KLS VishwanathraoDeshpande Institute of Technology

(Accredited by NAAC with "A" Grade)
(Approved by AICTE, New Delhi. Affiliated to VTU, Belagavi)
(Recognized Under Section 2(f) by UGC, New Delhi)
Udyog Vidya Nagar, Haliyal – 581329, Dist.: Uttara Kannada
Phone: 08284-220861
www.klsvdit.edu.in | principal@klsvdit.edu.in

Department of Electronics and Communication Engineering

Add-On Course Syllabus (Skill Development)

Course Title: Fundamentals of Electric Vehicle Technology

Semester: 6th Semester

Credits: Certificate Course

Total Duration: 30 Hours

Contact Hours: 20 Theory + 10 Practical

1. Course Objectives

The objectives of this add-on course are to:

- Introduce fundamentals of electric vehicle systems and architecture
- Develop understanding of batteries, motors, power electronics, and charging systems
- Provide hands-on exposure to EV components and diagnostic tools
- Familiarize students with current trends, standards, and safety practices in EV technology

2. Course Outcomes

Upon successful completion, the student will be able to:

1. Explain EV types, configurations, and basic architecture
2. Describe battery types, BMS operation, and safety requirements
3. Understand working principles of electric motors and controllers
4. Identify charging standards and infrastructure requirements
5. Perform basic practical activities on EV components, software tools, and diagnostics

3. Prerequisites: (Not compulsory but desirable)

Basic knowledge of:

- Electrical & Electronics fundamentals
- Engineering Physics / Basic Machines

Syllabus

Module 1: Introduction & EV Architecture (6 Hours)

- **EV History & Evolution:** From early electric carriages to modern Tesla/BYD era.
- **Classification of EVs:** Understanding BEV (Battery), HEV (Hybrid), PHEV (Plug-in Hybrid), and FCEV (Fuel Cell).

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- **Comparison:** Performance, efficiency, and environmental impact vs. ICE vehicles.
- **EV Layout:** Block diagram of a typical EV, drivetrain configurations, and chassis integration.
- **Battery Chemistry:** Lead-acid, Lithium-ion (LFP, NMC) and future Solid-State batteries.
- **Battery Pack Design:** Cells, modules, and pack construction; series / parallel connections.
- **Battery Management System (BMS):** SOC (State of Charge) and SOH (State of Health) estimation.
- **Safety:** Battery hazards, thermal runaway, and fire suppression standards.

Module 2: Energy Storage & Battery Management (10 Hours)

- **Traction Motors:** Working principles of BLDC, PMSM, and Induction Motors (IM).
- **Motor Controllers:** Role of the Inverter and DC-DC converters functionality.
- **Speed & Torque Control:** Basics of Pulse Width Modulation (PWM) and Variable Frequency Drive (VFD).
- **Regenerative Braking:** How energy is recovered during deceleration.
- **Charging Levels:** Level 1 (Home), Level 2 (AC Public), and Level 3 (DC Fast Charging).
- **Charging Protocols:** Understanding Global Standards (CCS, CHAdeMO, GB/T, and NACS).
- **Grid Integration:** Vehicle-to-Grid (V2G) technology and smart charging concepts.

Module 3: Charging Systems & Standards (4 Hours)

- **Battery Swapping:** Pros, cons, and current infrastructure in urban mobility.
- **Telematics &IoT:** Connected vehicles, remote diagnostics, and OTA (Over-the-Air) updates.
- **Maintenance & Troubleshooting:** Common EV faults and high-voltage safety precautions.
- **Economics:** Total Cost of Ownership (TCO) and government incentives/subsidies.
- **Environmental Impact:** Life cycle analysis and battery recycling (Circular Economy).

Assessment & Certification

- Attendance & participation.
- Practical record.
- Viva / Quiz
- Final test / assignment

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EV Laboratory Experiments:

1. Identification of Components of an EV Two-Wheeler
2. Disassembly of External Body and Frame of an EV Two-Wheeler
3. Battery Removal, Inspection, and Reassembly in an EV.
4. Demonstration of Motor and Controller Wiring in an EV.
5. Assembly of Subsystems of an EV.
6. Performance Demonstration of an EV on Test Stand
7. Troubleshooting and Fault Diagnosis in EV.
8. Demonstration of Charging System and Safety Practices in EV.

Textbooks

1. **Electric Vehicles: Technology, Modeling and Control** – Amir Khajepour, M. Saber, A. Emadi (Wiley)
2. **Electric Vehicle Technology Explained** – James Larminie& John Lowry (Wiley)
3. **Introduction to Electric Vehicles** – B. R. Gupta (University Press)
4. **Electric and Hybrid Vehicles: Technologies, Models, and Control – Second Edition** – Amir Khajepour, M. Saber, A. Emadi (Wiley)
5. **Battery Management Systems for Large Lithium-Ion Battery Packs** – Davide Andrea (Elsevier)
6. **Electric Vehicle Batteries: Fundamentals, Technologies and Applications** – Gianfranco Pistoia (Elsevier)
7. **Power Electronics: Converters, Applications, and Design** – Ned Mohan, Tore M. Undeland, William P. Robbins (Wiley)
8. **Electric Motor Drives: Modeling, Analysis, and Control** – R. Krishnan (Prentice Hall)
9. **Modern Power Electronics and AC Drives** – Bimal K. Bose (Prentice Hall)
10. **Automotive Technology: A Systems Approach** – Jack Erjavec& Rob Thompson (Cengage)
11. **Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives** – Chris Mi, M. AbulMasrur, and David Wenzhong Gao (Wiley)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Cryptography

B.E., VI Semester, Electronics & Communication Engineering

Number of Lecture Hours/Week: 02
Total Number of Lecture Hours: 30 (10 Hours /Module)
CIE Marks: 10
Exam Hours: 01

Modules	RBT Level
Module-1	
Attacks on Computers and Computer Security: Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks	
Cryptography Concepts and Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.	L1, L2, L3
Module-2	
Symmetric Key Algorithms and AES: Introduction Symmetric and Asymmetric Key Cryptography, Algorithm Types and Modes, An Overview of Symmetric Key Cryptography, Data Encryption Standard (DES), Advanced Encryption Standard (AES)	L1, L2, L3
Module-3	
Asymmetric Key Algorithms, Digital Signatures and RSA: Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures.	L1, L2, L3
Course Outcomes:	
After studying this course, students will be able to: - Use basic cryptographic algorithms to encrypt the data. - Provide authentication and protection for encrypted data.	
Text Books: 1. Cryptography and Network Security, Atul Kahate, TMH, 2003. 2. William Stallings , "Cryptography and Network Security Principles and Practice",Pearson Education Inc., 6th Edition, 2014, ISBN: 978-93-325-1877-3	

ADDON COURSE (2)

BASICS OF AI & ML

SEM: 4th (A&B)   AY: 2025-26

1. **Introduction to Artificial Intelligence, ML & DL**
   What is Artificial Intelligence (AI)?, Relationship between AI, ML, and DL, Types of Learning in ML, Getting Started with Python for ML/DL, Handling Data, Feature Scaling.

2. **Introduction to Machine Learning**
   Types of Machine Learning, The ML Workflow, Basic Example – Predicting Iris Flower Species, Classification vs Regression, Data Pre-processing, Handling Missing Values, Handling Categorical Data, Feature Scaling

3. **Supervised Learning Algorithms**
   Categories of Supervised Learning, Linear Regression, Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees, Random Forest, Performance Metrics, Neural Networks

4. **Unsupervised Learning Algorithms**
   Clustering, K-Means Clustering, Hierarchical Clustering, DBSCAN (Density-Based Clustering), Dimensionality Reduction

5. **Neural Networks and Deep Learning**
   Biological Inspiration: Neurons, Types of Neural Networks, Feedforward Neural Network (FNN), Activation Functions, Training Neural Networks, Backpropagation, Building First Neural Network

COURSE COORDINATORS   HOD, ECE

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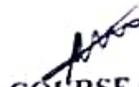## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Add-on Course Syllabus

Title: Cloud Computing

Semester: 4th   **Total Number of Lecture Hours: 30Hrs**   **AY:2025-26 (EVEN)**

COURSES	RBT Level
Module-1	
Introduction to Cloud Computing: Evolution of Computing: Distributed, Grid, and Cloud, Definition and Characteristics of Cloud Computing, Advantages and Limitations of Cloud Computing, Cloud Service Models: IaaS, PaaS, SaaS, Cloud Deployment Models: Public, Private, Hybrid, Community, Cloud Architecture and Components 6h	L1, L2
Module-2	
Virtualization and Infrastructure: Basics of Virtualization, Types of Virtualization, Hypervisors: Type I and Type II, Virtual Machines vs Containers, Introduction to Docker, Cloud Infrastructure Overview 6h	L1, L2
Module-3	
Cloud Services and Platforms: Overview of Cloud Platforms: AWS, Microsoft Azure, Google Cloud, Compute Services (VMs), Storage Services (Object, Block, File Storage), Networking Basics: VPC, Subnets, Load Balancers, Cloud Pricing Models and Cost Management 8h	L1, L2
Module-4	
Cloud Security and Management: Cloud Security Issues and Challenges, Shared Responsibility Model, Identity and Access Management (IAM), Data Security and Encryption, Backup, Disaster Recovery, and High Availability 5h	L1, L2
Module-5	
Application Deployment and Hands-On: Cloud Application Development Lifecycle, Web Application Hosting on Cloud, Basic DevOps Concepts and CI/CD Overview, Case Studies of Cloud Adoption 5h	L1, L2

Text Books:

1. Rajkumar Buyya, *Cloud Computing: Principles and Paradigms*
2. Thomas Erl, *Cloud Computing*
3. Cloud provider official documentation

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Add-on Course Syllabus

Title: Mathematics for Machine Learning

Semester: 3rd   **Total Number of Lecture Hours: 30Hrs**   **AY:2025-26 (ODD)**

COURSES	RBT Level
Module-1	
Mathematical Statistics Foundation for Machine learning: Probability Distributions and Density Functions, Estimation Theory (MLE & MAP Estimators), Hypothesis Testing and Statistical Inference, Bayesian Statistics and Inference **8h**	L1,L2
Module-2	
AWS-DGL-SS-Math for Machine learning: Linear Algebra for Deep Learning, Graph Theory and Spectral Graph Mathematics, Optimization Techniques in Machine Learning, Probability and Information Theory in ML . **10h**	L1,L2
Module-3	
Explore Machine Learning using R: Supervised Learning with caret , Unsupervised Learning , Text Mining and Sentiment Analysis using R , Time Series Forecasting with Machine Learning **13h**	L1,L2

Text Books:

T1: Mathematical Statistics and Data Analysis; John A. Rice; CENGAGE LEARNING PUBLICATION; 3rd Edition.

T2: Mathematics for Machine Learning; Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong; CAMBRIDGE UNIVERSITY PRESS PUBLICATION

Head of the Department
of Electronic & Communication Engg.
KLS V.D.I.T. HALIYAL (U.K.)