SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN :: BHIMAVARAM

(Autonomous)

IV B.TECH- IT (R22- SYLLABUS)

BIOMETRICS
(ProfessionalElective-III)

SubjectCode:UGIT7T0122	L	T	P	C
IVYear/ISemester	3	0	0	3

Prerequisites:

1. KnowledgeonBiometricauthenticationprocess
2. Awarenessondifferentbiometricdevices
3. DataCommunicationandComputerNetworks,CryptographyandNetwork Security

CourseObjectives:

1. ToexplainBiometricMatching,AccuracyandFingerScan Technology.
2. TointroduceFacialScan,IrisScan,VoiceScanandotherBiometric Technologies.
3. ToexplainBiometricSolutionMatrixandvariousBiometricStandards.
4. ToexplaintheuseofBiometricsinNetwork Security.

SYLLABUS:

UNIT I: (6Hrs)

Introduction − Why Biometrics? - Benefits of biometrics versus Traditional Authentication methods, Benefits of biometrics in identification Systems

Key Biometric Terms and Processes - Definitions, Verification andidentification, Logical versus Physical Access, how biometric matching works, **Accuracy inbiometric systems**– False match rate, False non-match rate, Failure to enroll rate, Derived metrics. **[T1]**

UNIT II: (8Hrs)

Finger scan – Components, how finger scan technology works, competing finger Scan technologies, Finger scan Deployments, Finger scan Strengths, Finger scan weaknesses. **[T1]**

Facial Scan – Components, how facial scan technology works, competing facial Scan technologies, Facial scan Deployments, Facial scan Strengths, Facial scan weaknesses. **[T1]**

UNITIII: (8Hrs)

Iris Scan - Components, how it works, Deployments, Iris scan Strengths, Iris scan weaknesses. **[T1]**

Voice Scan - Components, how it works, Deployments, Voice scan Strengths,Voice scan weaknesses. **[T1]**

Otherphysiological biometrics –HandScan,RetinaScan,AutomaticFingerprint Identification Systems (AFIS)

UNIT IV: 10 Hrs)

OtherLeadingBehavioralBiometrics–Signaturescan,keystrokescan.**[T1]**

Categorizing Biometrics Applications – Defining the Seven Biometric Applications, Introduction to IBG's Biometric Solution Matrix

Assessing the Privacy Risks of Biometrics – Bio Privacy Technology Risk Ratings

Biometricstandards–WhyStandards?ApplicationProgrammingInterfaces.
[T1]

UNIT V: (12Hrs)

Recommended Biometric for Network Security – Finger Biometrics, Face Biometrics, Voice Biometrics, Iris Biometrics, the Choice of a Biometric for Network Access

An Introduction to Statistical Measures of Biometrics – FAR, FRR, FTE, EER, and What Measure is Most Important?

The Biometric Transaction – Securing and Trusting a Biometric Transaction, Trusted Biometric Devices, and non-trusted biometric devices, Matching Location. **[T2]**

CourseOutcomes:

Uponthecompletionofthecourse,thestudentswillbeableto:

- **CO1:** Identifyvariousbiometrictechniquesandstandards.**[L3]**
- **CO 2:** categorizesbiometricapplicationsandtechnologiestorealtime
  Problems. **[L4]**
- **CO3:** Describevariousbiometricmechanisms.**[L2]**
- **CO4:** DeterminesecuritymechanismsinBiometrics.**[L5]**

MappingofCOstoPOs:

COs/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	3	-

TEXTBOOKS:

1. "Biometrics–IdentityVerificationinaNetworkedWorld",Samir

   Nanavati, Michael Thieme, Raj Nanavati, A Wiley Tech Brief.

2. "BiometricsforNetworkSecurity"PaulReid,PearsonEducation.

REFERENCEBOOKS:

1. "Biometrics-TheUltimateReference",JohnD.Woodward,Jr.WileyDreamtech
2. Woodward,J.D.andOrlans,NicholosM.,Biometrics,McGraw Hill
3. "ImplementingBiometricSecurity",JohnChirillo,ScottBlaul, Wiley

ONLINECOURSES/REFERENCES:

1. "Biometrics-Anintroductory course about understanding the different types and uses of biometrics" Created by Art of Service – Udemy course

2. "Biometrics"-offeredbyIITKanpur –NPTELCourse

3. "UsableSecurity"offeredbyUniversityofMaryLand–Courseracourse

4. https://blog.mantratec.com/category/biometric-technology

5. https://www.bayometric.com/biometric-blog/

6. https://www.aware.com/blog/

IMAGEPROCESSING
(PROFESSIONALELECTIVE–III)

SubjectCode:UGCS7T0322   **L   T   P   C**
IVYear/ISemester   **3   0   0   3**

Prerequisites: BasicknowledgeinMathematicsandComputerGraphics.

Course Objectives: The course objective is to provide introduction to basic concepts and methodologies to digital image processing, and to develop a foundation that can be usedas the basis for further study andresearch in this field.

Syllabus:

UNITI:INTRODUCTION   (8hrs)

Introduction to Digital Image Processing, Fundamental steps in image processing systems, Image acquisition, Sampling and quantization, Basic relationship between pixels, Mathematical tools used inimage processing, Cameramodelof Image, Need for image transform and spatial frequencies in image processing, 2-D DFT, DCT, DST transforms.

UNITII:IMAGEENHANCEMENT   (8hrs)

Some basicintensitytransformation functions,Histogram processing,Fundamentals of spatial filtering –smoothing spatial filters and sharpening spatial filters,Combining spatial enhancement methods, Transformation and spatial filtering, Image smoothing using frequency domain filters Selective filtering and implementation.

UNITIII: (12hrs)
IMAGERESTORATION&RE-CONSTRUCTION:

Image degradation/restoration model, Noise models, Restoration in the presence of noise, linear Position invariant degradation, Estimation of degradation function and inverse filtering, Wiener filtering, Constrain least square filtering.

COLORIMAGEPROCESSING:

Color fundamentals, Color models, Pseudo color Image Processing, Basics of full color image processing, Color transformations, Smoothing and sharpening.

UNIT IV: IMAGE COMPRESSION AND WATERMARKING   (8hrs)

Lossless Compression: Variable length coding, Dictionary-based coding, LZW compression, Lossy Compression, Image Compression standards, JPEG, JPEG 2000, Digital Water Marking, Frequency Domain Water Marking, Security Attacks.

UNIT V: SEGMENTATION & MORPHOLOGICAL PROCESSING   (7hrs)

Erosion and Dilation, Opening and closing, Hit or miss transformation, some basic Morphological algorithms, Gray-Scale Morphology, Point, line and edge detection, Thresholding, Region oriented segmentation, Segmentation using morphological watersheds, Use of motion in segmentation.

Course Outcomes:

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

CO1: Understand the fundamentals steps in image processing.

CO2: Analyze different filters and transformations for the enhancement of an image.

CO3: Apply image processing techniques for restoration, reconstruction and compression of images.

CO4: Compare various color models to perform color image processing.

CO 5: Understand the concepts of segmentation and distinguish basic morphological algorithms.

Mapping of COs to POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	2	-	2	-	-	-	-	-	-	-	3	-
CO3	3	-	2	2	2	-	-	-	2	2	-	2	3	-
CO4	2	2	-	-	3	-	-	-	2	2	-	2	3	-
CO5	2	2	2	-	2	-	-	-	-	-	-	-	3	-

TEXTBOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 2011, Pearson Education.
2. Anil K jain, Fundementals of Digital Image Processing, 2012, Prentice Hall of India.

REFERENCE BOOKS:

1. S. Jayaraman, S, Esakkirajan, T. Veerakumar, Digital Image Processing, 2009, McGraw Hill Publisher.
2. B. Canda and D Dutta Mjumder, Digital Image Processing and analysis, 2011/12, Prentice Hall of india.

INFORMATIONSECURITYINCIDENCERESPONSE&MANAGEMENT

(ProfessionalElective-III)

	L	T	P	C
SubjectCode:UGIT7T0222				
IVYear/ISemester	3	0	0	3

Prerequisites:
FamiliaritywithComputerNetworks.

CourseObjectives:
The Students learn different types of threats and attacks, data leakage, prevent them by applying policies, roles and responsibilities of information security, in addition to that security audits, mechanisms for auditing, generating of auditreports and post audit actions to be taken, and social engineering.

SYLLABUS:

UNIT I: (8hrs)
Information Security Management: Information Security Overview, Threatsand Attack Vectors, Types of Attacks, Common Vulnerabilities andExposures (CVE), Security Attacks, Computer Security Concerns, Information Security Measures etc., Key Elements of Networks, Logical Elements of Network, Critical Information Characteristics, Information States. [T1]

UNIT II: (9hrs)
Data Leakage, Information Security Policies, Procedures and Audits: What is Data Leakage and statistics, Data Leakage Threats, Reducing the Risk of Data Loss, Key Performance Indicators (KPI), and Database Security.[T2] Information Security Policies necessity key elements & characteristics, Security Policy Implementation, Configuration. Security Standards-Guidelines & Frameworks. Security Roles & Responsibilities, Accountability,

UNITIII: (10hrs)
Information Security Roles, Performance Metrics and Audit: Roles and Responsibilities of Information Security Management, team-responding to emergency situation-risk analysis process. [T2] Security Metrics and Reporting, Common Issues and Variances of Performance Metrics.

Introduction to Security Audit, Servers and Storage devices, Infrastructure and Networks, Communication Routes, Information Security Methodologies (Black-box, White-box, Grey-box), Phases of Information Security Audit and Strategies. [T2]

UNIT IV: (8hrs)

Information Security Audit Tasks, Reports and Post Auditing Actions: Pre-audit checklist, Information Gathering, Vulnerability Analysis, External Security Audit, Internal Network Security Audit, Firewall Security Audit, IDS Security Auditing, Social Engineering Security Auditing, Web Application Security Auditing, Information Security Audit Deliverables & Writing Report, Post Auditing Actions, Report Retention. [T2]

UNIT V: (10hrs)

Vulnerability Management: Information Security Vulnerabilities – Threats and Vulnerabilities, Human-based Social Engineering, Computer-based Social Engineering, Social Media Countermeasures, Vulnerability Management – Vulnerability Scanning, Testing, Threat management, Remediation etc. [T2]

CourseOutcomes:

Uponthecompletionofthecourse,thestudentswillbeableto:
  CO1: Identifyandanalyzethetypesofthreatsandvulnerabilities,security policies and data leak. [L2]
  CO2: Critically evaluate security audits methodologies and post audit actions tobe taken. [L5]
  CO3: Analyzeandidentifytheththreatsandvulnerabilitiesofthesystemat network and web application levels. [L3]
  CO4: Classifyprotectionmechanismsfordifferenttypesofsocialengineering. [L2]
  CO5: Makeuseofvulnerabilitymanagementtoprotectthewebsitefromattacks. [L3]

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3		-	-	-	-	-	-	-	-		-
CO3	-	-	-	3	-	-	-	-	-	-	-	-		-
CO4	-	-	-	3	-	-	-	-	-	-	-	-		-
CO5	-	-	-	3	-	-	-	-	-	-	-	-		-

TEXTBOOKS:

1. ManagementofInformationSecuritybyMichaelE.WhitmanandHerbertJ.Mattord
2. Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K.Gavrilenko, and A.Michajlowski
3. "TheArtofComputerVirusResearchandDefense"byPeter Szor.

REFERENCES:

1. http://www.iso.org/iso/home/standards/management-standards/iso27001.htm
2. http://csrc.nist.gov/publications/nistpubs/800-55-Rev1/SP800-55-rev1.pdf
3. https://www.sans.org/reading-room/whitepapers/threats/implementing-vulnerability-management-process-34180
4. http://csrc.nist.gov/publications/nistpubs/800-40-Ver2/SP800-40v2.pdf

ONLINECOURSESANDREFERENCES:

1. CybersecurityRoles,Processes&OperatingSystemSecurity(OfferedbyIBM)
2. IntroductiontoCybersecurityTools&CyberAttacks(OfferedbyIBM)

NETWORKPROTOCOLS
(ProfessionalElective-III)

SubjectCode:UGIT7T0322	L	T	P	C
IVYear/ISemester	3	0	0	3

Prerequisites:

1. DataCommunications.
2. ComputerNetworks.

CourseObjective:

Thestudentwillknow,

1. TheimportanceofTCP/IPprotocolsuite.
2. Howtheprotocolsrelatetoone another?
3. Thefunctionalityofeachprotocol,syntax,andsemanticsofvariousPDUs.

SYLLABUS:

UNIT I: **(8Hrs)**
Internetworking Concept and Architectural Model: Introduction, Application-Level Interconnection, Network-Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers.**[T1]**
Classful Internet Addresses: Introduction, Universal Identifiers, The Original Classful Addressing Scheme, Addresses Specify Network Connections, Network and Directed Broadcast Addresses, Limited Broadcast, Subnet and Supernet Extensions, IP Multicast Addresses, Loopback Address, IPV4 packet format.**[T2]**

UNIT II: **(8Hrs)**
IPV6 addressing scheme: Introduction, Address Space Allocation, Global Unicast Addresses, IPV6 packet format, Comparison between IPv4 and IPv6 Headers. **[T2]**

UNITIII: **(6Hrs)**
Address Mapping-Static Mapping, Dynamic Mapping, The ARP Protocol-Packet Format, Encapsulation, Operation, RARP, DHCP-operation, packet format, BOOTP. **[T1 &T2]**

IP protocol error handling: The Internet Control Message Protocol- Error Reporting vs. Error Correction, ICMP Message Format. **[T2]**

UNIT IV: **(8Hrs)**
Transport layer protocols: TCP-services, protocols-stop & wait, Go back-N, Selective repeat, TCP format. UDP- Introduction, services, format, applications.**[T2]**

UNIT V: **(12Hrs)**
Application Layer protocols: DNS-need, name space, DNS in Internet, Resolution, Telnet, R-Login, HTTP protocol. **[T2]**
Client-Server Paradigm-Socket Interfaces, Communication Using UDP, Communication Using TCP, Predefined Client-Server Applications, Peer-To-Peer Paradigm. **[T2]**

CourseOutcomes:

Uponthecompletionofthecourse,thestudentswillbeableto:

CO1: Apply various layered techniques for designing sub-nets and super-nets and observe packet flow on basis of routing protocols. [L3]
CO2: Analyzetheservicesandfeaturesofvariousprotocollayersindata networks. [L4]
CO3: Evaluatedatacommunicationlinkconsideringelementaryconceptsof layered protocols. [L5]
CO4: Distinguish Various underlying protocols and its Applications in Applicationlayer. [L4]

MappingofCOstoPOs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2		3												
CO3				3										
CO4		3												

TEXTBOOKS:

1. InternetworkingwithTCP/IPVol-1,Principles,Protocols,andArchitecture,Douglas e. Comer, Prentice Hall
2. TCP/IPProtocolSuite:byBehrouzA.Forouzan,McGrawHill,4^{th}edition

REFERENCES:

1. Computer Networking: A Top-Down Approach, 6th edition, by James F. Kurose and Keith W. Ross.
2. TCP/IPIllustrated,Vol.1:TheProtocols,by W.RichardStevens.

ONLINECOURSESANDREFERENCES:

1. Introduction to TCP/IP: Coursera link:
   https://www.coursera.org/learn/tcpip#syllabus

BLOCKCHAINTECHNOLOGIES
(ProfessionalElective-IV)

SubjectCode:UGIT7T0422　　　　　　　　　　　**L　T　P　C**
IVYear/ISemester　　　　　　　　　　　　　　　**3　0　0　3**

Prerequisite:
Theprerequisitestolearnaboutblockchaintechnologyareimportanttoidentify whether you are ready for blockchain concepts.

Courseobjective:
TounderstandblockchaintechnologyandCryptocurrencyworks

SYLLABUS

UNIT I: Introduction to the blockchain, basic ideas behind blockchain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required, Blockchain or distributed trust, Currency, Cryptocurrency, how Cryptocurrency works, financial services, and Bitcoin prediction markets.

UNIT II: Hashing, public key cryptosystems, private vs. public blockchain and use cases, Hash Puzzles, Extensibility of Blockchain concepts, Digital Identity verification, Blockchain Neutrality, Digital art, Blockchain Environment

UNIT III: Introduction to Bitcoin, Bitcoin Blockchain and scripts, Use cases of Bitcoin Blockchain, scripting language in micropayment, escrow etc Downside of Bitcoin mining,

Introduction to Blockchain Science, Grid coin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

UNIT IV: Ethereum continued, IOTA, the real need for mining, consensus, Byzantine Generals Problem, and Consensus as a distributed coordination problem, Comingtoprivateorpermissionedblockchains,IntroductiontoHyperledger, Currency,Token,Campuscoin,CoindropasastrategyforPublic
adoption, Currency Multiplicity, Demurrage currency

UNIT V: Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations, Uses of Blockchain in E-Governance, Land Registration, Medical Information Systems.

CourseOutcomes:

Afterthecompletionofthecourse,studentswillbeableto
CO1: Demonstratetheblockchainbasics,Cryptocurrency
CO2: To compare and contrast the use of different private vs. public blockchainsand use cases
CO3: DesignaninnovativeBitcoinBlockchainandscripts,blockchainScienceon various coins
CO4: ClassifyPermissionBlockchainandusecases –Hyperledger,Corda
CO5: MakeUseofBlock-chaininE-Governance,LandRegistration,MedicalInformation Systems and others

MappingofCOstoPOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	-	3	3	-	-	-	-	-	-	3	-
CO2	3	3	3	-	3	3	-	-	-	-	-	-	3	-
CO3	3	3	3	-	3	3	-	-	-	-	-	-	3	-
CO4	3	3	3	-	3	3	-	-	-	-	-	-	3	-
CO5	3	3	3		3	3	-	-	-	-	-	-	3	-

TextBook:
1. BlockchainBlueprintforEconomybyMelanieSwan

ReferenceBooks:
1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2. Antonopoulos,MasteringBitcoin:UnlockingDigitalCryptocurrencies
3. SatoshiNakamoto,Bitcoin:APeer-to-PeerElectronicCashSystem
4. DR.GavinWood,"ETHEREUM:ASecureDecentralizedTransactionLedger," Yellow paper 2014.
5. NicolaAtzei,MassimoBartoletti,andTizianaCimoli,Asurveyofattackson Ethereum smart contracts
6. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, byDaniel Drescher

HUMANCOMPUTERINTERACTION
(ProfessionalElective-IV)

SubjectCode:UGCS7T0722   **L   T   P   C**
IVYear/ISemester   **3   0   0   3**

Prerequisites: Basicconcepts of system analysisand design and exposureto various user interface designs related to web and mobile.

CourseObjectives:
Uponsuccessfulcompletionofthiscourse,studentsshouldbeableto:
- Designclear,easy-to-understandanduseinterfacesandscreensforgraphical and Web systems.
- Describeandapplycoretheories,modelsandmethodologiesfromthefieldof HCI.

Syllabus:

UNITI: **(10hrs)**
The User Interface – An Introduction and Overview: Importance of User Interface, Defining the User Interface, importance of Good Design, Benefits of Good Design, A brief history of the Human-Computer Interface**.**
Characteristics of Graphical and Web User Interfaces: The Graphical User Interface, popularity of Graphics, the concept of direct manipulation, Graphical systems: Advantages and Disadvantages, Characteristics of the Graphical User Interface, The Web User Interface, The Popularity of the Web, Characteristics of a Web Interface, Principles of user interface Design.

UNITII: **(8hrs)**
The User Interface Design process: Obstacles and Pitfalls in the Development Path, Usability, The Design Team, Understanding How People Interact with Computers, Important Human Characteristics in Design, Human Considerations in Design, Human Interaction Speeds.
Understand the Business Function: Business Definition and Requirements Analysis, Determining Basic Business Functions, Design Standards or Style Guides, System Training and Documentation Needs.

UNITIII: **(12hrs)**
Develop System Menus and Navigation Schemes: Structures of Menus, Functions of Menus, Content of Menus, Formatting of Menus, Phrasing the Menu, Selecting Menu Choices, Navigating Menus, Kinds of Graphical Menus.

Select the Proper Kinds of Windows: Window Characteristics, Components of a Window, Window Presentation Styles, Types of Windows, Window Management, Organizing Window Functions, Window Operations, Web Systems.

UNIT IV: **(9hrs)**

Select the Proper Device-Based Controls: Characteristics of Device-Based Controls, Selecting the Proper Device-Based Controls.

Choose the Proper Screen-Based Controls: Operable Controls, Text Entry/Read-Only Controls, Selection Controls,Combination Entry/Selection Controls, Other Operable Controls, Custom Controls, Presentation Controls, Selecting the Proper Controls.

UNIT V: **(9hrs)**

Components: Words,Sentences,MessagesandText,TextforWebPages.

CreateMeaningfulGraphics,IconsandImages: Icons,Multimedia.

Choose the Proper Colors: Color, Color Uses, Possible Problems with Color,Color and Human Vision, Choosing Colors, Choosing Colors for Textual Graphic Screens, Choosing Colors for Statistical Graphics Screens, Choosing Colors for Web Pages, Colors to Avoid.

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbeableto:

CO1: Interpretthebasicprinciplesofuserinterface&GUIdesign concepts.

CO2: Applyinteractivedesignprinciplesinreal-timeapplicationdevelopment with client and system requirements.

CO3: Classifyvariousinterfacedesigncomponentsbyusingmodern tools.

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	3	3	-	-	3	3	3	-	-	-
CO3	3	-	3	-	3	3	-	-	-	-	-	-	-	-

TEXTBOOKS:

1. WilbertOGalitz,"TheEssentialGuideToUserInterfaceDesign",Wiley DreamaTech.
2. BenShneidermann,"DesigningTheUserInterface",3rdEdition,Pearson Education Asia.

REFERENCEBOOKS:

1. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, "Human Computer Interaction", Pearson.
2. Prece,Rogers,Sharps,"InteractionDesign",WileyDreamtech.
3. SorenLauesen,"UserInterfaceDesign",PearsonEducation.

SECURESOFTWAREENGINEERING
(ProfessionalElective-IV)

SubjectCode:UGIT7T0522

IVYear/ISemester

L	T	P	C
3	0	0	3

Prerequisites:
ConceptsrelatedtoSoftwareEngineering,ObjectOrientedDevelopment.

CourseObjectives:
1. Thiscoursehighlightstheproblemsfacedbytheprojectteamintheindustry
2. Ithelpsthepeopleinvolvedintheprojecttoplanscheduleandmanagethe project
3. Itgivessuccessfulandimprovementsforeffectiveandefficientprojects.

SYLLABUS:

UNIT I: (8Hrs)

INTRODUCTION: Problem, Process, and Product, Problems of software practitioners, approach through software reliability engineering, experience with SRE, SRE process, defining the product, Testing acquired software, reliability concepts, software and hardware reliability. Implementing Operational Profiles, Developing, identifying, crating, reviewing the operation, concurrence rate, occurrence probabilities, applying operation profiles

UNIT II: (8Hrs)

RELIABILITY: Engineering "Just Right" Reliability - Defining "failure" for the product, choosing a common measure for all associated systems. Setting system failure intensity objectives, determining user needs for reliability and availability. Overall reliability and availability objectives, common failure intensity objective. Engineering software reliability strategies. Preparing for Test, Preparing test cases.

UNITIII: (10Hrs)

TEST STRATEGY: Executing Test, Planning and allocating test time for the current release. Invoking test identifying failures, Analyzing test output for deviations. Determining which deviations are failures, establishing when failures occurred.
GUIDE TO RELIABILITY ENGINEERING: Guiding Test, Tracking reliability growth, Estimating failure intensity. Using failure intensity patterns to guide test, Certifying reliability.

UNIT IV: (8Hrs)

SECURITYWITHUML: UsingUMLforSecurity,UMLdiagramsforsecurity
requirement,securitybusinessprocessphysicalsecurity,securitycriticalinteraction,

security state. Analyzing Model, Notation, formal semantics security analysis, important security opportunities. Model based security engineering with UML.

UNIT V: (7Hrs)

APPLICATIONS: Secure channel, Developing Secure Java program, more case studies. Tool support for UML, Extending UML CASE TOOLS with analysis tools, automated tools for UML. Formal Foundations, UML machines Rely guarantee specifications, reasoning about security properties.

CourseOutcomes:

Aftercompletionofthecoursethestudentswill

CO1: Understandthecontentsofasoftwarerequirementsdocument.[L1]

CO2: Identify thedifference between software, hardware reliability and different test plan to manage S/W failures. [L3]

CO3: Analyzehowsecurityassurancecanbeincorporatedintothesoftware development life cycle with UML. [L4]

CO4: DevelopdifferentapplicationswithCASETools.[L6]

MappingofCOstoPO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-

TEXTBOOKS:

1. John Musa D, "Software Reliability Engineering", 2nd Edition, Tata McGraw-Hill, 2005   (Units I, II, III)
2. Jan Jurjens, "Secure Systems Development with UML", Springer; 2004 (Unit IV and V)

SEMANTICWEBANDSOCIALNETWORKS
(ProfessionalElective-IV)

SubjectCode:UGIT7T0622　　　　　　　　　　　　　**L　T　P　C**
IVYear/I Semester　　　　　　　　　　　　　　　　**3　0　0　3**

Prerequisites: Familiaritywiththeconceptsofdatabasesandweb.

CourseObjectives:

The objective of this course is to provide insights to students about the context based semantic integration of multiple web resources and expose semantically enriched social data to the public domain. This course also focuses on various concepts such as knowledge representation, management, extraction; aggregating information across heterogeneous sources and analysis related o semantic web and social networks.

Syllabus:

UNIT I:　　　　　　　　　　　　　　　　　　　　　　**(9hrs)**
Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Web Architecture and Business Logic, The Semantic Web, Berners-Lee, Competing Web Standards, Semantic Web Road Map, Semantic Web Services, Logic on the semantic Web, Semantic Web Capabilities and Limitations.

UNIT II:　　　　　　　　　　　　　　　　　　　　　**(7hrs)**
Knowledge Representation on the Semantic Web: Ontologies and their rolein the semantic web, Ontology Languages for the Semantic Web – Resource Description Framework(RDF), Ontology Web Language(OWL).

UNITIII:　　　　　　　　　　　　　　　　　　　　　**(10hrs)**
Ontology Engineering: Ontology Engineering, Constructing Ontologies, Ontology Example, Ontology Methods, Ontology Libraries, Ontology Matching, Ontology Mapping, Ontology Mapping Tools, Logic and Inference, Monotonic and Nonmonotonic Rules, Descriptive Logic, Inference Engines.
Semantic Web Applications: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bio-informatics

UNIT IV:　　　　　　　　　　　　　　　　　　　　　**(10hrs)**
Services and Technology:, XML Based Web Services, Next Generation Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

Social Network Analysis: What is network analysis? Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis, Blogs and online communities, Web-based networks.

UNIT V: **(8hrs)**
Developing Social Semantic Applications: Building Semantic Web applications withsocialnetworkfeatures,Flink-thesocialnetworksoftheSemanticWeb community, Open academia: distributed, semantic-based publication management. **Course Outcomes:**

Uponcompletionofthiscourse,thestudentswillbeableto:

CO1: InterprettheneedoftransformationofWWWandbasicconceptsof semantic web technology.
CO2: Buildknowledgebaseforsemanticwebusing ontologyengineering.
CO3: Developsemanticwebapplicationsbyusingsemantictechnologyand services for various domains.
CO4: Illustratesocialnetworkanalysisanddevelopsocialsemanticapplications.

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	3

TEXTBOOKS:
1. BernersLee,Godel,andTuring,"ThinkingontheWeb", Wiley.
2. PeterMika,SocialNetworksandtheSemanticWeb,Springer.

REFERENCEBOOKS:
1. J.Davies, RudiStuder, and Paul Warren, Semantic Web Technologies,Trends and Research in Ontology Based Systems, John Wiley & Sons.
2. LiyangLuChapmanandHall,SemanticWebandSemanticWebServices, CRC Publishers. (Taylor & Francis Group)
3. HeinerStuckenschmidtandFrankVanHarmelen,InformationSharingon thesemantic Web, Springer Publications.

E-COMMERCEANDDIGITALMARKETING
(ProfessionalElective-V)

SubjectCode:UGIT7T0722	**L**	**T**	**P**	**C**
IIIYear/I Semester	**3**	**0**	**0**	**3**

Prerequisites:

1. Knowledgeontraditionalcommerceandbusinessprocesses
2. Basicsofinternetandonlinerelatedtransactions

CourseObjectives:

Thestudentswilllearnthefollowing:

1. Basic concepts of e-business and e-commerce, including presentation and discussion of the strategies and technologies involved
2. Concepts and challenges of e-business, including a balanced coverage of both the technical and the management (operational, tactical and strategic) aspects of successful e-business
3. Concepts of business strategies, and technologies involved in the design and deployment of business and Digital Marketing on the internet and WorldWide Web.

SYLLABUS:

UNIT I: (8hrs)
Electronic Commerce: Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications, Consumer Oriented Electronic commerce, Mercantile Process models

UNIT II: (9hrs)
Electronic Payment Systems: Smart Cards, Credit Cards, Risks in Electronic Payment systems.
Inter Organizational Commerce: EDI, EDI Implementation, Value added networks.

UNITIII: (10hrs)
Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

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

UNIT IV: **(8hrs)**
Introduction to Digital Marketing: Origin of Digital Marketing, traditional Vs Digital Marketing, internet users, Digital Marketing strategy, Digital marketing Advertisement in India

UNIT V: **(9hrs)**
Digital Marketing Strategies: Social media marketing, Facebook Marketing-Introduction, Anatomy of an ad campaign, adverts.Introduction and need for SEO - search engine and its working pattern, On-page and off-page optimization, SEO Tactics, SEO tools-Google page speed insights, Google analytics

CourseOutcomes:

Uponthesuccessfulcompletionofthecourse,thestudentwill:

CO1:comprehendtheincreasingsignificanceofE-Commerceanditsapplications in Business and Various Sectors

CO2: ToidentifyvariousPayment,Security,Privacy andLegalIssues.
CO3: TodevelopskillsofstudentsinrelationwithapplicationofITinE- Commerce.
CO4: Toexplorethestudentstothelatesttrendsinmarketing.
CO5: AnalyzetheconfluenceofDigitalmarketingandoperationsinreal-time delivery

MappingofCO'stoPO's:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		3				3	.						3	
CO2											3		3	
CO3			3		3								3	
CO4										3			3	
CO5					3								3	

Textbooks:

1. "Frontiersofelectroniccommerce",RaviKalakata,AndrewB.Whinston,Pearson education.
2. DigitalMarketing,SeemaGupta,McGrawHILL Education.

References:

1. E-CommercefundamentalsandapplicationsbyHendryChan,RaymondLee, Tharam Dillon, Ellizabeth Chang, - John Wiley.
2. E-CommercebyS.Jaiswal–Galgotia.
3. E-CommercebyEfrainTurbon,JaeLee,DavidKing,H.Michael Chang.
4. ElectronicCommercebyGaryP.Schneider–Thomson

INFORMATIONRETRIEVALSYSTEMS
(ProfessionalElective-V)

SubjectCode:UGIT7T0822   **L   T   P   C**

IVYear/ISemester   **3   0   0   3**

Prerequisites: BasicsofDatabaseManagementSystems,Datastructures.

CourseObjectives

TogiveknowledgeonInformationRetrievalSystemdatastructures, algorithmsfor effective information retrieval.

UNIT I: **(9hrs)**

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation.

Introduction to Data Structures and Algorithms related to information Retrieval: Basic Concepts, Data Structures, Algorithms.

UNIT II: **(8hrs)**

Inverted Files: Introduction, Structures used in Inverted Files, Building Inverted File using a sorted array, Modifications to Basic Techniques.

UNITIII: **(12hrs)**

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning

New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA trees, PAT representation as arrays.

UNIT IV: **(9hrs)**

Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files.

UNIT V: **(9hrs)**

Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction,ThesaurusconstructionfromTexts,MergingexistingThesauri**.**

CourseOutcomes

Aftercompletingthiscoursesatisfactorily,astudentwill:

CO1: Understand the importance of Information Retrieval System and its data structures

CO2: Familiarize the representation of Information retrieval system in various formats like inverted files and signature files.

CO3: UnderstandPATtrees andPATarraysfor representationofinformation

CO 4: Understand stemming algorithms to compress the data in text preprocessing

CO5: Analyzethethesaurusconstructionfromthegiventext

MappingofCOs&POs

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
C01	3	3	3	3	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3

TEXTBOOKS:

1. Frakes, W.B., Ricardo Baeza - Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. ModernInformationRetrievalbyYatesPearsonEducation.
3. InformationStorage&RetrievalbyRobertKorfhage -JohnWiley& Sons.

REFERENCEBOOKS:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. InformationRetrievalAlgorithmsandHeuristics,2ed,Springer.

NATURAL LANGUAGE PROCESSING
(Professional Elective-V)

Subject Code: UGIT7T0922   **L   T   P   C**

IV Year/I Semester   **3   0   0   3**

Prerequisites: Familiarity with machine learning.

Course Objectives: The main objective of the course is to learn how to develop practical computer systems capable of performing intelligent tasks on natural language analyze, understand and generate written text.

Syllabus:

UNIT I: (8hrs)

Introduction: Natural Language Processing Definition, Origins, applications, challenges, components of modern NLP – Regular Expressions, Words, Corpora, Tokenization, Text Normalization, Minimum Edit Distance. NLTK python library

Language Models: N-grams, Evaluating Language Models - Perplexity, Generalization and zeros, Smoothing – Laplace, Add-k, Interpolation and Backoff

UNIT II: (8hrs)

Naive Bayes: Naive Bayes Classifier - Training the NB Classifier - an example, Optimizing for Sentiment Analysis

Vector Semantics and Embeddings: Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Pointwise Mutual Information (PMI), Word2vec

UNIT III: (10hrs)

Neural Networks and Neural Language Models : Feedforward networks for NLP :classification, Feedforward Neural Language Modelling, Training the Neural Language the model.

Sequence Labelling for Parts of Speech and Named Entities : English word classes, Part-of-speech tagging, Named Entities and Named Entity Tagging.

UNIT IV: (8hrs)

DeepLearningArchitecturesforSequenceProcessing:LanguageModels,Recurrent Neural Networks, Managing Context in RNNs: LSTMs and GRUs

Machine Translation and Encoder-Decoder Models : The Encoder-Decoder Model, Encoder-Decoder with RNNsgrammars. Dialogues: Turns and utterances,grounding, dialogue acts and structures.

UNIT V: **(10hrs)**

Large Language Models and Applications: Introduction, The Impact of LLMson NLP, Applications of LLMs: Text Generation, Question Answering, Language Translation

GPT (Generative Pre-trained Transformer) Architecture: Overview of GPT Architecture, Pre-training and Fine-tuning

Introduction to Prompt Engineering: Role of Prompts in Controlling LLMs, Crafting Prompts for Specific Tasks, Guidelines for Prompt Design, Examples of Effective Prompts

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbe ableto:

CO1: Understand the theoretical foundations of natural language processing in linguistics and formal language theory.

CO2: Analyse NLP tasks like text pre-processing, part-of-speech tagging, syntax parsing and semantic role labelling using existing algorithms and frameworks.

CO3: Apply existing mathematical models and machine learning algorithms to build NLP applications.

CO4: Conduct experiments to implement building blocks of statistical NLP Summarize the mechanisms to generate natural language.

CO5: EvaluatelanguagemodelsdesignedtosolveNLP problems

MappingofCOstoPOs:

POs/ Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO5	-	-	3	3	-	-	-	-	-	-	-	-	-	3

TEXTBOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications
2. Prompt Engineering for Generative AI-James Phoenix, Mike Taylor, Orielly publications

REFERENCEBOOKS:

1. PracticalNaturalLanguageProcessing:A Comprehensive Guide toBuildingReal-World NLP Systems, Oreilly Publishers - by Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana
2. Natural Language Processing with Python: Analysing Text with the Natural Language Toolkit. Oreilly Publishers - Stevem Bord. Ewam Klein, Edward Loper

REAL-TIMESYSTEMS
(ProfessionalElective-V)

SubjectCode:UGIT7T1022 IV   **L**   **T**   **P**   **C**

Year / I Semester   **3**   **0**   **0**   **3**

Pre-Requisites:
Basicprogrammingskillsandoperatingsystems concepts

CourseObjectives:

Studentswilllearnthefollowing:

1. Real-timeschedulingandschedulabilityanalysis{a,b,c}
2. Formalspecificationandverificationoftimingconstraintsandproperties {a,b,c,d}
3. Designmethodsforreal-timesystems{a,b,c}
4. Developmentandimplementationofnewtechniquestoadvancethestate-of- the-art real-time systems research {c,d,e,f}

SYLLABUS:

UNIT I: **(9hrs)**

Introductiontoreal-timesystems: Historical background, RTS Definition, Classification of Real-time Systems, Time constraints, Classification of Programs.

Conceptsofcomputercontrol: Introduction, Sequence Control, Loop control, Supervisory control, Centralized computer control, Distributed system, Human-computer interface, Benefits of computer control systems.

UNIT II: **(8hrs)**

Computer hardware requirements for RTS: Introduction,General purpose computer, Single chip microcontroller,Specialized processors, Process-related Interfaces, Data transfer techniques,Communications, Standard Interface.

UNITIII: **(9hrs)**

Languages for real-time applications: Introduction,Syntax layout and readability, Declaration and Initialization of Variables and Constants, Modularity and Variables, Compilation, Data types, Control Structure.

Exception Handling, Low-level facilities, Co routines, Interrupts and Devicehandling, Concurrency, Real-time support, Overview of real-time languages.

UNIT IV: **(9hrs)**

Operating systems: Introduction, Real-time multi-tasking OS, Scheduling strategies, Priority Structures, Task management, Scheduler and real-time clock interrupt handles, Memory Management, Code sharing, Resource control, Task co-operation and communication, Mutual exclusion, Data transfer, Liveness, Minimum OS kernel, Examples.

UNIT V: **(9hrs)**

Design of RTOS – general introduction: Introduction, Specification documentation, Preliminary design, Single-program approach, Foreground/background, Multi-tasking approach, Mutual exclusion, Monitors. Development methodologies: Introduction, Yourdon Methodology, Requirement definition for Drying Oven, Ward and Mellor Method, Hately and Pirbhai Method.

CourseOutcomes:

Uponthecompletionofthecourse,thestudentswillbeableto:

- **CO1:**UnderstandtheworkingofrealtimeOperatingSystemswithrealtime database.
- **CO2:**Developnewrealtimedistributedapplications.
- **CO 3:**Design and development of applications related to real time communication.
- **CO4:**ImplementrealtimeembeddedsystemsusingtheconceptsofRTOS.

MappingofCOs&POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	2	-	3	-	3	-	-	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	-	-	-	-	-	-	-

TextBooks:

1. JaneW.Liu,"Real-TimeSystems"PearsonEducation,2001.

References:

1. RajibMall,"Real-TimeSystems:TheoryandPractice,"1stEdition,Pearson, 2008.
2. KrishnaandShin,"Real-TImeSystems,"TataMcGrawHill.1999.
3. AlanC.Shaw,Real-TimeSystemsandSoftware,Wiley,2001.
4. PhilipLaplante,Real-TImeSystemsDesignandAnalysis,2ndEdition, Prentice Hall of India, 2012.

AUGMENTEDREALITYANDVIRTUALREALITY
(JobOrientedElective-III)

SubjectCode:UGCS7T1322   **L   T   P   C**
IVYear/ISemester   **2   0   2   3**

Prerequisites: Thestudentsshouldhavebasicknowledgeonprogrammingand computer graphics.

CourseObjectives:
To introducethebasicconceptsof Augmented Realityand VirtualRealityandtogain knowledge on various devices required for interaction and applications.

Syllabus:

UNIT I: **(8Lectures)**
Introduction: Virtual Reality, Augmented Reality, Mixed Reality, Augmented Virtuality, ExtendedReality,History,VRFeatures,VRControllers,CurrentissueswithVR,AR Mobile devices, AR headsets, AR glasses, AR Controllers, Current issues with AR.

UNIT II: **(8Lectures)**
Consuming Content in VR : High-end devices, Mid-tier devices, Low-end devices, Near-Future Hardware.
Consuming Content in AR: Microsoft HoloLens, Meta 2, Magic Leap, Mira Prism,Apple ARKit, Google ARCore, Near-Future Hardware.

UNITIII: **(12Lectures)**
Creating Content in VR and AR: Evaluating Your Project, Planning Your Virtual Reality Project, Planning Your Augmented Reality Project, Assessing Design Software, Capturing Real Life, Assessing Development Software, Distributing Your Content.

Cross-Platform Theory: Role of Game Engines, Understanding 3D Graphics, The Virtual Camera, Degrees of Freedom, Portability Lessons from Video Game Design, Simplifying the Controller Input.

UNIT IV: **(8Lectures)**
Virtual Reality Toolkit: History of VRTK, SteamVR Unity Toolkit, VRTK v4,Future of VRTK, Success of VRTK, Getting Started with VRTK 4.
Best Practices: Handling Locomotion in VR & AR, Effective Use of Audio in VR & AR, Common Interactions Paradigms, Inventory for VR, Augmented Reality Raycasts.

UNIT V: **(8Lectures)**
Applications: Travel, Museums, Aerospace, Retail, Military, Education, Entertainment, Real Estate, Advertising and Marketing, Mobile Apps for Experiencing Augmented Reality, Future of Virtual Reality and Augmented Reality.

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbeableto:
CO1: GainknowledgeonAR&VRandvariouscomponentsinvolvedinmanifesting the same.
CO2: Plan content creation and identify necessary software required in implementing AR & VR.
CO3: Analyzetheportabilityissuesandunderstandthebestpractices.
CO 4: Understand how to implement various applications using AR and VR technologies.

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	3	-	3	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	3	-	-	-	-	-	-	-	3	-

TEXTBOOKS:
1. PaulMealy,Virtual&AugmentedRealityForDummies,JohnWiley&Sons,Inc
2. ErinPangilinan,SteveLukasandVasanthMohan,CreatingAugmentedandVirtual Realities, O'Reilly Media Inc.

REFERENCEBOOKS:
1. Kelly S. Hale, Kay M. Stanney, Handbook of Virtual Environments: Design, Implementation, and Applications, Second Edition, CRC Press.
2. GregoryC.Burdea&PhilippeCoiffet,John,VirtualRealityTechnology,Second Edition, Wiley & Sons, Inc.
3. WilliamR.Sherman,AlanCraig,UnderstandingVirtualReality,interface,Application and Design,Elsevier (Morgan Kaufmann).
4. JohnVince,VirtualRealitySystems,PearsonEducation.
5. AndrewDavison,KillerGameProgramminginJava,Oreilly-SPD.
6. AlanBCraig,WilliamRShermanandJeffreyDWill,"DevelopingVirtualReality Applications: Foundations of Effective Design", Morgan Kaufmann.
7. AlanB.Craig,UnderstandingAugmentedReality,ConceptsandApplications, Morgan Kaufmann
8. SteveAukstakalnis,"PracticalAugmentedReality:AGuidetotheTechnologies, Applications, and Human Factors for AR and VR", Addison Wesley.
9. BrettS.Martin,"VirtualReality",Norwood HousePress.
10. AnandR.,"AugmentedandVirtual Reality",KhannaPublishingHouse,Delhi
11. Adams,"VisualizationsofVirtualReality",TataMcGrawHill.

DEEP LEARNING
(JobOrientedElective-III)

SubjectCode:UGIT7T1122　　　　　　　　　　　**L　T　P　C**
IVYear/ISemester　　　　　　　　　　　　　　**2　0　2　3**

Prerequisites: The students should have basic knowledge in linear algebra, statistics, as well as programming in Python and Machine Learning.

CourseObjectives:

1. IntroducemajordeeplearningAlgorithms,theproblemsettingandtheir application to solve real world problems.
2. Identify the deep learning Algorithms which are more appropriate for varies types of learning tasks in various domains.

Syllabus:

UNITI　　　　　　　　　　　　　　　　　　　　**(9Hrs)**
Neural Networks: Biological Neuron, Linear Perceptron, Expressing Linear Perceptron's as Neurons, Perceptron Learning Algorithm, Sigmoid, Tanh and ReLu Neurons. **[T1]**

UNIT II:　　　　　　　　　　　　　　　　　　**(8Hrs)**
Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units,ArchitectureDesign,Back-PropagationandOtherDifferentiationAlgorithms.
　　[T2]

UNITIII:　　　　　　　　　　　　　　　　　　**(16Hrs)**
Regularization for Deep Learning: Parameter Norm Penalties, Data set augmentation, Noise Robustness, Early stopping, Bagging and other Ensemble methods, Dropouts. **[T2]**
Convolution Neural Network: Convolution operation, Building Blocks of CNN, Pooling, Variants of basic convolution function. **[T2]**

UNIT IV:　　　　　　　　　　　　　　　　　　**(9Hrs)**
RecurrentandRecursiveNetworks: Recurrent Neural Networks, Bidirectional RNNs,Deeprecurrentneuralnetworks,LongShort-TermMemoryNetworks.
　　[T2]

UNIT V:　　　　　　　　　　　　　　　　　　**(9Hrs)**
DeepLearningFrameworks: IntroductiontoKerasandTensorFlow,Deep Learningforcomputervision–usingCIFAR-10,LeNetDeepLearningforTextand

Sequences: working with Text Data, Sequence processing with ConvNets, TextGeneration with LSTM. **[T3]**

Lab Experiments:

1. WriteanapplicationtoimplementPerception.
2. WriteanapplicationtoimplementANDORgatesusingPerception.
3. Writeanapplicationtoimplementasimpleneural network
4. Writeanapplicationtoimplementamulti-layeredneuralnetwork
5. BuildanArtificialNeuralNetworkbyimplementingtheBackpropagation algorithm and test the same using appropriate data sets.
6. DesignfeedforwardneuralnetworkforsolvingregressiontypeProblems.(Example: Predicting car purchase amount from car sales datasets)
7. DesignConvolutionNeuralNetworkforImageclassification(useCIFAR-10dataset for image classification)
8. DesignConvolutionNeuralNetworkfortrafficsignclassification(UseLeNet dataset for traffic sign images classification)
9. DesignRecurrentNeuralNetworkwithLSTM(Example:Stockprice prediction)

CourseOutcomes:

Uponcompletionofthiscourse,the studentswillbeableto:

CO1: MakeuseoftheAlgorithmsassociatedwithDeeplearningandDeep Network architectures for Machine Learning. **[L3]**

CO2: Determinethedeeplearningalgorithmswhicharemorefeasiblefor operations in various domains. **[L4]**

CO3: Implement deep learning models using Python libraries and train them with real- world datasets. **[L3]**

CO4: Evaluate the performance of different deep learning models with respect to the overfitting and under fitting, estimation of test error. **[L5]**

MappingofCOsto POs:

POs/ Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2		3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	3

TEXTBOOKS:

1. FundamentalsofDeepLearning,byNikhilBuduma,ReleasedJune 2017, Publisher(s): O'Reilly Media, Inc
2. Deep Learning, Goodfellow, I., Bengio,Y., and Courville,A., MIT Press, 2016.
3. DeepLearningwithPython,FrancoisChollet,Manningpublisher

REFERENCEBOOKS:

1. ArtificialNeuralNetworks,B.Yegnanarayana,PHILearning Ltd,
2. NeuralNetworks:AClassroomApproach,Satish Kumar

ONLINECOURSESANDREFERENCES:

1. IntroductiontoDeeplearningofferedbyHSEUniversity-Coursera.
2. Machinelearning,DataScienceandDeeplearningwithPythonbySunDog Education – Udemey.com

GO PROGRAMMING
(JobOrientedElective-III)

SubjectCode:UGIT7T1222 IV   **L   T   P   C**
Year / I Semester   **2   0   2   3**

Prerequisites: Familiaritywithanyprogramming language.

CourseObjectives:
Thecourseisdesignedtocoverthebasicsandthendiveintomoreadvanced features of the Go programming language.

Syllabus:

UNIT I: **(7Lectures)**
Introduction: Origins and evolution, Languages that influenced Go, Why a new language?, Targets of the language, Guiding design principles, Characteristics ofthe language, Uses of the language, Missing features, Programming in Go.
Program Structure: Names, Declarations, Variables, Assignments, Type Declarations, Packages and Files, Scope.

UNIT II: **(9Lectures)**
Basic Data Types: Integers, Floating-Point Numbers, Complex Numbers, Booleans, Strings, Constants.
ControlStructures:ifelseconstruct,switchconstruct,forconstruct,break,continue and labels.
CompositeTypes: Arrays,Slices,Maps,Structs,JSON,TextandHTML Templates.

UNITIII: **(9Lectures)**
Functions: Function Declarations, Recursion, Multiple Return Values, Errors, FunctionValues,AnonymousFunctions,VariadicFunctions,DeferredFunctionCalls, Panic, Recover.

Methods: MethodDeclarations,MethodswithaPointerReceiver,Composing Types by Struct Embedding, Method Values and Expressions, Encapsulation.

UNIT IV: **(9Lectures)**
Interfaces: Interfaces as Contracts, Interface Types, Interface Satisfaction, Parsing Flags with flag.Value, Interface Values, The error Interface, Type Assertions, Discriminating Errors with Type Assertions, Querying Behaviors with Interface Type Assertions, Type Switches.

Reading and Writing: Reading input from the user, Reading from and writing to a file, Copying files, Reading arguments from the command-line, Reading files with a buffer, Reading and writing files with slices,Using defer to close a file.

Goroutines and Channels: Goroutines, Concurrent Clock Server, ConcurrentEcho Server, Channels, Looping in Parallel, Concurrent Web Crawler, Multiplexing with select,Concurrent Directory Traversal, Cancellation, Chat Server.

UNITV: **(9Lectures)**
Concurrency with Shared Variables: Race Conditions, Mutual Exclusion, Read/Write Mutexes, Memory Synchronization, Lazy Initialization, Goroutines and Threads.
Packages and Go Tool: Introduction, Import Paths, The Package Declaration, Import Declarations, Blank Imports, Packages and Naming, The Go Tool.
Testing: Go Test Tool, Test Functions, Coverage, Benchmark Functions, Profiling, Example Functions.

CourseOutcomes:
Uponcompletionofthiscourse,thestudentswillbeableto:
   CO1: StudythebasicconstructsofGoProgrammingandlearnitsstructural elements in detail.
   CO2: Developmodularprogrammingandmakeuseoffunctionsandmethods.
   CO3: ImplementtheInterfacesandGoroutinesforexecutingtheprogramindependently and simultaneously.
   CO4: PerformTestingandapplyconcurrencyinGoprogramsandexamine different packages in Go.

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-

TEXTBOOKS:

1.AlanA.A.Donovan,BrianW.Kernighan,"TheGoProgrammingLanguage", Addison-Wesley.

2. IvoBalbaert,"TheWaytoGO–AThoroughIntroductiontotheGo Programming Language", i-Universe Publisher.

REFERENCEBOOKS:

1. MarkSummerfield,ProgramminginGo:Creatingapplicationsforthe21st century. Addison-Wesley.

2. CalebDoxsey,AnIntroductiontoProgramminginGo.

3. Tarik Guney, "Hands-On Go Programming: Explore Go by solving real-world challenges", Packt Publishing.

4. JohnP.Baugh,"Go Programming",CreateSpace Publisher.

5. MatRyer,GoProgrammingBlueprints,PacktPublishing.

SOFTWARETESTINGMETHODOLOGIES
(JobOrientedElective-III)

SubjectCode:UGIT7T1322   **L   T   P   C**
YearSemester:IV/ I Semester   **2   0   2   3**

Prerequisites:
BasicconceptsofProgramming,softwareengineeringandanalyticalskills.

CourseObjectives:

This course enables the learners to have a higher level knowledge related to software testing of a product in IT industry.

1. It focuses on various principles, methods and techniques related to various types of software testing as well as efficient testing strategies, software quality management, and automation & testing tools.
2. Learnerswillgetexposuretovariousrealtimetestingpracticestestingdifferent types of software through this course.

Syllabus:

UNIT I: **(7Hrs)**
SOFTWARETESTING:
Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.
Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology**.[T1]**

UNIT II: **(8Hrs)**
VERIFICATIONANDVALIDATION:
Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, how to verify code, Validation**. [T2]**
Dynamic Testing, I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing. [**T1**]
UNITIII: **(7Hrs)**
DYNAMICTESTINGII:
White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing

StaticTesting:inspections,StructuredWalkthroughs,Technicalreviews.[**T1**]

UNIT IV: (7Hrs)
VALIDATIONACTIVITIES:
Unit testing, Integration Testing, Function testing, system testing, acceptance testing.
Regression testing: Progressives Vs regressive testing, Objectives of regression testing, when regression testing done? Regression testing types, Regression testing techniques. [**T1]**

UNIT V: (6Hrs)
AUTOMATIONANDTESTINGTOOLS:
Need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.

CourseOutcomes:
Uponcompletionofthiscourse,thestudentswillbeableto:

CO1: Understandvarioustestingissues&solutionsinsoftware (**L2)**
CO2: Applymodernsoftwaretestingprocessesinrelationtosoftware Development and project management. **(L3)**
CO3: Analyze different types of verification & validation techniques to ensure the Functioning of a software system. **(L4)**
CO4: Createandexecutetestcasesforobjectorientedandwebbased Projects. **(L6)**
CO5: EvaluatedifferenttestingtoolsandtheirWorkingmechanisms**(L5) Mapping**

of COs to POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	3	-
CO 2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO 3	-	3	-	-	-	-	-	-	-	3	-	-	3	-
CO 4	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	3	3	-	-	-	-	-	-	-	3	-

TEXTBOOKS:

1. NareshChauhan,SoftwareTestingPrinciplesandPractices,Oxford.
2. YogeshSingh, SoftwareTesting, Cambridge.

REFERENCEBOOKS:

1. BarisBeizer,SoftwareTestingTechniques,2ndEdition,InternationalThomson
   Computer Press.
2. MGLimaye,SoftwareTesting,Principles,TechniquesandTools,TMH.

Experiments:

S.NO	ListOfExperiments
1	**Module 1: Introspect The causes for Failure and write down the reasons for failure** AprogramWritteninClanguageformatrixmultiplicationfails. Introspectcausesandreasonsforfailures
2	**Module2:BoundaryValueAnalysis,DecisionTablebased Testing** TakeanyAutomatedSystem(Eg:ATM)andapplyabovementioned blackboxtechniques
3	**Module3:WhiteBoxTesting** Consideraprogramwhichmultipliestwomatricesthen generate i. DDGraph ii. Cyclomaticcomplexity iii. DesignTestCasesForIndependent Path
4	**Module 4: Create test cases using Boundary ValueAnalysis,execute test cases by using JUnit and discuss the Results** Design and Develop a program in Java to solve triangle problem as follows Accept3integerswhicharesupposedtobethreesidesofatriangle determine if the three values represent Equilateral triangle, Isosceles Triangle, Scalene Triangle or they don't form any triangle at all.

5	**Module5:Selenium IDE** 1.Installationofselenium IDE 2. Using Selenium IDE, write a test suite containing minimum 4 test cases. 3. Conductatestsuiteforanytwoweb sites.
6	**Module 6: SeleniumTestNG** 1.InstallationofTestNGinEclipse 2.Launching Your tests in Eclipse 3.ByusingTestNGgeneratetestreports
7	**Module7:SeleniumTestswithMicrosoftExcel** 1.Write and Test a program to update 10 student records into tablein Excel file 2.Writeandtestaprogramtoprovidetotalnumberofobjects present/ available on the page

BIGDATATECHNOLOGIES
(JobOrientedElective-IV)

SubjectCode:UGIT7T1422
IVYear/ISemester

	L	T	P	C
	2	0	2	3

Prerequisites: The student should have knowledge of high level programming languages and SQL for analyzing the data.

Course Objectives: The student will be able to understand Big Data as a popular term used to describe the exponential growth, availability and use of information, both structured and unstructured. It is imperative that organizations and IT leaders focus on the ever-increasing volume, variety and velocity of information that forms Big Data. Hadoop is the core platform for structuring Big Data, and solves the problem of making it useful for Analytics.

Syllabus:

UNIT I: (8hrs)

Introduction toBigData: Whatis BigDataandwhere itis produced?Rise ofBig Data, Compare Hadoop vs traditional systems, Limitations and Solutions of existing Data Analytics Architecture, Attributes of Big Data, Types of Data, Use Cases of Big Data, Other technologies vs Big Data.

UNIT II: (9hrs)

Hadoop Architecture and HDFS: What is Hadoop? Hadoop History, Distributing Processing System, Core Components of Hadoop, HDFS Architecture, Hadoop Master – Slave Architecture, Daemon Types, Name node, Data node, Secondary Name node.

HadoopClustersandtheHadoopEcosystem-WhatisHadoopCluster?Pseudo Distributed mode, Type of Clusters, Hadoop Ecosystem: Pig, Hive, Flume, SQOOP.

UNITIII: (10hrs)

Hadoop MapReduce Framework: Overview of MapReduce Framework, MapReduce Architecture, Job Tracker and Task Tracker, Use Cases of Map Reduce, Anatomy of Map Reduce Program.

MapReduce Programs in Java: Basic MapReduce API Concepts, Writing MapReduce Driver, Mappers, and Reducers in Java, speeding up Hadoop Development by Using Eclipse, Word Count Example and Weather DatasetExample.

UNIT IV: (8hrs)

Hive and HiveQL- What is Hive? Hive vs MapReduce, Hive DDL: Create/Show/DropTables,InternalandExternalTables,HiveDML:LoadFiles

&Insert Data, Hive Architecture & Components, Difference between Hive and RDBMS, Partitions in Hive.

UNIT V: **(8hrs)**

Pig: Pig vs MapReduce, Pig Architecture & Data types, Shell and Utilitycomponents, Pig Latin Relational Operators, Pig Latin: File Loaders and UDF, Programming structure in UDF, Pig Jars Import and limitations of Pig.

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbeableto:

CO1: OutlineimportanceofBigDatainsolvingrealtimeproblemsindata analytics.
CO2: IllustrateHadoopecosystemanditscomponentsin detail.
CO3: MakeuseofdistributedfilesystemsandHadoopandcanwriteMapReduce programs to solve complex problems.
CO4: ExploretheHadoopecosystemscorecomponentsandapplyinreal-time scenarios.

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		3				-	-	-	-	-	-	-	3	3
CO2			3			-	-	-	-	-	-	-	3	3
CO3			3			-	-	-	-	-	-	-	3	3
CO4				3		-	-	-	-	-	-	-	3	3

TEXTBOOKS:

1. TomWhite,Hadoop:TheDefinitiveGuide,3rdEdition, O'reilly
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "UnderstandingBigDataAnalyticsforEnterpriseClassHadoopandStreaming Data", 1st Edition, TMH.

REFERENCEBOOKS:

1. AlexHolmes,HadoopinPractice,MANNINGPublications.
2. SrinathPerera,ThilinaGunarathne,HadoopMapReduceCookbook,Packt publishing.

DEVOPS

(JobOrientedElective-IV)

SubjectCode:UGIT7T1522   **L   T   P   C**

IVYear/I Semester   **2   0   2   3**

Prerequisites: Good Exposure to Software Engineering concepts and Software Development Methodologies.

CourseObjectives:

To get an expertise on the culture of DevOps in Software Development Methodologies for finding ways to adapt and innovate social structure, culture, and technology together in order to work more effectively in the Enterprises.

Syllabus:

UNIT- I: **(8Hrs)**

Introduction to DevOps: What is DevOps, A History of DevOps, Fundamental Terminology and Concepts – Software Development Methodologies, Operations Methodologies, Systems Methodologies, Development Release and Deployment Concepts, Infrastructure Concepts, Cultural Concepts.   **[T1]**

UNIT-II: **(8Hrs)**

Collaboration: Defining Collaboration, Individual Differences and Backgrounds, Opportunities for Competitive Advantage, Mentorship, Introducing Mindsets, MindsetsandLearningOrganizations,TheRoleofFeedback,ReviewsandRankings, CommunicationandConflictResolutionStyles,EmpathyandTrust,HumaneStaffing   and Resources**[T1]**

UNIT-III: **(9Hrs)**

Affinity: What Makes a Team, Teams and Organizational Structure, Finding Common Ground Between Teams, Benefits of Improved Affinity, Requirements for Affinity, Measuring Affinity, Misconceptions and Troubleshooting of Affinity.

Tools: SoftwareDevelopment,Automation, Monitoring,EvolutionoftheEcosystem, The Value of Tools to People, The Right Tools for Real Problems, Embracing Open Source, Standardization of Tools, Consistent Processes for Tool Analysis, Exceptions to Standardization, Irrelevance of Tools, The Impacts of Tools on Culture, Selection of Tools. **[T1]**

UNIT- IV: (8Hrs)

Scaling: Understanding Scaling, Considering Enterprise DevOps, Organizational Structure, Team Flexibility, Organizational Life cycle, Complexity and Change, scaling for Teams, Team Scaling and Growth Strategies, scaling for Organizations, Misconceptions and Troubleshooting of Scaling. **[T1]**

UNIT V: (8Hrs)

DevOps Practices: Implementing CI/CD and continuous deployment, Understanding IaC practices, DevOps Best Practices: Automating everything, Choosing the right tool, writing all your configuration in code, Designing the system architecture, building a good CI/CD pipeline, integrating tests, Applying security with DevSe. **[T1]**

Experiments:

1. ToPerforminstallation ofGitand workonlocalandremotegitrepositories
2. TofetchandsynchronizeGitrepository
3. Toperformbasicbranchingandmergingin Git
4. ToinstallandJenkinsbuildajobinJenkins
5. ToCreateCI/CD pipelinein Jenkins
6. ToinstallDockerandexecutebasiccommand in Docker
7. Tobuildimagefromthe Dockerfile
8. Todeployjava applicationinto Docker
9. ToperformcontinuoustestingofwebapplicationsusingSelenium

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbeableto:

CO 1: Make use the Influence of DevOps on Software Development Methodologies along with its Misconceptions and Anti-Patterns. **[L3]**

CO2: IllustratetheMethodologyofFourPillarsofDevOpsandTroubleshoot common problems that can arise in the effective DevOps**. [L2]**

CO3: InferencethecultureofDevOpstotheEnterprisesforachievingagility and innovation in its business units**. [L4]**

MappingofCOstoPOs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	3	-	-	-	-	-	-	-	-	3	-	3	-
CO2	-	-	-	3	-	-	-	-	-	-	3	-	3	-
CO3	-	-	-	3	-	-	-	-	-	-	3	-	3	-

TEXTBOOKS:

1. Jennifer Davis, RynDaniels, Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, O'Reilly.
2. MikaelKrief,LearningDevOps,PacktPublications

REFERENCEBOOKS:

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, the DevOPS Handbook:How to Create World-Class Agility, Reliability, and Security in Technology Organizations, IT Revolution Press

2. Verona,Joakim.PracticalDevOps.PacktPublishing Ltd.

3. By Jez Humble and David Farley, Continuous Delivery: Reliable Software Releases through Build, Test and Deployment Automation, Addison-Wesley Professional

4. MandiWalls,BuildingaDevOpsCulture,O'Reilly publications.

5. Sanjeev Sharma,"The DevOps Adoption Playbook – A Guide toAdopting DevOps in a Multi-Speed IT Enterprise", Wiley Publications.

6. Gene Kim, Kevin Behr, George Spafford, The phoenix Project, 5th.Anniversary Limited Edition

ONLINECOURSESandReferences:

1. DevopsCultureandMindset:offeredbyUniversityofVIRGINIA.

2. DevopsCultureandMindset:offeredbyUCDAVIS

.NETPROGRAMMING
(JobOrientedElective-IV)

SubjectCode:UGIT7T1622	L	T	P	C
IVYear/ISemester	2	0	2	3

Prerequisites: Familiaritywithanyprogramminglanguage.
CourseObjectives:

TointroducetheconceptsofMicrosoft.NETFrameworkfordevelopingweb applications.

Syllabus:

UNIT I: **(9hrs)**
.NET Introduction: Understanding .NET, Writing code using Visual Studio Code, CompilingandRunningcodeusingthe.NETCLI,Writingtop-levelprograms,Using Git with Visual Studio Code,Looking for help.

UNIT II: **(9hrs)**

C# Basics: C# grammar,Variables, Null values, Exploring console applications, Operators, Selection statements, Iteration statements, Casting and converting between types,Arrays, Functions.

UNITIII: **(10hrs)**

C# Object-Oriented Programming: Classes, Objects, Storing data within fields, Methods, Properties and Indexers, Pattern matching with objects, Records, Simplifying Methods, Raising and Handling Events, Interfaces, Generics,Inheritance.

Files&Streams: Managingthefile system,Readingand writingwith streams.

UNIT IV: **(9hrs)**

Working with Databases: Using Entity Framework Core, Querying and Manipulating Data Using LINQ.

ADO.NET: Using Database Connections, Commands, Asynchronous Data Access, Transactions with ADO.NET, Transactions with System.Transactions.

UNIT V: **(10hrs)**

ASP.NET: Understanding app models for .NET, understanding web development, Understanding ASP.NET Core, Exploring Razor Pages, Using Entity Framework Core,

UsingRazorclasslibraries,configuringservicesandtheHTTPrequestpipeline, Building Websites using the MVC Pattern

CourseOutcomes:

Uponcompletionofthiscourse,thestudentswillbeableto:

CO1: Understandthe.NETFramework.

CO2: WritevariousapplicationsusingC#Language.

CO3: Access databases using LINQ and ADO.NET

CO4: Develop web applications using ASP.NET

MappingofCOstoPOs:

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	3	-	-	3	3	3	-	3	3	-
CO3	3	-	2	2	3	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	-	-	3	3	3	-	-	3	-

TEXTBOOKS:

1. MarkJ.Price,C#9and.NET5–ModernCross-PlatformDevelopment,Packt Publisher.
2. ChristianNageletal."ProfessionalC#7with.NETCORE2.0",WileyIndia

REFERENCEBOOKS:

1. JamieChan,LearnC#inOneDayandLearnItWell,LCFPublishing.
2. JosephAlbahari,C#9.0PocketReference:InstantHelpforC#9.0Programmers, O'Reilly
3. IanGariffiths,"ProgrammingC#8.0:BuildWindows,Web,andDesktop Applications", O'Reilly.
4. KevinHoffman,"MicrosoftVisualC#",Pearson Education.
5. S.ThamaraiSelvi,R.Murugesan,"ATextBookonC#",Pearson Education.
6. AndrewTroelsen,C#andthe.NETPlatform, APress.

LAB EXPERIMENTS

1. Createawindowsformwiththefollowingcontrols Textbox, Radiobutton, Check box, Command Button
2. WriteaprogramforMenuoption.
3. Create aprogram toconnectwith database andmanipulate the records in the database using ADO .NET
4. CreateaprogramtoimplementtheconceptsofOOPSforcreatingclass, inheritance
5. Createaprogramtoperforminputvalidation usingprocedure.
6. Write a program to open a file and using I/O operations write contents into a file and read the contents from the file.
7. CreateawindowformusingHTMLcontrols.
8. Createaprogramtoperformvalidation usingvalidationcontrols.
9. CreateaprograminASP.NETtoconnectwiththedatabaseusingADODB connectivity and manipulate the records.
10. WriteaprogramtostoretheemployeedetailsusingclassandmethodsinC# .NET
11. WriteaprogramtoHandleExceptions
12. Writeaprogramtocreateaformwith Basiccontrols.Inc#. NET.

SECURECODINGTECHNIQUES
(JobOrientedElective-V)

SubjectCode:UGIT7T1722   **L   T   P   C**

IVYear/ISemester   **2   0   2   3**

Prerequisites:

Concepts related to the basic principles and practices of programming, Data Structures, Software development.

CourseObjectives:

Students having successfully completed this course will understand the basic principles and practices of secure computingand writing secure software, including: security threats, secure software design, authentication, authorization, access control,buffer-overflowattacks,typesafety,layerednetworkingarchitectures,basic

network protocols, firewalls, intrusion-detection systems, web applications, databases and information management, SQL queries, SQL injection attacks and defenses, XSS, symmetric cryptography, asymmetric cryptography, and password management.

SYLLABUS:

UNIT I: **(8Hrs)**

SecurityDesignPrinciples:

Security Is Holistic: Physical Security Technological Security Policies and Procedures AuthenticationAuthorization Access Control Lists (ACLs) Access Control Models the Bell-LaPadula Model Confidentiality Message/Data Integrity Accountability Availability

UNIT II: **(8Hrs)**

Secure Systems Design: Understanding Threats Defacement Infiltration Phishing Pharming Insider Threats Click Fraud Denial-of-Service (DoS Data Theft and Data Loss. Designing-In Security Windows 98.

UNITIII: **(10Hrs)**

Secure Programming Techniques: Worms and Other Malware Buffer Overflows Safe String Libraries Additional Approaches Heap-Based Overflows.
Client-State Manipulation Using HTTP POST Instead of GET SQL Injection Attack Scenario SolutionsPassword Security Additional Password Security Techniques

UNIT IV: **(8Hrs)**

Cross-Domain Security in Web Applications: Interaction Between Web Pages from Different Domains, Attack Patterns, Preventing XSRF, Preventing XSSI, Preventing XSS

UNIT V: (7Hrs)

Symmetric Key Cryptography: Introduction to Encryption, Stream Ciphers, Steganography, Asymmetric Key Cryptography, Key Management and Exchange, MACs and Signatures

CourseOutcomes:

Studentswilldemonstratetheabilityto:

CO1: Explain the basic principles and practices of secure computing and writing secure software

CO2: Analyze, evaluate, and explain security vulnerabilities (including buffer overflows, SQL injections, and XSS) in software designs and implementations

CO3: Synthesize alternative designs and implementations that incorporate mitigations for observed vulnerabilities

CO4: Applyknowledgeofinformationmanagementandcomputernetworking and communications while performing software-security assessments and designing and implementing secure code.

MappingofCOstoPO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-

TEXTBOOKS:

1. Foundations of Security. Neil Daswani, Christoph Kern, and Anita Kesavan.Apress, 2007 (1st ed). ISBN-10: 1590597842; ISBN-13: 978-1590597842.

MANAGEMENTSCIENCE
(Commontoallbranches)

SubjectCode:UGMB7T0122   **L   T   P   C**
IVYear/ISemester   **3   0   0   3**

Prerequisites:
- GeneralawarenessaboutPrinciplesofManagement.
- TohaveaninsightaboutProductionandOperationsManagement.
- TobeabletoacquireknowledgeaboutHumanResourceManagement,Marketing, Strategic Management.

CourseObjectives:
1. To create awareness about different Managerial concepts like Management, Production, Marketing, Human Resource and Strategic Management.
2. To make the students equip with knowledge on techniques of PERT and CPM in project management.

SYLLABUS:
UNIT-I: (8Hrs)
Introduction to Management: Concept and importance of Management, Functions of management, Evaluation of Management thought, Fayol's principles of Management, Maslow's need hierarchy & Herzberg's two factor theory ofMotivation, Decision making process, Designing organizational structure, Principles of Organization, Types of organization structures.

UNIT-II: (8Hrs)
Operations Management: Plant Location Principles andtypes of plant Layout , Work study, Materials Management: Objectives -Need for inventory control-Inventory control techniques EOQ , ABC, HML, SDE, VED and FSN analysis.

UNIT-III: (12Hrs)
Human Resources Management (HRM):Concepts of HRM, Basic functions of HR manager, Job Evaluation and Merit Rating, Performance Appraisal, Methods of Performance appraisal Concepts Compensation.
Marketing Management: Functions of marketing, Marketing Mix, Marketing strategies based on Product life cycle, Channels of distribution (Place), Promotional Mix.

UNIT-IV: **(10Hrs)**
Project Management (PERT/CPM): Network analysis, Program Evaluation and Review Technique (PERT), Critical path method (CPM) - Identifying critical path, Difference between PERT & CPM (simple problems).

UNIT-V: **(8Hrs)**
Strategic Management: Mission, Goals, objectives, policy, strategy, Environmental scanning, SWOT analysis, Steps in strategy formulation and implementation Generic strategy alternatives.

CourseOutcomes:
Uponcompletingthecourse,studentwillbeableto

COs	Description	BloomsLevel
CO 1	UnderstandthefundamentalsofManagementwithspecific insightasitsfunctionandrole	Understanding
CO2	Learntheconceptsofproduction,Managementofhuman Resources and Management of Marketing activities along withbusinessenvironment	Understanding
CO 3	Applytheproblemsolvingskillstodemonstratelogical solutiontoreallife problems	Applying
CO 4	Createtheawarenessofbusinessstrategiestodealwiththe dynamicbusinessenvironment	Creating

MappingofCOstoPOs:

POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO 2	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	2	-	-	-

TextBooks:
1. Dr.AryaSri,"ManagementScience",TMH2011.
2. L.M. Prasad, "Principles & Practices of Management" Sultan chand & Sons,2007.

ReferenceBooks:
1. K. Aswathappa and K. Sridhara Bhat, "Production and Operations Management", Himalaya Publishing House, 2010.
2. PhilipKotlerPhilipKotler,KevinKeller,MaireadBrady,MalcolmGoodman, Torben Hansen, "Marketing Management"Pearson Education Limited, 2016.

ETHICALHACKING

SubjectCode:UGIT7K1822   **L   T   P   C**

IVYear/ISemester   **1   0   2   2**

Prerequisite: The student should be familiar with the fundamentals of Linux operating system, Computer Networks, web application, and Cryptography.

Objective: The student will learn how to evaluate the security of and identify vulnerabilities in target systems, networks, or system infrastructure to determine whether unauthorized access or other malicious activities are possible.

Tools: Metasploit, Burp Suite, Wireshark, SQL Map, Kali Linux, Cookie Manager, Nessus

Syllabus: Introduction to Hacking, Important Terminologies, Session Hijacking, ICMP Traceroute, TCP Traceroute, SQL Injection, HTML injection, OS command Injection, XML Injection, Spoofing, Remote Code Execution Attack, Brute force Attacks, Buffer overflow Attacks, TCP Session Hacking, UDP Session Hacking, Intrusion Detection System, Intrusion prevention System, OS finger printing Attempts,

Lab Experiments:
1StudytheuseofnetworkreconnaissancetoolslikeWHOIS,dig,traceroute,nslookup to gather information about networks and domain registrars.

2 Study of packet sniffer tools like Wireshark, ethereal, tcpdump etc. Use the tools to do the following
1. Observerperformanceinpromiscuousaswellasnon-promiscuous mode.
2. Showthatpacketscanbetracedbasedondifferentfilters.

3Downloadandinstallnmap.Useitwithdifferentoptionstoscanopenports, perform OS fingerprinting, do a ping scan, tcp port scan, udp port scan, etc.

4DetectARPspoofingusingopen-sourcetool ARPWATCH.

5. UsetheNessustooltoscanthenetworkfor vulnerabilities.

6. Implementacodetosimulatebufferoverflowattack.

7. SetupIPSECunder LINUX

8. InstallIDS(e.g.,SNORT)and studythelogs.

9. UseofiptablesinLinuxtocreate firewalls.

CourseOutcomes:
CO1: Examinethetoolsforconductingethicalhacking[L5].
CO2: Analysethevulnerabilitiesofthetargetsystem [L4]
CO3: Articulatethelegalandethicalissuesrelatedto vulnerability[L3].

MappingOFCOsto POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	3	-	-	-	-	-	-	-	3	3
CO2	-	-	3	-	3	-	-	-	-	-	-	-	3	3
CO3	-	-	-	3	3	-	-	3	-	3	-	-	3	3