Department of CSE (Artificial Intelligence & Machine Learning)

Circular

***

It is informed that the 4th BoS Meeting will be held on 7th February at 02:00 PM in the principal's chamber to discuss the following agenda points.

AGENDA

Item-1: Introduction of Board of Studies (BoS) Members.

Item-2: About the Department / Accreditations / Recognitions

Item-3: B.Tech CSE (AI&ML)-IV-I, IV-II Course Structure and Detailed Syllabus and Amendments.

Item-4: Amendment of III-II course structure for IOMP/Internship/SDC(DevOps) to IOMP/Internship.

Item-5: Any other points with the permission of chair.

Dr. A. Swathi

HoD & Chairman BoS

Department of CSE (Artificial Intelligence & Machine Learning)

Minutes of meeting:

The Minutes of the Meeting of the 4th Board of Studies (BoS), CSE (AI&ML) Department was conducted in hybrid mode on 7th February at 2:00 PM in the Principal's Chamber.

AGENDA:

Item-1: Introduction of Board of Studies (BoS) Members.

Item-2: About the Department / Accreditations / Recognitions

Item-3: B.Tech CSE (AI&ML)-IV-I, IV-II Course Structure and Detailed Syllabus and Amendments.

Item-4: Amendment of III-II course structure for IOMP/Internship/SDC(DevOps) to IOMP/Internship.

Item-5: Any other points with the permission of chair.

Agenda Points elaborated:

1. To confirm the minutes of previous BOS meeting and introduce CSE(AI&ML) department.

2. To approve syllabus proposal for IV B.Tech I Semester Theory subjects, taught by CSE (AI&ML) department.

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		DevOps	3	0	0	3	
2		Nature Inspired Computing	3	0	0	3	
3		Professional Elective-III	3	0	0	3	
4		Professional Elective-IV	3	0	0	3	

3. To approve syllabus proposal for IV B.Tech I Semester Practical subjects, handled by CSE (AI&ML) department to CSE (AI&ML) students of SIET.

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		DevOps	0	0	2	1	

		Lab				
2		Professional Elective-III Lab	0	0	2	1

4. To approve Project Stage-I offered to the students of IV B.Tech I Semester students of CSE (AI&ML).

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		Project Stage-I	0	0	6	6	

5. To approve syllabus proposal for IV B.Tech I Semester Theory subjects (Open Elective-I), taught by CSE (AI&ML) department to the students of other branch of SIET.

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		Introduction To Natural Language Processing	3	0	0	3	
2		AI Applications	3	0	0	3	

6. To approve syllabus proposal for IV B.Tech II Semester Professional Elective subjects, taught by CSE (AI&ML) department to CSE (AI&ML) students of SIET.

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		Professional Elective-V	3	0	0	3	
2		Professional Elective–VI	3	0	0	3	

7. To approve syllabus proposal for IV B.Tech II Semester Theory subjects (Open Elective-III), taught by CSE (AI&ML) department to the students of other branch of SIET.

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		Open Elective–III	3	0	0	3	

8. To approve Project Stage-II offered to the students of IV B.Tech II Semester students of CSE (AI&ML).

S.No.	Course Code	Course	L	T	P	Credits	Remarks

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

1		Project Stage–II including Seminar	0	0	22	11	

9. To approve amendment in IOMP offered to the students of III B.Tech II Semester students of CSE (AI&ML).

S.No.	Course Code	Course	L	T	P	Credits	Remarks
1		Industry Oriented Mini Project/Internship	0	0	2	1	

10. Any other matter as per approval of chairman BOS.

Points discussed:

1. The meeting commenced with a formal introduction of the BoS members.
2. The Chairperson welcomed all the members and highlighted their contributions to curriculum development.
3. An overview of the department's achievements, faculty expertise, research contributions, and student outcomes was presented.
4. The proposed course structure of the **IV-I and IV-II course structure** were presented and discussed.
5. **Confirmation of Minutes of the Previous BOS Meeting:**
   The minutes of the previous BOS meeting were reviewed and confirmed by all members.
6. **Approval of Syllabus Proposal for IV B.Tech I Semester Theory Subjects:**
   The following courses were approved to be taught by the CSE (AI&ML) department:
   o DevOps (3-0-0) - 3 credits
   o Nature Inspired Computing (3-0-0) - 3 credits
   o Professional Elective-III (3-0-0) - 3 credits
   o Professional Elective-IV (3-0-0) - 3 credits
   Changes made:
   o Dr. D. Vasumathi, Dr. K.Shyamala suggested to modify the title Gen AI to Generative AI under Professional Elective-III.
   o They also suggested including Reinforcement Learning in Professional Elective-IV.
7. **Approval of Syllabus Proposal for IV B.Tech I Semester Practical Subjects:**
   The following practical courses were approved:
   o DevOps Lab (0-0-2) - 1 credit
   o Generative AI Lab (0-0-2) - 1 credit

8. **Approval of Project Stage-I for IV B.Tech I Semester Students:**
   - Project Stage-I (0-0-6) - 6 credits
   - The project work will be guided by faculty members and will be evaluated based on evaluation guidelines.

9. **Approval of Syllabus Proposal for IV B.Tech I Semester Open Elective-I:**
   The following open electives were approved for students of other branches:
   - Introduction to Natural Language Processing (3-0-0) - 3 credits
   - AI Applications (3-0-0) - 3 credits

10. **Approval of Syllabus Proposal for IV B.Tech II Semester Professional Elective Subjects:**
    The following elective subjects were approved with the amendment of replacing the Web Security subject with Cyber Security:
    - Professional Elective-V (3-0-0) - 3 credits
    - Professional Elective-VI (3-0-0) - 3 credits

11. **Approval of Syllabus Proposal for IV B.Tech II Semester Open Elective-III:**
    - Open Elective-III (3-0-0) - 3 credits are approved for students of other branches.

12. **Approval of Project Stage-II for IV B.Tech II Semester Students:**
    - Project Stage-II including Seminar (0-0-22) - 11 credits are approved.

13. **Approval of Amendment in IOMP for III B.Tech II Semester Students:**
    Approved the amendment in 3-2 course structure: Industry Oriented Mini Project /Internship /SDC(DevOps) is modified to Industry Oriented Mini Project/Internship.
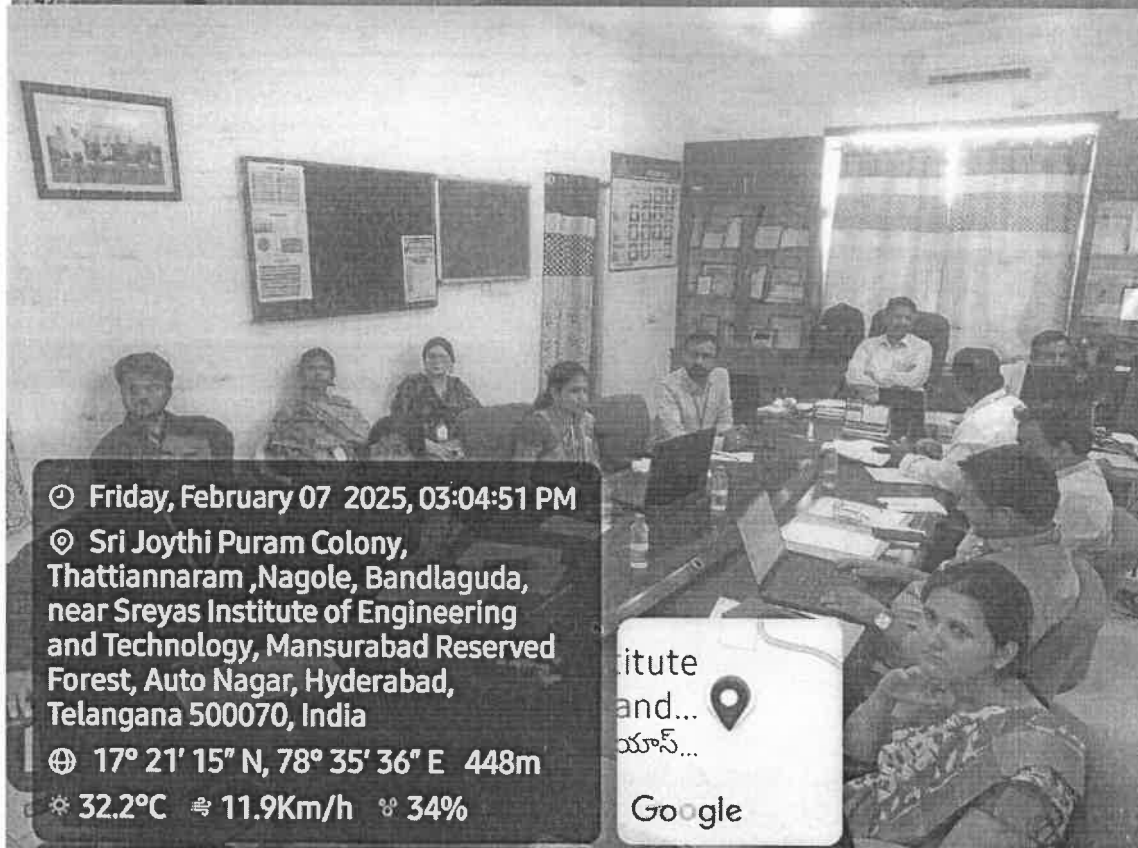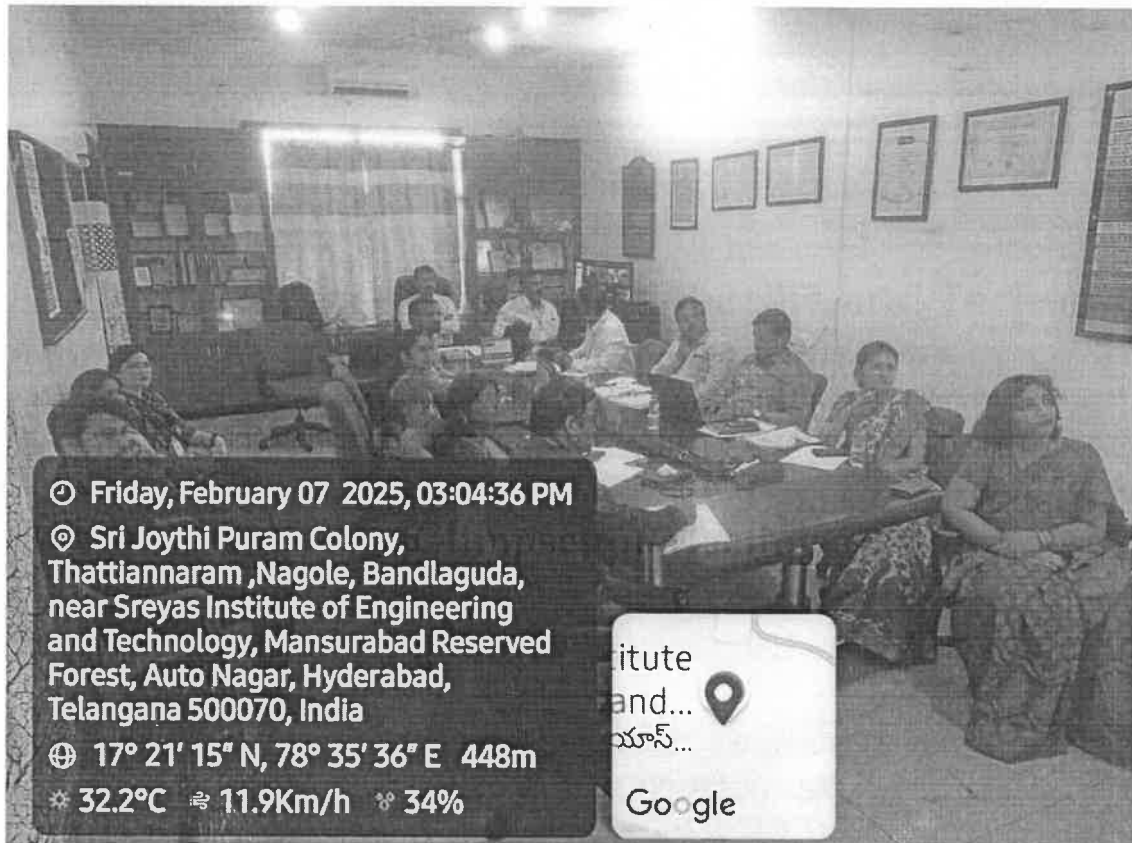
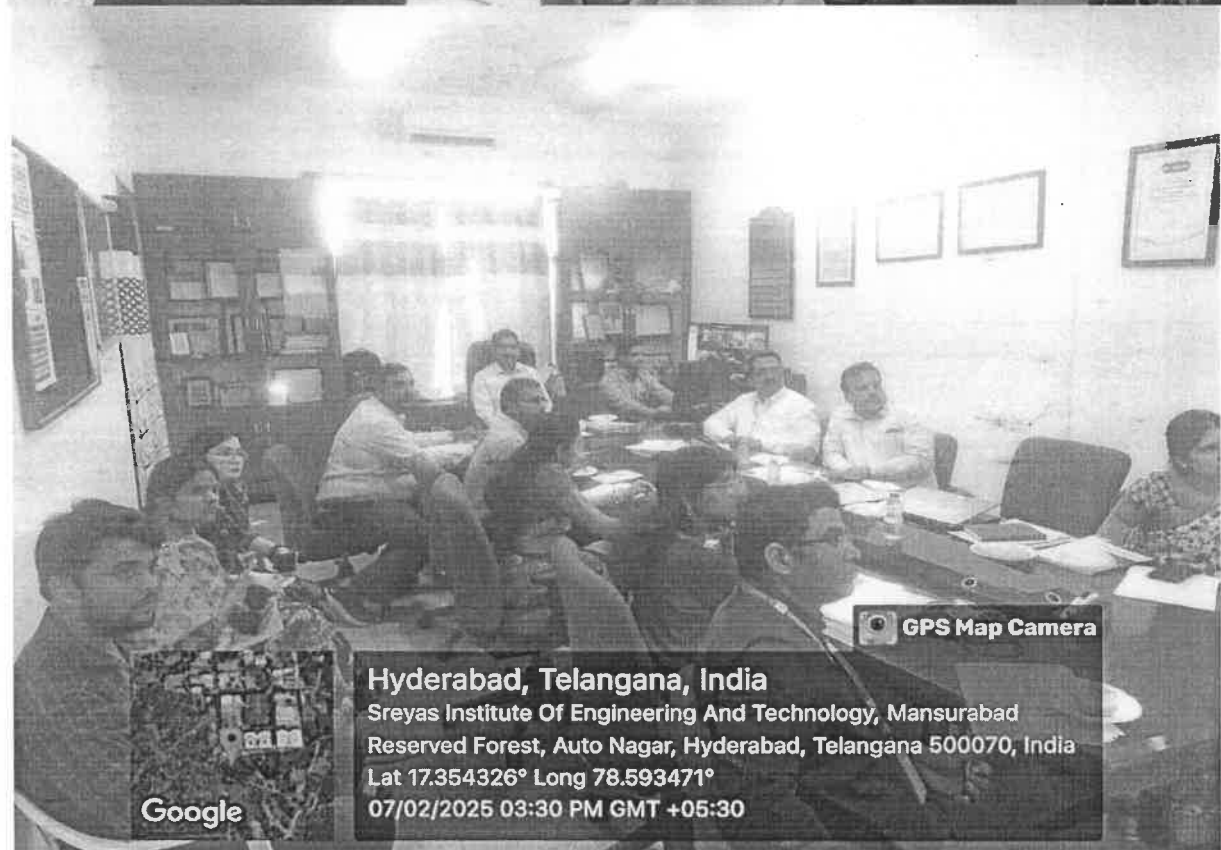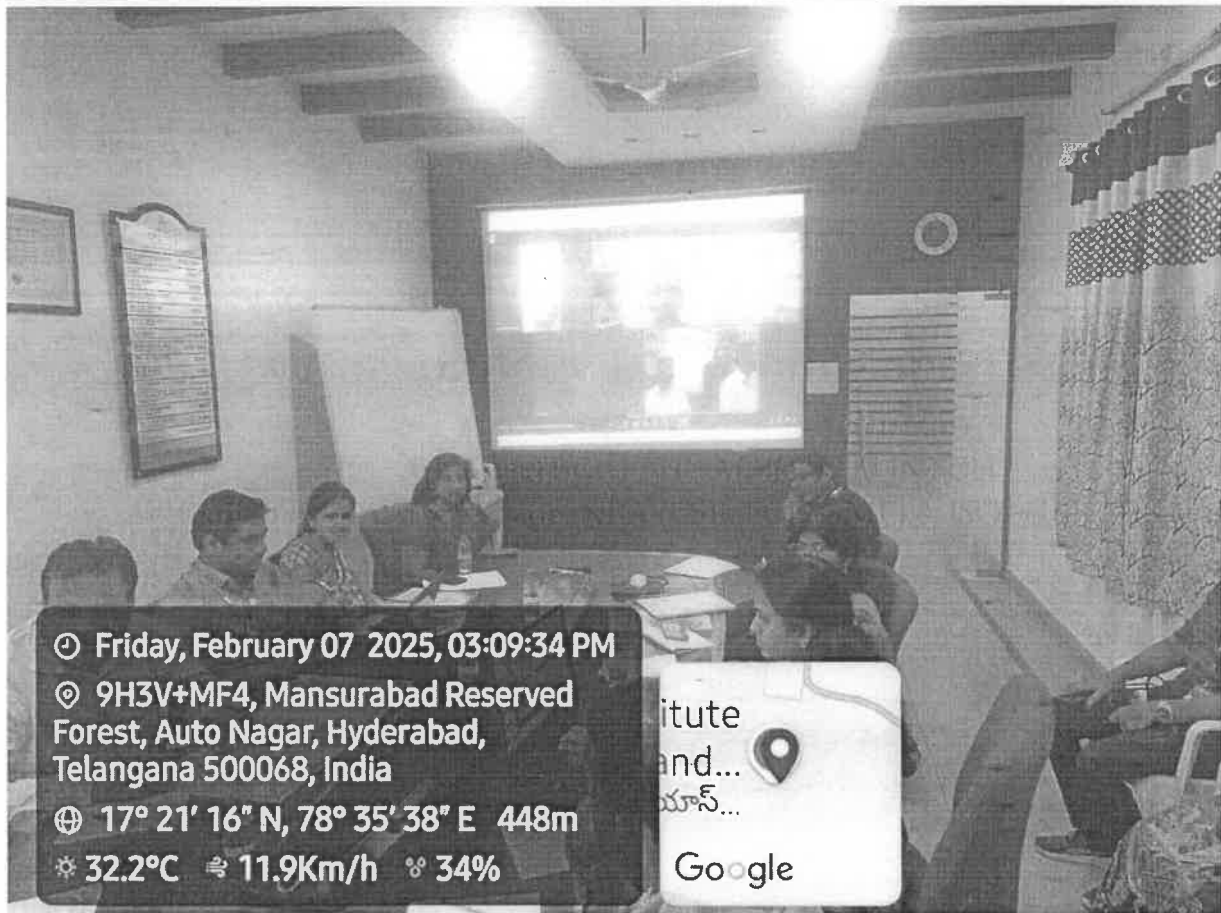14. **Any Other Matter as per Approval of Chairperson of BOS:**
    - Conventional AI syllabus verified with content from book.

15. **Conclusion of Meeting:**
    The Principal and Chairman thanked all the members for their valuable contributions and concluded the meeting.

![SREYAS logo]

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Few Glimpses of Meeting

⊙ Friday, February 07 2025, 03:04:36 PM
◉ Sri Joythi Puram Colony,
Thattiannaram ,Nagole, Bandlaguda,
near Sreyas Institute of Engineering
and Technology, Mansurabad Reserved
Forest, Auto Nagar, Hyderabad,
Telangana 500070, India
⊕ 17° 21′ 15″ N, 78° 35′ 36″ E   448m
☀ 32.2°C   ≋ 11.9Km/h   ⚲ 34%

⊙ Friday, February 07 2025, 03:04:51 PM
◉ Sri Joythi Puram Colony,
Thattiannaram ,Nagole, Bandlaguda,
near Sreyas Institute of Engineering
and Technology, Mansurabad Reserved
Forest, Auto Nagar, Hyderabad,
Telangana 500070, India
⊕ 17° 21′ 15″ N, 78° 35′ 36″ E   448m
☀ 32.2°C   ≋ 11.9Km/h   ⚲ 34%

![Sreyas logo] **Sreyas Institute of Engineering and Technology**
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Friday, February 07 2025, 03:09:34 PM

9H3V+MF4, Mansurabad Reserved Forest, Auto Nagar, Hyderabad, Telangana 500068, India

17° 21' 16" N, 78° 35' 38" E   448m

32.2°C   11.9Km/h   34%

Google

GPS Map Camera

Hyderabad, Telangana, India
Sreyas Institute Of Engineering And Technology, Mansurabad Reserved Forest, Auto Nagar, Hyderabad, Telangana 500070, India
Lat 17.354326° Long 78.593471°
07/02/2025 03:30 PM GMT +05:30

Google

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Department of CSE (Artificial Intelligence & Machine Learning)

Board of Studies - Members

S.No	Name	Designation	Position	Signature
1	Dr. A.Swathi	Prof, HoD of CSE (AI&ML)	Chairman	
2	**Dr. Devara Vasumathi**	**Prof of CSE, JNTUH, UCESTH**	**University Nominee**	
3	Dr.Varsha Srivastava	Staff Scientist & Head CDFD-Hyd	Industrialist	
4	Dr. U.M.Fernandes Dimlo	Prof, HoD of CSE, SIET	Specialized Faculty-1	
5	Dr. Kallepalli Rohit kumar	HoD of CSE (DS), SIET	Specialized Faculty-2	
6	Mr. K. Siddhardha	SDE-1, AssetSense, Hyderabad	Alumni	
7	Dr. K.Shyamala	Professor, Department of CSE, Osmania University	Subject Expert-1	
8	**Dr. Sunil Bhutada**	**Professor & Head - Department of IT, Sreenidhi Institute of Science & Technology - Hyderabad**	**Subject Expert-2**	
9	Dr. Sheri Deepika	Prof, SIET	Faculty	
10	Dr. B. Jyoshna	Prof, SIET	Faculty	
11	Dr. Sarada Sowjanya Chintalapati	Associate Prof, SIET	Faculty	
12	Dr. S.Sridhar Reddy	Associate Prof, SIET	Faculty	

The Board of Studies meeting was concluded with vote of thanks.

B.Tech. in CSE (AI & ML)
COURSE STRUCTURE & SYLLABUS
(R22 Regulations-Autonomous)
Applicable from 2022-23 Batch

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		DevOps	3	0	0	3
2		Nature Inspired Computing	3	0	0	3
3		Professional Elective-III	3	0	0	3
4		Professional Elective-IV	3	0	0	3
5		Open Elective-II	3	0	0	3
6		DevOps Lab	0	0	2	1
7		Professional Elective-III Lab	0	0	2	1
8		Project Stage-I	0	0	6	3
		Total Credits	**16**	**0**	**8**	**20**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective-V	3	0	0	3
2		Professional Elective–VI	3	0	0	3
3		Open Elective–III	3	0	0	3
4		Project Stage–II including Seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

Professional Elective-III

	Data Mining
	Scripting Languages
	Mobile Application Development
	Cloud Computing
	Generative AI

 # Courses in PE –III and PE-III Lab must be in 1-1 correspondence.

Professional Elective Lab-III

	Data Mining Lab
	Scripting Languages Lab
	Mobile Application Development Lab
	Cloud Computing Lab
	Generative AI Lab

Professional Elective-IV

	Quantum Computing
	Expert Systems
	Semantic Web
	Game Theory
	Mobile Computing
	Reinforcement Learning

Open Elective- II

	Introduction To Natural Language Processing
	AI Applications

Professional Elective-V

	Social Network Analysis
	Federated Machine Learning
	Augmented Reality & Virtual Reality
	Cyber Security
	Ad-hoc & Sensor Networks

Professional Elective–VI

	Speech and Video Processing
	Robotic Process Automation
	Randomized Algorithms
	Cognitive Computing
	Conversational AI

Open Elective III:

	Chatbots
	Evolutionary Computing

DEVOPS

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Pre-Requisites:
1.   Software Engineering

Course Objectives:
*   Understand the skill sets and high-functioning teams involved in Agile, DevOps and related methods to reach a continuous delivery capability.
*   Implement automated system update and DevOps lifecycle.

Course Outcomes:
*   Understand the various components of DevOps environment.
*   Identify Software development models and architectures of DevOps
*   Use different project management and integration tools.
*   Select an appropriate testing tool and deployment model for project.
*   Apply Continuous Integration and Continuous Deployment (CI/CD) pipelines for automated software delivery.
*   Analyze and optimize DevOps workflows to enhance software development and operational efficiency.

UNIT-I

Introduction to DevOps:

Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

UNIT-II

Software development models and DevOps:

DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience.

UNIT-III

Introduction to project management:

The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV

Integrating the system:

Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V

Testing Tools and Deployment:

Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker.

TEXT BOOKS:
1.   Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

NATURE INSPIRED COMPUTING

B.Tech. IV Year I Sem.

L T P C
2 0 0 2

Pre-requisites: Knowledge on Statistics, Data Structures, Basics of AI& ML

Course Objectives:
- Knowledge on significance of evolutionary computing, neuro computing and swarm intelligence

Course Outcomes:
- Familiar with Evolutionary Computing algorithms
- Understand scope of neurocomputing
- Compare different Ant Colony Optimization algorithmic models.
- Understand the scope of artificial immune systems
- Tackle different real world problems
- Apply AI Techniques in Bioinformatics and Information Display

UNIT - I
Evolutionary Computing
Problem Solving as a Search Task, Hill Climbing and Simulated Annealing, Evolutionary Biology, Evolutionary Computing, The Other Main Evolutionary Algorithms, From Evolutionary Biology to Computing, Scope of Evolutionary Computing

UNIT - II
Neurocomputing
The Nervous System, Artificial Neural Networks, Typical ANNS and Learning Algorithms, From Natural to Artificial Neural Networks, Scope of Neurocomputing

UNIT - III
Swarm Intelligence
Ant Colonies, Swarm Robotics, Social Adaptation of Knowledge

UNIT - IV
Immunocomputing
The Immune System, Artificial Immune Systems, Bone Marrow Models, Negative Selection Algorithms, Clonal Selection and Affinity Maturation, Artificial Immune Networks, From Natural to Artificial Immune Systems, Scope of Artificial Immune Systems
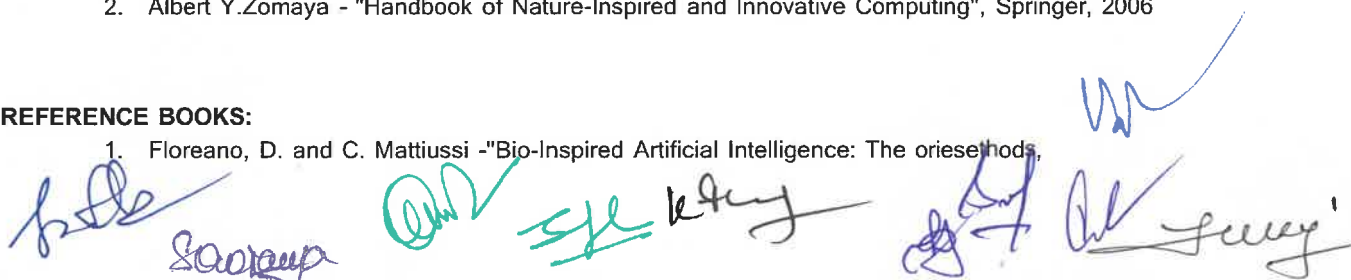
UNIT - V
Case Studies- Bioinformatics, Information Display

TEXT BOOKS:
1. Leandro Nunes de Castro - " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007
2. Albert Y.Zomaya - "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006

REFERENCE BOOKS:
1. Floreano, D. and C. Mattiussi -"Bio-Inspired Artificial Intelligence: The oriese hods,

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

and Technologies" IT Press, 2008

2. Marco Dorrigo, Thomas Stutzle -" Ant Colony Optimization", Prentice Hall of India, New Delhi, 2005
3. Vinod Chandra S S, Anand H S - "Machine Learning: A Practitioner's Approach", Prentice Hall of India, New Delhi, 2020

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA MINING (Professional Elective – III)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Pre-Requisites:
1. Database Management System
2. Probability and Statistics

Course Objectives:
- Students will become acquainted with both the strengths and limitations of various data mining techniques like Association, Classification, Cluster and Outlier analysis.

Course Outcomes:
- Understand the need of data mining and pre-processing techniques.
- Perform market basket analysis using association rule mining.
- Utilize classification techniques for analysis and interpretation of data.
- Identify appropriate clustering and outlier detection techniques to handle complex data.
- Understand the mining of data from web, text and time series data.
- Apply Advanced Mining Techniques to Real-World Problems

UNIT - I
Introduction to Data Mining:
What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing: Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT - II
Association Analysis: Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

UNIT - III
Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed - Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.
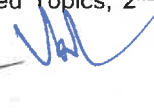
UNIT - IV
Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density-Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detection, and Overview of Outlier Detection Methods

UNIT - V
Advanced Concepts: Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

TEXT BOOKS:
1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition,

Pearson Education, India, 2006.

REFERENCE BOOKS:
1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

SCRIPTING LANGUAGES (Professional Elective – III)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Prerequisites:
1. A course on "Computer Programming and Data Structures".
2. A course on "Object Oriented Programming Concepts".

Course Objectives:
- This course introduces the script programming paradigm
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL

Course Outcomes:
1. Understand the Fundamentals of Ruby and Web Integration
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Develop Advanced PERL-Based Applications
4. Acquire programming skills in scripting language
5. Analyze the Evolution and Core Concepts of Scripting Languages
6. Apply TCL for Script-Based Application Development

UNIT - I
Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services
RubyTk - Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT - III
Introduction to PERL and Scripting
Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - IV
Advanced perl
Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.
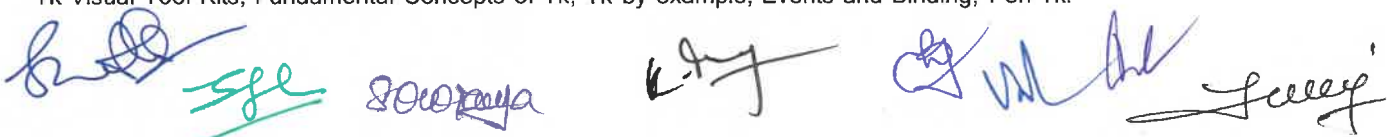
UNIT - V TCL
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk
Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.
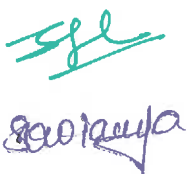
Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

TEXT BOOKS:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:
1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

MOBILE APPLICATION DEVELOPMENT (Professional Elective – III)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Prerequisites
1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives
- To demonstrate their understanding of the fundamentals of Android operating systems
- To improves their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes
- Understand the Android Operating System and Application Lifecycle.
- Develop Interactive User Interfaces in Android Applications
- Analyze and Implement Intents, Broadcasts, and Notifications
- Evaluate Persistent Storage Mechanisms in Android
- Design and Manage Databases Using SQLite and Content Providers
- Integrate Best Practices and Optimize Android Application Performance

UNIT - I
Introduction to Android Operating System: Android OS design and Features - Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components - Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes
Android Application Lifecycle - Activities, Activity lifecycle, activity states, monitoring state changes
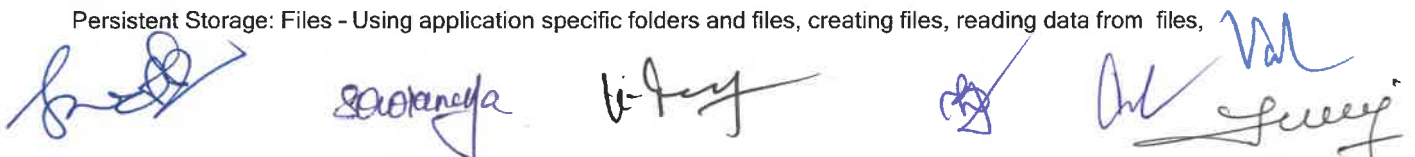
UNIT - II
Android User Interface: Measurements - Device and pixel density independent measuring unit - s Layouts - Linear, Relative, Grid and Table Layouts
User Interface (UI) Components –Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling - Handling clicks or changes of various UI components
Fragments - Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

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

UNIT - IV
Persistent Storage: Files - Using application specific folders and files, creating files, reading data from files,

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V
Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOK:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.

REFERENCE BOOKS:
1. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.
2. Beginning Android 4 Application Development, Wei-Men

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

CLOUD COMPUTING (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
3  0  0  3
```

Pre-requisites:
1. A course on "Computer Networks".
2. A course on "Operating System".

Course Objectives:
- This course provides an insight into cloud computing.
- Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models, Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing.

Course Outcomes:
- Understand different computing paradigms and potential of the paradigms and specifically cloud computing
- Understand cloud service types, cloud deployment models and technologies supporting and driving the cloud
- Apply Cloud-Based Programming Models for Distributed Computing
- Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers
- Understand the security concerns and issues in cloud computing
- Acquire the knowledge of advances in cloud computing.

UNIT - I
Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

UNIT - II
Cloud Deployment Models, Cloud Service Models, Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, Application Environment

UNIT - III
Virtualization, Programming Models for Cloud Computing: MapReduce, Cloud Haskell, Software Development in Cloud

UNIT - IV
Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers

UNIT - V
Security in Cloud Computing, and Advanced Concepts in Cloud Computing

TEXT BOOK:
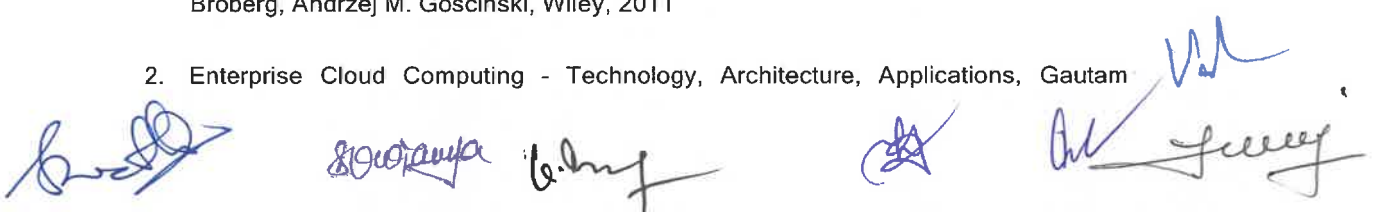1. Chandrasekaran, K. *Essentials of cloud computing*. CRC Press, 2014

REFERENCE BOOKS:
1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011

2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam

Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Generative AI (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
3  0  0  3
```

Pre-requisites: Knowledge on Probability, Statistics, Basics of ML and DL

Course Objectives
- To introduce the Fundamentals of Generative AI
- Understand the implementation of Generative AI Models

Course Outcomes
- Understand the Evolution and Foundations of Generative AI
- Apply Advanced Neural Network Architectures for Generative AI
- Analyze Large Language Models and Pre-Training Strategies
- Evaluate BERT and Transformer-Based NLP Models
- Design and Develop Generative AI Models for Music and Creativity
- Assess Ethical and Future Trends in Generative AI

UNIT-I

Introduction to Generative AI

History and evolution of AI/ML, Deep learning revolution, Transfer learning, History of Neural Natural Language Processing, Structure of Artificial Neural Networks, Steps in Training an Artificial Neural Network, Backpropagation.

UNIT 2
Advanced Neural Network Architectures

Introduction to advanced architectures, Introduction to Generative AI Models: Generative Adversarial Networks (GANs)-Generator and Discriminator networks., Variational Autoencoders (VAEs), Transformers, Attention Mechanism in detail Long Short-Term Memory Networks (LSTMs).

Unit 3
Introduction to Large Language Models

Overview of Generative AI and Large Language Models. Basics of attention mechanisms and Transformer architecture. Pre-training techniques and transfer learning strategies. Introduction to Variational AutoEncoders (VAE) of deep learning and its Application on Image fashion MNIST classification VAE.

UNIT 4
BERT and Advanced Techniques

Understanding BERT architecture and pre-training objectives. Fine-tuning BERT for downstream NLP tasks. Exploration of advanced Transformer architectures and techniques

UNIT 5
Advanced Techniques and Applications

Transfer learning in music generation, Fine-tuning generative models for specific music genres or styles, Ethical considerations in AI-generated music, Future directions and emerging trends in AI-driven music composition

Text Books:
1. "Generative AI for Everyone: Understanding the Essentials and Applications of This Breakthrough Technology". Altaf Rehmani .
2. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville.
3. "Neural Networks and Deep Learning: A Textbook" by Charu C. Aggarwal.
4. Generative AI with Python and TensorFlow 2: Create images, text, and music with VAEs, GANs, LSTMs, Transformer models" , Joseph Babcock and Raghav Bali , 2024

Reference books:

1. "Generative Adversarial Networks Cookbook: Over 100 recipes to build generative models using Python, TensorFlow, and Keras" by Josh Kalin.
2. "Generative AI in Software Development: Beyond the Limitations of Traditional Coding" Jesse Sprinter, 2024.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

QUANTUM COMPUTING (Professional Elective – IV)

B.Tech. IV Year I Sem.　　　　　　　　　　　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　0　0　3

Pre-requisites: Probability theory, Data structures

Course Objectives
- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

Course Outcomes
- Understand the Basics of Quantum Computing and Its Historical Context
- Apply Mathematical and Physical Concepts in Quantum Computing
- Analyze Qubits and Quantum Circuits
- Design and Implement Quantum Circuits
- Develop Quantum Algorithms for Computation
- Evaluate Noise, Error Correction, and Quantum Cryptography

UNIT - I
History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II
Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III
Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV
Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V
Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXT BOOK:
1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge.

REFERENCE BOOKS:
1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II.
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

EXPERT SYSTEMS (Professional Elective – IV)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Pre-requisites: AI fundamentals, Python Programming

Course Objectives:
- Understand the basic techniques of artificial intelligence.
- Understand the Non-monotonic reasoning and statistical reasoning.

Course Outcomes:
- Understand Search Strategies and AI Problem-Solving Techniques
- Apply Knowledge Representation Techniques in AI
- Analyze the Architecture and Types of Expert Systems
- Develop Expert Systems Using Knowledge Representation Tools
- Evaluate the Expert System Development Process
- Assess Challenges and Pitfalls in Expert System Development

UNIT- I

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm - game trees, Min-max algorithms, game playing – Alpha-beta pruning.

UNIT- II

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT- III

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

UNIT- IV

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

UNIT- V

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process.
Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.
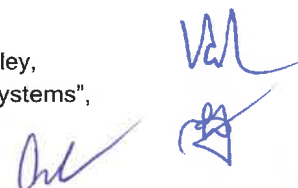
TEXT BOOKS:
1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi.
2. Waterman D.A., "A Guide to Expert Systems", Addison Wesley Longman.

REFERENCE BOOKS:
1. Stuart Russel and other Peter Norvig, "Artificial Intelligence - A Modern Approach", Prentice- Hall,
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley,
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley,
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman &Allanheld, New Jersey.

SEMANTIC WEB (Professional Elective – IV)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Pre-requisites: Web Technologies, AI Concepts

Course Objectives:
- Introduce Semantic Web Vision and learn Web intelligence
- Understanding about XML, RDF, RDFS, OWL
- Querying Ontology and Ontology Reasoning
- To learn Semantic Web Applications, Services and Technology
- To learn Knowledge Representation for the Semantic Web

Course Outcomes:
- Understand the characteristics of the semantic web technology
- Understand the concepts of Web Science, semantics of knowledge resource and ontology
- Describe logic semantics and inference with OWL.
- Use ontology engineering approaches in semantic applications
- Learn about web graph processing for various applications such as search engine, community detection
- Apply Semantic Web Technologies in Real-World Applications

UNIT - I
Introduction: Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT - II
Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT - III
Resource Description Framework: Features, Capturing Knowledge with RDF.
XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

UNIT - IV
Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT - V
Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base.
Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle
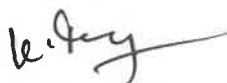
TEXT BOOKS:
1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
2. Peter Mika, Social Networks and the Semantic Web, Springer
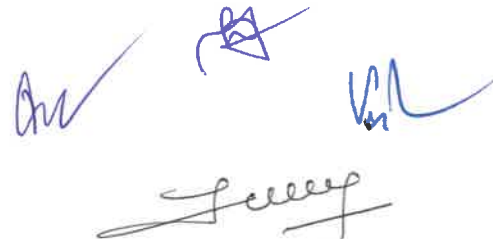
REFERENCE BOOKS:
1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience

2. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
3. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
4. Semantic Web and Semantic Web Services - Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
5. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
6. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.

GAME THEORY (Professional Elective – IV)

B.Tech. IV Year I Sem.   L T P C
3 0 0 3

Pre-requisites: Knowledge on Probability, Statistics, ML and AI Applications

Course Objectives
- The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others) in Game Theory.

Course Outcomes
- Understand the basic concepts of game theory and solutions
- Understand different types of equilibrium interpretations
- Understand and analyze knowledge and solution concepts
- Analyze extensive games with perfect information
- Understand and Apply Bargaining Theory in Game Theory
- Analyze and Apply Knowledge in Game Theoretic Models

UNIT - I

Introduction- Game Theory, Games and Solutions, Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation
Nash Equilibrium- Strategic Games, Nash Equilibrium, Examples, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information

UNIT - II

Mixed, Correlated, and Evolutionary Equilibrium -Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium
Rationalizability and Iterated Elimination of Dominated Actions- Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions

UNIT - III

Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game

UNIT - IV

Extensive Games with Perfect Information -Extensive Games with Perfect Information, Subgame Perfect Equilibrium, Two Extensions of the Definition of a Game, The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated Strategies
Bargaining Games -Bargaining and Game Theory, A Bargaining Game of Alternating Offers, Subgame Perfect Equilibrium, Variations and Extensions

UNIT - V
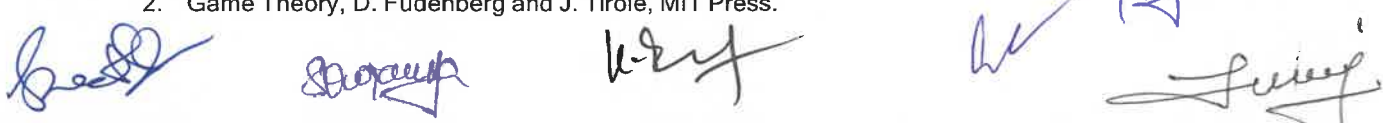
Repeated Games - The Basic Idea Infinitely Repeated Games vs. Finitely Repeated Games, Infinitely Repeated Games: Definitions, Strategies as Machines, Trigger Strategies: Nash Folk Theorems, Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion, Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion, The Structure of Subgame Perfect Equilibria Under the Discounting Criterion, Finitely Repeated Game
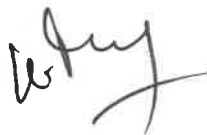
TEXT BOOKS:
1. A course in Game Theory, M. J. Osborne and A. Rubinstein, MIT Press.

REFERENCE BOOKS:
1. Game Theory, Roger Myerson, Harvard University Press.
2. Game Theory, D. Fudenberg and J. Tirole, MIT Press.

3. Theory of Games and Economic Behavior, J. von Neumann and O. Morgenstern, New York: John Wiley and Sons.
4. Games and Decisions, R.D. Luce and H. Raiffa, New York: John Wiley and Sons.
5. Game Theory, G. Owen, 2nd Edition, New York: Academic Press.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MOBILE COMPUTING (Professional Elective – IV)

B.Tech. IV Year I Sem.

```
L  T  P  C
3  0  0  3
```

Prerequisites:
- Computer Networks
- Distributed Systems / Distributed Operating Systems

Course Objectives:
- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations, typical mobile networking infrastructure through a popular GSM protocol, the issues of various layers of mobile networks and their solutions.

Course Outcomes:
- Understand the concept of mobile computing paradigm, its novel applications and limitations.
- Analyze and develop new mobile applications
- Understand the issues of various layers of mobile networks and their solutions.
- Classify data delivery mechanisms
- Design Data Dissemination and Synchronization Techniques
- Evaluate Mobile Ad Hoc Networks (MANETs) and Routing Algorithms

UNIT - I
Introduction
Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.
GSM - Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT - II
(Wireless) Medium Access Control (MAC)
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)
Mobile Network Layer
IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT - III
Mobile Transport Layer
Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.
Database Issues
Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT - IV
Data Dissemination and Synchronization
Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

UNIT -

Mobile Ad hoc Networks (MANETs)

Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOK:

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal Mobile Computing: Technology, Applications and Service Creation, McGraw Hill Education.

REINFORCEMENT LEARNING (Professional Elective – IV)

B.Tech. IV Year I Sem.

```
L  T  P  C
3  0  0  3
```

Pre-requisites: Machine Learning Fundamentals, Artificial Intelligence, Probability and Statistics

Course Objectives: Knowledge on fundamentals of reinforcement learning and the methods used to create agents that can solve a variety of complex tasks.

Course Outcomes

- Understand basics of RL.
- Understand RL Framework and Markov Decision Process.
- Analyzing ning through the use of Dynamic Programming and Monte Carlo.
- Understand TD(0) algorithm, TD(λ) algorithm.
- Implement and evaluate model-free control algorithms, such as Q-learning, SARSA, and Expected SARSA.
- Explore policy gradient methods and function approximation techniques for handling large-scale RL problems.

UNIT - I
Basics of probability and linear algebra, Definition of a stochastic multi-armed bandit, Definition of regret, Achieving sublinear regret, UCB algorithm, KL-UCB, Thompson Sampling.

UNIT - II
Markov Decision Problem, policy, and value function, Reward models (infinite discounted, total, finite horizon, and average), Episodic & continuing tasks, Bellman's optimality operator, and Value iteration & policy iteration

UNIT - III
The Reinforcement Learning problem, prediction and control problems, Model-based algorithm, Monte Carlo methods for prediction, and Online implementation of Monte Carlo policy evaluation

UNIT - IV
Bootstrapping; TD(0) algorithm; Convergence of Monte Carlo and batch TD(0) algorithms; Model-free control: Q-learning, Sarsa, Expected Sarsa.

UNIT - V
n-step returns; TD(λ) algorithm; Need for generalization in practice; Linear function approximation and geometric view; Linear TD(λ). Tile coding; Control with function approximation; Policy search; Policy gradient methods; Experience replay; Fitted Q Iteration; Case studies.

TEXT BOOKS:
1. "Reinforcement learning: An introduction," First Edition, Sutton, Richard S., and Andrew G. Barto, MIT press 2020.
2. "Statistical reinforcement learning: modern machine learning approaches," First Edition, Sugiyama, Masashi. CRC Press 2015.

REFERENCE BOOKS:
1. "Bandit algorithms," First Edition, Lattimore, T. and C. Szepesvári. Cambridge University Press. 2020.
2. "Reinforcement Learning Algorithms: Analysis and Applications," Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, and Jan Peters First Edition, Springer 2021.
3. Alexander Zai and Brandon Brown "Deep Reinforcement Learning in Action," First Edition, Manning Publications 2020.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTRODUCTION TO NATURAL LANGUAGE PROCESSING (Open Elective – II)

B.Tech. IV Year I Sem.

```
L  T  P  C
3  0  0  3
```

Prerequisites:
- Data structures and compiler design

Course Objectives:
- Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:
- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms; and design different language modeling Techniques.
- Evaluate Semantic Parsing Techniques and Meaning Representation
- Implement Advanced Language Modeling Techniques

UNIT - I
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II
Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III
Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues
Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV
Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems
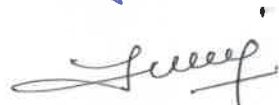
UNIT - V
Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:
1. Multilingual natural Language Processing Applications: From Theory to Practice - Daniel M. Bikel and Imed Zitouni, Pearson Publication

REFERENCE BOOKS:
1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

AI APPLICATIONS (Open Elective – II)

B.Tech. IV Year I Sem.

L T P C
3 0 0 3

Prerequisites: Fundamentals of AI

Course Objectives:

- To give deep knowledge of AI and how AI can be applied in various fields to make life easy.

Course Outcomes:

- Correlate AI and solutions to modern problems.
- Apply AI to Improve Customer Relationships and Service Efficiency
- Use of AI in business applications
- Application of AI in manufacturing automation
- Use of AI in streaming of data and Network applications
- Design AI-Driven Solutions for Industrial and Automotive Innovations

UNIT - I

Alibaba: Using Artificial Intelligence To Power The Retail And Business-To-Business Services Of The Future
Amazon: Using Deep Learning To Drive Business Performance

UNIT - II

McDonald's: Using Robots And Artificial Intelligence To Automate Processes Walmart: Using Artificial Intelligence To Keep Shelves Stacked And Customers Happy

UNIT - III

LinkedIn: Using Artificial Intelligence To Solve The Skills Crisis
Netflix: Using Artificial Intelligence To Give Us A Better TV Experience

UNIT - IV

Salesforce: How Artificial Intelligence Helps Businesses Understand Their Customers
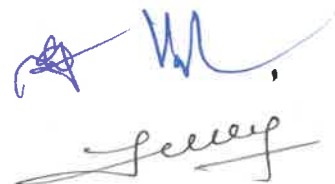Uber: Using Artificial Intelligence To Do Everything

UNIT - V

Siemens: Using Artificial Intelligence And Analytics To Build The Internet Of Trains
Tesla: Using Artificial Intelligence To Build Intelligent Cars

TEXT BOOK:

1. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

DEVOPS LAB

B.Tech. IV Year I Sem.   **L T P C**
                                                                                       0 0 2 1

Course Objectives:
•   Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

Course Outcomes:
1.   Understand the need of DevOps tools
2.   Understand the environment for a software application development
3.   Apply different project management, integration and development tools
4.   Use Selenium tool for automated testing of application

List of Experiments:
1.   Write code for a simple user registration form for an event.
2.   Explore Git and GitHub commands.
3.   Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4.   Jenkins installation and setup, explore the environment.
5.   Demonstrate continuous integration and development using Jenkins.
6.   Explore Docker commands for content management.
7.   Develop a simple containerized application using Docker.
8.   Integrate Kubernetes and Docker
9.   Automate the process of running containerized application for exercise 7 using Kubernetes.
10.   Install and Explore Selenium for automated testing.
11.   Write a simple program in JavaScript and perform testing using Selenium.
12.   Develop test cases for the above containerized application using selenium.

TEXT BOOKS:
1.   Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:
1.   Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2.   Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley..

DATA MINING LAB (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
0  0  2  1
```

Prerequisites
- A course on "Database Management System

Course Objectives:
- The course is intended to obtain hands-on experience using data mining software.
- Intended to provide practical exposure of the concepts in data mining algorithms

Course Outcomes:
1. Apply preprocessing statistical methods for any given raw data.
2. Gain practical experience of constructing a data warehouse.
3. Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data.
4. Apply OLAP operations on data cube construction

LIST OF EXPERIMENTS: Experiments using Weka/ Pentaho/Python
1. Data Processing Techniques:

(i) Data cleaning (ii) Data transformation - Normalization (iii) Data integration
2. Partitioning - Horizontal, Vertical, Round Robin, Hash based
3. Data Warehouse schemas - star, snowflake, fact constellation
4. Data cube construction - OLAP operations
5. Data Extraction, Transformations & Loading operations
6. Implementation of Attribute oriented induction algorithm
7. Implementation of apriori algorithm
8. Implementation of FP - Growth algorithm
9. Implementation of Decision Tree Induction
10. Calculating Information gain measures
11. Classification of data using Bayesian approach
12. Classification of data using K - nearest neighbour approach
13. Implementation of K - means algorithm
14. Implementation of BIRCH algorithm
15. Implementation of PAM algorithm
16. Implementation of DBSCAN algorithm

TEXT BOOKS:
1. Data Mining - Concepts and Techniques - JIAWEI HAN &MICHELINE KAMBER, Elsevier.
2. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007

REFERENCE BOOK:
1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Anuj Karpatne, Introduction to Data Mining, Pearson Education

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SCRIPTING LANGUAGES LAB (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
0  0  2  1
```

Prerequisites: Any High level programming language (C, C++)

Course Objectives
- To Understand the concepts of scripting languages for developing web based projects
- To understand the applications the of Ruby, TCL, Perl scripting languages

Course Outcomes
- Ability to understand the differences between Scripting languages and programming languages
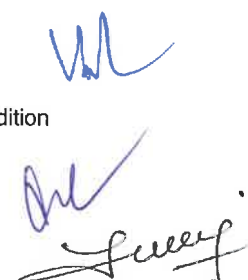- Gain some fluency programming in Ruby, Perl, TCL

LIST OF EXPERIMENTS
1. Write a Ruby script to create a new string which is n copies of a given string where n is a non-negative integer
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept the users first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for sorting a list using a comparison function
14. Write a TCL script to (i) create a list (ii) append elements to the list (iii) Traverse the list (iv) Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17.   a) Write a Perl script to find the largest number among three numbers.
        b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions
    a) Shift
    b) Unshift
    c) Push
19. a) Write a Perl script to substitute a word, with another word in a string.
    b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

TEXT BOOKS:
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MOBILE APPLICATION DEVELOPMENT LAB (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
0  0  2  1
```

Course Objectives:
- To learn how to develop Applications in an android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

Course Outcomes:
- Understand the working of Android OS Practically.
- Develop user interfaces.
- Develop, deploy and maintain the Android Applications.

LIST OF EXPERIMENTS:
1. Create an Android application that shows Hello + name of the user and run it on an emulator.
   (b) Create an application that takes the name from a text box and shows hello message along with the name entered in the text box, when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Datepicker), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on the right fragment instead of the second screen with the back button. Use Fragment transactions and Rotation event listeners.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store usernames and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with a Login Failed message.
7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

TEXT BOOKS:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage, 2013.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

CLOUD COMPUTING LAB (Professional Elective – III)

B.Tech. IV Year I Sem.

```
L  T  P  C
0  0  2  1
```

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service- oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

- Understand various service types, delivery models and technologies of a cloud computing environment.
- Understand the ways in which the cloud can be programmed and deployed.
- Understand cloud service providers like Cloudsim, Globus Toolkit etc.
- Examine various programming paradigms suitable to solve real world and scientific problems using cloud services.
- Configure and manage cloud-based databases such as Amazon RDS and Google Cloud SQL for efficient data storage and retrieval.
- Evaluate cloud security measures, file transfer mechanisms, and resource optimization techniques to enhance cloud performance and reliability.

List of Experiments:

1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IP address with the instance.
4. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count.
9. Create a database instance in the cloud using Amazon RDS.
10. Create a database instance in the cloud using Google Cloud SQL

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Generative AI LAB (Professional Elective – III)

B.Tech. IV Year I Sem.	L	T	P	C
	0	0	2	1

Course Objectives:
- This course provides an insight into Generative AI
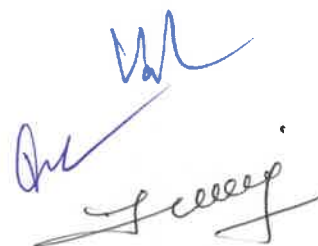- Topics covered include- GANS, LSTM, BERT

Course Outcomes:
- Understand the methods to preprocess data and apply them to GenAI models.
- Understand the ways to implement GAN, LSTM, and BERT in NLP applications.
- Understand the implementation of transformer-based models.
- Train and fine-tune generative models for text, image, and music generation.
- Optimize model performance using hyperparameter tuning and loss functions.
- Apply transfer learning techniques for domain-specific Generative AI applications.

List of Experiments:
1. Write Python scripts to implement basic operations of Tensor Flow and tensors.
2. Preprocess and clean datasets for Generative AI applications using Python libraries such as Pandas and NumPy. Handle missing data, normalize features, and encode categorical variables.
3. Use Matplotlib or Seaborn to visualize data distributions and patterns in Generative AI datasets. Plot histograms, scatter plots, and heatmaps to analyze data characteristics.
4. Implement a Generative Adversarial Network (GAN) architecture using TensorFlow 2. Train the GAN model on a dataset such as MNIST or CIFAR-10 for image generation tasks.
5. Train a GAN model on a custom dataset for image generation. Experiment with hyperparameters, loss functions, and optimization techniques to optimize GAN training.
6. Implement a Long Short-Term Memory (LSTM) network using TensorFlow 2 for text generation tasks. Train the LSTM model on a dataset of text sequences and generate new text samples.
7. Implement a Transformer-based language model (e.g., GPT) using TensorFlow 2 for text generation. Fine-tune the model on a text corpus and generate coherent and contextually relevant text.
8. Fine-tune a pre-trained language model (e.g., GPT, BERT) using transfer learning techniques. Fine-tune the model on a domain-specific dataset and evaluate its performance for text generation tasks.
9. Implement a Long Short-Term Memory (LSTM) network using TensorFlow 2 for music generation. Train the LSTM model on a dataset of music sequences and generate new musical compositions.
10. Implement a Transformer-based architecture (e.g., MusicBERT, MusicGPT) using TensorFlow 2 for music generation. Fine-tune the model on a music dataset and generate novel music compositions.

Text Books:

1. Responsible AI: Implementing Ethical and Unbiased Algorithms, by Shashin Mishra and Sray Agarwal
2. Generative AI in Practice: 100+ Amazing Ways Generative Artificial Intelligence is Changing Business and Society, Bernard Marr

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOCIAL NETWORK ANALYSIS (Professional Elective – V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites
- Web Technologies
- Computer Networks
- Data Warehousing and Data Mining

Course Objectives
- Understand the concepts of social media
- Learn the mechanisms for social network analysis
- Analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

Course Outcomes
- Ability to construct social network maps easily
- Gain skills in tracking the content flow through the social media
- Understand NodeXL use to perform social network analysis
- Visualize and Interpret Networks in Social Media Platforms
- Synthesize Network Patterns Across Social Media Platforms
- Investigate Content Interaction and Collaboration in Media Networks

UNIT - I
Introduction: Social Media and Social Networks
Social Media: New Technologies of Collaboration
Social Network Analysis: Measuring, Mapping, and Modelling collections of Connections.

UNIT - II
NodeXL, Layout, Visual Design, and Labelling, Calculating and Visualising Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

UNIT - III
CASE STUDIES:
Email: The lifeblood of Modern Communication.
Thread Networks: Mapping Message Boards and Email Lists
Twitter: Conversation, Entertainment and Information

UNIT - IV
CASE STUDIES:
Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks
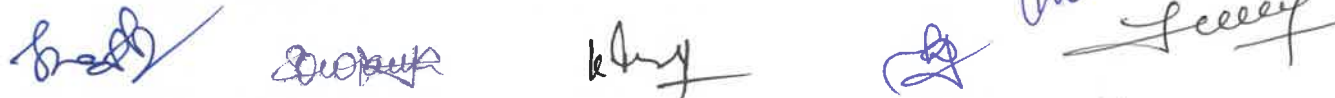
UNIT - V
CASE STUDIES:
You Tube: Contrasting Patterns of Content Interaction, and Prominence. **Wiki**
Networks: Connections of Creativity and Collaboration

TEXT BOOK:
1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.

REFERENCE BOOKS:

1. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.
2. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1st Edition, MGH, 2011.

FEDERATED MACHINE LEARNING (Professional Elective – V)

B.Tech. IV Year II Sem.   L T P C
                                                                                   3 0 0 3

Prerequisites
- The prerequisite knowledge for this course includes machine learning, basic computer systems and basic programming skills.

Course Objectives
- Understand the key concepts and issues behind Federated Learning
- Get familiar with key theoretical results of Federated Learning

Course Outcomes
- Understand the basics on privacy-preserving ML
- Analyze the key concepts of Distributed ML and FL
- Understand the key concepts and applications of Horizontal FL and Vertical FL
- Motivates the intensive mechanism design for FL
- Analyze the concepts of federated reinforcement learning
- Explore Federated Transfer Learning and its Security

UNIT - I
Introduction: Motivation, Federated Learning as a Solution, The Definition of Federated Learning, Categories of Federated Learning, Current Development in Federated Learning, Research Issues in Federated Learning, Open-Source Projects, Standardization Efforts, The Federated AI Ecosystem Background: Privacy-Preserving Machine Learning, PPML and Secure ML, Threat and Security Models, Privacy Threat Models, Adversary and Security Models, Privacy Preservation Techniques, Secure Multi-Party Computation, Homomorphic Encryption, Differential Privacy

UNIT - II
Distributed Machine Learning: Introduction to DML, The Definition of DML, DML Platforms, Scalability-Motivated DML, Large-Scale Machine Learning, Scalability-Oriented DML Schemes, Privacy-Motivated DML, Privacy-Preserving Decision Trees, Privacy-Preserving Techniques, Privacy-Preserving DML Schemes, Privacy-Preserving Gradient Descent, Vanilla Federated Learning, Privacy-Preserving Methods

UNIT - III
Horizontal Federated Learning: The Definition of HFL, Architecture of HFL, The Client- Server Architecture, The Peer-to-Peer Architecture, Global Model Evaluation, The Federated Averaging Algorithm, Federated Optimization, The FedAvg Algorithm, The Secured FedAvg Algorithm, Improvement of the FedAvg Algorithm, Communication Efficiency, Client Selection Vertical Federated Learning: The Definition of VFL, Architecture of VFL, Algorithms of VFL, Secure Federated Linear Regression, Secure Federated Tree-Boosting

UNIT - IV
Federated Transfer Learning: Heterogeneous Federated Learning, Federated Transfer Learning, The FTL Framework, Additively Homomorphic Encryption, The FTL Training Process, The FTL Prediction Process, Security Analysis, Secret Sharing-Based FTL Incentive Mechanism Design for Federated Learning: Paying for Contributions, Profit- Sharing Games, Reverse Auctions, A Fairness-Aware Profit Sharing Framework, Modeling Contribution, Modeling Cost, Modeling Regret, Modeling Temporal Regret, The Policy Orchestrator, Computing Payoff Weightage

UNIT - V
Federated Learning for Vision, Language, and Recommendation: Federated Learning for Computer Vision, Federated CV, Federated Learning for NLP, Federated NLP, Federated Learning for Recommendation Systems, Recommendation Model, Federated Recommendation System
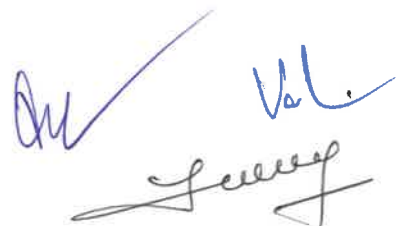
Federated Reinforcement Learning:

Introduction to Reinforcement Learning, Policy, Reward, Value Function, Model of the Environment, RL Background Example, Reinforcement Learning Algorithms, Distributed Reinforcement Learning, Asynchronous Distributed Reinforcement Learning, Synchronous Distributed Reinforcement Learning, Federated Reinforcement Learning, Background and Categorization

TEXT BOOK:

1. Federated Learning, Qiang Yang, Yang Liu, Yong Cheng, Yan Kang, Tianjian Chen, and Han Yu Synthesis Lectures on Artificial Intelligence and Machine Learning 2019.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

AUGMENTED REALITY & VIRTUAL REALITY (Professional Elective –V)

B.Tech. IV Year II Sem.

L T P C

3 0 0 3

Pre-requisites: Linear Algebra, Computer Vision Basics

Course Objectives:

- Provide a foundation to the fast growing field of AR and make the students aware of the various AR concepts.
- To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Course Outcomes:

- Describe how AR systems work and list the applications of AR.
- Understand the software architectures of AR.
- Understand the Visual perception and rendering in VR
- Understand the interaction, auditory perception and rendering in VR
- Apply Computer Vision Techniques in Augmented Reality
- Understand Motion and Interaction in Virtual and Augmented Worlds

UNIT - I
Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history of augmented reality, Examples, Related fields
Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays
Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors

UNIT - II
Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking.
Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction
Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs

UNIT - III
Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception
The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations
Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

UNIT - IV
The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color
Visual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT - V
Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection
Interaction: Motor Programs and Remapping, Locomotion, Social Interaction
Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

TEXT BOOKS:
1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;First edition (12 October 2016),ISBN-10: 9332578494
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

REFERENCE BOOKS:
1. Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

CYBER SECURITY (Professional Elective – V)

B.Tech. IV Year II Sem.

L T P C
3 0 0 3

Prerequisites: NIL

Course objectives:
- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes:
- The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT - I
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance - Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV
Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.
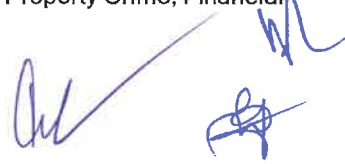
UNIT - V
Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.
Cybercrime: Examples and Mini-Cases
Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.
Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

TEXT BOOKS:
1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES BOOKS:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

AD-HOC & SENSOR NETWORKS (Professional Elective – V)

B.Tech. IV Year II Sem.

```
L  T  P  C
3  0  0  3
```

Prerequisites
- Computer Networks
- Distributed Systems
- Mobile Computing

Course Objectives
- To understand the challenges of routing in ad-hoc and sensor networks
- To understand various broadcast, mutlicast and geocasting protocols in ad hoc and sensor networks
- To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

Course Outcomes
1. Understand the concepts of sensor networks and applications
2. Understand and compare the MAC and routing protocols for adhoc networks
3. Understand the transport protocols of sensor networks
4. Analyze TCP Performance Over Ad Hoc Networks
5. Understand Wireless Sensor Networks (WSNs) and Lower Layer Issues
6. Analyze Upper Layer Protocols in WSNs

UNIT - I
Introduction to Ad Hoc Networks
Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.
Routing in MANETs
Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT - II
Data Transmission
Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT - III
Geocasting
Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT - IV
Basics of Wireless Sensors and Lower Layer Issues-Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.
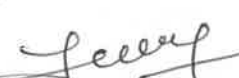
UNIT - V
Upper Layer Issues of WSN
Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

TEXT BOOKS
1. Ad Hoc and Sensor Networks - Theory and Applications, *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications, March 2006, ISBN - 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas

![Sreyas logo] **Sreyas Institute of Engineering and Technology**
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

Guibas, Elsevier Science, ISBN - 978-1-55860-914-3 (Morgan Kauffman)

REFERENCE BOOKS:

1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

SPEECH AND VIDEO PROCESSING (Professional Elective – VI)

B.Tech. IV Year II Sem.

L T P C
3 0 0 3

Pre-requisites: Knowledge on Computer Vision, ML and DL

Course Objectives:
- To make students understand speech and video processing techniques

Course Outcomes:
- Describe the mechanisms of human speech production systems and methods for speech feature extraction.
- Understand basic algorithms of speech analysis and speech recognition.
- Explain basic techniques in digital video processing, including imaging characteristics and sensors.
- Apply Digital Image and Video Processing Techniques
- Apply motion estimation and object tracking algorithms on video.
- Implement Image and Motion Segmentation Techniques

UNIT - I
Speech processing concepts
The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and non linear filter banks, spectral estimation of speech using DFT.
Linear Prediction analysis of speech.

UNIT - II
Speech recognition
Feature extraction for speech, static and dynamic feature for speech recognition, MFCC, LPCC, Distance measures, vector quantization models, Gaussian Mixture model, HMM.

UNIT - III
Multi-Dimensional Signals and Systems
Multi-Dimensional Signals, Multi-Dimensional Transforms, Multi-Dimensional Systems, Multi-Dimensional Sampling Theory, Sampling Structure Conversion
Digital Images and Video: Human Visual System and Color, Digital Video

UNIT - IV
Motion Estimation
Image Formation, Motion Models, 2D Apparent-Motion Estimation, Differential Methods, Matching Methods, Nonlinear Optimization Methods, Transform-Domain Methods, 3D Motion and Structure Estimation

UNIT - V
Video Segmentation and Tracking
Image Segmentation, Change Detection, Motion Segmentation, Motion Tracking, Image and Video Matting, Performance Evaluation

TEXT BOOKS:
1. Fundamentals of Speech recognition - L. Rabiner and B. Juang, Prentice Hall signal processing series
2. Digital Video processing, A Murat Tekalp, 2nd edition,Prentice Hall.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

REFERENCE BOOKS:

1. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
2. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, Pearson Education
3. "Speech and Audio Signal Processing", B.Gold and N. Morgan, Wiley.
4. "Digital image sequence processing, Compression, and analysis", Todd R. Reed, CRC Press
5. "Handbook of Image and Video processing", Al Bovik, Academic press, second Edition.

ROBOTIC PROCESS AUTOMATION (Professional Elective – VI)

	L T P C
B.Tech. IV Year II Sem.	3 0 0 3

Pre-requisites: Knowledge on Python Programming, AI

Course Objectives:
- Introduce robotic process automation, techniques of automation using UIPath RPA tool.

Course Outcomes:
- Understand the concepts of Robotic Process Automation.
- Apply the flow chart mechanism in various calculations.
- Applying UIPath tool for debugging process
- Utilize Plugins and Extensions for Automation
- Design system managing techniques.
- Create application for process automation using UIPath tool.

UNIT - I

Robotic Process Automation: Introduction, Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath

UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator

UIPath Studio Projects, User interface

The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

UNIT - II

Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, various types of loops and decision making

Data Manipulation: Variables and scope, Collections, Arguments - Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

UNIT - III

Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder, When to use OCR, Types of OCR available, How to use OCR

Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

UNIT - IV

Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event

Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting

UNIT - V

Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files

Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

TEXT BOOK:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition

REFERENCE BOOK:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

RANDOMIZED ALGORITHMS (Professional Elective – VI)

B.Tech. IV Year II Sem.
C

L T P

3 0 0 3

Pre-requisites: Statistics, Algorithm Design and Analysis

Course Objective:
- To introduce the power of randomization in the design of algorithms.

Course Outcomes:
- Appreciate the fundamentals of randomized algorithm design.
- Understand the fundamentals of Markov chains and the Monte Carlo method.
- Apply high probability analysis to selected randomized algorithms.
- Apply Algebraic Techniques to Pattern Matching
- Understand the Fingerprint and Pattern Matching techniques
- Understand and Implement Parallel and Distributed Algorithms

UNIT- I
Introduction, A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence
Game-Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

UNIT- II
Moments and Deviations: Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection, Two Point sampling, The Coupon Collector's problem.
Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

UNIT – III
Algebraic Techniques: Fingerprinting and Freivald's Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching

UNIT- IV
Data Structures: The Fundamental of Data-structures, Random Treaps, Skip Lists, Hash Tables
Graph Algorithms: All Pairs Shortest Path, The Min- Cut Problem, Minimum Spanning Trees

UNIT – V
Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, Half-Space Intersections, Dalaunay Triangulations, Trapezoidal Decompositions, Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings

TEXT BOOKS:
1. Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan, Cambridge University Press
2. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and
3. Data Analysis by Eli Upfal and Michael Mitzenmacher.

Sreyas Institute of Engineering and Technology

An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

COGNITIVE COMPUTING (Professional Elective – VI)

B.Tech. IV Year II Sem.   **L T P C**
                                                                             3 0 0 3

Prerequisites: Probability theory

Course Objectives:
- To provide an understanding of the central challenges in realizing aspects of human cognition.
- To provide a basic exposition to the goals and methods of human cognition.
- To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
- To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

Course Outcomes:
- Understand cognitive computing
- Plan and use the primary tools associated with cognitive computing.
- Plan and execute a project that leverages cognitive computing.
- Design Human-Centric Cognitive Systems
- Implement Formal Cognitive Models for Various Cognitive Tasks
- Understand and develop the business implications of cognitive computing.

UNIT - I
Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

UNIT - II
Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT - III
Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

UNIT - IV
Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

UNIT - V
DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOK:
1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

REFERENCE BOOKS:
1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Hollan.

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

CONVERSATIONAL AI (Professional Elective – VI)

B.Tech. IV Year II Sem

L	T	P	C
3	0	0	3

Pre-requisites: Knowledge on NLP, ML and DL

Course Objectives:
- To be familiar with the basic knowledge about conversational systems.
- To understand the different techniques of natural language processing
- Study the fundamental role of machine learning in building conversational systems.
- To know the various applications of conversational systems and its future development

Course Outcomes:
- Understand the basic technologies required for building a conversational system.
- Learn the rule-based dialogue system
- Involve AI in building conversational system and build advanced systems that are cognitively inclined towards human behaviour.
- Apply reinforcement learning and Markov decision processes to model dialogues.
- Evaluate Dialogue Systems Effectively
- Develop a real time working conversational system for social domain that can intelligently process inputs and generate relevant replies.

UNIT- I Introducing Dialogue Systems
Introduction of Dialogue System, History of Dialogue Systems, Present-Day Dialogue Systems, Modeling Conversation Dialogue Systems, Designing and Developing Dialogue Systems

UNIT- II Rule-Based Dialogue Systems: Architecture, Methods, and Tools
Dialogue Systems Architecture, designing a Dialogue System, Tools for Developing Dialogue Systems, Rule-Based Techniques in Dialogue Systems Participating in the Alexa Prize

UNIT- III Statistical Data-Driven Dialogue Systems
Motivating the Statistical Data-Driven Approach, Dialogue Components in the Statistical Data-Driven Approach, Reinforcement Learning (RL), Representing Dialogue as a Markov Decision Process, From MDPs to POMDPs, Dialogue State Tracking, Dialogue Policy, Problems and Issues with Reinforcement Learning in POMDPs

UNIT- IV Evaluating Dialogue Systems
Process of Evaluation, Evaluating Task-Oriented Dialogue Systems, Evaluating Open-Domain Dialogue Systems, Evaluation Frameworks- PARADISE, Quality of Experience (QoE), Interaction Quality, Best Way to Evaluate Dialogue Systems.
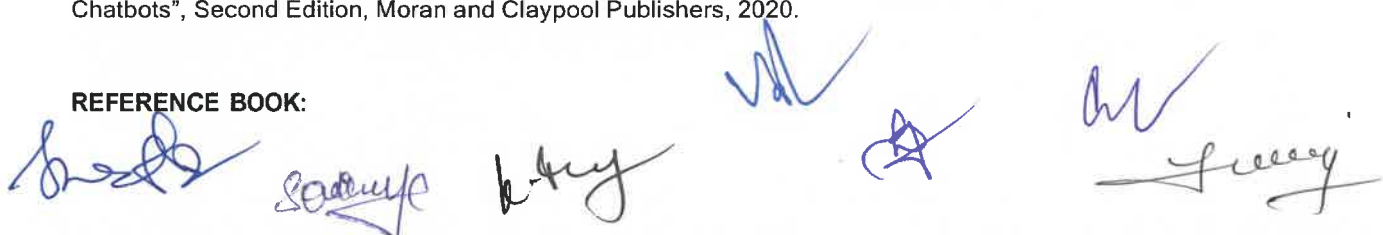
UNIT- V End-to-End Neural Dialogue Systems
Neural Network Approaches to Dialogue Modeling, A Neural Conversational Model, Introduction to the Technology of Neural Dialogue, Retrieval-Based Response Generation, Task-Oriented Neural Dialogue Systems, Open-Domain Neural Dialogue Systems, Some Issues and Current Solutions, Dialogue Systems: Datasets, Competitions, Tasks, and Challenges.

TEXT BOOKS:
1. Michael McTear, "Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots", Second Edition, Moran and Claypool Publishers, 2020.

REFERENCE BOOK:

1. Cathy Pearl, "Designing Voice User Interfaces: Principles of Conversational Experiences", O'REILLY, 2016.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

CHATBOTS (Open Elective – III)

B.Tech. IV Year II Sem.

L T P C
3 0 0 3

Pre-requisites: Knowledge on NLP, ML and DL

Course Objectives:
- Knowledge on concepts of chatbots and understanding the developer environment bot framework.

Course Outcomes:
- Understand basic concepts of chatbots
- Analyze different entities in building bots
- Understand the concepts of advanced bot building
- Develop Basic Chatbots Using Intents and Entities
- Design and Build Advanced Chatbots
- Discuss different types of chatbot use cases

UNIT - I
Introduction to Chatbots: Definition of chatbots, Journey of Chatbots, Rise of Chatbots, Messaging Platforms

UNIT - II
Setting Up the Developer Environment Botframework
Local Installation, Installing NodeJS, Following the Development Pipeline, Storing Messages in Database.

UNIT - III
Basics of Bot Building- Intents, Entities

UNIT - IV
Advanced Bot Building
Design Principles, Showing Product Results, Saving Messages, Building Your Own Intent Classifier

UNIT - V
Business and Monetization
Analytics, Chatbot Use Cases- Modes of Communication- Business-to-Business (B2B), ChapBusiness- to-Consumer (B2C) Consumer-to-Consumer (C2C) Business-to-Employee (B2E), Employee-to- Employee (E2E), Chatbots by Industry Vertical

TEXT BOOK:
1. Rashid Khan, Anik Das, Build Better Chatbots: A Complete Guide to Getting Started with Chatbots, Apress

REFERENCE BOOKS:
1. Drexen Braxley, Chat GPT #1 Bible - 10 Books in 1: A Comprehensive Guide to AI: Elevate Your Daily Life, Increase Work Output, Secure Financial Gains, Foster Career Growth, and Cultivate Modern Talents Paperback
2. D. Nardo Publications, ChatGPT Made Simple How Anyone Can Harness AI To

Streamline Their Work, Study & Everyday Tasks To Boost Productivity & Maintain Competitive Edge By Mastering Prompt Engineering

3. Robert E. Miller,Prompt Engineering Bible Join and Master the AI Revolutions Profit Online with GPT-4 & Plugins for Effortless Money Making!

4. Lucas Foster, Chat GPT Bible Developer and Coder Special Edition: Enhancing Coding Productivity with AI-Assisted Conversations.

Sreyas Institute of Engineering and Technology
An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH
Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

EVOLUTIONARY COMPUTING (Open Elective – III)

B.Tech. IV Year II Sem.

```
L  T  P  C
3  0  0  3
```

Prerequisites: Knowledge on algorithms

Course Objectives:
- Introduce the concepts of evolutionary computing and various evolution algorithms

Course Outcomes:
- Appraise the significance of evolutionary computing
- Apply genetic operators and genetic programming for classification problems
- Hybridization of genetic algorithms with other techniques
- Implement Evolutionary Algorithms
- Design and Tune Evolutionary Algorithms
- Understand multi objective, interactive evolutionary algorithms

UNIT - I
Optimization, Modelling, and Simulation Problems
Search Problems, Optimization Versus Constraint Satisfaction, The Famous NP Problems
Evolutionary Computing: The Origins: The Main Evolutionary Computing Metaphor, Brief History, The Inspiration from Biology, Evolutionary Computing
Evolutionary Algorithm: Definition, Components of Evolutionary Algorithms, An Evolutionary Cycle by Hand, Example Applications, The Operation of an Evolutionary Algorithm, Natural Versus Artificial Evolution, Evolutionary Computing, Global Optimization, and Other Search Algorithms

UNIT - II
Representation, Mutation, and Recombination
Representation and the Roles of Variation Operators, Binary Representation, Integer Representation, Real-Valued or Floating-Point Representation, Permutation Representation, Tree Representation **Fitness, Selection, and Population Management:** Population Management Models, Parent Selection, Survivor Selection, Selection Pressure, Multimodal Problems, Selection, and the Need for Diversity
Popular Evolutionary Algorithm Variants: Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Learning Classifier Systems, Differential Evolution, Particle Swarm Optimization, Estimation of Distribution Algorithms

UNIT - III
Parameters and Parameter Tuning: Evolutionary Algorithm Parameters, EAs and EA Instances, Designing Evolutionary Algorithms, The Tuning Problem, Algorithm Quality: Performance and Robustness, Tuning Methods.
Parameter Control: Introduction, Examples of Changing Parameters, Classification of Control Techniques, Examples of Varying EA Parameters

UNIT - IV
Working with Evolutionary Algorithms: Working of EA, Performance Measures, Test Problems for Experimental Comparisons, Example Applications
Hybridization with Other Techniques: Memetic Algorithms: Motivation for Hybridizing EAs, A

Brief Introduction to Local Search, Structure of a Memetic Algorithm, Adaptive Memetic Algorithms, Design Issues for Memetic Algorithms, Example Application: Multistage Memetic Timetabling

UNIT - V
Multiobjective Evolutionary Algorithms
Multiobjective Optimization Problems, Dominance and Pareto Optimality, EA Approaches to Multiobjective Optimization, Example Application: Distributed Coevolution of Job Shop Schedules
Constraint Handling: Two Main Types of Constraint Handling, Approaches to Handling Constraints, Example Application: Graph Three-Colouring
Interactive Evolutionary Algorithms: Characteristics of Interactive Evolution, Algorithmic Approaches to the Challenges of IEAs, Interactive Evolution as Design vs. Optimization, Example Application: Automatic Elicitation of User Preferences

TEXT BOOK:
1. A. E. Eiben, J. E. Smith, Introduction to Evolutionary Computing, Second Edition, Springer.

REFERENCE BOOKS:
1. David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning". Neural Networks and Fuzzy Logic S