LIST OF OPEN ELECTIVES OFFERED BY ALL DEPARTMENTS

OPEN ELECTIVE-I

S.No.	Open Elective-I Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Disaster Management	CE	R20CC1OE01	3	0	0	3
2	Green Technology	CE	R20CC1OE02	3	0	0	3
3	Micro Electro Mechanical System	EEE	R20CC1OE03	3	0	0	3
4	Fundamentals of Electrical Engineering	EEE	R20CC1OE04	3	0	0	3
5	Rapid Prototyping & 3D Printing (Other than ME)	ME	R20CC2OE05	3	0	0	3
6	Operations Research	ME	R20CC2OE06	3	0	0	3
7	Principles of Signals, Systems & Communications (Other than ECE)	ECE	R20CC1OE08	3	0	0	3
8	Medical Electronics	ECE	R20CC1OE08	3	0	0	3
9	DBMS (Other Than CSE)	CSE	R20CC1OE09	3	0	0	3
10	Web Development Using Mean Stack Tech	CSE	R20CC1OE11	3	0	0	3
11	Front End UI and Frame Work	IT	R20CC1OE10	3	0	0	3
12	Web Development Using Mean Stack Tech	IT	R20CC1OE12	3	0	0	3
13	Financial Institutions, Markets and Services	MBA	R20CC1OE13	3	0	0	3
14	Human Resource Practices	MBA	R20CC1OE14	3	0	0	3
15	OOP Through JAVA	AI	R20CC1OE15	3	0	0	3
16	Computer Organization	AI	R20CC1OE16	3	0	0	3

OPEN ELECTIVE-II

S.No.	Open Elective-II Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Remote Sensing And GIS	CE	R20CC2OE01	3	0	0	3
2	Traffic Safety	CE	R20CC2OE02	3	0	0	3
3	Hybrid Electric Vehicle	EEE	R20CC2OE03	3	0	0	3
4	Energy Audit and Conservation	EEE	R20CC2OE04	3	0	0	3
5	Industrial Engineering & Management (Other than ME)	ME	R20CC2OE05	3	0	0	3
6	Industrial Robotics (Other than ME)	ME	R20CC2OE06	3	0	0	3
7	Fundamentals of Image Processing (Other than ECE)	ECE	R20CC2OE07	3	0	0	3
8	Global Positioning System(GPS)	ECE	R20CC2OE08	3	0	0	3
9	Artificial Intelligence	CSE	R20CC2OE09	3	0	0	3
10	OOPS through JAVA	CSE	R20CC2OE10	3	0	0	3
11	Introduction to AI	IT	R20CC2OE11	3	0	0	3
12	OOP Through JAVA	IT	R20CC2OE12	3	0	0	3
13	Digital Marketing	MBA	R20CC2OE13	3	0	0	3
14	Personal Finance Planning	MBA	R20CC2OE14	3	0	0	3
15	Database Management Systems	AI	R20CC2OE15	3	0	0	3
16	Cloud Computing	AI	R20CC2OE16	3	0	0	3

OPEN ELECTIVE-III

S.No.	Open Elective-III Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Railway, Airport & Harbour Engineering	CE	R20CC3OE01	3	0	0	3
2	Low Cost Housing	CE	R20CC3OE02	3	0	0	3
3	Concept of Smart Grid Technology	EEE	R20CC3OE03	3	0	0	3
4	Industrial Automation	EEE	R20CC3OE04	3	0	0	3
5	Automotive Vehicles	ME	R20CC3OE05	3	0	0	3
6	Nano Technology	ME	R20CC3OE06	3	0	0	3
7	Introduction to Micro Processors & Micro Controllers(Other than ECE)	ECE	R20CC3OE07	3	0	0	3
8	Nano Electronics	ECE	R20CC3OE08	3	0	0	3
9	Cloud Computing	CSE	R20CC3OE09	3	0	0	3
10	Block Chain Technologies	CSE	R20CC3OE10	3	0	0	3
11	Digital Marketing	IT	R20CC3OE11	3	0	0	3
12	Augmented Reality	IT	R20CC3OE12	3	0	0	3
13	Performance Management	MBA	R20CC3OE13	3	0	0	3
14	Services Marketing	MBA	R20CC3OE14	3	0	0	3
15	Block Chain Technologies	AI	R20CC3OE15	3	0	0	3
16	Human Computer Interaction	AI	R20CC3OE16	3	0	0	3

OPEN ELECTIVE-IV

S.No.	Open Elective-IV Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Environmental Pollution & Control	CE	R20CC4OE01	3	0	0	3
2	Construction Technology and Management	CE	R20CC4OE02	3	0	0	3
3	Non-Conventional Energy Resources	EEE	R20CC4OE03	3	0	0	3
4	Electrical Safety	EEE	R20CC4OE04	3	0	0	3
5	Pneumatics & Hydraulic Automation	ME	R20CC4OE05	3	0	0	3
6	Mechatronics	ME	R20CC4OE06	3	0	0	3
7	Introduction to Embedded Systems (Other than ECE	ECE	R20CC4OE07	3	0	0	3
8	Embedded and Real time Operating System	ECE	R20CC4OE08	3	0	0	3
9	Cyber Security	CSE	R20CC4OE09	3	0	0	3
10	Ethical Hacking	CSE	R20CC4OE010	3	0	0	3
11	Ethical Hacking	IT	R20CC4OE011	3	0	0	3
12	E-Commerce	IT	R20CC4OE012	3	0	0	3
13	Quality Management	MBA	R20CC4OE013	3	0	0	3
14	Logistics and Supply Chain Management	MBA	R20CC4OE014	3	0	0	3
15	DevOps	AI	R20CC4OE015	3	0	0	3
16	E-Commerce	AI	R20CC4OE016	3	0	0	3

LIST OF OPEN ELECTIVES OFFERED BY DEPARTMENT

OPEN ELECTIVE-I

S.No.	Open Elective-I Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Front End UI and Frame Work	IT	R20CC1OE10	3	0	0	3
2	Web Development Using Mean Stack Tech	IT	R20CC1OE12	3	0	0	3

OPEN ELECTIVE-II

S.No.	Open Elective-II Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Introduction to AI	IT	R20CC2OE11	3	0	0	3
2	OOP Through JAVA	IT	R20CC2OE12	3	0	0	3

OPEN ELECTIVE-III

S.No.	Open Elective-III Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Digital Marketing	IT	R20CC3OE11	3	0	0	3
2	Augmented Reality	IT	R20CC3OE12	3	0	0	3

OPEN ELECTIVE-IV

S.No.	Open Elective-IV Subject Title	Department Offering the Subject	Sub Code	No.of periods per week			No.of Credits
				L	T	P	C
1	Ethical Hacking	IT	R20CC4OE011	3	0	0	3
2	E-Commerce	IT	R20CC4OE012	3	0	0	3

OPEN ELECTIVE-I

O E- I	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUB CODE: R20CC1OE10	**FRONT END UI AND FRAMEWORK**						

OBJECTIVES:

- To gain the knowledge of techniques associated with the World Wide Web.
- To understand how to use Web-based media-rich programming tools for creating interactive web pages.

COURSE OUTCOMES:

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

CO 1: Analyze a web page and identify its elements and attributes of HTML5.
CO 2: Apply Cascading Styles sheets to design web pages.
CO 3: Build dynamic web pages using Java Script.
CO 4: Build interactive web pages with jQuery.

SYLLABUS:

UNIT - I

HTML5 Basic Tags, Text Formatted Tags, Lists, Tables, Images, Colors, Forms, HTML5 Canvas, HTML5 SVG, HTML5 Media.

UNIT - II

Cascading Style Sheets: Styling Text, Color, Background, Images, Styling Links, Understanding the CSS Box Model and Positioning, Creating Fixed or Liquid Layouts, Using CSS to Design Navigation.

UNIT - III

Introduction to Java Script: General Syntactic Characteristics, Primitives, Control Statements. Objects in Java Script, Dynamic HTML with Java Script: Positioning elements, Moving Elements. Regular Expressions in Java Script: Pattern matching using regular expressions,Working with Events: onload, onclick, onsubmit, onmouseover, onmouseout, onkeydown, onkeyup, onkeypress.

UNIT - IV

JQuery API: Introduction: What jQuery can Do, Who Develops jQuery? Obtaining jQuery Programming Conventions, Markup and CSS Conventions, JavaScript Conventions. Events: The Various Event Wrapper Methods, Attaching Other Events, Attaching Persistent Event Handlers, Removing Event Handlers. Manipulating Content and Attributes:Setting, Retrieving, and Removing Attributes, Manipulating HTML and Text Content. Iteration of Arrays and objects: Enumerating Arrays, Filtering Selections and Arrays, Mapping a Selection or an Array, Array Utility Methods.

UNIT - V

JQuery UI: Animations and Effects: Showing and Hiding Elements, Sliding Elements, Fading Elements, Custom Animation, Animation Options. HTML5 Drag and Drop: Implementing Drag and Drop. Sortable: Making a List Sortable, Customizing Sortable, Saving the State of Sorted Lists. Date picker: Implementing a Date picker, Localizing the Date picker

TEXT BOOKS:

1. Kogent leaning solutions Inc, "Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book", ISBN: 978-93-5004-593-0,Dream Tech,2013.
2. Robert W Sebesta," Programming the World Wide Web", ISBN 10:1-292-02431-3, Pearson, 7th edition,2014.
3. Richard York, "Web Development with JQuery", ISBN:978-1-118-86607-8, John Wiley & Sons,2nd Edition,2015.

REFERENCE BOOKS:

1. Paul S Wang, Sanda S Katila, "An Introduction to Web Design, Programming", ISBN- 10: 8131503674, Cengage,2012.
2. Uttam K Roy "Web Technologies", ISBN-10: 9780198066224, Oxford,2010.

WEB REFERENCES:

1. https://www.edx.org/course/html5-css-fundamentals-w3cx-html5-0x-0
2. https://freevideolectures.com/course/3196/jquery
3. https://www.edx.org/course/introduction-to-jquery

O E- I	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1OE12	**WEB DEVELOPMENT USING MEAN STACK TECH**						

COURSE OBJECTIVE:

- This course is designed to introduce students to learn how to design both the front and back end of web applications. The course will introduce web-based media-rich programming tools for creating interactive web pages.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Apply Angular8 to develop web applications. [K3]
CO2: Make use of Forms and Services. [K3]
CO3: Utilize Node.js to create Server Side Applications. [K3]
CO4: Make use of Express to deploy web applications. [K3]
CO5: Experiment with NoSQL using MongoDB. [K3]

UNIT-I: **Angular8:** Introduction, Installation, Creating First Angular8 Application, Architecture, Angular Components and Templates, Data Binding, Directives, Pipes, Services and Dependency Injection.

UNIT-II: **Angular8:** Reactive Programming, Http Client Programming, Angular Material, Routing and Navigation, Forms, Form Validation, CLI Commands.

UNIT-III: Node.js: Introduction, Git Basic commands, Node.js Process Model, Node.js Console, Node.js Basics, Node.js Modules, Local Modules, Export Module, Node Package Manager, Node.js Web Server

UNIT-IV: Node.js contd. & Express.js: Node.js File System, Debugging Node.js, Node Inspector, Node.js EventEmitter, Frameworks for Node.js. **Express.js:** Express.js Web App, Serving Static Resources.

UNIT-V: MongoDB: Access MongoDB in Node.js, Connecting MongoDB, Insert Documents, Update/Delete Documents, Query Database, Mangoose.

TEXT BOOKS:

1. Node.js, MongoDB and Angular Web Development by Brad Dayley, Brendan Dayley- 2nd Edition – Addison –Wesley
2. Getting MEAN with Mango, Express, Angular and Node by Simon Holmes, Clive Harber-2nd Edition - Manning Publications.
3. MEAN Cookbook by Nicholas McClay - Packt

REFERENCES BOOKS:

1. Node.js: Web Development for Beginners by Joseph Conner
2. Mean Stack Developer by Camila Cooper

ADDITIONAL RESOURCES:

1. https://www.edx.org/course/introduction-to-mongodb-using-the-mean-stack
2. https://www.simplilearn.com/full-stack-web-developer-mean-stack-certification- training
3. https://www.tutorialsteacher.com/nodejs/expressjs-web-application.

O E- II	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2OE11	**INTRODUCTION TO AI**						

COURSE OBJECTIVE:

- Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic and learning.
- The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO 1: Summarize the characteristics of AI that make it useful to real-world problems. [K2]
CO 2: Analyse different search techniques and predicate logic in artificial Intelligence. [K4]
CO 3: Interpret knowledge representation and symbolic reasoning using different rules. [K2]
CO 4: Apply the basic knowledge on learning and reinforcement learning. [K3]
CO 5: Make use of the power of AI in Natural language processing as an advanced Application of AI. [K3]

SYLLABUS:

UNIT - I

Introduction to AI, Problems, Problem Spaces and Search: Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

UNIT - II

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis. **Knowledge Representation Using Predicate Logic:** Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution.

UNIT - III

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.
Weak slot-and-filler structures: Semantic Nets, Frames, **Strong slot-and-filler structures**: Conceptual dependency, Scripts

UNIT - IV

Learning: Rote learning, learning by taking advice, learning in problem solving,

Reinforcement Learning: Markov Decision Problem, Q-Learning, Q-Learning Algorithm, temporal difference Algorithm

UNIT – V

Natural Language Processing: Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Statistical Natural language Processing, Spell Checking.

TEXT BOOKS:

1. Elaine Rich & Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Edition, 3rd Edition, Reprint 2008.
2. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
3. Carl Townsend, "Introduction to TURBO PROLOG", BPB Publications. 2011
4. Tom M Mitchell, "Machine Learning", McGraw-Hill Science/Engineering/Math, 1997.

REFERENCE BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Patrick Henry Winston, 'Artificial Intelligence', Pearson Education, 2003
3. Russel and Norvig, 'Artificial Intelligence', Pearson Education, PHI, 2003

WEB REFERENCES

1. https://www.coursera.org/learn/machine-learning
2. https://www.simplilearn.com/big-data-and-analytics/machine-learning
3. https://www.appliedaicourse.com/course/applied-ai-course-online
4. http://nptel.ac.in/courses/106105152

O E- II	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC2OE12	**OOPS Through JAVA**						

COURSE OBJECTIVE:

The course provides fundamentals of object-oriented programming in Java and development of user interface.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:
CO1: Summarize the basic concepts of Object Oriented Programming.
CO2: Illustrate various programming paradigms of Object Oriented Programing.
CO3: Analyze inheritance, packages and Exception handling concepts.
CO4: Apply multi-threading concepts and Applets.
CO5: Apply Event Handling and AWT concepts in various UI Applications.

SYLLABUS:

UNIT - I

Introduction to OOP: Introduction, Need of Object Oriented Programming, Principles of Object-Oriented Languages(Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism), Procedural languages Vs. OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features(Platform Independence, Object-Oriented, Both Java compiled and interpreted, Robust, Security, Multithreaded, other features), and Program structures, Installation of JDK1.8(Getting started with JDK, JDK Installation notes, Exploring the JDK).

UNIT - II

Programming Constructs: Variables, Primitive Data types, Identifiers (Naming Conventions, Keywords), Literals, Operators (Binary, Unary and ternary), Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control (Branching, Conditional, loops).
Classes and Objects: classes, Objects, Creating Objects, Methods (method types, method overloading), constructors (Parameterized Constructors, Constructor overloading), Cleaning up unused objects (Garbage collector, Finalization), Static keyword (static variables, methods, blocks), this keyword, Arrays, Recursion, Command line arguments and String handling.

UNIT - III

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overriding, super keyword, final keyword, Abstract class.
Interfaces, Packages and Enumeration: Interface (Variables in interface, Extending interface), Interface vs. Abstract classes, Packages (Creating packages, using Packages,

Access protection), Understanding CLASSPATH, java.lang package (Object class, String class), enumeration.
Exceptions: Introduction, Exception handling techniques (try...catch, throw, throws, finally block), user defined exception.

UNIT - IV

Multi-Threading: java.lang.Thread, Thread life cycle, main Thread, Creation of new threads (by inheriting Thread class, Implementing the Runnable interface), Thread priority, Multithreading using isAlive () and join (), Synchronization (Synchronizing Methods, Statements), Suspending and Resuming threads, Communication between Threads.
Applets: Applet class, Applet structure, An Example Applet Program, Applet Life Cycle (init (), start (), stop (), destroy ()), paint (), update () and repaint (), passing parameters to the Applet.

UNIT - V

Event Handling: Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.
Abstract Window Toolkit: Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar.

TEXT BOOK:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.

REFERENCE BOOKS:

1.JAVA Programming, K. Rajkumar, Pearson.
2.Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech.

ONLINE REFERENCES:

1. https://www.coursera.org/learn/object-oriented-java
2. https://www.youtube.com/watch?v=3u1fu6f8Hto
3. https://www.edx.org/course/object-oriented-programming-in-java

O E- III	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC3OE11	**DIGITAL MARKETING**						

COURSE OUTCOME:

At the end of the course, student will be able to

CO1: Develop insight on Current Trends – Digital and Social Statistics (Infographics)

CO2: Analyze the Digital Marketing Platforms like Facebook, Twitter, YouTube etc.

CO3: Analyze the basics of Search Engine Optimization (SEO) and Mobile Marketing

CO4: Design the various strategies involved in Marketing products and Services Digitally.

SYLLABUS:

UNIT-I :

Introduction to Digital Marketing- Evolution of Digital Marketing from traditional to modern era, Role of Internet;Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.

UNIT-II :

Internet Marketing and Digital MarketingMix – Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix,Impact of digital channels on IMC

Search Engine Advertising:- Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation

Display marketing: Types of Display Ads, Buying Models, Programmable Digital Marketing, Analytical Tools, YouTube marketing

UNIT-III:

Social Media Marketing – Role of Influencer Marketing,Tools & Plan–

Introduction to social media platforms, penetration & characteristics; Building a successful social media marketingstrategy

Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook MarketingTools

Linkedin Marketing: Introduction and Importance of Linkedin Marketing,Framing Linkedin Strategy, Lead Generation throughLinkedin, Content Strategy, Analytics and Targeting

UNIT-IV:

Twitter Marketing: Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter AdvertisingCampaigns

Instagram and Snapchat: Digital Marketing Strategies through Instagram andSnapchat

Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, MobileAdvertising Analytics

UNIT-V:

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising Introduction and need for SEO, How to use internet &search engines; search engine and its working pattern,On-page and off-page optimization, SEO Tactics, Introduction to SEM

Web Analytics: Google Analytics & Google AdWords; data collection for web analytics, multichannel attribution, Universalanalytics, Tracking code, **Trends in digital advertising.**

TEXT BOOKS:

1. Seema Gupta, Digital Marketing, Mc-Graw Hill, 1st Edition- 2017
2. Ian Dodson, The Art of Digital Marketing, Wiley Latest Edition
3. Puneet Singh Bhatia, Fundamentals of Digital Marketing, Pearson, 1st Edition – 2017

REFERENCE BOOKS:

1. Vandana Ahuja, Digital Marketing, Oxford University Press, Latest Edition
2. Philip Kotler, Marketing 4.0: – Moving from Traditional to Digital, Wiley 2017
3. Melissa S. Barker |Donald I. Barker | Nicholas F. Bormann | Debra Zahay | Mary Lou Roberts, Social Media Marketing: AStrategic Approach, Cengage Latest Edition
4. Ward Hanson , Kirthi Kalyanam, Internet Marketing & e-Commerce Cengage Latest Edition

WEB REFERENCES:

1 https://learndigital.withgoogle.com/digitalunlocked/
2 https://digitalskills.fb.com/en-in/
3 https://www.hubspot.com/digital-marketing
4 http://www.afaqs.com/
5 https://www.linkedin.com/learning/

O E- III	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC3OE12	**AUGMENTED REALITY**						

COURSE OBJECTIVE:

- This course is designed to give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Describe how VR systems work and list the applications of VR.
CO2: Understand the design and implementation of the hardware that enables VR systems tobe built.
CO3: Understand the system of human vision and its implication on perception and rendering.
CO4: Explain the concepts of motion and tracking in VR systems.
CO5: Describe the importance of interaction and audio in VR systems.

SYLLABUS:

UNIT - I

Introduction to Virtual Reality:

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

UNIT - II

Representing the Virtual World:

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR

UNIT - III

The Geometry of Virtual Worlds &The Physiology of Human Vision:

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.

UNIT - IV

Visual Perception & Rendering:

Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates

UNIT – V

Motion & Tracking:

Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Tracking- Tracking 2D & 3D

Orientation, Tracking Position and Orientation, Tracking Attached Bodies
Interaction & Audio: Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering.

TEXT BOOKS:

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016 2.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002 3.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.

REFERENCE BOOKS:

1. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005. 2. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
3. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005.
4. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.

WEB REFERENCES

1. http://lavalle.pl/vr/book.html

MOOC COURSES:

2. https://nptel.ac.in/courses/106/106/106106138/
3. https://www.coursera.org/learn/introduction-virtual-reality

O E- IV	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC4OE11	**ETHICAL HACKING**						

COURSE OBJECTIVES:

- To develop ability to quantitatively assess and measure threats to information assets
- Evaluate where information networks are most vulnerable and perform penetration tests into secure networks for evaluation purposes
- Critique security plans designed at protecting data assets against attacks from the Internet and investigate and mitigate data risk

COURSE OUTCOMES:

After completion of this course, the students would be able to:
CO1: Classify the elements of information security and its challenges and role of security and penetration testing [K2]
CO2: Analyze different attacks and hacking methods [K4]
CO3: Exemplify different techniques in hacking [K2]
CO4: Apply Ethical hacking techniques and Ethical Hacking Laws [K3]

SYLLABUS:

UNIT - I:

ETHICAL HACKINFG: Types of Data Stolen, Elements of Information security, Authenticity and Non-Repudiation, Security Challenges, Effects of Hacking, Types of Hackers, Ethical Hacker, Hacktivism - Role of Security and Penetration Tester, Penetration Testing Methodology, Networking & Computer Attacks – Malicious Software (Malware), Protection Against Malware, Intruder Attacks on Networks and Computers, Addressing Physical Security – Key Loggers and Back Doors.

UNIT - II:

FOOT PRINTING AND SOCIAL ENGINEERING: Web Tools for Foot

Printing, Conducting Competitive Intelligence, Google Hacking, Scanning, Enumeration, Trojans & Backdoors, Virus & Worms, Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering – shoulder surfing, Dumpster Diving, Piggybacking.

UNIT - III:

DATA SECURITY & FIREWALLS: Physical Security – Attacks and Protection, A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks, Attacks and Measures, Wireless Hacking, Windows Hacking, Linux Hacking

UNIT - IV:

NETWORK PROTECTION SYSTEM & HACKING WEB SERVERS:

Routers, Firewall & Honeypots, IDS & IPS, Web Filtering, Vulnerability, Penetration Testing, Session Hijacking, Web Server, SQL Injection, Cross Site Scripting, Exploit Writing, Buffer Overflow, Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobiles Phone Hacking.

UNIT - V:

ETHICAL HACKING LAWS AND TESTS : An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance, Session Hijacking, Hacking - Web Server, Database, Password Cracking, Network and Wireless, Trojan, Backdoor, UNIX, LINUX, Microsoft, NOVEL Server, Buffer Overflow, Denial of Service Attack, Methodical Penetration Testing.

TEXT BOOKS:

1. Michael T. Simpson, Kent Backman, James E. “Corley, Hands-On Ethical Hacking and Network Defense”, Second Edition, CENGAGE Learning, 2010.
2. Kenneth C.Brancik, “Insider Computer Fraud”, Auerbach Publications Taylor & Francis, Group 2008.
3. Ankit Fadia, “Ethical Hacking”, Second Edition Macmillan India Ltd, 2006.

REFERENCE BOOKS:

1. Steven DeFino, Barry Kaufman, Nick Valenteen, “Official Certified Ethical Hacker Review Guide”, CENGAGE Learning, 2009-11-01.
2. Patrick Engebretson, “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy”, Syngress Basics Series –Elsevier, August 4, 2011.Whitaker & Newman, “Penetration Testing and Network Defence”, Cisco Press, Indianapolis, IN, 2006.

O E- IV	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC4OE12	**E-COMMERCE**						

COURSE OBJECTIVE:

- To introduce the fundamental principles of e-business, e-commerce, and the role of management.
- To introduce the application of tools and services to the development of small-scale e-commerce applications

COURSE OUTCOMES:

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

CO 1: Interpret the E-commerce applications and Process Model. [K2]
CO 2: Compare and contrast various electronic Payment Systems. [K3]
CO 3: Interpret the Intra Organizational Commerce. [K2]
CO 4: Outline the corporate digital library and marketing research. [K2]
CO 5: Analyze resource discovery and information filtering. [K4]

SYLLABUS:

UNIT – I

Electronic Commerce-Framework, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT – II

Consumer Oriented Electronic commerce - Mercantile Process models.
Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT – III

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT – IV

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.
Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT – V

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering. Digital Video and electronic Commerce

TEXT BOOKS :

1. Kalakata, Whinston, “Frontiers of electronic commerce”, Pearson.

REFERENCE BOOKS :

1. Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley, "E-Commerce fundamentals and applications"
2. S.Jaiswal – Galgotia, "E-Commerce".
3. Efrain Turbon, Jae Lee, David King, H.Michael Chang, "E-Commerce".
4. Gary P.Schneider, "Electronic Commerce", Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

WEB REFERENCES:

1.https://www.slideshare.net/kamalgulati7/full-notes-on-ecommerce-study-material-for-ecommerce
2.http://www.vssut.ac.in/lecture_notes/lecture1428551057.pdf
3.https://www.geektonight.com/e-commerce-notes/