energy conversions

**CO-4:** Analyze the bio waste utilization and to avoid the environmental pollution

### COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)*

CO	PROGRAM OUTCOMES (PO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CO-1	3	2	3	1	2	1
CO-2	3	3	3	3	2	3
CO-3	3	2	3	2	2	3
CO-4	3	3	3	3	2	3

### UNIT-I:

**Introduction to Energy From Waste:** Classification of waste as fuel, Agro based, Forest residue, Industrial waste, MSW (Municipal solid waste) – Conversion devices – Incinerators, Gasifiers, Digestors. Urban waste to energy conversion, Biomass energy Programme in India.

### UNIT-II:

**Biomass Pyrolysis:** Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

### UNIT-III:

**Biomass Gasification:** Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power.

### UNIT-IV:

**Biomass Combustion:** Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

**UNIT-V:**

**Biogas:** Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion.

Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

**TEXT BOOKS:**

1. Biogas Technology-Transfer and Diffusion, M. M. EL-Halwagi, Elsevier Applied Science Publisher, 1984
2. Introduction to Biomass Energy Conversions, Sergio Capareda

**REFERENCES:**

1. Non-Conventional Energy, Desai Ashok V., Wiley Eastern Ltd., 1990
2. Biogas Technology - A Practical Hand Book, Khandelwal K. C. and Mahdi S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983
3. Food, Feed and Fuel from Biomass, Challal D. S., IBH Publishing Co. Pvt. Ltd., 1991
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996