

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – DEC 2024**  
**Programme Name: B Tech (Marine Engineering)**  
**Semester: VII**  
**Subject Code: UG11T4706**  
**Subject Name: FUELS AND LUBRICANTS**

Date: 26.12.2024

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. Which of the following types of coal has the highest calorific value?  
(a) Peat (b) Lignite (c) Bituminous (d) Anthracite
2. The main constituent in CNG gas is \_\_\_\_\_.  
(a) Methane (b) Ethane (c) Propane (d) Butane
3. In Orsat apparatus, pyrogallic acid is used to absorb  
(a) CO<sub>2</sub>                      (b) O<sub>2</sub>                      (c) N<sub>2</sub>                      (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 is a key property of Dimethyl Ether (DME) that makes it suitable as an alternative fuel in diesel engines?

- (a) High viscosity (b) High octane number (c) Low boiling point (d) High cetane number

9. What is the primary challenge in using hydrogen as a fuel in internal combustion engines?

- (a) Difficulty in storage and distribution (b) High greenhouse gas emissions (c) Low calorific value (d) High sulphur content

10. Which ISO standard is used to define the cleanliness code for lubricants?

- (a) ISO 12185 (b) ISO 3103 (c) ISO 4406 (d) ISO 9001

### **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. Briefly explain the mechanism of extreme pressure (EP) lubrication.

13. What is Producer gas?

14. Why are vegetable oils not directly used as fuel in diesel engines without transesterification?

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)

20(a) What is knocking? Compare the knocking in SI and CI engines.

(b) What are Octane number and Cetane number? Explain their significance for SI and CI engine performance.

(c) What does it mean when a lubricating oil has an ISO Cleanliness Code of 18/16/13? (3 + 4 + 3 marks)

21. (a) With the help of (p - $\theta$ ) diagram, describe combustion process in SI engine.

(b) With the help of (p - $\theta$ ) diagram, describe combustion process in CI engine.

(c) What are the disadvantages of using vegetable oil as C.I. Engine fuel? (4 + 4 + 2 marks)

22. (a) What is carbonization in the context of coal? State its two applications.

(b) Write short notes on Dimethyl ether (DME) and Diethyl ether (DEE).

(c) Write short notes on Viscosity index improvers and Anti-foaming agents additives used for lubricating oils. (2 + 4 + 4 marks)

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