Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160207 Date: 22-05-2025

Subject Name: Alternative Fuels and Power Systems

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	(a)	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.	07
	(b)	Define 1) Fire point 2) Flash point 3) Pour point and 4) Viscosity as per ASTM standard.	04
	(c)	Why pure alcohol as fuel is used for racing car as blending?	03
Q.2	(a)	Explain biodiesel production process with diagram as per ASTM standard.	07
	(b)	What modification in vehicle is required for the use of ethanol blend more than 10% and 20% in engine-give reasons for same.	04
	(c)	Discuss advantages and disadvantages of methanol.	03
		OR	
	(c)	Differentiate Bi-fuel and Dual fuel engine with its example.	03
Q.3	(a)	Compare the fuel properties of CNG and Gasoline. Based on property justify that the CNG is suitable to SI engine.	07
	(b)	Compare LPG and CNG from its property, performance, emission and safety point of view.	04
	(c)	What are ecofriendly plastic fuels?	03
		OR	
Q.3	(a)	Explain the effect of vegetable oil on engine performance and emission characteristics with reason.	07
	(b)	Explain the properties of Jatropha seed oil and its Biodiesel in detail.	04
	(c)	Define: (i) Emulsification (ii) Esterification (iii) Pyrolysis	03
Q.4	(a)	Hydrogen is more suitable to SI engine than CI engine- Justify the statement with fuel properties.	07
	(b)	Describe with neat sketch the solar powered automobiles with its advantages and limitations.	04
	(c)	Describe in short, the metal hydride hydrogen storage methods for Automobile.	03
		OR	
Q.4	(a)	Compare the Electric and Hybrid vehicle.	07
	(b)	Define the following Motor characteristics: (i) Nominal voltage, (ii) Rated torque & (iii) Base speed	04
	(c)	Explain positive and negative consequences of electric vehicles.	03
Q.5	(a)	Describe the fuel cell vehicle with its performance and safety aspects.	07
	(b)	Explain working of the stratified charge engine in detail with neat sketch.	04

	(c)	Describe in short, the compressed hydrogen storage methods for Automobile.	03
		OR	
Q.5	(a)	For electric vehicle, what are the parameters affecting the battery storage capacity? – discuss them in detail.	07
	(b)	Give the detailed classification of various electric motors used in electric vehicle powertrain.	04
	(c)	Explain different biogas production process stages.	03

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160207 Date:17-05-2024

Subject Name:Alternative Fuels and Power Systems

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define. (i) Calorific value (ii) Fire Point (iii) Esterification	**03**
	(b)	Enlist advantages and disadvantages of biodiesel.	**04**
	(c)	With neat sketch discuss construction and working of electric vehicle.	**07**
Q.2	**(a)**	Discuss about 'Appropriate selection of biodiesel feedstock'.	**03**
	(b)	Discuss advantages & disadvantages of CNG as an alternative fuel	**04**
	(c)	Write a short note on biodiesel production process.	**07**
		OR	
	(c)	Discuss construction and working of solar vehicle with block diagram.	**07**
Q.3	**(a)**	Discuss comparison between Electric and Hybrid vehicle in brief.	**03**
	(b)	What is a fuel cell? Explain its power rating and performance.	**04**
	(c)	Explain different components of CNG fuel gas conversion kit.	**07**
		OR	
Q.3	**(a)**	What are the factors affecting transesterification process? Explain	**03**
	(b)	Which modification is required to convert petrol engine in to CNG engine?	**04**
	(c)	With suitable sketches explain Wankel rotary engine.	**07**
Q.4	**(a)**	Explain the layout of solar powered vehicle in brief.	**03**
	(b)	Explain the physical properties of hydrogen fuel.	**04**
	(c)	Discuss the method of biomass gasification and enlist the merits & demerits.	**07**
		OR	
Q.4	**(a)**	Compare fuel cell with battery.	**03**
	(b)	Distinguish between viscosity and volatility.	**04**
	(c)	Explain the various configuration of Hybrid vehicle in detail with neat diagram	**07**
Q.5	**(a)**	Explain different electric motors used for automotive applications	**03**
	(b)	Discuss advantages and disadvantages of hydrogen fuel.	**04**
	(c)	Write a short note LPG as a fuel in vehicle.	**07**
		OR	
Q.5	**(a)**	Define effect of vegetable oil on engine emission characteristics.	**03**
	(b)	Write a short note on "need of alternative fuels in India	**04**
	(c)	Explain free piston engine with necessary diagrams	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160207 Date:06-07-2023

Subject Name:Alternative Fuels and Power Systems

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is the need of fuels? List out the various alternate fuels.	**03**
	(b)	Compare alternative fuels with fossil fuels.	**04**
	(c)	Discuss on availability and properties of alternate fuels.	**07**
Q.2	**(a)**	Explain drawback of using pure alcohol as a fuel in vehicle.	**03**
	(b)	Give the properties of methanol as fuel with its merits and demerits.	**04**
	(c)	Explain Dual fuel system with detail.	**07**
		OR	
	(c)	Explain the properties of diesel blended with vegetable oil and discuss the effects of it on performance of engine.	**07**
Q.3	**(a)**	Explain Synthetic Alternative Fuels.	**03**
	(b)	Describe the various raw materials for biodiesel production.	**04**
	(c)	Write a short note on Gasifiers.	**07**
		OR	
Q.3	**(a)**	Discuss cost assessment of LPG and CNG.	**03**
	(b)	Write the properties of LPG & CNG as engine fuels.	**04**
	(c)	Discuss the various factors affecting on biogas formation.	**07**
Q.4	**(a)**	Compare the working of fuel cell with batteries.	**03**
	(b)	Give the advantages and disadvantages of hydrogen as a fuel.	**04**
	(c)	Explain the working of Electric-Fuel cell hybrid configurations vehicle.	**07**
		OR	
Q.4	**(a)**	Give the comparison of fuel cell with batteries.	**03**
	(b)	Explain storage of hydrogen for automobile application.	**04**
	(c)	List out the various types of fuel cell and explain any one with neat diagram.	**07**
Q.5	**(a)**	List out the different types of Non-Conventional I.C. Engines.	**03**
	(b)	Explain the limitations of electric vehicles.	**04**
	(c)	Draw the layout of solar powered vehicle and explain the working of it.	**07**
		OR	
Q.5	**(a)**	Explain eco friendly plastic fuel.	**03**
	(b)	Write a note on free piston engine.	**04**
	(c)	Explain the types of electric motors for automobile with detail.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160207 Date:03/06/2022

Subject Name:Alternative Fuels and Power Systems

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain the need for alternate fuel in brief.	**03**
	(b)	Describe the method of production of methanol in short.	**04**
	(c)	Explain the suitability of algae fuel in brief and discuss the process for separating algae fuel from it in detail.	**07**
Q.2	**(a)**	Define: (i) Emulsification (ii) Esterification (iii) Pyrolysis	**03**
	(b)	Explain the properties of jatropha seed oil in detail.	**04**
	(c)	Enlist the numerous Synthetic Fuel and explain the plastic fuel production method in detail.	**07**
		OR	
	(c)	Enlist the vegetable oils available as alternate fuel and discuss the performance and emission characteristics of any vegetable oil.	**07**
Q.3	**(a)**	Discuss the cost and safety of CNG fuel for vehicles in short.	**03**
	(b)	Explain the physical properties of hydrogen fuel.	**04**
	(c)	Explain the process of biogas formation with neat sketch in detail.	**07**
		OR	
Q.3	**(a)**	Explain the comparison of LPG and CNG fuel in short.	**03**
	(b)	Discuss the factor affecting the biogas formation.	**04**
	(c)	Discuss the method of biomass gasification and enlist the merits and demerits of it.	**07**
Q.4	**(a)**	Explain the principal of fuel cell technology with neat sketch in brief.	**03**
	(b)	Explain the possible drive train configuration for Electric Vehicle.	**04**
	(c)	Explain the various configuration of Hybrid vehicle in detail with neat diagram.	**07**
		OR	
Q.4	**(a)**	Discuss comparison between Electric and Hybrid vehicle in brief.	**03**
	(b)	Give the detailed classification of various electric motors used in electric vehicle powertrain.	**04**
	(c)	For electric vehicle, what are the parameters affecting the battery storage capacity? – discuss them in detail.	**07**
Q.5	**(a)**	Define the following Motor characteristics: (i) Nominal voltage (ii) Rated torque (iii) Base speed	**03**
	(b)	Explain the layout of solar powered vehicle in brief.	**04**

(c) Explain working of the stratified charge engine in detail with neat sketch. **07**

OR

Q.5 **(a)** Define the following Battery characteristics: **03**

(i) Energy Density
(ii) Power Density
(iii) State of Charge

(b) Discuss the advantages and limitations of solar powered vehicles. **04**

(c) Discuss the working of the Wankel engine in details. **07**

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