Chaitanya Bharathi Institute of Technology (Autonomous)
Gandipet, Hyderabad – 500075
Department of Artificial Intelligence and Machine Learning

Consolidated Action taken report on the Feedback obtained from Stake Holders
AY : 2022-2023

S.No	Suggestions received	Feedback obtained from	Stake Holder Details	Action Taken	Remarks
1	Fullstack should be made mandatory subject	Student	Shivaganesh 160120748055	Full Stack Development subject has been introduced.	BOS 2022
2	Include more new age technology And also include Java for AIML	Student	Gowtham 160120748028	Unmanned Ariel vehicles subject was introduced	BOS 2022 Syllabus R22
3	Include Application Oriented courses in AI	Student	Sheeba 160120748013	Robotics and Automation	BOS 2022 Syllabus R20
4	Include industry oriented courses	Student	Sannihitha 160120748010	Introduction to Inference Interpretation, Building Large, Reliable Software Systems courses were introduced.	BOS 2022 Syllabus R20
5	Include Devops and current technologies	Parent	Sukirithi Mohan	DevOps with lab has been introduced in the curriculum	Syllabus R20

HOD(CSE)

Department of Computer Science and Engineering

MINUTES of BoS-MEETING

Department of CSE BoS meeting (online) for the program B.E. CSE (AI & ML) was conducted on 04-06-2022 at 1:30 PM

Agenda

1. Confirmation of the minutes of the BoS CSE(AI&ML) meeting held on 20.04.2021
2. Approval of BE CSE(AI&ML) – V to VIII semester Syllabus
3. Any other item

The following members were present:

Sno	Name	Organization	Designation
1	Prof. P. Ravinder Reddy	Principal, CBIT(A)	Principal
2	Prof. Y. Ramadevi	Head, CSE Dept., CBIT	Chairperson
3	P. Radha Krishna	Head & Professor, Dept. of CSE, NITW.	Expert from University
4	Prof. Praveen Tammana	Assistant Professor, Dept. of CSE, IIT Hyderabad	Academic Expert
5	Prof. Nagender Kumar S	Associate Professor, SCIS, University of Hyderabad Central University	Academic Expert
6	Mr. Srikanth Srinivasan	Sr. Director & Head - Membership & Outreach	Member, corporate
7	Mr. Akash Sinha	Head, Learning and Development, L4G, Hyderabad	Member from Industry
8	Mr. M. Nagarjuna Reddy	Team Manager, SAP Labs India Pvt. Ltd. (PG Alumni)	Member from Industry
9	Prof. M. Swamy Das	Professor, CSE Dept.	Member
10	Prof. K. Sagar	Professor, CSE Dept.	Member
11	Prof. China Ramu	Professor, CSE Dept.	Member
12	Prof. N. Ramadevi	Professor, CSE Dept.	Member
13	Smt. I Srujana	Assistant Professor, CSE Dept.	Member
14	Dr. G. Vanitha	Assistant Professor, CSE Dept.	Member
15	Dr. R. Ravinder Reddy	Associate Professor, CSE Dept.	Member
16	Dr. Sangeeta Gupta	Associate Professor, CSE Dept.	Member
17	Dr. E. Padmalatha	Assistant Professor, CSE Dept.	Member
16	Smt. A. Sangeetha	Assistant Professor, CSE Dept.	Member
17	Smt. T. Suvarna Kumari	Assistant Professor, CSE Dept.	Member
18	Smt. P. V. Manohara Ruth	Assistant Professor, CSE Dept.	Member
19	Dr. Kolla Morarjee	Associate Professor, CSE Dept.	Invitee
20	Smt. S. Durga Devi	Assistant Professor, CSE Dept.	Invitee

- The Chairperson welcomed BoS members and briefed about the Institute Vision, Mission and Department Vision and Mission. And also presented department PEOs, PO, PSO.

Minutes:

1. **Confirmation of minutes of meeting (online) held on 20.04.2021**

Minutes of BoS meeting held on 20.04.2021 were confirmed.

2. **Approval of R20 BE CSE (AI&ML) Syllabus for V to VIII semester**

Prof. Y RamaDevi, presented Plan of Study and syllabus (V to VIII semester) for BE CSE (AI&ML) including common Professional Elective Courses. The same was approved with minor modifications.

The following Suggestions/Recommendations/Observations made by the Members

a. Flutter and IOS topics may be included in Mobile Application Development course.
b. The Angular JS may be replaced with REST API and GO language in Full Stack Development course.
c. Relevant Case Studies/ Usecases / Scenarios may be included in Theory/ practical wherever possible.
d. In advanced databases course XML may be replaced with graph, neo 4J and noise databases.
e. Case Studies on modeling by using open source data analytic tools, alternative models with synthetic data and fake accounts may be included in Social Computing.
f. Streaming and Time series data experimentations may be included in Machine Learning lab.
g. Ransomware topic may be included in Cryptography and Network Security course.
h. Redundancy to be avoided in courses (Deep Learning, Soft Computing Techniques and Machine Learning)
i. Prerequisites are to be included for every course.
j. Reinforcement Learning (in depth) may be offered in place of Computational Neuroscience.
k. Cryptography and Network Security lab, "Cryptography C and C++" by Michael Welschenbach text book may be included.
l. Lab component may be included for all Professional Electives either implicitly or explicitly by readjusting the credits.

Any other item

a. The Members suggested to engage the students in research projects/ Entrepreneurship/ Startups within the campus instead of allowing for paid internships.
b. Revised PSOs of BE CSE (AI &ML) were discussed and accepted with minor modifications.

Sd/-

Chairperson, BoS

20AME09

UNMANNED ARIEL VEHICLES
(Professional Elective – V)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Objectives:-
The objective of this course is to understand
1. The features of UAV and elements.
2. Navigation and guidance of UAV
3. Design and Simulate UAV.

Course Outcomes:-
On completion of the course students will be able to
1. Explain the types and characteristics of UAVs and their applications.
2. Illustrate the concepts of aerodynamics of flight vehicle.
3. Demonstrate UAV elements
4. Identify and explain the components, sensors and payload of UAVs, their navigation and guidance
5. Design and perform structural, aerodynamic analysis of UAV components.

Unit-I:
Introduction to UAV
UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

Unit-II:
Basics of Flight and Aerodynamics
Different types of flight vehicles; Components and functions of an airplane ; Forces actin9 on Airplane; Physical properties and structure of the atmosphere; Aerodynamics - aerofoil nomenclature, aerofoil characteristics, Angle of attack, Each number, Lift and Drag, Propulsion and airplane structures.

Unit-III:
UAV Elements
Components: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion, Data Link; Sensors and Payloads: GPS, ITU, Light Detection and Ranging (LiDAR), Imaging cameras, Classification of payload based on applications;

Unit-IV
UAV Navigation
Hyper-spectral sensors; Laser Detection and Range (LADAR); Synthetic ADerture Radar (SAR); Thermal cameras; ultra-sonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

Unit-V:
Design & Simulation of UAV
Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFE; Manufacturing of the components of UAVs: 3D printing; Case studies;

SUGGESTED TEXT BOOKS
1. Andey Lennon, 'Basics of R/C Model Aircraft Design" Model Airplane News Publication
2. John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.

REFRENCE TEXT BOOKS
1. K Valavanis, George Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.
2. DGCA RPAS Guidance Manual, Revision 3 – 2020.

20MEC39 **ROBOTICS AND AUTOMATION**

Instruction	3L-0T-0P
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objective: The main objectives of this course are to:

1. Impart knowledge about basic mathematics related to industrial robots for their control, design, and application in robotics & automation

Course Outcomes: At the end of the course, students shall be able to:

1. Perform kinematic analysis with simulation
2. Perform dynamitic analysis with simulation
3. Design control laws for a simple robot
4. Integrate mechanical and electrical hardware for a real prototype of robotic device
5. Select a robotic system for a given industrial application

Unit I:

Introduction to Robotics - Introduction, classification of robots; **Kinematics systems** – mechanisms and manipulators, degrees of freedom; Kinematic Modelling- translation and rotation representation, coordinate transformation,

Unit II:

Robot Kinematics and Dynamics: DH parameters, forward and inverse kinematics, Jacobian, Singularity and Static; Dynamic Modelling: Forward and invers dynamics, equations of motion using Euler-Lagrange formulation, Newton Euler formulation

Unit III:

Sensors, Cameras and Vision - Various sensors - Contact and proximity, position, velocity, force, tactile etc., introduction to Cameras, Camera calibration, geometry of image formation, Euclidian/Similarity/Affine/Projective transformations, Vision applications in robotics

Unit IV:

Robotic Actuation Systems - Actuators: Electric, hydraulic and pneumatic. Transmission: Gears, timing belts and bearings, parameters for selection of actuators. **Robot Control**: Basic control: open-loop, closed loop, transfer functions, control laws P, PD, PID, linear and non-linear controls

Unit V:

Control Hardware and Interfacing: Microcontroller architectures and integration with sensors, actuators, components, programming applications for industrial robot, VAL II Programming.

AI in Robotics: Applications in unmanned systems, defence, medical, industries etc., Robotics and Automation for Industry 4.0, Robotics safety and social robotics

Text Books to be followed:

1. Introduction to Robotics : J. Craig , Pearson
2. Robot Dynamics and Control, Spong & Vidyasagar, Mc Graw Hill
3. Robotics Engineering : R. Klafter, PHI
4. Robotics : Subir K Saha , Mc GrawHill
5. Industrial Robotics : M. P. Groover, Ashish Dutta , McGraw Hil

20AMC06

INTRODUCTION TO INFERENCE AND INTERPRETATION

(BE AI/ML)

Instruction	0L-1T-3P
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	2.5

Course Objectives: The main objectives of this course are to:

1. Achieve competency in identifying causal effects using varied modelling approaches, starting with the essential experimental designs to complex observational models
2. Implement a variety of computational statistical tools and strategies for causal inference
3. Develop programming skills to relate different ways of explaining the data, and data collection strategies

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

1. Get awareness of causal thinking and understand selection bias.
2. Understand counterfactual vital ideas and assumptions of causal inference methods.
3. Apply causal inference methods to assess whether these assumptions are reasonable, and finally, the ways to interpret the quantity being estimated.
4. Use R to work on data science related projects.
5. Develop scripts for data visualization, analytics and dashboards.

UNIT I:

Introduction to R– Introduction to R, operators, objects, vectors, functions, data files, saving objects, packages

UNIT II:

Causality - Racial discrimination in the labour market, sub-setting data in R, causal effects and the Counterfactual, randomized controlled trials, observational studies, descriptive statistics for a single variable.

UNIT III:

Measurement & Visualization – Handling missing data, visualizing univariate distribution, survey sampling, summary of bivariate relationships, clustering.

UNIT IV:

Prediction and Discovery – Linear regression, Regression and Causation, textual data, network data, spatial data, animation using R.

UNIT V:

Probability - Conditional Probability, Random Variable and Probability Distributions, Large Sample Theorems, Estimation, Hypothesis Testing, Linear Regression Model with Uncertainty.

Textbooks:

1. Kousuke Imai, Quantitative Social Science: An Introduction, Princeton University Press, 2017.
2. Jonas Peters, Domnik Janzig and Bernhard Scholkopf, " Elements of Causal Inference – Foundations of Machine Learning", 2017, MIT, Open Access (https://mitp-content-server.mit.edu/books/content/sectbyfn?collid=books_pres_0&id=11283&fn=11283.pdf)

20AMC11

BUILDING LARGE, RELIABLE SOFTWARE SYSTEM

(BE AI/ML)

Instruction	0L-2T-2P
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	3

Course Objectives: The main objectives of this course are to:

1. Make the student to understand the underlying infrastructure and Technologies for building, maintaining reliable systems
2. Understand principles of concurrency and be able to build concurrent software

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

1. Understand the principles and strategies of infrastructure for building secure and reliable systems.
2. Identify various tools and technologies to manage infrastructure and other resources.
3. Create Git-based platforms for collaborative development and maintenance of Software Products
4. Perform various tests including infrastructure, production, fail-over, capacity, security, and compliance tests.
5. Configure infrastructure resources using configuration management tools.
6. Design systems to provide concurrency.

UNIT I:

Principles and Strategies of Infrastructure: Technical Practices, Modernization of Computer, Network and Storage, Infrastructure Management, scaling production readiness, DevOps and SRE, System Admin; Life Cycles of Physical Hardware and Cloud Services, Challenges to plan infrastructure strategy, Infrastructure Stacks, Infrastructure as Code

UNIT II:

Version Control and Local Development Environments: Fundamentals of Git, Working with Remote Git Repositories, Conflict Resolution, Fixing local Repositories, Collaboration with Version Control, Editors, Languages, Installation and Configuration of Applications.

UNIT III:

Testing and Security: Need and types of tests, shape of test strategy, main tests to plan, Flaky Tests; Security collaboration, Data Assets, attack vectors and surfaces, Design for Security Operability, Qualifying issues.

Unit-IV-

Infracode and Security:-Infracode, Building Machine Images, Provisioning Infrastructure Resources, Terraform, Configuring Infrastructure Resources, Writing Unit Tests and Integration for Infracode, Managing Identiy, Access and Secrets, Securing Compute Infrastructure and Networking, Recommendations for Security Infracode.

UNIT - V:

Scaling Production Readiness: Monitoring building blocks, Monitoring process, Information Presentation, Developing on-call Resilience, Incident Management, and Capacity Management.

20CSE10

DEVOPS
(Professional Elective – IV)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Pre-requisites: Database management systems, Operating systems, OOPs.

Course Objectives: The objectives of this course are,

1. To describe the agile relationship between development and IT operations.
2. To understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
3. To implement automated system update and DevOps lifecycle.

Course Outcomes: On successful completion of this course, students will be able to,

1. Identify components of Devops environment.
2. Describe Software development models and architectures of DevOps.
3. Apply different project management, integration, testing and code deployment tools.
4. Investigate different DevOps Software development models.
5. Assess various Devops practices.
6. Collaborate and adopt Devops in real-time projects.

UNIT - I

Introduction: Software development models, Introduction to DevOps, Why DevOps, DevOps process and Continuous Delivery, Delivery pipeline, Release management, Scrum, Kanban DevOps Architecture, DevOps Workflow DevOps Lifecycle for Business Agility, and Continuous Testing.

UNIT - II

Introduction to project management: The need for source code control, the history of source code management, Git **- A version control tool**, Version Control System and Types, CVCS and DVCS
Git Essentials: Creating repository, Cloning, check-in and committing, Fetch pull and remote, Branching

UNIT - III

Jenkins - Continuous integration: Introduction to Continuous Integration, Build & Release and relation with DevOps Why continuous integration, Nodes/Salves, Managing plugins, Managing Software Versions.
Build Tools: Overview of Maven, Virtualization, and Virtualization in DevOps Understand Containers Dockers - A containerization technology

UNIT - IV

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

UNIT - V

Code monitoring and Issue Tracking: Code monitoring tools Nagios, Munin, Ganglia, Log handling.
Introduction to issue trackers, Need of issue tracker: Workflows and issues.
Trackers tools: Bugzilla, GitLab tracker, and Jira.

Text Books:

1. Joakim Verona. “Practical Devops”, Second Edition. Ingram short title; 2nd edition, 2018.
2. Deepak Gaikwad, Viral Thakkar, “DevOps Tools from Practitioner's Viewpoint”. Wiley publications, 2019.

20CSE19

DEVOPS LAB
(Professional Elective – IV)

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Pre-requisites: Database management systems, Operating systems, OOPs.

Course Objectives: The objectives of this course are,

1. To explore the fundamental concepts in Project Life Cycle.
2. To develop skills using tools of DevOps.
3. To examine the application development with different automation tools.

Course Outcomes: On successful completion of this course, students will be able to,

1. Understand the phases of the software development life cycle.
2. Examine the different version control systems.
3. Recognize the importance of the build and deployment tools and test the software application.
4. Deployment of application in production environment.
5. Summaries the software configuration management.
6. Synchronize and provisioning using Puppet and Ansible.

List of Experiments:

1. Git installation and create a repository and perform fetch, pull, branching operations.
2. Jenkins Installation and implement continues Integration and Continues deployment, build a job using Jenkins.
3. To install and configure Docker for creating containers of different Operating System (Virtualization Concept)
4. Deployment Tool (Team City /Ansible) Install Docker and execute commands in a Docker and deploy the application in to Docker file
5. Test the Application using selenium tool.
6. Configuring and establish Connection between Agent and Master using Puppet
7. Install code monitoring tools ex: Nagios..Perform operations
8. Install issue tracker and monitor the workflow of any application and track the issues JIRA tool (Agile management tool)

Text Books:

1. Joakim Verona. “Practical Devops”, Second Edition. Ingram short title; 2nd edition, 2018.
2. Deepak Gaikwad, Viral Thakkar, “DevOps Tools from Practitioner's Viewpoint”. Wiley publications, 2019.

Suggested Reading:

1. Len Bass, Ingo Weber, Liming Zhu, “DevOps: A Software Architect's Perspective”. Addison Wesley, 1st Edition, 2015.

Online Resources:

1. https://www.coursera.org/learn/intro-to-devops
2. https://www.tutorialspoint.com/introduction-to-devops/index.asp