COURSE STRUCTURE(R19)
AND
DETAILED SYLLABUS
(III YEAR)

COMPUTER SCIENCE & ENGINEERING

For
B.Tech., Four Year Degree Course
(Applicable for the batches admitted from 2019-20)

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, ECE, EEE & ME)
Jonnada (Village), Denkada (Mandal), Vizianagaram Dist – 535 005
Phone No. 08922-241111, 241112
E-Mail: lendi_2008@yahoo.com
Website: www.lendi.org

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING ENGINEERING

B. Tech III-Year Course Structure and Syllabus –R19

III Year - I Semester							
S. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**
1	R19CSE-PC3101	Web Services	PC	3	0	0	3
2.	R19CSE-PC3102	Computer Networks	PC	3	0	0	3
3.	R19CSS-PC3102	Compiler Design	PC	3	0	0	3
4.	R19CSE-PC3103	Object Oriented Analysis & Design using UML	PC	3	0	0	3
5	R19CSE-PE3101.1 R19CSE-PE3101.2 R19CSE-PE3101.3 R19CSE-PE3101.4	**Professional Elective – I** 1. Computer Graphics 2. Advanced operating systems 3. Advanced Data Structures 4. Scripting Languages	PE	3	0	0	3
6	R19CSE-PC3104	Computer Networks Lab	PC	0	0	3	1.5
7	R19CSE-PC3105	Object Oriented Analysis & Design using UMLLab	PC	0	0	3	1.5
8	R19CSE-PC3106	Web Services Lab	PC	0	0	3	1.5
9	R19BSH-MC3101	Employability Skills – 2	MC	3	0	0	0
10	R19CSE-PJ3101	Socially Relevant Projects	PJ	0	0	1	0.5
11	R19CSE-MC3101	MOOCS-3	MC	0	0	0	0
12	R19CSE-SI3101	Summer Internship-1 (Evaluation)	SI	0	0	0	0
			Total	**18**	**0**	**10**	**20**
***Honors Course(CSE) -2**							
Track No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**
1	R19CSE-HN3101	TCP/IP Protocol Suite	HN	3	1	0	4
2	R19CSE-HN3102	Secure Coding					
3	R19CSE-HN3103	Angular Framework					
4	R19CSE-HN3104	Mathematical Essential For Data Science					
***Minor Course-2**							

III Year - II Semester							
S. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**
1	R19CSE-PC3201	Data Warehousing and Data Mining	PC	3	0	0	3
2.	R19CSE-PC3202	Software Engineering	PC	3	0	0	3
3.	R19CSE-PC3203	Design and Analysis of Algorithms	PC	3	0	0	3
4.	R19CSE-PE3201.1 R19CSE-PE3201.2 R19CSE-PE3201.3 R19CSE-PE3201.4	**Professional Elective – II** 1. Artificial Intelligence 2. Malware Analysis 3. Human Computer Interaction 4. Advanced computer networks	PE	3	0	0	3
5	R19BSH-OE3201 R19BSH-OE3203 R19BSH-OE3202	**Open Elective- I** 1. Statistics with R 2. Entrepreneurship & Incubation 3. Optimization Techniques	OE	3	0	0	3
6	R19CSE-PC3204	Software Architecture & Design Patterns (SADP)	PC	3	0	0	3
7	R19CSE-PC3205	Data Mining Lab	PC	0	0	3	1.5
8	R19CSE-PC3206	Software Architecture & Design Patterns (SADP) Lab	PC	0	0	3	1.5
9	R19CSE-MC3201	MOOCS-4	MC	0	0	0	0
			Total	**17**	**0**	**6**	**21**
***Honors Course(CSE) -3**							
Track No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**
1	R19CSE-HN3201	Wireless Sensor Networks	HN	3	1	0	4
2	R19CSE-HN3202	Block Chain Technologies					
3	R19CSE-HN3203	.NET Framework					
4	R19CSE-HN3204	Natural Langauge Processing					
***Minor Course-3**							
Summer Internship-2(After ThirdYear & Evaluated inIV-I Semester)							

**The Eligeble students who opted the courses for B.Tech with Honors/Minor only*
Note: L-Lecture, T-Tutorial, P-Practical, C-Credits

HONOR DEGREE IN COMPUTER SCIENCE AND ENGINEERING

Track-I (Networks)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R19CSE-HN2201	Data Communication	HN	3	1	0	4
2	III-I	R19CSE-HN3101	TCP/IP Protocol Suite	HN	3	1	0	4
3	III-II	R19CSE-HN3201	Wireless Sensor Networks	HN	3	1	0	4
4	IV-I	R19CSE-HN4101	Internet of Things	HN	3	1	0	4
5	II Year to IV Year	R19CSE-HNMS01.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R19CSE-HNMS01.2	Honors MOOCS-2	HN	0	0	0	2
							Total	**20**

Track- II(Cyber Security)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R19CSE-HN2202	Information Security	HN	3	1	0	4
2	III-I	R19CSE-HN3102	Secure Coding	HN	3	1	0	4
3	III-II	R19CSE-HN3202	Blockchain Technologies	HN	3	1	0	4
4	IV-I	R19CSE-HN4102	Vulnerability Assessment & Penetration Testing	HN	3	1	0	4
5	II Year to IV Year	R19CSE-HNMS02.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R19CSE-HNMS02.2	Honors MOOCS-2	HN	0	0	0	2
							Total	**20**

Track III (Web Frameworks)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R19CSE-HN2203	Web UI Framework	HN	3	1	0	4
2	III-I	R19CSE-HN3103	Angular Framework	HN	3	1	0	4
3	III-II	R19CSE-HN3203	.Net Framework	HN	3	1	0	4
4	IV-I	R19CSE-HN4103	J2EE Framework	HN	3	1	0	4
5	II Year to IV Year	R19CSE-HNMS03.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R19CSE-HNMS03.2	Honors MOOCS-2	HN	0	0	0	2
							Total	**20**

Track IV (Data Science)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R19CSE-HN2203	Advanced Python Programming	HN	3	1	0	4
2	III-I	R19CSE-HN3103	Mathematical Essential For Data Science	HN	3	1	0	4
3	III-II	R19CSE-HN3203	Natural Language Processing	HN	3	1	0	4
4	IV-I	R19CSE-HN4103	Deep Learning	HN	3	1	0	4
5	II Year to IV Year	R19CSE-HNMS03.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R19CSE-HNMS03.2	Honors MOOCS-2	HN	0	0	0	2
							Total	**20**

III Year – I Semester

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3101	Web Services	3	0	0	3

Course Objectives:

- Understand web services and Service oriented architecture (SOA).
- Implement java generic classes and annotations.
- Implement java persistence using JSON and XML Parsers.
- Implement XML Web services using WSDL and JAX-WS.
- Implement RESTFul Web Services using JAX-RS.

Course Outcomes:

1. Understand the importance of Web Services and Service Oriented Architecture.
2. Implement Java Generic data Structures and Annotations.
3. Implement object persistence using different APIs.
4. Apply XML Web Services using JAX-WS APIs.
5. Apply RESTFul Web Services using JAX-RS APIs.

Unit 1

Introduction to Web Services: Client Server Distributed Computing, Web Services, Features and Characteristics of Web Services, Web Service Architecture, Components, SOAP Web Services, REST Web Services, SOAP vs REST, Service Oriented Architecture (SOA), Micro Services, Web Services vs Micro Services.

Learning Outcomes:student will be able to

- Understand Web Service Architecture (L2).
- Understand Web Service Components. (L2).
- Understand Micro Services and Service Oriented Archiecture. (L2).

Unit 2

Generics &Annotations: Generics in Java, Advantages of generics, Generic Classes, Type Parameters, Wild Cards, Nested Collections, Annotations, Annotation Elements, Built-in Annotations, Custom Annotations.

Learning Outcomes: Student will be able to

- Understand java generics and annotations (L2).
- Implement Wild cards for generic types and classes (L4).
- Implement Custom annotations and for complex java classes. (L4).

Unit 3

Object Persistence: XML, Rules of XML Document, XML Schema and NameSpace, Marshalling and UnMarshalling XML document using JAXB, DOM Parser, JSON Object, JSON Array, Serializing and De-serializing JSON, JSON Parsing using Jackson APIs.

Learning Outcomes: Student will be able to

- Understand structure of XML document(L2).
- Implement XML parsers using JAXBAPIs and DOM (L4).
- Implement JSON binding using JACKSON APIs (L4).

Unit 4

SOAP Web Services: Introduction to SOAP, SOAP Architecture, WSDL, Structure of WSDL, WSDL Document Elements: Definitions, Types, Message, Operation, portType, binding, port & services, Schema Types and Binding styles, Publishing SOAP Web Services, Consuming Web Services, Exploring javax.xml.ws.*.

Learning Outcomes: Student will be able to

- Understand the structure of SOAP and WSDL (L2)
- Implement WSDL using JAX-WS APIs.(L4)

Unit 5

RESTFul Web Services: Introduction to RESTFul Web Services, HTTP Request & Response Header, HTTP Methods, Publishing and Consuming Rest based XML Web Services, Publishing and Consuming REST based JSON web services, Exploring JAX-RS through Jersey APIs: javax.ws.rs.*.

Learning Outcomes: Student will be able to

- Understand RESTFul Web Services and its structure. (L2)
- Analyze end point Web Services using JAX-RS. (L4)

Applications:

- Amazon Web Services
- Currency Converter Applications
- Movie Rating Web Services
- Client Server Applications.
- Online Transportation Applications like Uber, OLA etc.
- Project Deployment Models

TEXT BOOKS

1. Java, How to Program, 9th Edition, Dieitel&Deitel, 2012.
2. Java Web Services: Up and Running, 2nd Edition by Martin Kalin, 2013, Orielly Media.
3. Java XML and JSON, 2nd Edition, Jeff Friesen, Apress.

REFERENCE BOOKS

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly, SPD.

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3102	Computer Networks	3	0	0	3

Course Objectives:

- Understand the network architecture and applications.
- Understand about the basic Networking Components and their functionality.
- Understand the functionalities of the Data Link Layer.
- Understand the protocols for data transfer.
- Analyse different protocols and architecture of IEEE 802.11

Course Outcomes:

1. Understand and Compare the Reference Models.
2. Identify the Network Components and learn about their functionality.
3. Analyse the services provided by the Data Link Layer to the Network Layer.
4. Understand the use of DataLink Layer protocols.
5. Understand the architecture of IEEE 802.11

Unit 1

Introduction: Components of a Data Communication system, Dataflow **,**Network Topologies LAN,MAN,WAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model

Learning Outcomes:student will be able to

- Understand the components involved to form a Computer Network (L2).
- Understand the data flow in a Computer Network and the use of protocols.(L2)
- Analyzethe importance of each layer in the reference models.(L4).

Applications: Conceptual Framework of a Network, ATM, Online reservation systems, reservation systems.

Unit 2

Physical Layer and overview of PL Switching:

TransmissionMedia:Guided,Unguided.Bandwidth,throughput,Latency.

Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing,

Learning Outcomes: Studentwill be able to

- Understand the Connecting Devices.(L2).
- Analyzedifferent types of Multiplexing. (L4).
- Understand the performance metrics of a Network. (L3).

Applications: Identify the use of different devices in real time computer networks and data processing tasks.

Unit 3

Data Link Layer Design Issues:

Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, errordetection and correction, CRC,

Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol forNoisyChannel.**Sliding window protocol**: One bit, Go back N, Selective repeat-Stop and wait protocol,

Data link layer in HDLC:configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing.

Learning Outcomes: Student will be able to

- Understand DataLink Layer Services to the Network Layer. (L2)
- Understand Error Correction and Detection techniques. (L2)
- Apply Detecting Codes for sample data. (L3)

Applications: Error correction and detecting procedures on binary data.

Unit 4

Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance

Network Layer: Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

The Transport Layer: addressing,establishing a connection, releasing connection, flow control andbuffering and crash recovery, End to end protocols: UDP,

Unit 5

Application layer (WWW and HTTP): ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic MessageFormat, HTTP Request Message Format, HTTP Response Message Format

Learning Outcomes: Student will be able to

- Understand the Data Link Layer protocols.(L2)
- Understand which protocols are used for Noisy and Noiseless Channels.(L2)

Applications: Used to implement data transfer and collision detection mechanisms.

TEXT BOOKS:

1. Data Communications and Networking ,Behrouz A Forouzan,Fourth Edition.
2. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010

REFERENCE BOOKS:

1. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education
2. Larry L. Peterson and Bruce S. Davie, “Computer Networks - A Systems Approach” (5th ed), Morgan Kaufmann/ Elsevier, 2011

Subject Code	Subject Name	L	T	P	C
R19CSS-PC3102	Compiler Design	3	0	0	3

Course Objectives:

The objectives of this course is to acquire knowledge on the

- To teach concepts of language translation and phases of compiler design
- To describe the common forms of parsers by parsing LL parser and LR parser
- To demonstrate intermediate code using technique of syntax directed translation
- To describe the various optimization techniques for designing various optimizing compiler
- To Illustrate the Target code generation for designing the compiler

Course Outcomes:

The students should be able to:

1. Understand the functionalities of compilation phases and role of lexical analyzer.
2. Analyze the working process of top-down parser and the working process of Bottom-up parser.
3. Analyze the intermediate code by using of syntax directed translation.
4. Understand the symbol table and techniques of the optimized code.
5. Understand the Target code generation issues.

UNIT - I

Introduction and Lexical Analysis: Language Processors, the structure of a compiler, the science of building a compiler, phases of a compiler. Lexical Analysis: The role of the lexical analyzer, Identifying tokens, Transition diagrams for recognizing tokens, Input buffering, The lexical analyzer generator Lex, Finite automata, Conversion from regular expressions to automata, design of a lexical analyzer generator, Optimization of DFA-based patternmatchers.

UNIT - II

Syntax Analysis: Introduction, Context-Free Grammars, BNF(Backus-Naur Form), EBNF(Extended Backus-Naur Form). Preprocessing of grammars: left recursion elimination, left factoring. Top-Down Parsing: Recursive-descent parsers, LL(1) parsers. Bottom-Up parsing: Introduction to LR parsers, Simple LR, Canonical LR, Lookahead LR. Extending parsers to handle ambiguous grammars, Parser generators Yacc/Bison.

UNIT – III

Syntax-Directed Translation, Semantic Analysis, Intermediate Code Generation: Syntax-Directed Definitions, Evaluation orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's.

Intermediate code generation: Variants of Syntax trees, Three-address code, Types and declarations, Type checking, Control flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV

Code Optimization, Run-time Environment: Run-Time Environments: Storage organization, Activation record, Stack allocation, ccess to nonlocal data on the stack, Heap management, Introduction to garbage collection, Introduction to trace-based collection. Machine-Independent optimizations: The principal sources of optimization, Basic blocks and flow graphs, Introduction to data-flow analysis, Foundations of data-flow analysis, Constant propagation.

UNIT - V

Target Code Generation: Code Generation: Issues in the design of a Code Generator, The target language, Addresses in the target code, A simple code generator.

Machine-dependent Optimizations: Peephole optimization, Register allocation and

assignment, Dynamic Programming code generation.

Text Books:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred VAho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman,Pearson.
2. Compiler Construction-Principles and Practice, Kenneth C Louden, CengageLearning.

Reference Books:

1. Modern Compiler ImplementationinC, Andrew W Appel, Revised edition, Cambridge UniversityPress.
2. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G.Sorenson,TMH
3. lex &yacc, 2nd Edition by John Levine, Doug Brown, TonyMason

E-resources:

1. https://www.edx.org/course/compilers
2. https://nptel.ac.in/courses/106/108/106108113/

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3103	Object Oriented Analysis & Design using UML	3	0	0	3

Course Objectives:

- The focus of this course is on design rather than implementation.
- Introducing the Unified Process and showing how UML can be used within the process.
- Case study experience with architecture, analysis and design.
- Programmatic interactions using UML diagrams.
- Analyze and design solutions to problems using object oriented approach.

Course Outcomes:

1. Compare and contrast object orientedanalysis and design.
2. Create class diagrams that model both the domain model and design model of a software system.
3. Analyzed the conceptual model of UML.
4. Create interaction diagrams and other diagrams that model the dynamic aspects of a software system.
5. Detailed case study experience with architecture, analysis and design.

UNIT I

Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

Learning Objectives:

- Define object-oriented analysis and design (OOA/D).
- Illustrate a brief example of complex systems.
- Define fundamental object model.

UNIT II

Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

Learning Objectives:

- Understanding relationship between classes and objects
- Identification of key abstractions and mechanisms.

UNIT III

Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

Learning Objectives:

- Understanding of conceptual model.
- Implementation of structural diagrams like class, object.

UNIT IV

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Learning Objectives:

- Analyze interaction diagrams.
- Analyze use case & activity diagrams.
- Create state chart diagrams for classes and use cases.

UNIT V

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Library application.

Learning Objectives:

- Create component and deployment diagrams.
- Analyze different components and runtime elements

Text books

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

Reference

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3101.1	**Computer Graphics (Professional Elective- 1)**	3	0	0	3

Course Objectives:

1. To develop, design and implement two and three dimensional graphical structures
2. To enable students to acquire knowledge Multimedia compression and animations
3. To learn Creation, Management and Transmission of Multimedia objects

Course Outcomes:

1. Interpret algorithms to draw line, circle and ellipse.
2. Solve transformations related to the object.
3. Analyze algorithms of line, polygon, curve and text.
4. Classify surface detection methods.
5. Create shaded objects and Develop basic primitives with OPENGL.

UNIT-I:

2D Primitives Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms.

Learning outcomes: at the end of this unit, student will be able to

- Summarize the applications of Computer Graphics. [L2]
- Interpret algorithms to draw line, circle and ellipse. [L2]

UNIT-II:

3D Concepts Parallel and Perspective projections - Three dimensional object representation –Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3Dtransformations – Viewing -Visible surface identification.

Learning outcomes: at the end of this unit, student will be able to

- Solve transformations related to 3D object.[L3]
- Infer object representations. [L2]

UNIT-III:

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSPtree methods, area sub-division and octreemethods.

Graphics Programming Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Key frame - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

Learning outcomes: at the end of this unit, student will be able to

- Classify surface detection methods. [L2]
- Explain depth sorting methods. [L2]
- Compare Color Models. [L2]
- Develop basic primitives with OPENGL.[L3]

UNIT-IV

Rendering and Overview of Ray Tracing: Introduction to Shading models – Flat and Smooth shading – Adding texture to faces–Adding shadows of objects,Rendering texture – Drawing Shadows.

Learning outcomes: at the end of this unit, student will be able to

- Analyze shading models.[L3]
- Created shaded objects. [L2]

UNIT-V

Overview of Ray Tracing: Intersecting rays with other primitives – Adding Surface texture –Reflections andTransparency – Boolean operations on Objects.

Learning outcomes: at the end of this unit, student will be able to

- Analyze rays with other primitives[L3]
- Classify Boolean operations on Objects.[L2]

Text Books:

1. Computer Graphics *C* version, Donald Hearn, M.Pauline Baker, Pearson
2. Computer Graphics with Virtual Reality Systems, Rajesh K Maurya, Wiley.

Reference Books

1. Introduction to Computer Graphics, Using Java 2D and 3D, Frank Klawonn, Springer
2. Computer Graphics, Steven Harrington, TMH.

Applications:

1. Morphing images (Photoshop)
2. Animation videos
3. Diagnosis in medical field

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3101.2	Advanced Operating Systems **(Professional Elective- 1)**	3	0	0	3

Course Objectives:

- To Learn the main concepts of advanced operating systems.
- To Identify synchronization problems in distributed systems.
- To Handle deadlock situation in distributed environment.
- To Create awareness on process management in advanced environment.
- To Understand distributed file system and shared memory.

Course Outcomes:

1. Understand the potential benefits of advanced operating systems.
2. Illustrate process synchronization in distributed systems.
3. Solve deadlock situation in distributed environment.
4. Analyze process management in advanced environment.
5. Illustrate distributed file system and shared memory.

Unit 1:

Introduction to Distributed systems: Goals of distributed system, hardware and software concepts, design issues.

Communication in Distributed systems:

Layered protocols, ATM networks, the Client - Server model, remoteprocedurecalland groupcommunication.

Learning Outcomes: student will be able to

- Understand the importance of distributed systems (L2).
- Analyze various design issues related to distributed environment (L4).
- Understand how communication is implemented in distributed systems (L2).

Applications: Emerging systems, wireless networks, mobile networks, Banking and Finance, Grid computing, Cluster computing, Global positioning system.

Unit 2:

SynchronizationinDistributedsystems: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bullyalgorithm,aringalgorithm, atomic transactions,

Learning Outcomes: Student will be able to

- Understand time sharing among different systems (L2).
- Analyze various time sharing algorithms (L4).
- Understand various stages in transaction execution (L2).

Applications: Distributed coordination based systems, Scientific computing systems, Air traffic control system.

Unit3:

Deadlocks: deadlock in distributedsystems,Distributeddeadlockprevention,and distributeddeadlockdetection.

Learning Outcomes: Student will be able to

- Understand deadlocks in distributed systems (L2).
- Analyze various deadlock prevention methods (L4).
- Analyze various deadlock detection methods (L4).

Applications: Telecommunication networks, Internet technology, Airline reservation control systems, Industrial control equipment.

Unit 4:

Processes: Processes and Processors in distributed systems: Threads, system models, Processor allocation, Schedulingindistributed system, Faulttolerance and realtimedistributedsystems.

Learning Outcomes: Student will be able to

- Understand processes and threads execution in distributed systems (L2).
- Analyze various scheduling methods in distributed systems (L4).
- Understand fault tolerance mechanism in distributed systems (L2).

Applications: Distributed multimedia systems, Quality of service requirements, Routing algorithms, Multiplayer online gaming.

Unit 5:

Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributedfilesystems**.**

Distributedsharedmemory: Whatissharedmemory, consistencymodels, page based distributed shared memory,shared variable distributed shared memory, objectbasedDSM.

Learning Outcomes: Student will be able to

- Understand distributed file system design and implementation (L2).
- Analyze various trends in distributed file system (L4).
- Understand benefits of shared memory (L2).
- Analyze how objects are shared between processes (L4).

Applications: Distributed document based systems(WWW),Distributed object based systems, Distributed database systems. Data rendering, Network file system,

Textbooks:

1. DistributedOperatingSystem-Andrew.S.Tanenbaum,PHI
2. OperatingSystems'–InternalandDesignPrinciples Stallings, Fifth Edition 2005,Pearsoneducation/PHI

Referencebooks:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne7thEdition,John Wiley.
2. Modern Operating Systems,Andrew STanenbaum 2ndedition Pearson/PHI

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3101.3	Advanced Data Structures **(Professional Elective- 1)**	3	0	0	3

COURSE OBJECTIVES:

- To Demonstrate the importance of External Sorting Techniques
- Describe the various implements of Hashing Techniques, variants of trees, heaps, queues and analysis
- To Deal with the Optimal, Efficient binary search trees and Multi-way Trees
- To Create awareness on Digital Search trees, Binary ties, Patricia

COURSE OUTCOMES:

1. Apply external sorting algorithms on massive amounts of data.
2. Analyze hashing concepts like static hashing and dynamic hashing.
3. Analyze concepts of Binary Heap and binomial queues in real time applications such as event simulations problem, selection problem.
4. Construct the data structures such as AVL, Red-Black and Optimal Binary Search Trees for faster searching in directories.
5. Apply data structures such as M-way search trees, B trees and B+ trees in data base indexing and Analyze digital search structures such as binary tries and Patricia

UNIT-I:

SORTING: External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

Learning outcomes: Student should be able to

1. Understand the External sorting techniques with some examples(L2)
2. Understand Differences between internal and external sorting techniques(L2)
3. Implement the K-way Merging Techniques(L6)

UNIT-II:

HASHING: Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing,

Learning outcomes: Student should be able to

1. Understand the Hashing Techniques for Dictionaries(L2)
2. Implement the various techniques of Hashing Techniques(L6)
3. To identify the differences between Directory less and Directory oriented concepts(L2)

UNIT -III:

PRIORITY QUEUES (HEAPS): Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues

Learning outcomes: Student should be able to

1. Understand the concepts of Binary Heap and Binomial Queues(L2)
2. Apply the Heap techniques in Priority Queues(L4)

UNIT-IV

EFFICIENT BINARY SEARCH TREES: Optimal Binary Search Trees, AVL Trees, Red-Black Trees, Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree. Splay tree Introduction

Learning outcomes: Student should be able to

1. Understand different Balanced Binary Search trees like AVL,OBST, Red-Black Trees(L2)
2. Apply the data structures such as AVL, Red-Black and Optimal Binary Search Trees for faster searching in directories. (L4)

UNIT-V:

MULTIWAY SEARCH TREES:M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

DIGITAL SEARCH STRUCTURES : Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length- Height of a Trie

Learning outcomes: Student should be able to

1. Understand the concepts of B-Trees and B+ Trees(L2)
2. Apply data structures such as M-way search trees, B trees and B+ trees in data base indexing(L4)
3. Understand digital search structures such as binary tries and Patricia in applications such as internet packet forwarding and data compression schemes (L2)

TEXT BOOKS:

1. Data Structures, a Pseudo code Approach, Richard F Gilberg, Behrouz A Forouzan,Cengage
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Andersonfreed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

REFERENCE BOOKS:

1. File Structures : An Object oriented approach with C++, 3rd ed, Michel J Folk, GregRiccardi, Bill Zoellick
2. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu& EV Prasad, S Chand, 2010.

WEB REFERENCES:

1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3101.4	Scripting Languages **(Professional Elective- 1)**	3	0	0	3

Course Objectives:

- Understanding Linux Shell Scripting functionalities.
- Implementing TCL/TK scripting for network simulation.
- Understanding basic operations of perl programming.
- Working with Server side scripting through PHP Programming.
- Writing ruby scripts for building objects.

Course Outcomes:

1. Implementing Linux Shell Scripts for handling processes.
2. Implement TCL/TK Scripts for writing complex network simulations.
3. Understand basics of perl for running scripts dynamically.
4. Implementing server-side scripts for handling client requests.
5. Create simple ruby scripts for developing model objects.

Unit 1

Shell Scripting: What is Scripting, Determining the shell, She-bang, Comment,Variables, Sourcing a File, Troubleshooting a Script, Prevent setuid root Spoofing, Executing Shell Script, Shell Script Parameters, Shell Shift Parameters, Shell Sourcing Config File, Shell Getopts Options, Loops, if then else,if then elif, for loop,while loop, until loop, Advance Shell, Function, case, eval, Let

Learning Outcomes: student will be able to

- Understand basics of Shell Scripting.(L2)
- Write Configuration file for running processes. (L4)
- Create advanced shell operations for controlling complex processes. (L4)

Unit 2

TCL/Tk Scripting: Introduction to TCL/Tk, Execution of command,Arguments, Command & Backslash substitution, Expressions (expr), Flow control, Lists, Arrays, String manipulation, Regular expressions, Generating & parsing strings, Procedures - extending Tcl, eval, package, File I/O in Tcl, Treating errors, Script files.

Tk Library: Tk widget commands, Tk widget set, Resource (options) management, Geometry managers, Bindings, Send command and Hypertools

Learning Outcomes: Student will be able to

- Understand the basic functionalities of TCL/TK Scripting. (L2).
- Implement Regular expressions for parsing different data formats.(L4).
- Implement TK Widget set for script files. (L4)

Unit 3

Perl Scripting: Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object – Oriented Perl.

Learning Outcomes: Student will be able to

- Understand the basics of perlprogramming.(L2)
- Implement Data Processing using Perl regular expressions. L4)
- Understand Object oriented approach using perl classes. (L2)

Unit 4

Server Side Scripting: PHP introduction. Basic PHP Syntax, Comments in PHP, Variables, PHP Operators, Control Structures(If else, switch, all loops), Arrays, For Each Loop, Functions, Form Handling, PHP $_GET, PHP $_POST, PHP $_REQUEST, PHP date

Function, PHP include File, File Handling, File Uploading, PHP Sessions, Sending Emails, PHP Cookies, Working with databases.

Learning Outcomes: Student will be able to

- Understand the advantages of server-side scripting for handling requests. (L2)
- Create request-response scripting using sessions and cookies. (L4)
- Create database operations with PHP for secure data storage. (L4)

Unit 5

Ruby Scripting: Data Types & Variables, String, Integer, Float, Boolean and Nil values, Properties of Ruby data types, Instance variables, Local & Global variables, Functions & Control Flow, Built-in functions, Creating your own functions, Passing arguments and returning values

If/Else and Unless Statements, While/Until Loops, Ruby Data Structures Arrays, Hashes, Enumerators, Iterators, Classes, Creating classes, Inheritance, Class Methods,Overriding Methods

Learning Outcomes: Student will be able to

- Understand the fundamentals of Ruby scripts. (L2)
- Writefunctions for handling complex data structures. (L4)
- Create classes for introspecting real time objects. (L4)

Applications:

- Multimedia applications.
- Gaming and Monetisation.
- Web and Enterprise Applications.
- Web Scraping
- Data Science and Visualization.

Text Books:

1. Learning Perl – 4th Ed. Randal Schwartz, Tom Phoenix and Brain d foy. 2005.
2. "Beginning PHP", Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, Wiley Publishing, In.
3. The Ruby Programming Language: Everything You Need to Know by David Flanagan and Yukihiro Matsumoto .
4. Classic Shell Scripting by Arnold Robbins and Nelson H.F. Beebe .
5. Tcl and Tk Programming for the Absolute Beginner by Kurt Wall

Reference Books:

1. Teach Yorself Perl in 21 days by David Till.
2. Perl in 24 Hours – 3rd Ed., Clinton Pierce, 2005, Sams Publishing.
3. PowerShell Cookbook: Your Complete Guide to Scripting the Ubiquitous Object-Based Shellby Lee Holmes.
4. Programming Perl: Unmatched power for text processing and scriptingby Tom Christiansen, brian d foy, et al

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3104	Computer Networks Lab	0	0	3	1.5

Course Objectives:

- To understand the system calls.
- To understand the concepts of framing techniques.
- To understand the error detecting techniques.
- To understand routing strategies.
- To understand the connection oriented and connection less services.

COURSE OUTCOMES:

1. implement the simple commands used for networking.
2. understand the Framing techniques.
3. implement the Error Detection techniques. ·
4. implement the Routing protocols.
5. understand the Connection Oriented and Connection Less service.

List of Programs:

Week 1: Study of different types of network cables and practically implement the cross-wired cable and straight through cables using crimping tool.

Week2: Configuration of various topologies related to LANs and WANs Using Packet Tracer.

Week3: Study on Network Layer and data link layer using Packet Tracer

Week 4: Write a program to implement Bit Stuffing and Byte Stuffing.

Week 5: Write a program to implement CRC**.**

Week 6: Take an example subnet of hosts. Obtain broadcast tree for it.

Week 7: Implement Dijkstra's algorithm to compute the shortest path through a graph and Configure RIP using Packet tracer.

Week 8: Take an example subnet graph with weights indication delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.

Week 9: Configure a network using Link state Protocol OSPF using Packet Tracer.

Week 10: Configure DHCP on router using Packet Tracer.

Week 11: Configure VLAN Using Packet Tracer.

Week 12: Internal exam

Reference Books:

1.Unix Network Programming, Volume 1: The Sockets Networking API Addison-Wesley Professional Computing Series

2. Network Programmability and Automation: Skills for the Next-Generation Network Engineer

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3105	Objective Oriented Analysis &Design Lab	0	0	3	1.5

Course Objectives:

- The focus of this course is on design rather than implementation.
- To design static and dynamic parts of the system using UML diagrams.
- Case study experience with architecture, analysis and design.
- Programmatic interactions using UML diagrams and OOP.
- Focus on architectural design implementation using UML.

Course Outcomes:

1. Detailed case study experience with architecture, analysis and design.
2. Design class diagrams that model both the domain model and design model of a software system.
3. Design interaction diagrams that model the dynamic aspects of a software system.
4. Design class diagrams that model both the domain model and design model of a software system.
5. Design activity, state, component and deployment diagrams.

Take three case studies:

- Point-Of-Sale Terminal
- Atm transaction system
- Library Management System.

Week 1:

Familiarization with Rational Rose or Umbrella.

For each case study:

Week 2, 3 & 4:

a) Identify and analyze events.
b) Identify Use cases.
c) Develop event table.
d) Identify & analyze domain classes.
e) Represent use cases and a domain class diagram using Rational Rose.
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes.

Week 5 & 6:

a) Develop Use case diagrams.
b) Develop elaborate Use case descriptions & scenarios.
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams.

Week 7, 8, 9 & 10:

a) Develop high-level sequence diagrams for each use case .
b) Identify MVC classes / objects for each use case .
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
d)) Develop three-layer package diagrams for each case study.

Week 11 & 12:

a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them
d) Refine domain class model by showing all the associations among classes

Week 13 onwards:

a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity

diagrams and deployment diagrams.

Text books

1. ‘Applying UML and patterns’ by Craig Larman, Pearson.
2. “Object oriented analysis and design with applications” by gradeybooch,jocobson,rambaugh.
3. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson &Burd Cengage Learning
4. O’reilly‘ s ‘Head-First Design Patterns’ by Eric Freeman et al, Oreillly

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3106	Web Services Lab	0	0	3	1.5

Course Objectives:

- Understand web services, Generic Data structures and Annotations in Java.
- Implement XML and JSON Parsing APIs.
- Implement XML Web services using WSDL
- Implement RESTFul Web Services using different dependencies.
- Create and analyze different real time web services with JAX-WS & RS dependencies.

Course Outcomes:

1. Implement Generic classes and Types parameters.
2. Implement Custom annotations for writing complex classes.
3. Implement XML and JSON Parsers using different APIs.
4. Apply XML Web Services using JAX-WS APIs.
5. Apply RESTFul Web Services using JAX-RS APIs.

List of Programs:

1. Implement a java program to apply Generic classes for an Employee Class.
2. Implement a Java Program to apply Generic Type Parameters and Methods.
3. Implement a Java program to apply Bounded Type Parameters for Salary Attribute of Employee class.
4. Implement a Java program to create a Custom Annotation.
5. Implement JAXB to marshall and unmarshall a Student Object (sId,sName,dept,gender,percentage) into XML and viceversa.
6. Implement Jackson APIs to serialize and deserialize a Employee object (eId,eName,designation, salary) into XML and viceversa.
7. Implement a java program to read Employee XML file containing details (eId,eName,designation, salary) and print details of employee having highest salary.
8. Implement Jackson dependencies to serialize and deserialize Employee Object (sId,sName,dept,gender,percentage) to JSON and viceversa.
9. Implement a program to parse JSON file using Jackson JSONParser API.
10. Implement a SOAP Web Service Client for accessing any Web service using wsimport.
11. Write a SOAP Web Service Client for calling service classes and access information.
12. Create a simple SOAP Web Service and deploy in a Server to generate WSDL.
13. Create a SOAP Web Service using EndPointapi to access WSDL file.
14. Write a REST Web Service for returning XML responses.
15. Write a REST Web Service for returning JSON responses.
16. Write a REST Web Service to implement GET and POST methods .

Applications:

- Amazon Web Services
- Currency Converter Applications
- Movie Rating Web Services
- Client Server Applications.
- Online Transportation Applications like Uber, OLA etc.
- Project Deployment Models

TEXT BOOKS:

1. Java, How to Program, 9th Edition, Dieitel&Deitel, 2012.
2. Java Web Services: Up and Running, 2nd Edition by Martin Kalin, 2013, Orielly Media.
3. Java XML and JSON, 2nd Edition, Jeff Friesen, Apress.

REFERENCE BOOKS:

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly, SPD.

Subject Code	Subject Name	L	T	P	C
R19BSH- MC3101	Employability Skills- 2	3	0	0	0

Course Objectives

- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing
- Demonstrate good writing skills for effective paraphrasing, argumentative essays, and formal correspondence
- Provide training and opportunities to develop fluency in English through participation informal group discussions and presentations using audio-visual aids
- Knowing the best practices at the workplace to perform well in the interview.
- Encouraging smart self-learning, communication skills that focus on employability.

Course Outcomes

1. understand the grammatical forms of English and the use of these forms in specific communicative and career context
2. use a wide range of reading comprehension strategies appropriate to texts, to retrieve information
3. strengthen their ability to write paragraphs, essays, emails and summaries
4. improve their speaking ability in English both in terms of fluency and comprehensibility by participating in Group discussion and oral assignments
5. prepare their own resume and answer interview related questions unhesitatingly with acceptable soft skills

Unit 1

Preparing for Written Assessment [6 Hours]

Grammar: Articles: Know how to use different types of Articles**,** use articles appropriately in context Identify errors in the use of articles, **Prepositions**: Learn to use prepositions in context, Identifying errors in the use of prepositions, Look at the different functions of Prepositions, **Tenses**: understand the different form of tense used in sentences, know the various purposes of using different Tense forms, Use appropriate tense forms of verbs in context, Identify the errors in the use of tense forms, **Concord**: Know how to identify Subject-Verb-Agreement in sentences, Use SVA appropriately in Context, identify the errors in the use of SVA, **Voices**: Know when to use Active or Passive Voice, Convert Active sentences to Passive ones, Relative Clause: Know what relative pronouns are, know when to use relative clauses, know the functions of Relative Clauses.

Soft Skills: Leadership: Introduction to Leadership, Leadership Power, Leadership Styles, And Leadership in Administration. **Interpersonal Relations**: Introduction to Interpersonal Relations, Analysis of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ Comprehend the factors that influence use of grammar and vocabulary in speech and writing(L3)
- ➢ Produce a range of valid grammatical sentences in the real world situations and professional environment.(L3)
- ➢ develop employability skills through Leadership skills and interpersonal skills (L3)

Unit 2

Reading Comprehension [6 Hours]

Purposes & Strategies of Reading: know the general purpose of Reading, assess your skills of reading ,develop reading Strategies **Skimming for details**: Skim through a variety of passages, understand how skimming will orient you to the text, **Identifying main Ideas**:

Identify the main ideas in the give text, Look for supporting statements in a passage, understand how the writer supports main ideas with details **Scanning for information:** Scan passages for factual information, understand how scanning can help find certain answers quickly, know how to look for factual answers, **drawing inferences:** Understand how to draw inferences, infer meanings while reading passages, **vocabulary**: Learn strategies to understand difficult words used in the passage, Apply strategies of reading to understand a variety of passages, **practice tests**

Soft Skills: Communication: Introduction to Communication, Flow of Communication, Listening, Barriers of Communication, How to overcome barriers of communication. **Stress Management**: Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ assess the reading skill by developing reading strategies (L3)
- ➢ Understand the skimming & scanning techniques orients to identify the theme, purpose and statements.(L2)
- ➢ develop employability skills through communication skills and stress management(L3)

Unit 3

Writing paragraphs & Essays [6 Hours]

Features of Good Writing: understand what makes a piece of writing good, Analyze & discuss some samples of good & bad writing, **Gathering Ideas**: Discuss various techniques for gathering ideas before you start writing, practice some of the techniques that can be used in the Prewriting stage ,**Purposes of Writing:** understand the importance of purpose of writing, explore various purpose of writing, choose content & language based on the purpose **Writing for Specific audience:** Study ways of tailoring content to suit a target audience, analyse text to deduce the target audience, discuss how language is used to suit the target audience **organizing ideas:** understand the importance of organising ideas in a text, Learn the different ways of organising ideas, practice organising ideas while writing **Writing an introduction:** Know the importance of a good introduction, understand the different ways in which writers catch the attention of readers, **Developing supporting ideas:**Learn how to develop your ideas in a paragraph, discuss a variety of supporting ideas ,**Writing a conclusion:**Learn the different parts of a conclusion, Practice writing an effective conclusion **Using linkers:**Learn the different types of Linkers or cohesive devices, Discuss why it is important to use connectors in writing, **Choosing the right words:** Discuss why writers make a careful choice of language,Learn how to select language to make the intended impact, **Writing film & book reviews:** Learn the different categories of books &films,Know the elements which go into analysing books &films,Write your own film & book reviews **Common errors in writing, editing &proofreading**.:Practice correcting errors in basic sentence structure,Learn to proof-read & edit your draft before writing the final version

Soft Skills:Group Dynamics and Team Building: Importance of groups in organization,Interactions in group, Group Decision Taking, Team Building, Interaction with the Team, How to build a good team?

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ produce logically coherent argumentative essays (L3)
- ➢ understand the use of passive voice in academic writing (L2)
- ➢ use appropriate vocabulary to express ideas and opinions (L2)
- ➢ develop employability skills through group dynamics and team building (L3)

Unit 4

Preparing for oral Assignment **[6 Hours]**

Group Discussion: Group Discussions as a tool for selection, skills for GD,Leadership& Problem-Solving Skills, Types of GD, Group Dynamics, Roles & Functions: Beginning, Presenting, Elaborating, Roles & Functions: Clarifying, Synthesising & Challenging, Roles &

Functions: Agreeing, Disagreeing & Summarizing., Etiquette: Body Language & Time Management, GD Activities

Soft Skills: Conflict Management:Introduction to Conflict, Causes of Conflict, Managing Conflict **Time Management:** Time as a Resource, Identify Important Time Wasters, Individual Time Management Styles, Techniques for better Time Management.

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ participate in group discussions using appropriate conventions and language strategies and develop advanced listening skills for in-depth understanding of academic text(L3)
- ➢ collaborate with a partner to make discussions (L2)
- ➢ develop employability skills through conflict management and time management(L3)

Unit 5

Interview Skills **[6 Hours]**

Purpose of interviews: Know what recruiters looking for during Interviews,Become familiar with the process of career search, understand your skills,interests,achievements and attitude better **Preparing a Resume:**Understand what a job application is,know the details to be included in a CV,Know how to lay out details of a CV & prepare CV on your own **Writing a Cover Letter:**Study the information which is included in a cover letter.Learn how to organise information in a cover letter ,**Before and at the interview:**Learn how to prepare for an interview,learn how to behave during the interview, discuss what the interviewer might assess you on **Answering FAQs about yourself & your families:**Learn how to answer questions about yourself & family, Learn how to identify & talk about your strengths and Weaknesses **Answering FAQs about Likes &Dislikes:**Learn to choose interests which will be relevant to your Interview.learn to speak about your likes & Dislikes **Answering FAQs about Justifying your candidature:**Know what you need to say to answer a question about yourself, Be able to answer questions about your suitability for a job **Answering FAQs about Priorities,Attitudes&Biases:**Understand what your priorities will be in a job & learn to talk about them,learn to correct understanding of your attitude, biases & prejudice, if any, towards others,know positive qualities that are valued at work **Answering FAQs about Professional goals:** Become aware of the things you need to keep in mind while choosing a job,Set goals for your professional growth & plan how to achieve them **Public Speaking: Planning, Practice &Delivery:**Plan one minute speeches on simple topics, understand how to capture the audience's attention, be able to create strong closing statements.

Soft Skills:Motivation: Introduction to Motivation, Relevance and types of Motivation, Motivating subordinates, Analysis of Motivation

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ prepare a CV with a cover letter to seek internship/ job (L2)
- ➢ understand the structure of Interviews and familiar with frequently asked questions while interview and how to respond to it (L3)
- ➢ develop employability skills through motivation and analysis of motivation (L3)

ASSESSMENT

The learners will demonstrate their knowledge and abilities through completion of the following required assessments while or at the end of this course. —1 Quiz, 1 GD, 2 Activities on Interview Readiness and Softskills, 1 Personal Interview

Quiz: (10M)

Quiz is conducted on Grammar, Vocabulary and Reading Comprehension. The Quiz consists of 50 questions and will be scaled down to 10 Marks. Duration of the quiz is 1hr 30 Min only and it is Computer Based Test (CBT)

Resume:(10 M)

Each student is required to submit 3 independently written Resumes during the course. Specific requirements for each one are accessed on the following Link:
https://docs.google.com/document/d/1W15961dOEnIxlnMm9BKyO8L9WIa7nPbEfgR-9DT_mRg/edit?usp=sharing

GD:(10 M)

1. Each student has to perform 5 Group Discussions during the course on a peer evaluation basis which fetches them 5 Marks.
2. The Final Assessment through one formal GD by the Internal Examiner is for 5 marks.

The GD will be assessed on the following criteria :

- Content (3M)
- Body Language(2M)
- Group dynamics & Leadership Skills (3M)
- Communication Skills (2M)

Soft Skills:(10M)

Student will be Assessed on

- Presentation of his/her Readiness of Interview (Grooming) with Prepared Resume (5M)
- Aptitude based question/Case study/Behavior based Question (5M)

Activities on Interview Readiness:(10M)

The external Examiner assess on Interview readiness

1) **Tell something about Yourself (5M)**

   Assessment Parameters:

   a) Initiation
   b) Confidence level
   c) Body Language
   d) Attention Grabbing

2) **JAM/Face to Face Interview (5M):**Student will be given a topic on-Spot for JAM and will be assessed by the External examiner on
   - Flow of Speech (2M)
   - Accuracy and Language (2M)
   - Confidence (1M)

Grading:

Assessment Model	Points
Quiz	**10**
Resume	**10**
GD	**10**
Soft Skills Activity	**10**
Personal Interview	**10**
Total	**50**

Pass Criterion:

1. Student has to Secure 30 Marks to pass this examination
2. Student who has an achievement certificate of any National or International Level Quiz/Psychometric Analysis, he/she has to secure a Minimum 20 Marks in this examination (Certificate+20 Marks) to pass the summative exam.
3. Clearing all categories is mandatory. Need to get 60% in each category.
4. 20M +Certificate=Successful or 30M+No certificate=Successful

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3101	TCP/IP Protocol Suite (**Honors Courses 2: Track-1)**	3	1	0	4

Course Objectives:

- To understand the architecture and principles of today's Internet.
- To understand the various protocols and their functionalities.
- To understand the Congestion and Quality of Service
- To understand the Queue Management
- To understand the requirements for the future Internet and its impact on the computer network architecture.

Course Outcomes:

1. Understand different reference models and networking Devices .
2. Analyze the various protocols and IP addressing.
3. Illustrate different methods to handle Congestion Control.
4. Analyze the Queue and Buffer Management.
5. Analyze Stream Control Transmission Protocol.

UNIT – I :

Overview Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite,Addressing. Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.

Learning outcomes: Student should be able to

1. Acquire the knowledge on basic arrangement of nodes (computers) in the network(L2)
2. Analyze the structure of layers in the network OSI and TCP/IP Reference Models(L4)

UNIT – II :

Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

Learning Outcomes: Student should be able to

1. Acquire the knowledge on different Protocols (L2).
2. Analyzethe IP addressing scheme(L4)
3. Analyzethe header formats (L4)

UNIT – III :

Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

Learning Outcomes: Student should be able to

1. Acquire the knowledge on Congestioncontrol (L2)
2. Analyze the how to Improve Quality of Service (L4)

UNIT – IV :

Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.

Learning Outcomes: Student should be able to

1. Acquire the knowledge on Queue Management (L2)
2. Analyze thePQM(L4)

UNIT – V :

Stream Control Transmission Protocol: SCTP Services, SCTP Features, Packet Format,FlowControl, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunneling and Encapsulating, Inefficiency in Mobile IP.

Learning Outcomes: Student should be able to

1. Acquire the knowledge on Stream Control Transmission Protocol (L2)
2. Analyze the how IP Packet Delivery process (L4)

TEXT BOOKS:

1. Behrouz A Forouzan, "TCP/IP Protocol Suite", TMH, 3rd Edition
2. B.A. Forouzan, "Data communication & Networking", TMH, 4th Edition.

REFERENCES:

1. Mahbub Hasan & Raj Jain, " High performance TCP/IP Networking", PHI -2005
2. Douglas. E.Comer, "Internetworking with TCP/IP ", Volume I PHI
3. Larry L. Perterson and Bruce S. Davie , "Computer Networks- A Systems Approach", 2011, Morgan Kaufmann
4. Jochen Schiiler, "Mobile Communications", Pearson, 2nd Edition.

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3102	Secure Coding (**Honors Courses 2: Track-2)**	3	1	0	4

Course Objectives:

- To understand the security development process.
- Knowledge of outline of the techniques for developing a secure application.
- To handling dynamic memory management effectively.
- Knowledge on stored procedures and XSS attacks.
- Acquire knowledge on software architecture and design.

Course Outcomes: At the end of the course, student will be able to

1. Analyze secure systems and various security principles.
2. Demonstrate the development of process of software leads to secure coding practices
3. Apply Secure programs and various risk in the dynamic memory management.
4. Understand XSS related attacks and remedies
5. Understand various software architecture models.

UNIT–I:

Introduction-Need for secure systems, Proactive security development process, Security principles to live by and threat modeling.

Learning Outcomes: student will be able to

- Understand the need of secure system (L2).
- Analyzesecurity development process(L4).
- Analyze various threats in secure systems (L4).

UNIT–II:

Secure Coding in C-Character strings- String manipulation errors, String Vulnerabilities and exploits Mitigation strategies for strings, Pointers, Mitigation strategies in pointer based vulnerabilities Buffer Overflow based vulnerabilities.

Learning Outcomes: student will be able to

- Describe the string manipulation errors (L2).
- Analyze the string buffer overflow Vulnerabilities (L4).
- Analyzemitigation strategies for strings (L4).

UNIT–III:

Secure Coding in C++ and Java-Dynamic memory management, Common errors in dynamic memory management, Memory managers, Double –free vulnerabilities, Integer security, Mitigation strategies.

Learning Outcomes: student will be able to

- Analyze errors in dynamic memory management (L4).
- Analyze double free vulnerabilities (L4).
- Apply integer security to various applications (3).

UNIT–IV:

Database and Web Specific Input Issues-Quoting the Input, Use of stored procedures, Building SQL statements securely, XSS related attacks and remedies.

Learning Outcomes: student will be able to

- Understand the stored procedures (L2).
- Implement SQL statements related to security (L5).
- Analyze XSS attacks and remedies (L4).

UNIT–V:

Software Security Engineering-Requirements engineering for secure software: Misuse and abuse cases, SQUARE process model Software security practices and knowledge for

architecture and design.

Learning Outcomes: student will be able to

- Describe Misuse and abuse cases in requirements engineering (L2).
- Understand software security practices (L2).
- Understand software architecture and design (L2).

Text Book:

1. Michael Howard, David LeBlanc, "Writing Secure Code", Microsoft Press, 2nd Edition, 2003.

Reference Books:

1. Robert C. Seacord, "Secure Coding in C and C++", Pearson Education, 2nd edition, 2013.
2. Julia H. Allen, Sean J. Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, "Software Security Engineering: A guide for Project Managers", Addison-Wesley Professional, 2008.

Subject Code	Subject Name	L	T	P	C
R19CSE- HN3103	Angular Framework (**Honors Courses 2: Track-3)**	3	1	0	4

Course Objectives:

- Understand model view framework for building applications.
- Create modules for binding the application.
- Understand dependency injection for implementing services.
- Create and establish routes redirects and navigation.
- Validate forms for the submission of data.

Course Outcomes:

1. Create Angular component using angular dependencies.
2. Apply data binding objects for implementing modules.
3. Create service and retrieve rest call data.
4. Understand routes and their configuration in angular.
5. Implement form handling with event driven apps.

Unit I:

Angular –Introduction to Angular, AngularJS vs Angular, MVC Framework, Component Based Model, Setting Up Angular, Installation of Node and NPM, Angular CLI, Creating and Running Project, Dependencies, App Component, Anatomy of Component, Creating Components.

Learning Outcomes:student will be able to

- Understand MVC framework for building applications.(L2)
- Understand the installations of Node, NPM and angular.(L2)
- Create Components using angular dependencies. (L4)

Unit II:

Data Binding: Introduction to Data Binding, Types of Binding, Binding Data from Component, Async, Template Interpolation, Looping with ngFor, Condition with ngif, Passing inputs and variables to Components, ngModel for 2-way binding, ngOnInit, Styling with components, Creating multiple modules

Learning Outcomes: Student will be able to

- Understand data binding for components. (L2).
- Implement looping and decision making for components.(L4).
- Create components and modules for binding data from the applications.(L4)

Unit III:

Dependency Injection: Understanding Dependency Injection(DI), Services, Creating a Service, Service Injection Context, Rest Calls with HttpClient, Building Angular Project.

Learning Outcomes: Student will be able to

- Understand the dependency injection and its types. (L2)
- Create rest based calls from client using HttpClient. (L4)
- Create Angular project by building angular services .(L4)

Unit IV:

Routing & Wrap Up: Introduction to Routing, Angular Project with routing, Creatingroutes, Route redirects and wild cards, Configuring child routes, Navigation for routes, Wrap Up

Learning Outcomes: Student will be able to

- Understand routing with angular (L2)
- Create and redirect routes for navigation. (L4)
- Implement wild cards and wrap up for building angular project. (L4)

Unit V:

Form Handling: Introduction to Form Handling, Form Validation, ng-minlength, ng-maxlength, ng-pattern, ng-required, Submitting Forms, Event Handling with Forms.

Learning Outcomes: Student will be able to

- Understand the working of forms and its validations. (L2)
- Implement event handling methods for form submissions. (L4)

APPLICATIONS:

- Online web applications
- Financial, banking applications and gateways etc
- Online and Social media applications

Text Books:

1. Angular 6 by Example: Get up and running with Angular by building modern real-world web apps, 3rd Edition, by Chandermani Arora.
2. Pro Angular 6, Apress, by Adam Freeman

Reference Books:

1. Angular JS by Green, Orielly
2. Professional AngularJS (WROX), by Valeri Karpov

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3104	Mathematical Essential for Data Science **(Honors Courses 2: Track-4)**	3	1	0	4

Course Objectives:

- To introduce the various mathematical concepts and models, and provide skills required to implement the models.
- To undertake a critical evaluation of a wide range of numerical and data.
- To develop designing skills for modeling non-deterministic problems.

Course Outcome:

1. Apply linear algebra in data science problems
2. Apply decompose the matrices to solve data science problems.
3. Demonstrate the data analysis using regression models.
4. Apply the optimization techniques to data science models.
5. Demonstrate with illustrative examples using sampling theory in data science models.

Unit-1

Linear Algebra (All theorems without Proofs): Introduction to Data Science. Importance of Mathematics in Data Science.Vector spaces and subspaces, basis and dimensions, rank, null space, linear transformations, basic properties-invertible lineartransformation, matrices of linear transformations. Inner products space, orthogonality, orthonormal basis, Gram-Schmidt orthogonalisation.

Unit-2

Matrix Decompositions: The LU decomposition,The Cholesky decomposition,QR decomposition,Singular value decomposition (SVD),Eigen values and Eigen vectors using **t**he power method.

Unit-3

Regression: Linear Models: Simple Linear Regression, Multiple Regression Generalized Linear Models: Logistic Regression, Poisson Regression, other Generalized Linear Models: Survival Analysis, Nonlinear Models: Splines, Decision- Random Forests.

Unit-4

Optimization – Jacobian, hessian, convex sets, convex functions and its properties, Unconstrained and Constrained optimization, Lagrange's Method, Kuhn-tucker conditions, Numerical optimization techniques for constrained and unconstrained optimization: Newton's method, Steepest descent method, Penalty function method. Linear Programming Problems, Simplex Method.

Unit-5

Statistics and Hypothesis Testing:, Basic Fundamentals of Sampling, Simple Random Sampling, Stratified Random Sampling, Bootstrap Methodology, Sampling distributions and Functions of random variables, Statistical inference, Methods of point estimation of parameters, Point and confidence interval estimation, and test of hypothesis, Test of hypothesis for attributes and, t-distributions, p-values, Z-scores, z-tests, and t-tests.

Text Books

1. Jin Ho Kwak and Sungpyo Hong, Linear Algebra, Second edition Springer(2004)(For Unit-1).
2. Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.
3. Matthias Dehmer, SalissouMoutari, Frank Emmert-Streib, Mathematical Foundations of Data Science Using R, De Gruyter Oldenbourg, 2020(for Unit-5).

4. Norman Matloff, Probability and Statistics for Data Science: Math + R + Data, CRC Data Science Series, 2019.
5. S.D.Sharma, Operations Research, Kedar Nath Ram Nath & Co. Meerut(for Unit-4)
6. Jared P. Lander, R for EveryoneAdvanced Analytics and Graphics, , Pearson(Unit-3)
7. D. S. Watkins, Fundamentals of Matrix Computation, 2nd Edition, Wiley, 2002(Unit-2)
8. William G. Cochran, Sampling Techniques, John Willey, 1977(for Unit-5).

References

1. Bradley Efron, R.J. Tibshirani, An introduction to the bootstrap, Chapman and Hall/CRC 1994.
2. D. G. Luenberger and Y. Ye, Linear and Nonlinear Programming, 3rd Edn., Springer, 2010.
3. Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, Introduction to Linear Regression Analysis by (Wiley).
4. E. K. P. Chong and S. H. Zak, An Introduction to Optimization, 2nd Edn., Wiley India Pvt. Ltd., 2010.
5. G. James, D. Witten, T. Hastie and R. Tibshirani, An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics), Springer, 2013.
6. Gene H. Golub, Charles F. Va n Loan, Matrix Computations, The Johns Hopkins University Press, 2013.
7. Heumann, Christian, Schomaker, Michael, Shalabh, Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R, Springer 2016
8. Irwin Miller, Marylees Miller, Probability and Statistics for Engineers.
9. J. Nocedal and S. J. Wright, Numerical Optimization. New York: Springer Science+Business Media, 2006.
10. J. S. Rosenthal, A First Look at Rigorous Probability Theory (Second Edition). Singapore: World Scientific Publishing, 2006.
11. C.R. Rao, H. Toutenburg, Shalabh, and C. Heumann, Linear Models and Generalizations - Least Squares and Alternatives (Springer, 2008)
12. Nathan Carter, Data Science for Mathematicians, CRC Press, Taylor & Francis Group, 2021.
13. Norman R. Draper, Harry Smith ,Applied Regression Analysis ,Wiley
14. P.S.R.S. Rao, Sampling Methodologies and Applications, Chapman and Hall/ CRC
15. Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet, The R Software-Fundamentals of Programming and Statistical Analysis -, Springer 2013
16. Robert V. Hogg. Allen T. Craig, Introduction to. Mathematical. Statistics, Pearson Education
17. S. Axler, Linear Algebra Done Right (Third Edition). Springer International Publishing, 2015.
18. W.G. Cochran, Sampling Techniques : Wiley
19. Trevor Hastie, Robert Tibshirani, Jerome Friedman, Data Mining, Inference, and Prediction,Springer.
20. W John Braun, Duncan J Murdoch, A First Course in Statistical Programming with R, Cambridge University Press 2008.
21. W. Cheney, Analysis for Applied Mathematics. New York: Springer Science+Business Medias, 2001.

III Year – II Semester

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3201	Data ware housing and Data Mining	3	0	0	3

Course Objectives:

- Students will be enabled to understand and implement classical models and algorithms indata warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevantmodels and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods andalgorithms and to analyze their behavior

.**Course Outcomes:**

1. Understand the process of Data Mining and its functionalities.
2. Apply the Data Pre-processing techniques..
3. Understand different classification techniques.
4. Apply the association rule mining algorithms and metrics used for forming association rules
5. Apply the clustering algorithms to various data sets.

UNIT –I

Introduction:Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted?Major Issues in Data Mining.Data Objects and Attribute Types,Basic Statistical Descriptions of Data,Data Visualization, Measuring Data Similarity and Dissimilarity

Learning Outcomes: Student should be able to

1. Summarize the process of Data mining.(L2)
2. Classify various kinds of Data Mining techniques.(L2)
3. Memorize different visualization techniques.(L1)
4. Differentiate a data warehouse with data mining(L4)

UNIT –II

Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

Learning Outcomes: Student should be able to

1. Recognize various steps in Data Preprocessing.(L1)
2. Identify the process of handling noisy data.(L1)

UNIT –III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

Classification: Alterative Techniques, Bayesian Classifier: Bayes theorem, using bayes theorem for classification, Native BayesClassifier: Bayes error rate, Bayesian Belief Networks: Model representation, model building (Tan)

Learning Outcomes: Student should be able to

1. Summarize the process of classification.(L2)
2. Apply the process of classification on sample data.(L3)
3. Construct a decision tree for any sample data.(L3)

4.Calculate Bayes probability for any given data(L3)
5.Calculate Naïve Bayes probability.(L3)

UNIT –IV

Association Analysis: Basic Concepts and Algorithms: Problem defination, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan &Vipin)**

Learning Outcomes: Student should be able to

1. Apply the Apriori algorithm on any sample data.(L3)
2. Construct an FP tree for any sample data. (L3)

UNIT –V

Cluster Analysis: Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan &Vipin)**

Learning Outcomes: Student should be able to

1. Identify the data objects and partition them into different clusters.(L2)
2. Apply the different clustering techniques on sample data.(L3)
3. Acquire the knowledge of The strenthg and weakness of clustering algorithms.(L2)

Text Books:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

Reference Books:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining :VikramPudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki,Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3202	Software Engineering	3	0	0	3

Course Objectives:

- Explain the phases of Software Development.
- Teach the customer requirement gathering techniques.
- Teach Software Design techniques
- Demonstrate coding standards
- Apply the testing techniques on software

Course outcomes:

Students will be able to:

1. Understand the need of Software Life Cycle Models (L1)
2. Demonstrate the Requirements of the Software Systems process (L2)
3. Summarize the system models of software engineering (L2)
4. Choose appropriate software architecture style for real-time software projects (L3)
5. Analyze various testing techniques, Risk management and Software quality of the software products(L4)

UNIT-1

Introduction: Introduction to Software Engineering, Evolving role of Software, Software Crisis,Changing Nature of Software, Software myths, Process Models for Software Development, Waterfall, prototyping Evolutionary models: Incremental model, Spiral model, Agile developmental process.

Applications: Various models for different projects

Learning Outcomes:

At the end of the module, students will be able to:

1. List the steps involved in software development. (L1)
2. Explain myths of software. (L2)
3. Apply various software process models (L3)

UNIT-2

Software Requirements Engineering: Functional & Non-functional requirements, Feasibility studies, Requirements Elicitation and Analysis, requirements validation, Software Requirements Specification, Process and System Models, context models, behavioural model, Data model.

Applications: Finding Functional &Non-functional requirements for banking system

Learning Outcomes:

At the end of the module, students will be able to:

1. Explain software development model (L2)
2. Define functional and non-functional requirements for software development (L1)
3. Analyse user requirementsfor a software(L4)

UNIT-3

Design Engineering: Design concepts, data design, software architecture, Architectural styles and patterns, User interface design - Golden rules, User interface analysis and design, Effective Modular Design.

Applications: Data designing for banking system

Learning Outcomes:

At the end of the module, students will be able to:

1. List the software architecture style for the given problem. (L1)
2. BuildGoldenrulesfor the given problem (L3)
3. User Interface Analysis and Design (L5)

UNIT-4

Coding&**Testing:**Coding standards, code review and verification, Testing levels: Unit testing, integration testing, system testing – alpha and beta testing, black box and white box testing, debugging.

Applications: Applyingtesting techniques on any software project

Learning Outcomes:

At the end of the module, students will be able to:

1. Implementation of coding standards(L6)
2. Apply different Testing concepts (L3)

UNIT-5

Risk Management: Risk types, strategies, Estimation and Planning. Software Quality – McCall Quality factors, Six Sigma for Software Quality, Quality Assurance and its techniques.

Applications: analyze the risks in any software project

Learning Outcomes:

At the end of the module, students will be able to:

1. Evaluatedifferent Risk management techniques. (L5)

Text books:

1. Roger S. Pressman, Software Engineering, A practitioner's Approach, 7thEdition, McGraw-Hill International Edition, 2009
2. Rajib Mal, Fundamentals of software Engineering, 3rdEdition, Eastern Economy Edition, 2009

Reference books:

1. Sommerville, Software Engineering, 7thEdition, Pearson education, 2004
2. K KAggarwal and Yogeshsingh, Software engineering,3rdEdition,New age International publication,2008

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3203	Design and Analysis of Algorithms	3	0	0	3

Course Objectives:

The objectives of this course is to acquire knowledge on the

- Analyze the asymptotic performance ofalgorithms
- Write rigorous correctness proofs foralgorithms
- Demonstrate a familiarity with major algorithms and datastructures
- Apply important algorithmic design paradigms and methods ofanalysis
- Synthesize efficient algorithms in common engineering designsituations

Course Outcomes:

The students should be able to:

1. Analyse the performance of an Algorithm in terms of Space, Time and Amortized Complexity.
2. Apply the Divide and Conquer techniques to the Algorithms.
3. Apply the greedy paradigm to the Algorithms.
4. Apply the dynamic-programming paradigms for the Analasys of algorithms
5. Apply the Backtracking and branch and bound paradigms for the analysis of Algorithms

UNIT - I:

Introduction: What is an Algorithm, Algorithm Specification, Pseudo code Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities' Performance Measurement.

UNIT - II:

Decrease-and-Conquer: Insertion Sort Algorithms for Generating Combinatorial Objects Decrease-by-a-Constant-Factor Algorithms Variable-Size-Decrease Algorithms

Dived and Conquer: Merge Sort, Quick Sort, Multiplication of Large Integers and Strassen's Matrix Multiplication

Transform and conquer: Pre-sorting Balanced Search Trees, Heaps and Heap sort

UNIT - III:

The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT - IV:

Dynamic Programming: The General Method Multistage graph ,All - Pairs Shortest Paths, , String Edition, 0/1 Knapsack, Reliability Design, optimal binary search trees.

UNIT - V:

Backtracking: The General Method, The S-Queens Problem, Sum of Subsets, Graph Coloring Hamiltonian Cycles

Branch and Bound: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson problem.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, UniversityPress
2. Introduction to the design and analysis of Algorithms Anany Levitin pearson ,3rd edition iii.IntroductiontoAlgorithms Thomas H CormenPHILearning

Reference Books:

1. The Design and Analysis of Computer Algorithms,AlfredVAhoJohnEHopcroft Jeffrey

DUllman
2. Algorithm Design, Jon Kleinberg,Pearson
3. Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education,2006.

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3201.1	**Artificial Intelligence (Professional Elective –II)**	3	0	0	3

Course Objectives:

- Expose various AI Applications areas.
- Introduce problem solving techniques like state space search and other control strategic techniques.
- Disseminate various logic techniques like predicate logic and propositional logic
- Demonstrate the applications of AI based Expert systems
- Elucidate probability theory and fuzzy logic

Course Outcomes:

1. Demonstrate various AI applications and AI languages
2. Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
3. Apply predicate and propositional logic techniques.
4. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
5. Solve uncertain problems through probability approaches and fuzzy logic .

UNIT-I:

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations ofAI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI

Learning Outcomes:

1. At the end of the module, students will be able to:
2. Classify various AI Applications (L2)
3. Apply the logic for tic-tac-toe game playing (L3)
4. List the AI Languages (L1)
5. Outline the current trends in AI (L2)

UNIT-II:

Problem solving: state-space search and control Strategies: Introduction, general problemsolving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening A*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games.

Learning Outcomes:

At the end of the module, students will be able to:

1. Demonstrate the state space search and control strategies techniques (L2)
2. Apply informed search and uninformed search techniques to problems (L3).
3. Identify problem reduction techniques. (L1)
4. Develop game playing strategies using AI techniques. (L3)

UNIT-III:

Logic concepts: Introduction, propositional calculus, propositional logic, natural deductionsystem, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

Learning Outcomes:

At the end of the module, students will be able to:

1. Classify predicate and propositional logic techniques (L2)
2. Explain natural deduction system and axiomatic system. (L2)
3. Explain semantic tableau system in propositional logic. (L2)

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledgerepresentation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Expert system and applications: Introduction phases in building expert systems, expert systemversus traditional systems, rule-based expert systems, application of expert systems, list of shells and tools

Learning Outcomes:

At the end of the module, students will be able to:

1. Illustrate knowledge representation using semantic networks, extended semantic networks and frames. (L2)
2. List phases in building expert systems (L1)
3. Distinguish between expert systems and traditional systems (L2)
4. Develop rule based expert system (L3)

UNIT-V:

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian beliefnetworks, certainty factor theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membershipfunctions, multi valued logic, fuzzy logic,linguistics variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Learning Outcomes:

At the end of the module, students will be able to:

1. Apply probability approaches like Bayesian belief networks, certainty factor theory, to address AI problems. (L3)
2. Apply fuzzy sets and fuzzy Logic Operations To Address Uncertainty In AI. (L3)

TEXT BOOKS:

1. Artificial Intelligence- SarojKaushik, Cengage Learning,
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russell, Peter Norvig, PEARSON

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, - George F Luger, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson
4. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rded, TMH
5. Introduction to Artificial Intelligence, Patterson, PHI

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3201.2	Malware Analysis **(Professional Elective –II)**	3	0	0	3

Course Objectives:

- To understand the purpose of computer infection program.
- To implement the covert channel and mechanisms.
- To test and exploit various malware in open source environment.
- To analyze and design the famous virus and worms.
- Understand the Reverse Engineering (RE) Methodology
- Disassemble products and specify the interactions between its subsystems and their functionality

Course Outcomes: At the end of the course, student will be able to

1. Explain the characteristics of Malware and its effects on Computing systems.
2. Predict the given system scenario using the appropriate tools to Identify the vulnerabilities and to perform Malware analysis.
3. Analyze the given Portable Executable and Non-Portable Executable files using Static and dynamic analysis techniques.
4. Demonstrate the Malware functionalities.
5. Apply anti-reverse engineering in different Applications

UNIT–I:

Malware Basics- General Aspect of Computer infection program, Non Self Reproducing Malware, How does Virus Operate, Virus Nomenclature, Worm Nomenclature, Recent Malware Case Studies.

UNIT– II:

Basic Analysis- Antivirus Scanning, x86 Disassembly, Hashing, Finding Strings, Packed Malware, PE File Format, Linked Libraries & Functions, PE Header File &Section.

UNIT–III:

Advanced Static & Dynamic Analysis-IDA Pro, Recognizing C code constructs, Analyzing malicious windows program, Debugging, OllyDbg, Kernel Debugging with WinDbg, Malware Focused Network Signatures.

UNIT–IV:

Malware Functionalities-Malware Behavior, Covert Malware Launch, Data Encoding, Shell code Analysis.

UNIT–V:

Reverse Engineering Malware (REM): REM Methodology, Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining Clam AV-Signatures.

Text books:

1. Michael Sikorski, Andrew Honig "Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" publisher Williampollock

Reference Books:

1. ErciFiliol, "Computer Viruses: from theory to applications", Springer, 1st edition, 2005.

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3201.3	Human Computer Interaction **(Professional Elective –II)**	3	0	0	3

COURSE OBJECTIVES:

- To get student to think constructively and analytically about how to design and evaluate interactive technologies.
- Describe the various styles and interactive devices in designing.
- Analyze the quality and different strategies in language processing.
- Study the design principles and guidelines of HCI.
- Apply different search patterns on data.

COURSE OUTCOMES:

1. Understand the capabilities of both humans and computers from the viewpoint of human information processing.
2. Understand human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
3. Apply an interactive design process and universal design principles to designing HCI systems.
4. Analyse HCI design principles, standards and guidelines.
5. Analyzed tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

Unit 1

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession

Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

Learning Outcomes: student will be able to

- Describe basic concepts of interactive systems.
- Analyze basic design and development methods.

Applications: useful formanaging design process.

Unit 2

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays.

Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

Learning Outcomes:student will be able to

- Describe utilisation of menus &dialog boxes.
- Analyze the interactive devices.

Applications: useful for designing of menus & dialog boxes in newly developed user applications.

Unit 3

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

Learning Outcomes: student will be able to

- Describe structure & strategies of natural language computing.
- Analyzeworking quality of designed applications.

Applications: useful for verifying quality of service by taking certain parameters.

Unit 4

Balancing Function and Fashion: Introduction, Error Messages, Non anthropomorphic Design, Display Design, Web Page Design, Window Design, Color

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

Learning Outcomes: student will be able to

- Analyzeand design different web pages.
- Analyzedocumentation generation.

Applications: useful for designing of different pages,documentation for each application

Unit 5

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Learning Outcomes:student will be able to

- Analysis of information search in textual documentation.

Applications: Easy to apply information search in all categories.

Text Books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

1 Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley

Subject Code	Subject Name	L	T	P	C
R19CSE-PE3201.4	Advanced Computer Networks **(Professional Elective –II)**	3	0	0	3

Course Objectives:

- To make the addressing mechanisms and address translation familiar to the student.
- To identify the fields in the Packet and its importance.
- Understand the Routing Protocols and its importance.
- Analyse the difference between connection oriented and connection less protocols.
- Understand the data transfer applications.

Course Outcomes:

1. Classify the Network Architectures and Topologies.
2. Analyze the Transmission Techniques.
3. Interpret Framing Techniques and Protocols.
4. Summarize the Medium Access Techniques and Analyze the IEEE Standards for different Layers.
5. Discuss various Routing Algorithms.

Unit 1:

IP Addressing: AddressSpace,Notations,Classliilladdressing,Classless addressing, NetworkAddresstranslation(NAT).InternetProtocol(IP): Datagram Format,Fragmentation, Options. ICMPv4: Messages,DebuggingTools,ICMPCheck sum,MobileIP:Addressing,Agents,Three Phases. InefficiencyinMobileIP.VirtualPrivate NetworkTechnology.

Learning Outcomes: student will be able to

- Understand the addressing mechanisms. (L2).
- Understand the calculation of Check Sum.(L2)
- Analyze packet format.(L4).

Applications: Conceptual Framework of a Network, ATM, Online reservation systems, reservation systems.

Unit-2:

IPv6Addressing: Representation,addressspace,addressspaceallocation,Autoconfiguration,Ren umbering. TransitionfromIPv4 to IPv6:Dual Stack, Tunneling, HeaderTranslation. IPv6 Protocol: Packet format,ExtensionHeader.

Learning Outcomes: Student will be able to

- Understand the IPV6 addressing .(L2).
- Analyze IPV6 Header fields. (L4).
- Understand the IPV6 format. (L2).

Applications: Addressing mechanisms in real time will be learnt.

Unit 3:

Introduction: Inter-domain,Intra-domainRouting. **Routing Algorithms:**DistanceVector Routing, Bellman—Fordalgorithm,LinkStateRouting,PathVectorRouting. UnicastRoutingProtocols:InternetStructure,RoutingInformationProtocol(RIP),OpenShortestPa th First(OSPF),BorderGatewayProtocolVersion 4(BGP4). Protocols: MulticastDistanceVector(DVMRP),MulticastLinkState (MOSPF),ProtocolIndependentMulticast(PIM).

Learning Outcomes: Student will be able to

- Understand the Network Layer concepts. (L2)
- Understand the types of routing algorithms. (L2)

Applications: Routing techniques in real world.

Unit4:

User DatagramProtocol: UserDatagram, UDP Services, UDPApplications .

TransmissionControlProtocol:TCPServices,TCPfeatures,Segment,ATCPConnection,State TransitionDiagram,WindowsinTCP,FlowControl,ErrorControl,TCP CongestionControl,TCPTimers,Options. SCTP: SCTP Services,SCTPFeatures,PacketFormat,FlowControl,ErrorControl.

Learning Outcomes: Student will be able to

- Understand the Transport Layer protocols.(L2)
- Understand which protocols are used for Flow Control and Error Control.(L2)

Applications: Used to implement data transfer and collision detection mechanisms.

Unit 5

WorldWideWeb and HTTP,FTP,TFTP,e-mail :Architecture,SMTP,POP,emailsecurity,MIME,RemoteLogin:Telnet and SSH.

Learning Outcomes: Student will be able to

- Understand E-mail architecture(L2)
- Understand security in Email.(L2)

Applications: mail transfer and real time data transfer.

Text Books:

1. Data Communications and Networking ,Behrouz A Forouzan,Fourth Edition.
2. InterNetworking with TCP/IP Volume 1 Fourth Edition, PrenticeHallo1IndiaPrivateLimited,

Reference Books:

1. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education
2. AdvancedComputerNetwork, B.M.Harwaniand DTEditorial, DreamtecISBN978-93-5004-013-3

Subject Code	Subject Name	L	T	P	C
R19BSH-OE3201	Statistics with R Programming **(Open Elective- I)**	3	0	0	3

Course Objective:

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modelling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

Course outcomes:

1. Apply the concepts of data types, data structure and advanced data structure in R Programming to the basic mathematics.
2. Develop R programs using control statement and functions.
3. Develop R programs using Mathematical and Statistical techniques.
4. Create various graphs using for data interpretations.
5. Implement probability Distributions and statistical methods using R.

UNIT-I

Introduction-How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

Learning Outcomes: Student should be able to

1. Understand the basic elements of programming languages. (L2)
2. Understand the concepts of Basic Math functions and Data types. (L2)

UNIT-II

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation.

Learning Outcomes: Student should be able to

1. Understand the concepts of structures, control statements and functions. (L2)
2. Apply the above concepts to solve basic math problems. (L3)

UNIT-III

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product.Set Operation, Input /Output, Accessing the Keyboard and Monitor, Reading and writer Files,

Learning Outcomes: Student should be able to

1. Create their own customized functions. (L6)
2. Identify data from files and other sources and perform various data manipulation tasks on them. (L2)

UNIT-IV

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

Learning Outcomes: Student should be able to

1. Create simple graphs and charts used in introductory statistics. (L6)
2. Construct tables and figures for descriptive statistics. (L6)

UNIT-V

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions, Basic Statistics, Correlation and Covariance, T-Tests. Linear Models, Simple Linear

Regression, -Multiple Regression.

Learning Outcomes: Student should be able to

1. Apply R programming to data Analytics. (L3).
2. Implement statistical functions in R. (L4)

Text books:

1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson

Reference books:

1) R Cookbook, PaulTeetor, Oreilly.
2) R in Action, Rob Kabacoff, Manning

Subject Code	Subject Name	L	T	P	C
R19BSH-OE3203	Entrepreneurship and Incubation **(Open Elective- I)**	3	0	0	3

Course Objectives:

1. Creation of environment and facilities to instruct students and assist in identifying products or services.
2. Develop innovative products, services, processes and techniques.
3. Able to prepare financial proposals and start-ups.
4. Promotethe ideas to collaborate with entrepreneur skills in establishment of start-ups.
5. Encourage the students to learn current trends of Science and Technology opportunities.

Course outcomes:

1. Enriches the knowledge of Entrepreneurial behavior, and skill development.
2. Initiate business ideas that have value in the end-market.
3. Identify the validity of idea and its unique selling proportion.
4. Comprehend opportunity and challenges of-start up (L2)
5. Analyze various Government andnon-Government financial resource.

Unit I:

Fundamentals of Entrepreneurship: Fundamentals of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship -Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship.

Case lets: Business cases of TATA Steel, Infosys, Visakha dairy.

Learning Outcomes:

At the end of this unit students will be able to:

- Interpret the concepts of entrepreneurship and the characteristics of an entrepreneur. (L2)
- Explain the significance of entrepreneurship in the economic development of a nation.(L3)

Unit II:

Ideation and Evaluation of Business Ideas : Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation –Technological Innovation And Entrepreneurship -Business Idea Evaluation - Product/ Service design – Design Thinking – Customer.

Case lets: Business cases of OYO, Paytm and Ola automobiles.

Activity: Concept generation methods.

Learning Outcomes:

- At the end of this unit students will be able to:
- Choose the right business ideas. (L3)
- Evaluate the business idea. (L2)

Unit III:

Feasibility Analysis and Business plan: Thrust areas of entrepreneurship - Techno-economic feasibility assessment- Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas- Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft)

Learning Outcomes:

At the end of this unit students will be able to:

- Evaluate technical feasibility.(L1)
- Developbusiness canvas. (L4)

Unit IV:

Business Incubation and start-ups: Fundamentals of business incubation - Business incubator models - Services of incubators - Start-ups-practical applications and challenges-start up strategy -blue ocean strategy vs red ocean strategy.

Activity: Business plan presentation.

Learning Outcomes:

At the end of this unit students will be able to:

- Describe the process of business incubation/incubators (L2)
- Select a suitable incubator and build a feasible business model. (L3)

Unit V:

Financial resources: Sources of finance – Bootstrapping - Government Support – Financial & Non-financial– Venture Capitalists & Angel Investors.

Activity: Business plan final version

Learning Outcomes:

At the end of this unit students will be able to:

- Knowledge about various sources of finance for entrepreneurship. (L2)
- Analyzethe opportunities Seed capital /Angel financiers and understand operation.(L3)

Text Book:

1. T.V Rao, Donald F. Kuratko, Entrepreneurship,A South-Asian Perspective, Cengage Learning, 2012
2. DatsyDavies,Indian Startups, Amazon Asia-Pacific Holdings Private Limited, 2016

Reference Books:

1. P.N.Rath, Sarjue Pandita, Entrepreneurship: Startup India & Stand up India, Lexicon Publishing House, 2018
2. MadhurimaLall, Shikha Sahai, Entrepreneurship, Excel Books (P) Ltd. 2008
3. Rajeev Roy, Entrepreneurship, Oxford Higher Education. 2011
4. H. Nandan, Fundamentals of Entrepreneurship, PHI Learning (P) Ltd, 2013

Web Resources:

https://www.startupindia.gov.in/
https://strategyzer.com/canvas/business-model-canvas
https://canvanizer.com/new/lean-canvas
https://msme.gov.in/
https://t-hub.co/
http://www.apinnovationsociety.com/index.php
https://aim.gov.in/atal-incubation-centres.php
https://nptel.ac.in/courses/110/106/110106141/

Subject Code	Subject Name	L	T	P	C
R19BSH-OE3202	Optimization Techniques **(Open Elective- I)**	3	0	0	3

Course objectives :

- To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
- To state single variable and multi variable optimization problems, without and with constraints.
- To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
- To state transportation and assignment problem as a linear programming problem to determine Simplex method.
- To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.

Course Outcomes

The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
4. Solve transportation and assignment problem by using Linear programming Simplex method.
5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.

UNIT – I

Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

At the end of this module the student will be able to :

- Understand various Optimization problems.(L2)
- Apply various objective functions on the Optimization Problems.(L2)

UNIT – II

Classical Optimization Techniques : Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

At the end of this module the student will be able to :

- Classify single and multi variable optimization techniques.(L3)
- Apply various Lagrange multipliers to solve the optimization problem.(L3)

UNIT – III

Linear Programming : Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Duality in Linear Programming – Dual Simplex

method.

At the end of this module the student will be able to :

- Identify what is a Linear programming problem.(L2)
- Summarize the solutions of Linear programming problems.(L2)

UNIT – IV

Transportation Problem : Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

At the end of this module the student will be able to :

- Identify the basic feasible solution using north west corner rule.(L2)
- Apply Vogels approximation method for testing optimality.(L3)

UNIT – V

- **Nonlinear Programming:** Unconstrained cases – One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method – Univariate method, Powell's method and steepest descent method.
- **Constrained cases** – Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

At the end of this module the student will be able to :

- Classify the constrained and unconstrained problem.(L3).
- Summarize the interior and exterior penalty function methods.(L2)

Text Books

1. "Engineering optimization : Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene& K.D. Kumar, Springer (India), Pvt. LTd.

Reference Books

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
3. "Operations Research : An Introduction" – by H.A.Taha,PHIpvt. Ltd., 6th edition Linear Programming–by G. Hadley.

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3204	Software Architecture and Design Patterns	3	0	0	3

Course Objectives:

1. The course should enable the student:
2. To understand interrelationships, principles and guidelines governing architecture and evolution over time.
3. To understand various architectural styles of software systems.
4. To understand design patterns and their underlying object-oriented concepts.
5. To understand implementation of design patterns and providing solutions to real world software design problems.
6. To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

Course Outcomes:

1. Understand the importance of Software Architecture with various reference models and documenting architectures.
2. Evaluation of architectures with appropriate decision making by system architect.
3. Analyse how problems can be solved using design patterns.
4. Understanding about the structural design patterns.
5. Analyse the case study of design patterns to solve the complex problems

UNIT-I

Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating and Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

Learning Outcomes:student will be able to

- Understand the necessity of Architecture Business Cycle and importance of Software Architecture.
- Understand software architecture with various reference models.
- Understand documenting software architectures.
- Analyse the Quality Attributes.

Applications:

- Architecture are influenced by (a) system stakeholders (b) developing organization (c) experience of the architect

UNIT-II

Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, CBAM

Moving from One System to Many: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Learning Outcomes:student will be able to

- Understand Architecture Evaluation.
- Understand different analysis models.
- AnalyseArchitecture design decision making.
- Analyse how software architectures can used in different software applications.

Applications:MVC architecture etc.,

UNIT-III

Patterns: Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creational Patterns: Abstract factory, Builder, Factory method, Prototype, Singleton

Learning Outcomes:student will be able to

- Understand what is the use of design patterns.
- Analyse how problems can be solved using design patterns.
- Analyse how to use creational design patterns for different problems.
- Evaluate the product design can be independent or not.

Applications: Usage of MVC architecture for developing web applications.

UNIT-IV:

Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

Learning Outcomes:student will be able to

- Understand the structure of design patterns.
- Analyse how classes and objects are composed to form large structures.
- Understands the logic of design patterns.

Applications: The result is a class that combines the properties of its parent classes. This pattern is particularly useful for making independently developed class libraries work together.

UNIT-V:

Behavioural Patterns: Chain of responsibility, command, Interpreter, state, strategy, template method, visitor. The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

Learning Outcomes:student will be able to

- Analyseresponsibilitiesbetween objects of classes.
- Apply complex control flow in applications.
- Analyse various dependencies between objects with respect to classes.

Applications: Quality of application can observed in web and desktop applications.

Text Books

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements &Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

Subject Code	Subject Name	L	T	P	C
R19CS-PC3205	Data Mining LAB	0	0	3	1.5

Course Objectives:

- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and An unsupervised setting.
- Handling a small data mining project for a given practical domain.

Course Outcomes:

1. Understand the Environment of weka tool and prepare Data sets.
2. Understand various pre-processing Techniques.
3. Analyze Various classification Algorithms.
4. Apply the Association rule mining to various data sets to Extract Patterns.
5. Analyze various clustering Algorithms.

System/Software Requirements:

· Intel based desktop PC

· WEKA TOOL

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of classification rule process on dataset student.arff using j48 algorithm
2. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
3. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
4. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
5. Demonstration of Association rule process on dataset contactlenses.arff using apriorialgorithm
6. Demonstration of Association rule process on dataset test.arff using apriori algorithm
7. Demonstration of clustering rule process on dataset iris.arff using simple k-means
8. Demonstration of clustering rule process on dataset student.arff using simple k- means.

Applications:

1. Financial Analysis
2. Biological Analysis
3. Scientific Analysis
4. Intrusion Detection
5. Fraud Detection
6. Research Analysis

Subject Code	Subject Name	L	T	P	C
R19CSE-PC3206	Software Architecture and Design Patterns LAB	0	0	3	1.5

Course Objective:

- The course is design to break down the root cause of inherited software complexity. After an in-depth
- knowledge to Object Models, their structures, and interactions, the course takes a thorough tour of
- UML 2.0 using Rational Unified Process (RUP) as development model.
- Software Architecture & Design Patterns are taught as reusable components of the design.
- Several architectural styles, middleware architectures are briefly studied with systems examples to
- help students understand the concept and offer quick practice

Course Outcomes:

1. Understand the importance of Software Architecture
2. Implement with case-study of weather mapping system.
3. Apply different design patterns on case-studies.
4. Analyse the case study with respect to design pattern to solve the complex problem.
5. Evaluate the results in solving the complex problem by choosing the design pattern.

Software Architecture Lab

The course project is divided in 3 small components that will be performed during the different lab sessions. The project consists of the design and implementation of the software architecture of a Weather Mapping System (WMS).

Implementation will take place both in Java or C++ (combination of both languages).

Report and demo (if applicable) for each assignment is due for the following session.

1. Tool Presentation

This session is an introductory session; there is no lab assignment for this session.

Introduction to working with an industrial strength software development environment, namely

Rational Rose: how to write and maintain a UML specification; configuration management; architecture design; CORBA-IDL document generation; Java code generation from a UML model etc.

Presentation of the Project: Weather Mapping System.

2. Use Case View

Design of the Use Case View. Risk Analysis.

3. Logical View

Design of the Logical View of the Weather Mapping System (WMS).

Design Patterns Lab

S. No Programs

1. Use case and class Diagram for Librarian Scenario
2. Using UML design Abstract factory design pattern
3. Using UML design Adapter-class Design pattern
4. Using UML design Adapter-object Design pattern
5. Using UML design Strategy Design pattern
6. Using UML design Builder Design pattern
7. Using UML design Bridge Design pattern
8. Using UML design Decorator Design pattern
9. User gives a print command from a word document. Design to represent this chain of responsibility Design pattern
10. Design a Flyweight Design pattern

11. Using UML design Facade Design pattern.
12. Using UML design Proxy Design pattern
13. Using UML design Visitor Design pattern

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3201	Wireless Sensor Networks (**Honors Courses 3: Track-1)**	3	1	0	4

Course Objectives:

- Emphasize the basic WSN technology and sensor node architecture with its unique constraints and challenges in design of WSN for different Applications.
- Summarize the transceiver design and network technologies used in wireless sensor and networks.
- Explains various key MAC protocols for sensor networks with their merits and demerits.
- Provide knowledge of different routing protocols with their advantages.
- Create awareness on transport layer protocols,security considerations, sensor network platforms and tools with a brief study of different WSN applications.

Course outcomes:

1. Understand the wireless sensor node architectures.
2. Understand Topologies of WSN.
3. Analyse MAC protocols of wireless sensor and networks.
4. Analyse various network layer routing protocols of wireless sensor.
5. Understand the Design and Security Issues of Transport Layer of WSN.

Unit 1

Overview of Wireless Sensor Networks: Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

Architectures:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Learning Outcomes:Students will be able to:

1. Describe application domain of Wireless Sensor Networks (L2)
2. Understand architecture of Wireless Sensor Networks(L2)

Unit 2

Networking Technologies:

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, and WANETs.

Learning Outcomes: Students will be able to:

1. Describe design considerations of Physical Layer and Transceiver(L2)
2. Illustrate Topologies of PANs, MANETs, and WANETs (L2)

Unit 3

MAC Protocols for Wireless Sensor Networks:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

Learning Outcomes: Students will be able to:

1. Understand MAC protocol(L2).
2. DescribeMAC Protocols that use Directional Antennas (L2).

Unit 4

ROUTING PROTOCOLS:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

Learning Outcomes: Students will be able to:

1. Understand Routing Protocol for Ad Hoc Wireless Networks (L2)
2. Use Routing Protocols for Ad Hoc Wireless Networks (L2)

Unit 5

Transport layer and security protocols:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning. Secure Routing in Ad Hoc Wireless networks.

Sensor network platforms and tools

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Learning Outcomes: Students will be able to:

1. Understand Transport Layer Protocol for Ad Hoc Wireless Networks (L2)
2. Security in Ad Hoc Wireless Networks (L2)

Text Books

1. Ad Hoc wireless networks: Architectures and protocols - C.Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Ad - Hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press.
3. Holger Karl & Andreas Willig, Protocol and Architectures for Wireless Sensor Networks, John Wiley, 2005.

References

1. Kazem Sohraby, Daniel Minoli, &TaiebZanti, "Wireless Sensor Networks - Technology, Protocols and Applications", John Wiley, 2007.
2. Feng Zhao & Leonidas J.Guibas, “Wireless Sensor Networks - An Information Processing Approach", Elsevier, 2007.
3. Ad Hoc Mobile Wireless Networks: Protocols & Systems, C.K.Toh, 1ed, Pearson Education.
4. Wireless Sensor Networks - C.S.Raghavendra, Krishna M.Sivalingam, 2004, Springer.
5. Wireless Sensor Networks - S Anandamurugan, Lakshmi Publications.

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3202	Block Chain Technologies (**Honors Courses 3: Track-2)**	3	1	0	4

Course Objectives:

- Understand how Block chain systems (mainly Bit coin and Ethereal) work,
- To securely interact with Block chain systems,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from Block chain technology into their own projects.
- To identify the importance of crypto currency.

Course Outcomes: At the end of the unit, student will be able to:

1. Understand basic skills and knowledge of Distributed Database and Cryptography.
2. AnalyseBlock chain system by sending and reading transactions.
3. Design, build and deploy a distributed application.
4. Understand the Basic knowledge of Crypto currency.
5. Understand the Basic knowledge of Crypto currency Regulation.

Unit I

Basics Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

Learning Outcomes: At the end of the unit, student will be able to

1. Acquire basic skills and knowledge of Cryptography.
2. Understanding of current trends of Block chain, and ability to imagine its use cases and future.

Unit II

Blockchain: Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Block chain application, Soft & Hard Fork, Private and Public Block chain.

Learning Outcomes: At the end of the unit, student will be able to

1. To understand the applications of Block chain.

Unit III

Distributed Consensus:Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Learning Outcomes: At the end of the unit, student will be able to:

1. Identify the challenges in Distributed Consensus.

Unit IV

Crypto currency: History, Distributed Ledger, Bit coin protocols - Mining strategy and rewards, Ethereum -Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Side chain, Name coin.

Learning Outcomes: At the end of the unit, student will be able to:

1. Understand the Basic knowledge of Crypto currency.
2. Analyze how Bit coin Crypto currency works uses in global market.

Unit V

Crypto currency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.

Learning Outcomes: At the end of the unit, student will be able to:

1. Understand the Basic knowledge of Crypto currency Regulation.

Text Book

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).

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies.
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts.

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3203	.NET Framework (**Honors Courses 3: Track-3)**	3	1	0	4

Course Objectives:

- To understand the working environment of Microsoft Visual Studio.
- Understand the OOPS concepts, Threads and File handling
- Understand and gain practical knowledge of Collections and Reflection framework
- To make the student to create websites using ASP.NET
- Understand the concept of session tracking mechanism in real time applications.

Course Outcomes:

1. Understand structure of C#program constructs.
2. Implement object oriented concepts with files and threads.
3. Implement generics and reflections for data collection.
4. Create user interactive web pages using ASP.NET
5. Develop secure web applications with persistence and state.

Unit I

Introduction to C#-Overview of Environment-Microsoft Visual Studio 2019 and Visual C#,features,ProgramStructure,DataTypes,Working with Variables and Constants, Type Conversion, Operators, Decision Making statements, Loops, Methods, Boxing and Unboxing,Arrays,Strings.

Learning Outcomes: Student will be able to

- Understand Microsoft Visual Studio environment and its program structure. (L2)
- Understand decision making and iterations in C#. (L2)
- Implement typecasting and conversion constructs. (L4)

Unit II:

File Handling and Threads-Structure, Enums, Classes, Inheritance, Abstract class,Polymorphism,OperatorOverloading,Interfaces, Namespaces,Pre-processor Directives,Exception Handling, Garbage collection,Threads-Life cycle,creation and managing threads, File Handling.

Learning Outcomes: Student will be able to

- Understand object oriented concepts with real time applications. (L2)
- Implement Threads and file handling for synchronous data processing. (L4)
- Understand error and exception handling strategies. (L2)

Unit III

Collections and Reflections-Attributes,Reflections, Properties,Indexers, Delegates,Events,Collections,Generics,Anonymous Methods,Unsafe Codes.

Learning Outcomes: Student will be able to

- Understand hierarchy of Collections and Reflections. (L2)
- Implement delegates and events in collections. (L4)

Unit IV

ASP.NET – Controls- An introduction to Web Forms,MVC Architecture, Server-side controls,The ASP.NET execution model. ASP.Net Page Life Cycle,Controls-User, Navigation, Validation and Login Controls, Master Page and Content Page, Themes.

Learning Outcomes: Student will be able to

- Implement the Model-View-Controller architecture for creating web applications. (L4)
- Implement ASP life cycle through user controls and navigation. (L4)
- Understand login and validation controls in the web application. (L2)

Unit V

ADO.NET and Session Management : Data access and data binding using ADO.NET,ASP.Net State Management-View, Session, Application, cookies and URL encoding, Web Application Security, Authentication and Authorization, Impersonation, ASP.Net provider model, Caching, Networking concepts-Web client, Web request and response, TopListener, Topclient

Learning Outcomes: Student will be able to

- Implement ADO.NET for database accessing.(L4)
- Develop web applications with persistency and state management. (L4)
- Develop secure applications for request-response handling. (L4)

TEXT BOOKS

1. A Text book on C#- Pearson Education,S.TamaraiSelvi,R.Murugesan.
2. Programming C# 8.0: Build Cloud, Web, and Desktop Applications,Orielly Publications
3. The Complete Reference ASP.NET, Mathew Mc Donald,Mc Graw Hill

REFERENCE BOOKS

1. C# in depth, manning publications, John Skeet
2. ASP.NET Core in Action, Andrew Lock,Manning publication.

Subject Code	Subject Name	L	T	P	C
R19CSE-HN3204	Natural Language Processing (**Honors Courses 3: Track-4)**	3	1	0	4

Course Objectives:

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and Pragmatics
- To gain knowledge in automated natural language generation and machine translation
- To understand language modeling

Course Outcomes: Upon completion of the course, the student will be able to

1. Understand the fundamentals of basic Language features
2. Analyze the words involved in NLP
3. Analyse the syntactic analysis involved in NLP
4. Apply semantic Analasys for NLP
5. Compare different statistical approaches of NLP applications.

UNIT I:

Introduction: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers forlexiconandrules, Tokenization, Detecting and Correcting Spelling errors.

Learning Outcomes: Student will be able to

1. Outline different grammar based languages **(L2)**

2.Illustrate the fundamentals of natural language processing**(L2)**

UNITII :

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

Learning Outcomes: Student will be able to

1 Demonstrate N-Grams in NLP**(L2)**

2 Analyze the Different Stochastic and Transformation-based tagging (L4)

UNITIII:

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

Learning Outcomes: Student will be able to

1. Interpret CFG and PCFG in NLP **(L2)**
2. Outline the syntactic importance in NLP **(L2)**

UNITIV:

Semantics Analysis: Requirements for representation, First-Order Logic, Description Logics – Syntax-DrivenSemantic analysis, Semantic attachments – Word Senses, Relations between Senses,Thematic Roles, selectional restrictions – Word Sense Disambiguation

Learning Outcomes: Student will be able to

1 Understand different order logics **(L2)**

2 Understand requirenetsof semantics of NLP(**L2**)

UNITV:

DiscourseAnalysis andLexicalResources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution usingHobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer,Lemmatizer, Penn Treebank, Brill's Tagger, Word

Net, Prop Bank, Frame Net, BrownCorpus, British National Corpus (BNC).

Learning Outcomes: Student will be able to

1. **U**nderstand Segmentation and Coherence**(L2)**
2. Determining statistical approaches for NLP applications (**L3**)

Text Books:

1. Daniel Jurafsky, James H. Martin―Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics andSpeech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing withPython, First Edition, OReilly Media, 2009.

References:

1. Breck Baldwin, ―Language Processing with Java and LingPipeCookbook,Atlantic Publisher, 2015.
2. Richard M Reese, ―Natural Language Processing with Java, OReilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural LanguageProcessing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and InformationRetrieval, Oxford University Press, 2008.