

# KRISHNASAMY COLLEGE OF ENGINEERING & TECHNOLOGY

Approved by AICTE & Affiliated to Anna University

Anand Nagar, Nellikuppam Main Road, Kumarapuram, Cuddalore – 607 109.

Phone no.(04142) 285 601- 604

[www.kcet.in](http://www.kcet.in)

[info@kcet.in](mailto:info@kcet.in)

30.10.2019

## DEPARTMENT OF MECHANICAL ENGINEERING

(Academic Year 2019-2020)

### CIRCULAR

It is planned to conduct a value added course for IV & III year mechanical Engineering students on the subject given below. Each module is scheduled from 13.12.2019 to 18.12.2019 and 23.12.2019 to 28.12.2019. The course plan, test procedure, attendance are followed as per regulation 2017 respectively. It is highly advised that the students should attend all the sessions and get benefited of the course.

The syllabus for the same has been formulated and will be circulated to students. The eminent staff from our department is invited to give lectures on topics from syllabus.

S.No	Year	Code/Name of the subject	Duration in Hours	Subject Incharge
1	IV	VAC1901 / Hybrid Electric Vehicles	30	Er.G.Senthilvel AP/Mech
2	III	VAC1902 / Waste Heat Recovery Systems and Applications	30	Er.E.Gopal AP/Mech

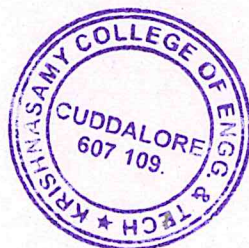
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## SYLLABUS

**SUBJECT CODE: ME-VAC1901**

**30 HOURS**

**SUBJECT NAME: HYBRID ELECTRIC VEHICLES**

### **COURSE OBJECTIVES:**

- This course introduces the fundamental concepts, principles, analysis and design of hybrid, electric and fuel cell vehicles.
- To know the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used energy storage devices, etc.

### **Module 1: INTRODUCTION TO HYBRID ELECTRIC VEHICLES 8**

Vehicle basics- Constituents of a conventional vehicle-Drive cycles and Drive Terrain, A Brief history of Hybrid Electric vehicles (HEVs), Basics of Electric Vehicles (EV), Basics of Hybrid Electric Vehicles (HEVs), Architecture of HEVs- Series HEVs, Parallel HEVs, Series-Parallel HEVs,

### **Module 2: ELECTRIC PROPULSION SYSTEMS 6**

DC Motors- Operating principle and control of DC motors, Induction Motor Drives: Operating principle and Control Mechanisms, Brushless Motor Drives

### **MODULE 3: DESIGN OF HYBRID ELECTRIC VEHICLE DRIVES 6**

Design of Series Hybrid Electric Vehicle Drive- Control Strategies, Sizing of Major Components and Case Study for designing for various parameters.

### **MODULE 4: DESIGN OF PARALLEL HYBRID ELECTRIC VEHICLE DRIVE 4**

Control Strategies of Drive Train and Design of Drive Train Parameters.

### **MODULE 5: ENERGY STORAGE SYSTEMS 6**

Electrochemical Batteries, Lead-Acid Batteries, Nickel Based Batteries, Lithium Based Batteries, Ultra Capacitors- Basic Principles and Performance, Ultrahigh-speed flywheels- Basic Principle and Power Capacity, Fly Wheel technologies.





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### COURSE OUTCOMES:

- Explain the basics of cogeneration and Waste heat recovery
- Apply the concepts of Cogeneration technologies and functions of its components
- Analyze the issues and applications of Co-generation technologies
- Choose the appropriate criteria for waste heat recovery systems and its components
- Understand the Economic aspects of cogeneration and Waste heat recovery

### REFERENCE

1. Charles H. Butler, Cogeneration, McGraw Hill Book Co.,
2. EDUCOGEN – The European Educational tool for cogeneration, Second Edition, 2001
3. Horlock JH, Cogeneration - Heat and Power, Thermodynamics and Economics, Oxford, 1987.
4. Institute of Fuel, London, Waste Heat Recovery, Chapman & Hall Publishers, London, 1963.
5. Seagate Subrata, Lee SS EDS, Waste Heat Utilization and Management, Hemisphere, Washington, 1983.
6. De Nevers, Noel, Air Pollution Control Engineering, Mc Graw Hill, New York, 1995.



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29/10/2019  
HOD / MECH