

# **SRM VALLIAMMAI ENGINEERING COLLEGE**

(An Autonomous Institution)

SRM Nagar, Kattankulathur– 603203.

## **DEPARTMENT OF MECHANICAL ENGINEERING**

### **QUESTIONBANK**



### **V SEMESTER**

## **PME202 CONVENTIONAL AND FUTURISTIC VEHICLE TECHNOLOGY**

**Regulation–2023**

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*Prepared by*

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**PME202 CONVENTIONAL AND FUTURISTIC VEHICLE TECHNOLOGY**

**QUESTION BANK**

<b>UNIT-I ADVANCED ENGINE TECHNOLOGY</b>			
Gasoline Direct Injection, Common Rail Direct Injection, Variable Compression Ratio Turbocharged Engines, Electric Turbochargers, VVT, Intelligent Cylinder De-activation, After Treatment Technologies, Electric EGR, Current EMS architecture.			
<b>PART-A (2 Marks)</b>			
<b>Q.No.</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Describe Gasoline Direct Injection.	BT-1	Remembering
2.	List out the main components of a GDI System.	BT-1	Remembering
3.	Summarize the advantages of GDI system.	BT-2	Understanding
4.	What is Common Rail Direct Injection	BT-1	Remembering
5.	List the main components of a CRDI system.	BT-2	Understanding
6.	How does CRDI differ from conventional diesel injection systems?	BT-2	Understanding
7.	What is the role of the Engine Control Unit (ECU) in a CRDI system?	BT-1	Remembering
8.	Why is high fuel pressure required in CRDI systems?	BT-2	Understanding
9.	What is a turbocharged engine?	BT-1	Remembering
10.	Describe the function of a turbocharger in an engine.	BT-2	Understanding
11.	What is meant by turbo lag?	BT-1	Remembering
12.	How does a turbocharger improve engine performance?	BT-2	Understanding
13.	What is Variable Valve Timing?	BT-1	Remembering
14.	How does VVT improve engine efficiency and performance?	BT-2	Understanding
15.	State the difference between VVT and fixed valve timing.	BT-1	Remembering
16.	Classify VVT mechanism.	BT-1	Remembering
17.	What is an Electric Turbocharger?	BT-1	Remembering

18.	How does an electric turbocharger differ from a conventional turbocharger?	BT-2	Understanding
19.	State one limitation of electric turbochargers.	BT-1	Remembering
20.	What is cylinder deactivation technology?	BT-1	Remembering
21.	List out the advantages of cylinder deactivation technology.	BT-1	Remembering
22.	Summarize the objective of aftertreatment systems in IC engines.	BT-2	Understanding
23.	What is the principle of EGR?	BT-1	Remembering
24.	What is meant by ATS and list its functions?	BT-1	Remembering
25.	Describe the EMS system in the engine.	BT-2	Understanding

<b>PART-B (15 Marks)</b>				
<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>BT Level</b>	<b>Competence</b>
1	Explain in detail the construction, working of a Gasoline Direct Injection (GDI) system.	15	BT-4	Analyze
2	Explain with a neat sketch the construction and working principle of the outward-opening pintle injector	15	BT-4	Analyze
3	Explain the working principle of Common Rail Direct Injection.	15	BT-4	Analyze
4	Explain in detail about the types of VVT mechanisms in the IC engine.	15	BT-4	Analyze
5	Describe in detail about variable compression ratio turbocharged engine with a suitable example.	15	BT-3	Apply
6	Summarize and explain the various mechanisms to obtain a variable compression ratio.	15	BT-3	Apply
7	Summarize the types and illustrate with a neat sketch of the working of a turbocharger.	15	BT-3	Apply
8	Distinguish between a supercharger and a turbocharger in detail.	15	BT-3	Apply
9	Describe about advantages, limitations, and applications of a turbocharger.	15	BT-3	Apply
10	Illustrate with a neat sketch of the working of a supercharger.	15	BT-3	Apply

11	Illustrate with a neat sketch of the working of an electrically assisted turbocharger.	15	BT-3	Apply
12	Write short notes about the types of turbochargers.	15	BT-3	Apply
13	Explain the following 1. Variable geometry turbocharger 2. Twin turbocharger.	(8) (7)	BT-4	Analyze
14	Explain in detail about the different types of fuel injection systems.	15	BT-4	Analyze
15	Illustrate with a suitable sketch about the working principle of exhaust gas recirculation.	15	BT-3	Apply
16	Explain in detail about the methods of cylinder deactivation technology.	15	BT-4	Analyze
17	Write detail about aftertreatment technologies and their mechanisms in an internal combustion engine.	15	BT-3	Apply
18	Explain in detail about the engine management system with a suitable sketch.	15	BT-4	Analyze

## UNIT-II COMBUSTION TECHNOLOGY

Spark Ignition combustion, Modern Spark Ignition system ( Digital Twin Spark Ignition System Digital Twin Spark-Swirl Induction, Digital Twin Spark-Fuel Injection System), Compression Ignition Combustion, Conventional Dual Fuel Combustion, Low Temperature Combustion Concepts– Controlled Auto Ignition, Homogeneous Charge Compression Ignition, Premixed Charge Compression Ignition, Partially Premixed Compression Ignition, Reactivity Controlled Compression Ignition, Gasoline Direct Injection Compression Ignition.

### PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	What is Spark Ignition (SI) combustion?	BT-1	Remembering
2.	What factors affect the flame speed in SI combustion?	BT-1	Remembering
3.	How can knocking in SI engines be controlled?	BT-2	Understanding
4.	Describe the function of the ignition coil.	BT-2	Understanding
5.	List out the modern spark ignition system.	BT-1	Remembering
6.	What is Compression Ignition (CI) combustion?	BT-1	Remembering
7.	Summarize the phases of combustion in a CI engine.	BT-2	Understanding
8.	Summarize the key factors affecting CI combustion.	BT-2	Understanding
9.	What is meant by diesel knock?	BT-1	Remembering
10.	Describe about digital twin spark ignition (DTS-i) system.	BT-2	Understanding
11.	List out the types of digital twin spark ignition systems.	BT-1	Remembering
12.	What is the role of the digital capacitor discharge ignition (CDI) unit in DTS-i?	BT-1	Remembering
13.	Define dual-fuel combustion in internal combustion engines.	BT-1	Remembering
14.	What is the advantage of using dual-fuel combustion?	BT-1	Remembering
15.	Describe the factor to reduces knocking in dual-fuel engines.	BT-2	Understanding
16.	Name two applications where dual-fuel combustion is commonly used.	BT-1	Remembering
17.	Describe low temperature combustion (LTC). Why is LTC used in modern engines?	BT-2	Understanding
18.	Distinguish between LTC and conventional diesel combustion.	BT-2	Understanding
19.	List out the engine parameters used to control LTC combustion.	BT-1	Remembering
20.	Describe reactivity controlled compression ignition.	BT-2	Understanding
21.	What is controlled auto ignition (CAI)?	BT-1	Remembering

22.	Classify the different types of LTC.	BT-2	Understanding
23.	Discriminate controlled auto ignition and homogeneous charge compression ignition.	BT-2	Understanding
24.	What engine parameters influence RCCI combustion behavior?	BT-1	Remembering
25.	Distinguish between controlled auto ignition (CAI) and spark ignition (SI).	BT-2	Understanding

<b>PART-B (15 Marks)</b>				
<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>BT Level</b>	<b>Competence</b>
1	Explain in detail the stages of combustion in a Spark Ignition engine.	15	BT-4	Analyze
2	What is knocking in spark ignition engines? Explain the causes, effects, and preventive measures.	15	BT-3	Apply
3	Explain in detail about the type of combustion chamber used in a spark ignition engine with a suitable sketch.	15	BT-4	Analyze
4	Illustrate with a suitable sketch the working principle of Digital Twin Spark Ignition System.	15	BT-3	Apply
5	Explain in detail of Distributor-Based Breaker-Point Ignition system in the SI engine.	15	BT-4	Analyze
6	Illustrate with a suitable sketch about Distributor-Based Electronic Ignition system in the SI engine.	15	BT-3	Apply
7	(i) Explain in detail about the stages of combustion in spark ignition and compression ignition engines. (ii) Summarize the comparison of SI and CI engine combustion.	(8) (7)	BT-4	Analyze
8	Explain in detail about conventional dual fuel combustion with a suitable sketch.	15	BT-4	Analyze
9	What are the major pollutants formed during SI engine combustion? Explain the formation mechanisms of CO, HC, and NO <sub>x</sub> .	15	BT-3	Apply
10	Write short notes about the formation of pollutants in SI and CI engines.	15	BT-3	Apply
11	Explain with a suitable sketch about low temperature combustion in a diesel engine.	15	BT-4	Analyze
12	Describe in detail about Low Temperature Combustion methods.	15	BT-3	Apply
13	Illustrate with a suitable sketch about the working principle of	15	BT-3	Apply

	Gasoline direct injection compression ignition.			
14	Explain in detail about the type of combustion chamber used in a CI engine with a suitable sketch.	15	BT-4	Analyze
15	Explain the working principle of the Homogeneous Charge Compression Ignition (HCCI) system.	15	BT-4	Analyze
16	Write short notes on methods of controlling emissions.	15	BT-3	Apply
17	Summarize and explain the factors affecting Controlled Auto Ignition in LTC.	15	BT-3	Apply
18	Explain in detail about factors affecting combustion in CI engine.	15	BT-4	Analyze

### UNIT-III LOW CARBON FUEL TECHNOLOGY

Alcohol Fuels, Ammonia Fuel and Combustion, Methane Technology, Dimethyl Ether, Hydrogen Fuel Technology, Challenges, and way Forward.

#### PART-A (2 Marks)

Q. No.	Questions	BT Level	Competence
1.	What are alcohol fuels? Give two examples.	BT-1	Remembering
2.	Why is ethanol considered a renewable fuel source?	BT-2	Understanding
3.	Name two types of alcohols used as fuels in internal combustion engines.	BT-1	Remembering
4.	Why do alcohol fuels require modifications in fuel systems of conventional IC engines?	BT-2	Understanding
5.	Describe the term 'blending' of alcohol fuels with petrol.	BT-2	Understanding
6.	Mention the environmental benefits of using alcohol fuels in automobiles.	BT-1	Remembering
7.	What is the effect of alcohol fuel on engine knocking?	BT-1	Remembering
8.	What is ammonia fuel and how is it produced?	BT-1	Remembering
9.	How does ammonia combustion affect NO <sub>x</sub> emissions?	BT-2	Understanding
10.	What modifications are required in engines to use ammonia as a fuel?	BT-1	Remembering
11.	State whether ammonia is suitable for spark ignition engines and provide reasons.	BT-1	Remembering
12.	What is the role of hydrogen blending in ammonia combustion?	BT-1	Remembering
13.	Why is ammonia considered a carbon-free fuel?	BT-2	Understanding
14.	Summarize the role of hydrogen blending in ammonia combustion.	BT-2	Understanding
15.	Why is preheating important in ammonia-fueled combustion systems?	BT-2	Understanding
16.	What are the challenges of storing and transporting methane for vehicle use?	BT-1	Remembering
17.	Mention two limitations of using methane in IC engines.	BT-1	Remembering
18.	How does methane combustion affect thermal efficiency in IC engines?	BT-2	Understanding
19.	What is methane and why is it used as a fuel in IC engines?	BT-1	Remembering

20.	Summarize the different forms of methane used in IC engines.	BT-2	Understanding
21.	What is hydrogen fuel and how is it produced?	BT-2	Understanding
22.	List two major advantages of using hydrogen as a fuel in IC engines.	BT-1	Remembering
23.	What safety precautions must be taken when handling hydrogen fuel?	BT-1	Remembering
24.	What is pre-ignition and why is it a concern in hydrogen-fueled engines?	BT-1	Remembering
25.	Why is hydrogen blending used with conventional fuels?	BT-2	Understanding

<b>PART-B (15 Marks)</b>				
<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>BT Level</b>	<b>Competence</b>
1	Explain the properties of alcohol fuels and discuss their suitability as alternative fuels for internal combustion engines.	15	BT-4	Analyze
2	Explain in detail about Ethanol production methods with a suitable sketch.	15	BT-4	Analyze
3	Explain in detail about Methanol production methods with a suitable sketch.	15	BT-3	Apply
4	Discuss the storage, handling, and distribution issues associated with alcohol fuels in comparison to petroleum based fuels.	15	BT-3	Apply
5	Explain the combustion process of ethanol in a spark ignition engine. Highlight the differences when compared to gasoline combustion.	15	BT-4	Analyze
6	Discuss the modifications required in spark ignition (SI) and compression ignition (CI) engines to operate on alcohol fuels.	15	BT-3	Apply
7	Explain the properties, advantages and limitations of ammonia fuels used in internal combustion engines.	15	BT-4	Analyze
8	Discuss briefly about types of ammonia fuels used in the internal combustion engine.	15	BT-3	Apply
9	Explain in detail about the challenges and transportation of ammonia fuels.	15	BT-4	Analyze
10	Explain the working principle of a methane-fueled spark ignition (SI) engine. How does it differ from a conventional gasoline engine?	15	BT-4	Analyze

11	Illustrate with a suitable sketch about Schematic diagram of the conversion of biogas to biomethane (CNG).	15	BT-3	Apply
12	With a neat diagram, explain the fuel supply system of a CNG-powered vehicle. Mention the components and their functions.	15	BT-3	Apply
13	Describe the process of liquefied natural gas (LNG) production with a neat flow diagram.	15	BT-3	Apply
14	Explain in a suitable about the process of biomethane production.	15	BT-4	Analyze
15	Explain in detail about manufacturing of Dimethyl Ether fuel.	15	BT-4	Analyze
16	Explain in detail about the challenges and transportation of hydrogen fuel.	15	BT-4	Analyze
17	Describe about the production methods of hydrogen fuel.	15	BT-3	Apply
18	Explain with a neat sketch about the Hydrogen-Fueled Spark-Ignited Engine and summarize the combustible properties of Hydrogen.	15	BT-4	Analyze

**UNIT-IV HYBRID AND ELECTRIC VEHICLE****(BATTERY POWERED)**

Conventional Hybrids (Conventional ICE + Battery), Modern Hybrids (RCCI/GDCI Engine + Battery), Pure Electric Vehicle Technology – Challenges and Way forward.

**PART-A (2 Marks)**

<b>Q.No.</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1	What is a conventional hybrid vehicle?	BT-1	Remembering
2	Define a parallel hybrid system.	BT-1	Remembering
3	List the components of a conventional hybrid electric vehicle.	BT-1	Remembering
4	What is the function of the electric motor in a hybrid vehicle?	BT-1	Remembering
5	Define the term hybrid powertrain.	BT-1	Remembering
6	List out the main power sources in a conventional hybrid vehicle.	BT-1	Remembering
7	Define the principle of GDCI combustion.	BT-1	Remembering
8	Define the principle of GDCI combustion.	BT-1	Remembering
9	Why are dual fuels used in RCCI hybrid engines?	BT-2	Understanding
10	Mention one key difference between RCCI and GDCI engines.	BT-1	Remembering
11	Describe reactivity controlled compression ignition.	BT-2	Understanding
12	State the challenge in controlling GDCI combustion.	BT-1	Remembering
13	Distinguish between AC and DC charging in EV.	BT-2	Understanding
14	Define regenerative braking. How does it benefit EVs?	BT-1	Remembering
15	What is a pure electric vehicle (EV)?	BT-1	Remembering
16	Name the main components of a pure electric vehicle.	BT-1	Remembering
17	What type of motor is commonly used in electric vehicles?	BT-1	Remembering
18	Describe about the state of charge (SOC) in EV batteries.	BT-2	Understanding
19	What is the role of the Battery Management System (BMS) in EVs?	BT-1	Remembering
20	Summarize the type of battery used in electric vehicles.	BT-2	Understanding

21	Define torque vectoring in electric vehicles.	BT-1	Remembering
22	Summarize the advantages of EVs over internal combustion engine vehicles.	BT-1	Remembering
23	Describe the range of an electric vehicle.	BT-1	Remembering
24	What is a traction motor in an electric vehicle?	BT-1	Remembering
25	How does an electric vehicle differ from a hybrid vehicle?	BT-2	Understanding

<b>PART-B (15 Marks)</b>				
<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>BT Level</b>	<b>Competence</b>
1	Explain the working principle of a conventional hybrid electric vehicle (HEV) with a neat block diagram.	15	BT-4	Analyze
2	Explain in detail about techniques to Enhance Hybrid Performance in Hybrid Electric Vehicles (HEVs).	15	BT-4	Analyze
3	Draw and explain the typical CAN system of a hybrid electric vehicle.	15	BT-3	Apply
4	Discuss the battery technology used in conventional hybrid vehicles. Explain the parameters like energy density, charge/discharge rate, cycle life, and thermal management that affect battery performance.	15	BT-2	Understanding
5	Explain the role of hybrid control systems and energy management strategies in conventional hybrid vehicles.	15	BT-4	Analyze
6	Describe the architecture and functioning of series and parallel hybrid systems. Compare them based on efficiency, complexity, and applications with suitable sketches.	15	BT-3	Apply
7	Explain in detail about a fuel cell electric vehicle with a suitable sketch.	15	BT-4	Analyze
8	Explain with a suitable sketch about a hybrid electric vehicle drive train.	15	BT-4	Analyze
9	Explain in detail about control architecture of a hybrid electric vehicle.	15	BT-4	Analyze
10	Explain modes of operation in a series-parallel Hybrid Vehicle.	15	BT-4	Analyze
11	Explain with a suitable sketch about a battery electric vehicle and a plug-in hybrid electric vehicle.	15	BT-4	Analyze
12	Explain in detail about the components and working of electric vehicle in detail.	15	BT-4	Analyze

13	Classify and briefly describe in brief about the basic principle of optimization-based energy management systems used in EV/HEVs. Elaborate on any one of the optimization-based energy management systems.	15	BT-3	Apply
14	Describe in detail about Reactivity Controlled Compression Ignition.	15	BT-3	Apply
15	Explain in detail about Reactivity Controlled Compression Ignition Integrated with a battery system (Hybrid Setup).	15	BT-4	Analyze
16	Describe in detail about Gasoline Direct Compression Ignition.	15	BT-3	Apply
17	Explain in detail about Gasoline Direct Compression Ignition Integrated with a battery system (Hybrid Setup).	15	BT-4	Analyze
18	Briefly explain about challenges in the implementation of EV and HEV.	15	BT-3	Apply

## UNIT-V FUEL CELL TECHNOLOGY

Fuel cells for automotive applications - Technology advances in fuel cell vehicle systems – Onboard hydrogen storage - Liquid hydrogen and compressed hydrogen - Metal hydrides, Fuel cell control system - Alkaline fuel cell - Road map to market.

### PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	What is a fuel cell? How does it work in an automotive application?	BT-1	Remembering
2.	Name the most used fuel cell type in fuel cell electric vehicles.	BT-1	Remembering
3.	Describe the role of the electrolyte in a fuel cell.	BT-2	Understanding
4.	List the advantages of fuel cells.	BT-1	Remembering
5.	Write the chemical reaction equation of a fuel cell.	BT-1	Remembering
6.	Classification of fuel cells based on the type of electrolyte.	BT-1	Remembering
7.	List out major fuel cell technologies.	BT-1	Remembering
8.	Summarize the fuel cell components.	BT-2	Understanding
9.	What is a Solid Oxide Fuel Cell?	BT-1	Remembering
10.	SOFC Components and Properties.	BT-2	Understanding
11.	Summarize the requirement for the cathode material in SOFC.	BT-2	Understanding
12.	Summarize the requirement for an anode material in SOFC.	BT-2	Understanding
13.	List out different electrolyte materials used in a fuel cell.	BT-1	Remembering
14.	Describe the working principle of a Proton Exchange Membrane Fuel Cell.	BT-2	Understanding
15.	Mention the types of onboard hydrogen storage methods.	BT-1	Remembering
16.	What are the main functions of the fuel cell control system in a hydrogen-powered vehicle?	BT-1	Remembering
17.	Differentiate between liquid hydrogen and compressed hydrogen storage	BT-2	Understanding
18.	Describe the role of metal hydrides in hydrogen storage.	BT-2	Understanding
19.	What are the limitations of Alkaline Fuel Cells in automotive applications?	BT-1	Remembering
20.	Describe how a fuel cell stack produces electricity.	BT-2	Understanding
21.	Identify two barriers to the widespread adoption of fuel cell electric vehicles.	BT-1	Remembering

22.	Describe the working principle of an alkaline fuel cell.	BT-2	Understanding
23.	Suggest a suitable hydrogen storage method for a compact fuel cell car and justify briefly.	BT-1	Remembering
24.	Compare the efficiency and storage requirements of liquid hydrogen and metal hydride systems.	BT-2	Understanding
25.	Describe the challenges in using metal hydrides for automotive onboard storage.	BT-2	Understanding

<b>PART-B (15 Marks)</b>				
<b>Q.No</b>	<b>Questions</b>	<b>Marks</b>	<b>BT Level</b>	<b>Competence</b>
1	Explain with a suitable sketch about fuel cell fuel cell operating principle.	15	BT-4	Analyze
2	Explain in detail about the Proton Exchange Membrane Fuel Cell with a suitable sketch.	15	BT-4	Analyze
3	Explain in detail about the Polymer Electrolyte Membrane Fuel Cell with a suitable sketch.	15	BT-4	Analyze
4	Explain the following polymer electrolyte membrane 1. Hydrocarbon polymer 2. Acid–base blends 3. Fluorinated polymer	(4) (4) (3)	BT-4	Analyze
5	Describe in detail about Solid Oxide Fuel Cells (SOFC) with a suitable sketch and mention their chemical reaction.	15	BT-3	Apply
6	Explain the energy flow in a typical FCEV from hydrogen storage to wheel drive with neat labeling.	15	BT-4	Analyze
7	List the different fuel cell types used in automotive applications and compare their typical characteristics based on their fuel, temperature, efficiency.	15	BT-3	Apply
8	Describe the concept of electrochemical reaction to derive the net reaction of a hydrogen fuel cell and explain energy conversion.	15	BT-3	Apply
9	Analyze the challenges in integrating a fuel cell control system with the vehicle energy management system.	15	BT-4	Analyze
10	Illustrate the operation of an onboard hydrogen fuel storage and delivery system with a schematic layout.	15	BT-3	Apply
11	Apply the concept of electrochemical reaction to derive the net reaction of a hydrogen fuel cell and explain energy	15	BT-4	Analyze

	conversion.			
12	Describe in detail the structure and function of a fuel cell stack used in FCEVs.	15	BT-3	Apply
13	Describe the difference between compressed and liquid hydrogen storage in FCEVs.	15	BT-3	Apply
14	Explain the working of a hydrogen-powered fuel cell vehicle and its energy flow pathway.	15	BT-4	Analyze
15	Explain the importance of thermal and water management in PEM fuel cells used in automotive applications.	15	BT-4	Analyze
16	Develop a detailed roadmap for the commercialization of fuel cell electric vehicles in India, considering infrastructure and policy.	15	BT-3	Apply
17	Suggest a multi-technology solution (e.g., fuel cell + battery hybrid) to improve fuel economy and reduce emissions in long-haul trucks.	15	BT-3	Apply
18	Describe how a fuel cell vehicle can be designed using both compressed hydrogen and a hybrid powertrain integrated with battery and fuel cell.	15	BT-3	Apply

17		13	BT-2	Understanding
18		13	BT-2	Understanding

UNIT-1	<a href="https://www.calnetix.com/industrial/applications/turbocharging-supercharging">https://www.calnetix.com/industrial/applications/turbocharging-supercharging</a>
UNIT-2	<a href="https://carfromjapan.com/article/types-of-ignition-system/">https://carfromjapan.com/article/types-of-ignition-system/</a> <a href="https://www.brainkart.com/article/Homogeneous-Charge-Compression-Ignition-(HCCI)_6325/">https://www.brainkart.com/article/Homogeneous-Charge-Compression-Ignition-(HCCI)_6325/</a>
UNIT-3	<a href="https://rayeneh.com/methanol-production-processes/">https://rayeneh.com/methanol-production-processes/</a> <a href="https://www.sciencedirect.com/topics/earth-and-planetary-sciences/compressed-natural-gas">https://www.sciencedirect.com/topics/earth-and-planetary-sciences/compressed-natural-gas</a>
UNIT-4	<a href="https://e-amrit.niti.gov.in/types-of-electric-vehicles">https://e-amrit.niti.gov.in/types-of-electric-vehicles</a> <a href="https://archive.nptel.ac.in/courses/108/103/108103009/">https://archive.nptel.ac.in/courses/108/103/108103009/</a> <a href="https://archive.nptel.ac.in/courses/108/103/108103009/">https://archive.nptel.ac.in/courses/108/103/108103009/</a> <a href="https://eee.poriyaan.in/topic/electric-vehicles-10081/">https://eee.poriyaan.in/topic/electric-vehicles-10081/</a>
UNIT-5	<a href="https://archive.nptel.ac.in/courses/103/102/103102015/">https://archive.nptel.ac.in/courses/103/102/103102015/</a>