

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam - 625 701 (Near VIRUDHUNAGAR).

# B.Tech. INFORMATION TECHNOLOGY REGULATION – 2020 AUTONOMOUS SYLLABUS CHOICE BASED CREDIT SYSTEM VII TO VIII SEMESTER CURRICULUM AND SYLLABI

#### **VISION:**

To make the department of Information Technology the unique of its kind in the field of Research and Development activities in this part of world

#### MISSION:

To impart highly innovative and technical knowledge in the field of Information Technology to the urban and unreachable rural student folks through Total Quality Education.

#### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

- **PEO 1:** Technical Knowledge: Graduates will be able to identify, analyze and create solutions for real life, industrial and societal needs by applying the principles and practices of Information Technology.
- **PEO 2:** Teamwork & Ethics : Graduates will be able to collaborate effectively and ethically in a multi-disciplinary team as a member &/ as a leader.
- PEO 3: Lifelong Learning: Graduates will be able to adopt the contemporary technologies in the field of Information Technology to provide solutions for challenging environments.

### **PROGRAM OUTCOMES:**

After going through the four years of study, the B.Tech. Information Technology graduates will have the ability to

POs	Graduate Attribute	Programme Outcome			
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering			
'	Lingineering knowledge	specialization to the solution of complex engineering problems.			
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
3	Design/Development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
4	Use research-based knowledge and research methods Conduct investigations including design of experiments, analysis and of complex problems interpretation of data, and synthesis of the information to provide valid conclusions				
5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations				
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice			

		Understand the impact of the professional engineering
7	Environment and	solutions in societal and environmental contexts, and
'	sustainability	demonstrate the knowledge of, and need for
		sustainable development.
		Apply ethical principles and commit to professional
8	Ethics	ethics and responsibilities and norms of the engineering
		practice.
	Individual and team	Function effectively as an individual, and as a member
9	work	or leader in diverse teams, and in multidisciplinary
	WOIK	settings.
		Communicate effectively on complex engineering
		activities with the engineering community and with
10	Communication	society at large, such as, being able to comprehend and
10	Communication	write effective reports and design documentation, make
		effective presentations, and give and receive clear
		instructions.
		Demonstrate knowledge and understanding of the
	Drain at management	engineering and management principles and apply
11	Project management and finance	these to one's own work, as a member and leader in a
	and finance	team, to manage projects and in multidisciplinary
		environments.
		Recognize the need for, and have the preparation and
12	Life-long learning	ability to engage in independent and life-long learning in
		the broadest context of technological change.

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

**PSO1:** Demonstrate technical and interpersonal skills to design and develop

IT enabled solutions to meet the real time industrial and societal

needs

**PSO2:** Exhibit an ability to adapt to the evolutionary changes in computing

#### **SEMESTER VII**

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	Т	Р	С
THEOF	THEORY							
1	CS1771	Cloud Computing	PC	3	3	0	0	3
2	IT1701	Software Project Management Techniques	PC	3	3	0	0	3
3	GE1471	Professional Ethics and Human Values	HS	3	3	0	0	ဂ
4	PE4	Professional Elective – IV#	PE	4	2	0	2	3
5	PE5	Professional Elective – V	PE	3	3	0	0	3
6	OE2	Open Elective II*	OE	3	3	0	0	3
PRACT	PRACTICALS							
8	CS1781	Cloud Computing Laboratory	PC	4	0	0	4	2
9	IT1721	Project Development	EEC	4	0	0	4	2
			TOTAL	27	17	0	10	22

#### **SEMESTER VIII**

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	Т	Р	С
PRACT	ΓICALS							
1	IT1821	Project Work	EEC	16	0	0	16	8
	TOTAL			16	0	0	16	8

<sup>\*</sup> Course from the Curriculum of other UG programmes. # Theory cum Laboratory Course

### **PROFESSIONAL ELECTIVES (PEs)**

### PROFESSIONAL ELECTIVE IV (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	Т	Р	С
1	IT1731	Applied Virtual Reality and Augmented Reality#	PE	4	2	0	2	3
2	IT1732	Essentials of .NET Framework#	PE	4	2	0	2	3
3	IT1733	Intrusion Detection System and Prevention System#	PE	4	2	0	2	3

### PROFESSIONAL ELECTIVE V (SEMESTER VII)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	Т	Р	С
1	IT1734	Cyber Security and Forensics	PE	3	3	0	0	3
2	IT1735	Web Development Frameworks	PE	3	3	0	0	3
3	AD1702	Natural Language Processing	PE	3	3	0	0	3

<sup>#</sup> Theory cum Laboratory Course

### **OPEN ELECTIVES (OEs)**

## OPEN ELECTIVE II (SEMESTER VII) – (Offered to ECE, EIE, EEE, MECH, MTR)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	Т	Р	С
1	OIT171	Fundamentals of Cloud Computing	OE	3	3	0	0	3
2	OIT172	Fundamentals of Deep Learning	OE	3	3	0	0	3

CS1771

#### **CLOUD COMPUTING**

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the basic concepts of cloud computing and its principles
- Make use of virtualization techniques in cloud computing
- Explain various service models and resource management in cloud computing
- Expose to cloud programming model and software environment
- Understand security and resource allocation issues in cloud computing

#### UNIT I INTRODUCTION, PRINCIPLES AND ARCHITECTURE 9

Cloud Computing: Reference model – Characteristics and challenges – historical development – Building cloud computing environment – Computing platforms and Technologies – Parallel Vs Distributed computing – Elements of parallel and distributed computing – Technologies for distributed computing – Cloud Computing Architecture: NIST Cloud Computing Reference Architecture – Types of Clouds – economics – Open challenges. Web services SOA, REST.

#### UNIT II VIRTUALIZATION

9

Characteristics of virtualized environments – Taxonomy of virtualization techniques – Execution virtualization – Machine reference model -Hypervisors – Hardware virtualization techniques – Operating system-level virtualization – Application-level virtualization – Virtualization and cloud computing – Pros and cons of virtualization – Technology examples – Xen: Para-virtualization – VMware: Full virtualization and binary translation – Microsoft Hyper-V – Management of Virtual Machines for Cloud infrastructure – Anatomy – Distributed management – Scheduling techniques – Capacity management to meet SLA commitment.

# CLOUD INFRASTRUCTURE AND RESOURCE UNIT III

9

**MANAGEMENT** 

Cloud Computing and Services Model – Public, Private and Hybrid Clouds – Cloud Eco System IaaS – PaaS – SaaS – Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global

Exchange of Cloud Resources - Resource Scheduling for cloud computing - Economic Models for resource allocation - Heuristics models for task execution - Real time scheduling in cloud computing.

# CLOUD PROGRAMMING AND SOFTWARE UNIT IV ENVIRONMENT 9

Cloud capabilities and platform features - Data features and databases - Parallel and Distributed Programming Paradigms - Hadoop - HDFS - MapReduce - Mapping Applications - Cloud Platforms - Google App Engine - Amazon Web Service - Microsoft Azure - Cloud Software Environments - Eucalyptus - Open Nebula - OpenStack - Cloudsim programming. Case Study: GoGrid - Rackspace.

#### UNIT V SECURITY IN CLOUD AND RESOURCE MANAGEMNET 9

Cloud Computing Risk Issues - Cloud Computing Security Challenges - Cloud Computing Security Architecture - Trusted cloud Computing - Identity Management and Access Control - Autonomic Security Dynamic Resource Allocation Using Virtual Machines for Cloud Computing Environment.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

**CO1:** Explain the basic concepts of cloud computing and its principles

CO2: Apply virtualization techniques for efficient resource utilization.

CO3: Summarize various models, services and resource management in cloud computing.

Apply cloud services in different programming models and software environment.

CO5: Interpret security and resource allocation issues in cloud computing.

#### **TEXT BOOKS**

- Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
- 2. Rittinghouse, JohnW., and James F. Ransome, Cloud Computing:

Implementation, Management and Security, CRC Press, 2017.

- RajkumarBuyya, James Broberg, AndrzejGoscinski, Cloud Computing: Principles and Paradigms, Wiley, 2012
- Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing A Practical Approach, Tata Mcgraw Hill, 2009.
- 3. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

IT1701

# SOFTWARE PROJECT MANAGEMENT TECHNIQUES

L	T	Р	С
3	0	0	3

9

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the Project Evaluation and Project Planning
- Learn about the Activity Planning and Risk Management principles
- Manage software projects and control software deliverables.
- Develop skills to manage the various phases involved in project management and people management
- Learn about the Software Quality Management Standards

#### UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Project Definition - Activities covered by Software Project Management -Overview of stepwise project planning -Project evaluation: Strategic assessment, Technical assessment, Cost-Benefit Analysis, Cash-flow forecasting, Cost-Benefit Evaluation Techniques- Risk Evaluation.

#### UNIT II ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning - Project schedules - Activities : Sequencing and scheduling, Network Planning models - Forward Pass & Backward Pass techniques, Critical path (CRM) method -Risk Management: Identification, Assessment, Monitoring, PERT technique, Monte Carlo simulation -Resource Allocation -Creation of critical patterns -Cost schedules

#### UNIT III PROJECT MANAGEMENT AND CONTROL 9

Framework for Management and control: Collecting of Data, Project termination - Visualizing Progress - Cost Monitoring: Earned Value - Project tracking - Change control: Software Configuration Management - Managing contracts: Types of Contract, Stages in Contract.

#### UNIT IV STAFFING

Managing people : Organizational behavior , Best methods of staff selection, Motivation -The Oldman – Hackman Job Characteristics Model, Ethical and Programmed concerns - Working In teams - Decision Making - Team structures:

Virtual teams - Communications genres - Communication plans.

#### UNIT V SOFTWARE QUALITY

9

Software Quality in project planning: Importance of Software Quality, Defining Software Quality, ISO9126 - Product and process metrics: Product versus Process Quality Management, Quality Management Systems - Process Capability Models - Techniques to help enhance Software Quality - Testing - Software Reliability - Quality Plan - Overview of Prince 2.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

CO1: Infer the activities in projects, planning and assessment

CO2: Construct network planning model to schedule the activities and overcome the anticipated risks.

CO3: Outline the factors that influence the project management and control

CO4: Illustrate the strategy adapted in selecting right people for right job and organizing teams

CO5: Interpret the importance of software development standards to enhance the Quality of projects.

#### **TEXT BOOK**

1. Bob Hughes, Mike Cotterell & Rajib Mall, 2018, Software Project Management, 6th ed, Tata McGraw Hill, New Delhi.

- Robert K. Wysocki, 2011, Effective Software Project Management, Wiley Publication.
- 2. Gopalaswamy Ramesh, 2013, *Managing Global Software Projects*, McGraw Hill Education.

#### GE1471 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Create an awareness on Engineering Ethics and Human Values.
- Instill Moral and Social Values and
- Impart Loyalty and to appreciate the rights of others

#### UNIT I HUMAN VALUES

9

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Stress management Techniques.

#### UNIT II ENGINEERING ETHICS

9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas –Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

#### UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics –A Balanced Outlook on Law.

#### UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk -Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest –Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

#### UNIT V GLOBAL ISSUES

9

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors - Moral Leadership - Code of Conduct - Corporate Social Responsibility

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

- CO1: Summarize the various Morals, Values, Ethics, Integrity and other Human Values
- CO2: Describe the Senses of Engineering ethics, its related Theories and Models of Professional Roles
- **CO3:** Explain the Codes of Ethics for various Engineering Experiments.
- CO4: Examine the various Risk, Safety and Risk Benefit Analysis for a Product/Service in an Organization
- CO5: Explain the Various Global Issues in Ethics and Review the Responsibilities and Rights of Professionals and Employees in an Organization

#### **TEXT BOOKS**

- Mike W. Martin and Roland Schinzinger, 2017, Ethics in Engineering,
   4th Edition, McGraw Hill.
- 2. Govindarajan M, Natarajan S, Senthil Kumar V. S, 2004, *Engineering Ethics*, Prentice Hall of India.

- 1. Charles B. Fleddermann, 2012, *Engineering Ethics*, 4th Edition, Prentice Hall.
- Charles E. Harris, Michael S. Pritchard, Raw W. James, Elaine E. Englehardt, and Michael J. Rabins, 2019, Engineering Ethics Concepts and Cases, 12th Edition, Cengage Learning.
- 3. John R Boatright, Jeffery Smith, 2016, *Ethics and the Conduct of Business*, 8th Edition, Pearson Education.
- Edmund G Seebauer and Robert L Barry, 2001, Fundamentals of Ethics for Scientists and Engineers, South Asia Edition, Oxford University Press.

CS1781

#### **CLOUD COMPUTING LABORATORY**

L	T	Р	С
0	0	4	2

#### **OBJECTIVES:**

#### This course enables the students to

- Learn how to use Cloud Services
- Implement Virtualization
- Build Private Cloud using Openstack / Eucalyptus
- Build Hadoop Cluster and execute Programs
- Implement Task Scheduling algorithms using cloudsim
- Execute version control commands using Github / Gitbash

#### LIST OF EXPERIMENTS

- 1. Study and Usage of Google Apps.
- Install Virtualbox/VMware Workstation with different flavours of linux or windows OS
  on top of windows7 or 8 & Install a C compiler in the virtual machine created using
  virtual box and execute Simple Programs
- 3. Create instances and volume attachment in AWS.
- 4. Setup a private cloud Using Eucalyptus.
- 5. Implement virtual machine migration from one node to another node.
- 6. Install Openstack on your local machine using Devstack.
- 7. Install a Single node Hadoop Cluster.
- 8. Implement Map Reduce concept for an application.
- 9. Simulate Task Scheduling algorithm using CloudSim
- 10. Use version control systems command to clone, commit, push, fetch, pull, checkout, reset, and delete repositories using Git Bash and Git Hub

**TOTAL: 60 PERIODS** 

#### **SOFTWARE SPECIFICATIONS**

S.NO.	NAME OF THE SOFTWARE
1	Eucalyptus or Open Stack or Cloudsim or equivalent
2	Git bash
3	Oracle or VMWare
4	DevStack C / Java / Python

#### **OUTCOMES**

### Upon successful completion of course the students will be able to

Students will be able to

**CO1:** Create virtual machines from available physical resources.

CO2: Construct a virtual machine using Openstack/Eucalyptus.

**CO3:** Demonstrate the procedure to install single node Hadoop.

CO4: Execute scheduling algorithms in Cloudsim.

**CO5:** Implement version control commands for file management.

IT1731

# APPLIED VIRTUAL REALITY AND AUGMENTED REALITY

L	T	P	С
2	0	2	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the basic concept and framework of virtual reality
- Be familiar with the relevance among virtual reality concept, methodology and environment
- Develop engineering applications using virtual reality in mobile.
- Understand augmented reality methodology
- Demonstrate the basic functionalities of augmented reality

#### UNIT I INTRODUCTION

6

The three I's of virtual reality - commercial Virtual Reality technology and the five classic components of a Virtual Reality system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation - interfaces and gesture interfaces - Output Devices: Graphics displays - sound displays & haptic feedback.

# UNIT II CONTENT CREATION CONSIDERATIONS

6

Geometric modelling - kinematics modelling - physical modelling - behaviour modelling - model Management, Methodology and terminology-user performance studies - Virtual Reality health and safety issues-Usability of virtual reality system- cyber sickness -side effects of exposures to virtual reality environment.

#### UNIT III VIRTUAL REALITY ON THE MOBILE

6

Google Virtual Reality for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics.

#### UNIT IV INTRODUCTION TO AUGMENTED REALITY

6

Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods,

visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems

#### UNIT V AUGMENTED REALITY DEVELOPEMENT PROCESS 6

Connecting Context and Content in AR System, Various types of contents. Associating content to context, Content Rendering in AR, POSE estimation, Obtaining RST (Rotation Scaling Translation) matrix, rendering 2D content - Images and Video, rendering 3D content - 3D models

#### LIST OF EXPERIMENTS

30

- 1. Game Engine Installation with Unity 3D
- 2. Virtual Reality with Unity
  - a. VR setup
  - b. Grabbing an Object
  - c. Teleportation
- 3. Augmented Reality with Unity
  - a. AR Background setup
  - b. AR characters setup
  - c. Movement for characters
- 4. Fix Target and Set levels in a game with Unity
- 5. Deploying AR in mobile

**Programming Language support: C# and Java** 

**TOTAL: 60 PERIODS** 

#### **OUTCOMES (THEORY)**

#### Upon successful completion of course the students will be able to

CO1: Demonstrate the basic concepts and framework of virtual reality

CO2: Interpret the relevance of virtual reality concepts, methods and

environment

**CO3:** Extend mobile applications using virtual reality

CO4: Outline the basic concepts of Augmented Reality

CO5: Illustrate the functionalities of Augmented Reality

#### **OUTCOMES (LAB)**

#### Upon successful completion of course the students will be able to

CO1: Construct Game engine with Unity 3D

CO2: Develop virtual reality applications with unity

CO3: Develop games using augmented reality with unity

Choose target and set levels in a game with Unity

**CO5:** Build an app with augmented reality in mobile

#### **TEXT BOOKS**

 C. Burdea & Philippe Coiffet, 2008, Virtual Reality Technology, 2nd Edition, Gregory, John Wiley & Sons, Inc.

2. Alan B. Craig, 2013, *Understanding Augmented Reality, Concepts and Applications*, Morgan Kaufmann, Elsevier.

- Dieter Schmalstieg & Tobias Hollerer, 2016, Augmented Reality: Principles and Practice (Usability), by Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States.
- Jason Jerald. 2015, The VR Book: Human-Centred Design for Virtual Reality, Association for Computing Machinery and Morgan & Claypool, New York, USA.
- 3. Steve Aukstakalnis, 2016, Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability), Addison-Wesley Professional.
- 4. Jos Dirksen, 2015, Learning Three.js: The JavaScript 3D Library for WebGL, 2nd Revised ed, Packt Publishing ebooks Account.
- 5. Dieter Schmalstieg & Tobias Hollerer, 2016, *Augmented Reality:*Principles & Practice, Addison-Wesley.
- 6. Cawood, Mark Fiala, 2008, *Augmented Reality: A Practical Guide*, Pragmatic Bookshelf.

#### IT1732 ESSENTIALS OF .NET FRAMEWORK

L	T	Р	С
2	0	2	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the .NET architecture and basic features of C#.
- Be familiar with the object oriented programming concepts of C#.
- Gain knowledge about advanced features in C#.
- Build simple application using database connectivity with C#.
- Develop web application using ASP.NET.

#### UNIT I INTRODUCTION TO THE .NET FRAMEWORK

6

Introduction to .NET Architecture - CLS, CTS, BCL, Overview of C# - Introduction to ASP.NET - IIS - MVC - Assembly - ASP.NET objects and Name Spaces - ASP.NET Application - Building ASP.NET website

#### UNIT II DEVELOPING ASP.NET APPLICATIONS

6

ASP.NET applications- Code behind – Global.asax – Understanding ASP.NET Configuration- Web form fundamentals – HTML control-page-server controls – Web controls-Validation controls

#### UNIT III STATE MANAGEMENT

6

Session – View – Query String – Cookies – Tracing – Logging – Error Handling

#### UNIT IV ADO.NET AND DATABASE CONNECTIVITY

6

Overview of ADO.NET – ADO.NET object model – SQL basics – Creating connection-Data Binding - Connected Model - Disconnected Model – Data List, Data Grid

#### UNIT V XML & Web Services

6

Introduction to XML – XSD – XSLT – AJAX - Web Services – Creating ASP.NET Web Services – server and client

#### LIST OF EXPERIMENTS

30

- 1. Develop simple web applications using HTML tags
- 2. Develop simple web applications using advanced ASP.NET Controls
- 3. Develop simple web application using ASP.NET validation controls

- 4. Create Master Page in a web application
- 5. Usage of gacutil
- 6. Develop web application to work with ADO.NET & CRUD
- 7. Develop web application with session management
- 8. Develop an application to work with XML
- 9. Develop web application with AJAX
- 10. Create a web service to implement the basic calculator services

**TOTAL: 60 PERIODS** 

#### **OUTCOMES (THEORY)**

#### Upon successful completion of course the students will be able to

**CO1:** Explain the basic concepts of C# and .NET framework.

CO2: Illustrate the object oriented programming concepts using C#

programming.

CO3: Demonstrate the exception handling and threading concepts.

CO4: Show the three tier applications using ADO.NET

**CO5:** Extend the concepts of web services using ASP.NET.

#### **OUTCOMES (LAB)**

#### Upon successful completion of course the students will be able to

Choose the appropriate HTML tags for creating the web application.

**CO2:** Apply the concepts of ASP.NET to validate the forms in the web

application.

Create a master web page using ASP.NET

CO4: Develop a web application to interact with database using ADO.NET

**CO5:** Build simple web application using ASP web services.

#### **TEXT BOOKS**

 Mathew Mac Donald, ASP.NET complete Reference, Tata McGraw Hill 2005. 2. Herbert Schildt, *C# 4.0: The Complete Reference*, McGraw Hill Education, Indian Edition, 2010, Reprint 2017.

- Crouch Matt J, ASP.NET and VB.NET Web Programming, Addison Wesley 2002.
- 2. J.Liberty, D.Hurwitz, *Programming ASP.NET*, Third Edition, O'REILLY, 2006.
- 3. Daniel Solis, *Illustrated C#*, Apress, Second Edition, 2012.

IT1733

# INTRUSION DETECTION AND PREVENTION SYSTEM

L	T	Р	С
2	0	2	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the basics of intrusion detection system
- Describe various intrusion detection and prevention system
- Outline the architecture of intrusion detection and prevention system
- Install and work with Snort
- Implement the commands in Snort for intrusion detection and prevention system

#### UNIT I INTRODUCTION

8

History of Intrusion detection, Audit, Concept and definition, Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources, Network based information sources.

#### UNIT II INTRUSION DETECTION AND PREVENTION

12

Components of IDS, Steps of implementation and monitoring, Host- and network-based IDS, Implementing and evaluating IDS, intrusion detection versus intrusion prevention, Data collection for IDS/IPS, Intrusion detection techniques, misuse detection: pattern matching, rule-based and state-based; anomaly detection: statistical based, machine learning based, data mining based; hybrid detection.

# UNIT III ARCHITECTURE

10

Tiered architectures, single-tiered, multi-tiered, peer-to-peer. Sensor: sensor functions, sensor deployment and security. Agents: agent functions, agent deployment and security. Manager component: manager functions, manager deployment and security. Information flow in IDS and IPS, defending IDS/IPS.

#### UNIT IV SNORT

5

Working with Snort Rules, Rule Headers, Rule Options, The Snort Configuration File etc. Plugins, Preprocessors and Output Modules, Using Snort with MySQL.

#### UNIT V AGENT DEVELOPMENT – SNORT

7

Using ACID and Snort Snarf with Snort, Agent development for intrusion detection, Architecture models of IDs and IPs.

#### LIST OF EXPERIMENTS on IDS and IPS using SNORT

18

- 1. Installing Snort into the Operating System
- 2. Configuring and Starting the Snort IDS
- 3. Working with Snort command line options
- 4. Writing and Adding a Snort Rule
- 5. Triggering an Alert for the New Rule
- 6. Working with preprocessors and output modules
- 7. Integrating Snort with MySQL
- 8. Using ACID and Snort Snarf with Snort
- 9. Agent development for intrusion detection

**TOTAL: 60 PERIODS** 

#### **OUTCOMES (THEORY)**

#### Upon successful completion of course the students will be able to

**CO1:** Explain the need for Intrusion Detection System to handle the threats in host based and network based systems

CO2: Paraphrase the various intrusion detection and prevention techniques to protect the systems from intruders

CO3: Outline the architectures of different types of Intrusion Detection and Prevention System

CO4: Summarize the SNORT commands for intercommunication between networks

CO5: Demonstrate the Intrusion Detection and Prevention System using SNORT

#### **OUTCOMES (LAB)**

#### Upon successful completion of course the students will be able to

**CO1:** Experiment with initial process of SNORT IDS

CO2: Choose appropriate commands to perform intrusion detection using

SNORT rules

CO3: Utilize the SNORT preprocessor and output modules to represent the

data for intrusion detection

**CO4:** Develop an Intrusion detection and prevention system that interact

with database

Create an agent for intrusion detection system

#### **TEXT BOOKS**

1. Carl Enrolf, Eugene Schultz, Jim Mellander, *Intrusion detection and Prevention*, McGraw Hill, 2004

2. Rafeeq Rehman, *Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID*, 1st Edition, Prentice Hall , 2003

- Christopher Kruegel, Fredrik Valeur, Giovanni Vigna: Intrusion
   Detection and Correlation Challenges and Solutions, 1st Edition,
   Springer, 2005.
- Carl Endorf, Eugene Schultz and Jim Mellander, *Intrusion Detection* & *Prevention*, 1st Edition, Tata McGraw-Hill, 2004.
- 3. Stephen Northcutt, Judy Novak, *Network Intrusion Detection*, 3rd Edition, New Riders Publishing, 2002.

#### IT1734 CYBER SECURITY AND CYBER FORENSICS

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the basics of cyber security and threats
- Realize the use of existing safeguard measures to enhance the security in cyber space
- Comprehend various Cyber Forensic Techniques to investigate the crime incident scene
- Elaborate the process of auditing and evidence collection
- Use the CF tools for cyber investigation

# UNIT I VULNERABILITIES

9

Overview of Cyber Security, Internet Governance – Challenges and Constraints. Vulnerabilities: vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Threats: Cyber Warfare, Cyber terrorism-Cyber Espionage Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.

#### UNIT II CYBER SECURITY SAFEGUARDS AND CYBER CRIMES 9

Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management. Cyber Crimes: Definition and types of cybercrimes, Internet crimes, hacking and cracking, credit card and ATM frauds, emerging digital crimes and modules.

#### UNIT III CYBER FORENSICS

9

Introduction to Cyber Forensics, Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems -

#### **Understanding Computer Investigation**

#### UNIT IV AUDITING AND EVIDENCE COLLECTION

9

Auditing: Internal Audit and IT Audit Function, IT Governance, Frameworks, Standards, and Regulations, Identifying information assets, Risk assessment, Risk management, Types of Auditing, ISO 27001, PCIDSS. Evidence Collection: Processing Crime and Incident Scenes – Working with Windows and Unix Systems

#### UNIT V CYBER FORENSIC TOOLS

9

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase, FTK and ProDiscover Tools.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

- **CO1:** Explain the basics of cyber security and vulnerabilities that lead to security breaches
- CO2: Discuss the existing security safeguard measures against crimes that occur in cyber space
- CO3: Paraphrase the Cyber Forensic techniques used to prepare Incidence Response Report.
- Outline the auditing and evidence collection process in a cyber crime investigation.
- **CO5:** Demonstrate the process of Cyber Forensic investigation using Cyber Forensic tools.

#### **TEXT BOOKS**

- 1. Charles P. Fleeger, *Security in Computing*, Prentice Hall, New Delhi, 2009.
- 2. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, Cengage Learning, 2nd Edition, 2005.
- C. Altheide& H. Carvey, Digital Forensics with Open Source Tools, Syngress, 2011. ISBN:9781597495868

- George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press, 2013
- Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics, Technology and Automation edited, Springer International Publishing Switzerland 2015
- 3. Nelson Phillips and Enfinger Steuart, *Computer Forensics and Investigations*, Cengage Learning, New Delhi, 2009.
- 4. Marjie T Britz, Computer Forensics and Cyber Crime: An Introduction, Pearson Education, 2nd Edition, 2008.

#### IT1735 WEB DEVELOPMENT FRAMEWORKS

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Identify the usage of the fundamentals of web development framework
- Demonstrate the use of Java based web development framework concepts
- Identify the usage of python based web development framework
- Work with Code Igniter web development frameworks
- Create applications using various web development frameworks

#### UNIT I INTRODUCTION TO WEB DEVELOPEMNT FRAMEWORKS 3

Web Framework-History-Types of framework architectures -Model-view-controller (MVC)-Three-tier organization -Introduction to frameworks- Framework applications - General-purpose website frameworks -Server-side-Client-side-Features

#### UNIT II HIBERNATE FRAMEWORK

12

Introduction to Java Web Frameworks- Introduction to Hibernate and JPA – JDBC and HB in object persistence - O-R mapping – HB basics - Architecture of HB-Configuration – HB Life Cycle – Annotations - HB Mapping – HQL – HCQL – Hibernate in web application.

#### UNIT III SPRING FRAMEWORK

9

Introduction to Spring Core – Aspect Oriented Programming- Spring Architecture – Spring web MVC – Spring in web application – Bean descriptor – Spring data access – Spring using Hibernate – Data access using Spring's JDBC

#### UNIT IV FLASK FRAMEWORK

9

Introduction to Python Frameworks-Web 2.0, introduction to Flask – Installation and setup - Basic application structure – Templates – Web forms – working with databases

#### UNIT V DJANGO FRAMEWORK

12

Introduction to Django-Django History-Django Components-Alternate Components-MVC Architecture in Django-Django Forms – Validation – Session Framework – Developing Web Application

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

CO1: Use the fundamental concepts of web development framework

CO2: Demonstrate the use of Java based web development framework

concepts

CO3: Identify the usage of python based web development framework

**CO4:** Work with Codelgniter web development frameworks

Create applications using various web development frameworks

#### **TEXT BOOKS**

1. Madhusudhan Konda, *Just Hibernate : A lightweight Introduction to the Hibernate Framework*, O'Reilly, 2015

- Rod Johnson, Jurgen Holler, Alef Arendsem, Thomas Risberg, Colin Sampaleanu, Professional Java Development with the Spring Framework, wrox, 2005
- 3. Dana Moore, Raymond Budd, William Wright, *Professional Python Frameworks Web 2.0*, John wiley & sons, 2008

- 1. Carlos de la Guardia, *Python Web Frameworks*,O'Reilly,2016
- 2. Miguel Grinberg, Flask Web Development, O'Reilly, 2014

#### AD1702 NATURAL LANGUAGE PROCESSING

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Learn the fundamentals of natural language processing
- Understand the use of CFG and PCFG in NLP
- Understand the role of semantics of sentences and pragmatics
- Apply the NLP techniques to IR applications

#### UNIT I INTRODUCTION

9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

#### UNIT II WORD LEVEL ANALYSIS

9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

#### UNIT III SYNTACTIC ANALYSIS

9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

#### UNIT IV SEMANTICS AND PRAGMATICS

10

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

#### UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES

8

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC). Applications - Machine Translation, Information Retrieval and Extraction, Text Categorization and Summarization.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

**CO1:** Explain the fundamentals of Natural Language Processing.

CO2: Illustrate the algorithms used in word level analysis in NLP.

CO3: Describe the use of CFG and PCFG syntactic analysis of NLP.

**CO4:** Explain the role of semantics of sentences and pragmatics in NLP.

CO5: Compare and contrast the use of different statistical approaches for different types of NLP applications.

#### **TEXT BOOKS**

- Daniel Jurafsky, James H Martin, 2014, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication.
- 2. Steven Bird, Ewan Klein & Edward Loper, 2009, *Natural Language Processing with Python*, 1st ed, O\_Reilly Media.

- 1. Breck Baldwin, 2015, Language Processing with Java and LingPipe Cookbook, Atlantic Publisher.
- Richard M Reese, 2015, Natural Language Processing with Java,
   O\_Reilly Media.
- 3. Nitin Indurkhya & Fred J Damerau, 2010, *Handbook of Natural Language Processing*, 2nd ed, Chapman and Hall/CRC Press.

4. Tanveer Siddiqui, Tiwary, 2008, *Natural Language Processing and Information Retrieval*, Oxford University Press.

#### OIT171 FUNDAMENTALS OF CLOUD COMPUTING

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

#### This course enables the students to

- Understand the concept and issues of cloud and utility computing
- Familiarize the types of virtualization
- Understand various cloud service models
- Know the lead players in cloud
- Appreciate the emergence of cloud as the next generation computing paradigm

#### UNIT I INTRODUCTION TO CLOUD COMPUTING

9

Introduction to Cloud Computing – Roots of Cloud Computing – Desired Features of Cloud Computing – Challenges and Risks – Benefits and Disadvantages of Cloud Computing.

#### UNIT II VIRTUALIZATION

9

Introduction to Virtualization Technology – Load Balancing and Virtualization – Understanding Hypervisor – Seven Layers of Virtualization – Types of Virtualization – Server, Desktop, Application Virtualization.

#### UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE

9

NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage

#### UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9

Inter Cloud Resource Management – Resource Provisioning Methods – Security Overview – Cloud Security Challenges – Data Security –Application Security – Virtual Machine Security.

#### UNIT V CASE STUDIES

9

Google App Engine(GAE) – GAE Architecture – Functional Modules of GAE – Amazon Web Services(AWS) – GAE Applications – Cloud Software Environments – Eucalyptus – Open Nebula – Open Stack.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

CO1: Outline the evolution of cloud Computing, its principles and characteristics

CO2: Paraphrase the cloud technologies and virtualization techniques

CO3: Interpret different cloud architectures and resource provisioning methods

CO4: Demonstrate Hadoop and Map Reduce application

**CO5:** Elucidate cloud security and various cloud technology platforms

#### **TEXT BOOKS**

- 1. Buyya R., Broberg J., Goscinski A., *Cloud Computing: Principles and Paradigm*, First Edition, John Wiley & Sons, 2011..
- Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012
- 3. Rittinghouse, John W., and James F. Ransome, *Cloud Computing: Implementation, Management, And Security*, CRC Press, 2017.

#### **FUNDAMENTALS OF DEEP LEARNING**

L	T	Р	С
3	0	0	3

#### **OBJECTIVES:**

OIT172

#### This course enables the students to

- Present the mathematical, statistical and computational challenges of building neural networks
- Study the concepts of deep learning
- Introduce dimensionality reduction techniques
- Enable the students to know deep learning techniques to support real-time applications
- Examine the case studies of deep learning techniques

#### UNIT I INTRODUCTION

9

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression) - Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

#### UNIT II DEEP NETWORKS

9

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

#### UNIT III DIMENTIONALITY REDUCTION

9

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures - AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

#### UNIT IV OPTIMIZATION AND GENERALIZATION

9

Optimization in deep learning - Non-convex optimization for deep networks - Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models-

Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

#### UNIT V CASE STUDIES AND APPLICATIONS

9

Imagenet- Detection - Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection BioInformatics - Face Recognition - Scene Understanding - Gathering Image Captions.

**TOTAL: 45 PERIODS** 

#### **OUTCOMES**

#### Upon successful completion of course the students will be able to

CO1: Understand basics of deep learning

CO2: Implement various deep learning models

CO3: Realign high dimensional data using reduction techniques

CO4: Analyze optimization and generalization in deep learning

**CO5:** Explore the deep learning applications

#### **TEXT BOOKS**

- 1. Cosma Rohilla Shalizi, *Advanced Data Analysis from an Elementary Point of View*, 2015.
- 2. Deng & Yu, *Deep Learning: Methods and Applications*, Now Publishers, 2013.
- 3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, MIT Press, 2016.
- 4. Michael Nielsen, *Neural Networks and Deep Learning*, Determination Press, 2015.