

**M.E. AUTOMOBILE ENGINEERING FIRST YEAR  
SECOND SEMESTER EXAM 2024**

**ALTERNATIVE FUELS AND ENERGY SYSTEMS**

Time: Three hours

(Answer any *FIVE* questions)

Marks: 100

*Different parts of the same question should be **answered together**.  
All symbols carry their usual meanings unless otherwise mentioned.  
Assume any relevant data if necessary.*

1. a) Explain the need of alternative fuels in present day automotive sectors. 6  
b) What are the advantages and dis-advantages of alcohols as alternative fuels? 6  
c) How alcohols are used in SI and CI engines? 8
2. a) What is biodiesel? Why it is used in C.I. Engine? 4  
b) Explain briefly the biodiesel production process. 6  
c) Briefly discuss the performance and emission characterises of a diesel engine with 10  
blended biodiesel.
3. a) What are the advantages and dis-advantages of biogas as alternative for automotive 6  
vehicles?  
b) What are the different factors affecting the bio-methanation process? 6  
c) Explain the performance characteristics of S.I. Engine using biogas. 8
4. a) What are merits and demerits of hydrogen as alternative for automotive vehicles? 6  
b) Briefly discuss different methods of hydrogen production. 8  
c) Explain how hydrogen could be used in automobile. 6
5. a) Explain how LPG is used in SI and CI Engines. 10  
b) What are the advantages and challenges of CNG as alternative fuel? 10

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6. a) What is fuel cell? How it is classified? 6
- b) What are the advantages and challenges of Electric vehicles? 7
- c) Briefly explain the operation of hybrid vehicle. 7
7. Write short notes on: (any **FOUR**) 4 X 5 20
- a) Storage of Hydrogen
- b) Stirling engine
- c) Ethanol is more popular compared to methanol as an alternative fuel
- d) Producer gas as alternative fuel
- e) Benefits of Fuel Cells