INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ELECTRIC VEHICLE CHARGING TECHNIQUES								
IV Semester: EPS								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
BPSE22	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes:**	**Practical Classes:**				**Total Classes:**		
Prerequisite: Electric and Hybrid Vehicles, Power Electronics, Smart Grid Technologies								

I. COURSE OVERVIEW:

This course provides a comprehensive guide to planning and implementing Electric Vehicle (EV) charging infrastructure. It begins with the technical foundations of charging equipment, standards, and site selection principles. The curriculum then details the processes for grid connection, regulations, and the critical need for smart charging to manage grid impacts. Finally, it concludes by exploring the various implementation models and key stakeholder roles for deploying charging networks effectively.

II. COURSE OBJECTIVES:

The students will try to learn

- **I.** To understand the charging infrastructure for EV's.
- **II.** To explore the working of grid connected with EV's.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 **Understand** the planning and operational issues related to EV's charging.
- CO2 **Acquire knowledge** about EV's charging implementation models.
- CO3 **Evaluate** the impact of EV charging loads on the electricity grid and propose smart charging solutions to ensure effective and stable grid integration.
- CO4 **Outline** the regulatory and procedural framework for connecting EV charging infrastructure to the electrical grid, including the role of Distribution Companies (DISCOMs).
- CO5 **Compare and contrast** different implementation models for EV charging infrastructure, analyzing the roles of government, consumers, and charge point operators in deployment.

IV. COURSE CONTENT:

MODULE–I: AN OVERVIEW OF EV CHARGING INFRASTRUCTURE: (12)

Orients the reader to EV charging infrastructure, providing a brief introduction to technical concepts of electric

vehicle supply equipment, AC and DC charging, power ratings, and charging standards.

MODULE–II: LOCATION PLANNING AND LAND ALLOCATION: (09)

Covers the location and site planning aspects for EV charging, by framing the principles of location planning and demonstrating a methodology for spatial allocation of charging demand, and identifies enabling processes and policies to integrate public charging in urban planning.

MODULE–III: CONNECTING EVs TO THE ELECTRICITY GRID: (09)

Focuses on supply of electricity for charging infrastructure, familiarizing readers with the regulations that govern electricity supply for EV charging, the role of DISCOMs in provision of EV charging connections, and the three methods of arranging for power supply for charging infrastructure.

MODULE–IV: ACHIEVING EFFECTIVE EV-GRID INTEGRATION: (09)

Zooms out from site-level considerations for supply of electricity to assess grid-level impacts, and then highlights the need for smart charging to minimize adverse impacts of EV charging loads on the grid.

MODULE–V: MODELS OF EV CHARGING IMPLEMENTATION (06)

Defines the typical roles within an implementation model for EV charging infrastructure and identifies three models in India – the government-driven model, the consumer-driven model and the charge point operator-driven model – for charging infrastructure implementation.

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IV. TEXT BOOKS:

1. Sulabh Sachan, P. Sanjeevikumar, Sanchari Deb, “Smart Charging Solutions for Hybrid and Electric Vehicles”,Wiley Publications, March 2022.
2. Handbook of Electric Vehicle Charging Infrastructure Implementation Version-1

V. REFERENCE BOOKS:

1. Vahid Vahidinasab, Behnam Mohammadi-Ivatloo, “Electric Vehicle Integration via Smart Charging, Springer, 2022.

2. Alam, Mohammad Saad, Pillai, Reji Kumar, Murugesan, N, “Developing Charging Infrastructure and Technologies for Electric Vehicles”, IGI Global

VI. WEB REFERENCES:

1. https://afdc.energy.gov/fuels/electricity_infrastructure.html
2. https://theicct.org/publication/guidebook-for-ev-charging-station-deployment/
3. https://cea.nic.in/wp-content/uploads/2020/01/CEA_Charging_Infrastructure_Guidelines_Jan_2020.pdf
4. https://sepapower.org/knowledge/grid-integration/

VII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open-end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. Power-point presentation