

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

ALTERNATIVE FUELS AND POWER SYSTEMS (3160207)

Unit 1: Introduction

Repeated Questions:

1. **Explain the need for alternate fuels / Justify the need for alternative fuels in India.**
(S25 - Q1b, 04 marks)
(W24 - Q1b, 04 marks)
(S22 - Q1a, 03 marks)
2. **Classify different alternative fuels / Give the classifications of alternative fuels.**
(W23 - Q1a, 03 marks)
(W24 - Q1a, 03 marks)
3. **Define: (i) Calorific value (ii) Fire Point (iii) Esterification / Define 1) Fire point 2) Flash point 3) Pour point and 4) Viscosity as per ASTM standard.**
(S24 - Q1a, 03 marks)
(S25 - Q1b, Part of 03 marks)

Other Important Questions (Newest to Oldest):

4. **Differentiate between conventional fuel and alternate fuel. What are the alternate fuel are being used in India, also explain the methodology to use it for any one type of fuel for CI and SI engine respectively.** (S25 - Q1a, 03 marks)
 5. **What is the need of fuels? List out the various alternate fuels.** (S23 - Q1a, 03 marks)
 6. **Compare alternative fuels with fossil fuels.** (S23 - Q1b, 04 marks)
 7. **Discuss on availability and properties of alternate fuels.** (S23 - Q1c, 07 marks)
 8. **Explain the properties flash point and viscosity.** (W22 - Q1a, 03 marks)
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Unit 2: Biofuels (Alcohols)

Repeated Questions:

1. **Discuss advantages and disadvantages of methanol.**
(W23 - Q2a, 03 marks)
(S25 - Q2c OR, 07 marks)
2. **Explain the drawback of using pure alcohol as fuel in a vehicle.**
(W24 - Q3b, 04 marks)
(W22 - Q2c, 07 marks)
(S23 - Q2a, 03 marks)
3. **Explain methanol production process with suitable reactions.**
(W22 - Q2b, 04 marks)
(W23 - Q3a OR, 03 marks)
(S22 - Q1b, 04 marks)

Other Important Questions (Newest to Oldest):

4. **What modification in vehicle is required for the use of ethanol blend more than 10% and 20% in engine- give reasons for same.** (S25 - Q2b, 04 marks)
 5. **Why pure alcohol as fuel is used for racing car as blending?** (S25 - Q1c, 07 marks)
 6. **Explain Dual fuel system with detail. / Differentiate Bi-fuel and Dual fuel engine with its example.** (S23 - Q2c, 07 marks) (S25 - Q2c OR, 07 marks)
 7. **Give the properties of methanol as fuel with its merits and demerits.** (S23 - Q2b, 04 marks)
 8. **Explain the production process of ethanol with reaction process.** (W24 - Q3b OR, 04 marks)
 9. **What is emulsification of alcohol with diesel? Describe emission improvement by blending of alcohol with diesel.** (W22 - Q4c OR, 07 marks)
 10. **Improvement/Change in emission characteristics with respect to % blending of alcohol.** [Topic from Syllabus]
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Unit 3: Biofuels (Biodiesel, Vegetable Oils & Synthetic Fuels)

Repeated Questions:

1. **Explain biodiesel production process with diagram.**
(W24 - Q1c, 07 marks)
(W23 - Q1c, 07 marks)
(S25 - Q2a, 07 marks)
(S24 - Q2c OR, 07 marks)
(S24 - Q2c, 07 marks)
(W22 - Q2c OR, 07 marks)
2. **Enlist advantages and disadvantages of biodiesel.**
(W23 - Q2b, 04 marks)
(S24 - Q1b, 04 marks)
3. **Define: (i) Emulsification (ii) Esterification (iii) Pyrolysis**
(S22 - Q2a, 03 marks)
(S22 - Q3b OR, 04 marks)
4. **Explain the properties of Jatropha seed oil and its Biodiesel in detail.**
(S25 - Q3b OR, 04 marks)
(S22 - Q2b, 04 marks)
5. **What are eco-friendly plastic fuels?**
(S25 - Q3a OR, 03 marks)
(W22 - Q2a, 03 marks)

Other Important Questions (Newest to Oldest):

6. **Discuss 'Appropriate selection of biodiesel feedstock'.** (S24 - Q2a, 03 marks)
 7. **Describe the various raw materials for biodiesel production.** (S23 - Q3b, 04 marks)
 8. **Explain the properties of diesel blended with vegetable oil and discuss the effects of it on performance of engine.** (S23 - Q2c OR, 07 marks)
 9. **Enlist the vegetable oils available as alternate fuel and discuss the performance and emission characteristics of any vegetable oil.** (S22 - Q2c OR, 07 marks)
 10. **Explain Synthetic Alternative Fuels.** (S23 - Q3a, 03 marks)
 11. **Enlist the numerous Synthetic Fuel and explain the plastic fuel production method in detail.** (S22 - Q2c, 07 marks)
 12. **Is it possible to use Di-Methyl Ether (DME) as alternative fuel in I.C. engine? Explain in detail.** (W22 - Q5a OR, 03 marks)
 13. **Define effect of vegetable oil on engine emission characteristics.** (S24 - Q5a OR, 03 marks) (W24 - Q5b, 04 marks)
 14. **Explain the effect of vegetable oil on engine performance and emission characteristics with reason.** (S25 - Q3a OR, 03 marks)
 15. **Write a short note on Gasifiers.** (S23 - Q3c, 07 marks)
 16. **Write a short note on Gasifiers.** (S23 - Q3c, 07 marks)
 17. **What are the factors affecting transesterification process? Explain.** (S24 - Q3a OR, 03 marks) (W23 - Q3b OR, 04 marks)
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Unit 4: Biogas, LPG & CNG

Repeated Questions:

1. **List/Explain/Discuss advantages and disadvantages of CNG as an alternative fuel.**
(W24 - Q2a, 03 marks)
(S24 - Q2b, 04 marks)
(W23 - Q5b, 04 marks)
2. **Explain different components of CNG gas conversion kit.**
(W24 - Q3a, 03 marks)
(S24 - Q3c OR, 07 marks)
(W22 - Q3a OR, 03 marks)
3. **Explain/Discuss storage, emission, cost and safety criteria for LPG and CNG.**
(W24 - Q2c, 07 marks)
(W22 - Q3a, 03 marks)
(S22 - Q3a, 03 marks)
4. **Discuss the factors affecting biogas formation. / Enlist factors affecting biogas formation.**
(W22 - Q3b, 04 marks)
(S22 - Q3b OR, 04 marks)
(S23 - Q3c OR, 07 marks)
5. **Compare LPG and CNG from its property, performance, emission and safety point of view. / Discuss cost assessment of LPG and CNG. / Explain the comparison of LPG and CNG fuel.**
(S25 - Q3a OR, 03 marks)
(S23 - Q3a OR, 03 marks)
(S25 - Q3b, 04 marks)

Other Important Questions (Newest to Oldest):

6. **Compare the fuel properties of CNG and Gasoline. Based on property justify that the CNG is suitable to SI engine.** (S25 - Q3a, 03 marks)
 7. **Describe properties & production process of CNG as an engine fuel.** (W22 - Q3c, 07 marks)
 8. **Write a short note on LPG as a fuel in vehicle.** (S24 - Q5c, 07 marks)
 9. **Write a short note on different types of biogas plants. / List down types of biogas plants. Explain anyone with diagram.** (W23 - Q2c OR, 07 marks) (W24 - Q5c OR, 07 marks)
 10. **Explain the process of biogas formation with neat sketch in detail.** (S22 - Q3c, 07 marks)
 11. **Explain major components of Biogas Plants in detail.** (W22 - Q3c OR, 07 marks) (W23 - Q4b, 04 marks)
 12. **Discuss the method of biomass gasification and enlist the merits & demerits.** (S24 - Q4c OR, 07 marks) (S22 - Q3c OR, 07 marks)
 13. **Explain storage and dispensing systems of CNG.** (W23 - Q3b, 04 marks)
 14. **Which modification is required to convert petrol engine into CNG engine?** (S24 - Q3b, 04 marks)
 15. **Describe dual fuel engine. / Explain dual fuel engine.** (W24 - Q3a OR, 03 marks) (W22 - Q3b OR, 04 marks)
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Unit 5: Hydrogen

Repeated Questions:

1. **Explain the physical properties of hydrogen fuel.**
(S24 - Q4b, 04 marks)
(S22 - Q3b, 04 marks)
2. **Discuss advantages and disadvantages of hydrogen as a fuel. / Give the advantages and disadvantages of hydrogen as a fuel.**
(S24 - Q5b, 04 marks)
(S23 - Q4b, 04 marks)
(W23 - Q4b OR, 04 marks)
3. **Explain storage of hydrogen for automobile application. / Describe in short, the metal hydride/compressed hydrogen storage methods for Automobile.**
(S23 - Q4b OR, 04 marks)
(S25 - Q4c, 03 marks)
(S25 - Q5a OR, 07 marks)

Other Important Questions (Newest to Oldest):

4. **Hydrogen is more suitable to SI engine than CI engine. Justify the statement with fuel properties.** (S25 - Q4a, 03 marks)
 5. **Explain production process and storage of hydrogen.** (W22 - Q4c, 07 marks)
 6. **Enlist different hydrogen production methods. Explain any two methods.** (W23 - Q3c OR, 07 marks)
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Unit 6: Electric, Hybrid Vehicles and Fuel Cells

Repeated Questions:

1. **Compare fuel cell with battery. / Compare the working of fuel cell with batteries.**
(W24 - Q5a, 03 marks)
(S24 - Q4a OR, 03 marks)
(S23 - Q4a, 03 marks)
(W23 - Q5a OR, 03 marks)
2. **Explain different electric motors used for automotive applications / Give the detailed classification of various electric motors used in electric vehicle powertrain.**
(W24 - Q4a, 03 marks)
(S24 - Q5a, 03 marks)
(W22 - Q4a, 03 marks)
(S23 - Q5c OR, 07 marks)
(W23 - Q4c OR, 04 marks)
(S22 - Q4b OR, 04 marks)
3. **Discuss comparison between Electric and Hybrid vehicle in brief. / Compare the Electric and Hybrid vehicle.**
(S24 - Q3a, 03 marks)
(S22 - Q4a OR, 03 marks)
(S25 - Q4a OR, 03 marks)
4. **State/Explain positive and negative consequences / advantages and disadvantages of electric vehicles.**
(W24 - Q2b, 04 marks)
(W22 - Q1b, 04 marks)
(W23 - Q3a, 03 marks)
(S25 - Q4c OR, 07 marks)
5. **What is a fuel cell? Explain its power rating and performance.**
(S24 - Q3b, 04 marks)
(W22 - Q4a OR, 03 marks)
6. **Explain the various configuration of Hybrid vehicle in detail with neat diagram. / Compare series type and parallel type hybrid electric vehicle with suitable diagrams.**
(S24 - Q4c OR, 07 marks)
(W22 - Q5c, 07 marks)
(W24 - Q5c, 07 marks)
(S22 - Q4c, 07 marks)
(W23 - Q5c OR, 07 marks)

Other Important Questions (Newest to Oldest):

7. **Define the following Motor characteristics: (i) Nominal voltage (ii) Rated torque (iii) Base speed.** (S25 - Q4b OR, 03 marks) (S22 - Q5a, 03 marks)
8. **For electric vehicle, what are the parameters affecting the battery storage capacity? - discuss them in detail.** (S22 - Q4c OR, 07 marks) (S25 - Q5a OR, 07 marks)
9. **Explain the working of Electric-Fuel cell hybrid configurations vehicle.** (S23 - Q4c, 07 marks)
10. **List out the various types of fuel cell and explain any one with neat diagram. / Define Fuel cell. List down the types of fuel cell.** (S23 - Q4c OR, 07 marks) (W24 - Q5a OR, 03 marks)
11. **Describe the fuel cell vehicle with its performance and safety aspects.** (S25 - Q5a, 07 marks)
12. **Explain the possible drive train configuration for Electric Vehicle.** (S22 - Q4b, 04 marks)
13. **Explain the principal of fuel cell technology with neat sketch in brief.** (S22 - Q4a, 03 marks)
14. **Define the following Battery characteristics: (i) Energy Density (ii) Power Density (iii) State of Charge.** (S22 - Q5a OR, 03 marks)

15. **Write a short note on fuel cell.** (W23 - Q5b OR, 04 marks)

Unit 7: Solar Powered Vehicles

Repeated Questions:

1. **Explain/Draw the layout of solar powered vehicle and explain it. / Describe with neat sketch the solar powered automobiles with its advantages and limitations.**

(S25 - Q4b, 04 marks)

(W22 - Q1c, 07 marks)

(S24 - Q2c OR, 07 marks)

(S22 - Q5b, 04 marks)

(W24 - Q3c OR, 07 marks)

(W23 - Q5c, 07 marks)

Other Important Questions (Newest to Oldest):

2. **Discuss the advantages and limitations of solar powered vehicles.** (S22 - Q5b OR, 04 marks)
 3. **Solar cells for energy collection. Storage batteries, layout of solar powered automobiles, advantages and limitations.** [Topic from Syllabus]
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Unit 8: Non-conventional I.C. Engines

Repeated Questions:

1. **Explain working of Wankel engine with neat sketch. / Explain construction and working of Wankel engine with neat sketch. / With suitable sketches explain Wankel rotary engine.**
(W24 - Q4c OR, 07 marks)
(W22 - Q5a, 03 marks)
(W23 - Q2c OR, 07 marks)
(S24 - Q3c OR, 07 marks)
(S22 - Q5c OR, 07 marks)
2. **Explain working of the stratified charge engine in detail with neat sketch. / Describe stratified charge engine.**
(S25 - Q5b, 07 marks)
(W22 - Q5b, 04 marks)
(W24 - Q4b, 04 marks)
(S22 - Q5c, 07 marks)
3. **Write a short note on free piston engine. / Explain free piston engine with necessary diagrams.**
(W24 - Q3c, 07 marks)
(S23 - Q5b, 04 marks)
(W22 - Q5c OR, 07 marks)
(S24 - Q5c OR, 07 marks)

Other Important Questions (Newest to Oldest):

4. **Describe working of Stirling engine. / Explain Stirling engine with suitable diagrams.** (W24 - Q5b OR, 04 marks) (W23 - Q4c, 07 marks)
5. **List out the different types of Non-Conventional I.C. Engines.** (S23 - Q5a, 03 marks)
6. **Explain the limitations of electric vehicles.** (S23 - Q5b, 04 marks)
7. **Explain the types of electric motors for automobile with detail.** (S23 - Q5c OR, 07 marks)
8. **Discuss the scope of availability of fossil fuel in future.** (W24 - Q4b OR, 04 marks)
9. **Discuss different barriers for implementing use of alternative fuels in India.** (W23 - Q5a, 03 marks)
