

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2025
Programme Name: B Tech (ME)
Semester: VII
Subject Code: UG11T4706
Subject Name: FUELS AND LUBRICANTS

Date: 09.06.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. What are the main Constituents of Fuels?

- a) Helium and oxygen b) carbon and hydrogen
- c) oxygen and hydrogen d) carbon and nitrogen

2. Water gas is a mixture of

- a) CO₂ and O₂ b) O₂ and H₂ c) H₂, N₂ and O₂ d) CO and H₂

3. In Orsat apparatus, pyrogallic acid is used to absorb

- (a) CO₂ (b) O₂ (c) N₂ (d) CO

4. The oil insoluble sludge can be reduced by using _____

- a) Pour point depressants b) Friction modifiers c) Oxide inhibitors

d) detergents

5. The viscosity index can be improved by adding _____

- a) Linear polymers
- b) Branched polymers
- c) Cyclic polymers
- d) Inorganic materials

6. vegetable oils are added to the lubricants to improve their _____

- a) Lubrication
- b) Oiliness
- c) Viscosity
- d) Efficiency

7. Acid number of a lubricating oil is _____ required to neutralise all acidic constituents of 1 g of oil.

- a) mgs of KOH
- b) mgs of K_2SO_4
- c) mgs of NaOH
- d) mgs of Na_2SO_4

8. Which of the following statements is not correct with respect to alcohols as alternate fuel?

- a) Anti-knock characteristics of alcohol are poor
- b) Alcohol contains about half the heat energy of gasoline/liter
- c) Alcohol does not vaporize as easily as gasoline
- d) Alcohols are corrosive in nature

9. Which of the following is a disadvantage of hydrogen as a fuel in IC engine?

- a) Storage is easy
- b) Low NOx emissions
- c) Detonating tendency
- d) Easy handling

10. Viscosity of multigrade oils

- a). Reduces with temperature but at higher sensitivity compare to monograde oil.
- b). Increases with temperature but at higher sensitivity compare to monograde oil.
- c). Reduces with temperature but at lower sensitivity compare to monograde oil.
- d). Increases with temperature but at lower sensitivity compare to monograde oil.

Section B

Five Questions of 02 Marks each

11. What is the difference between Gross calorific and Net calorific value write down the Dulong's formula"
12. What is the significance of saponification number in lubricants?
13. Define octane number. Do you prefer higher octane number or lower octane number in SI fuels?
14. What is the significance of biodiesel oxidation stability?
15. List out few engine oil grades?

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

- 16a). Discuss about advantages and disadvantages of liquid, and gaseous fuels (5Marks)
- b) Discuss in detail about the structures of various hydrocarbons (5Marks)
- 17a) Discuss about Bituminous Coal and characteristics of coke (5Marks)
- b) Explain how is producer gas manufactured? State its composition and uses. (5Marks)
- 18) Explain in detail about the manufacturing of lubricating base oil stock processes and show the process layout (10Marks)
- 19a) List out the factors affecting the delay period directly related to knocking in C. I. engines and what measures are needed to prevent them. (5Marks)
- b) What are the requirements of diesel additives? List out few additives added in diesel fuel to improve the engine performance. (5 Marks)
- 20a) Explain briefly about transesterification process of biodiesel production from non edible vegetable oils. (5Marks)
- b) Write short notes on i) Methanol ii) Dimethyl ether (5 Marks)

21a) Draw a block diagram representing the battery powered electric vehicle and explain (7Marks)

b) What safety precautions must be taken while using hydrogen as fuel in I.C. engines? (3Marks)

22a) Name different types of typical additives added in blended oils and discuss in detail about i) extreme pressure additive ii) Thickeners iii) Foam Inhibitors (7Marks)

b) List out suitable measures to control detonation in SI engines. (3Marks)

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