

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)

**December 2016 End Semester Examinations**  
**B.Tech. (Marine Engineering) Fifth Semester**

**Marine Internal Combustion Engine – I (UG11T1503/ UG11T2503)**

**Date : 20.12.2016**

**Time: 3 Hrs**

**Maximum Marks: 100**

**Pass Marks : 50**

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**PART – A**  
(Answer ALL Questions) (3 x 10 = 30 Marks)

1. a. Sketch the Dual Cycle and briefly explain the gas exchange process.
- b. What is : Scavenge Efficiency, Volumetric Efficiency, Thermal Efficiency in diesel engines.
- c. What is the purpose of ‘Tie Bolts’ in a large bore 2-Stroke Engine ?
- d. Why do engines need a ‘Cross Head’ ? How are lateral forces from the cross head accommodated.
- e. What is ‘Super-Charging’ of diesel engines? State four methods of super charging.
- f. Explain ‘surging’ in turbo chargers.
- g. Draw, and briefly explain the Heat balance diagram.
- h. Distinguish clearly between : Flash point, Ignition point, and fire point temperatures of a fuel oil.
- i. What is the scavenge pressure in the air manifold of a naturally aspirated engine while running? Explain why.
- j. What is the minimum compression ratio required in a diesel engine, and why?

**PART – B**  
Answer any FIVE questions. (14 x 5 = 70 Marks)

2. Explain the principle of operation of : 2-Stroke, & 4-Stroke cycles in diesel engines.
  - a) What is the camshaft speed in either of the cycles.
  - b) What is the purpose of ‘overlap’ of valves in the 4-stroke cycle ? ( 8+2+4 Marks)

3. Explain the various processes of scavenging in 2-stroke engines giving their merits and demerits.
- a) How is air circulation/swirl in liners achieved?
  - b) What constructional feature in a liner confirms it as a 2-stroke engine liner?
- (10+2+2 Marks)
4. Sketch and describe a Turbo-charger of a large engine.
- a) What is the purpose of the labyrinth seals ?
  - b) What is the purpose of the diffuser in the blower ?
- (10+2+2 Marks)
5. Sketch a Fuel Oil system for a main propulsion engine, indicating direction of flow, & relevant temperatures.
- a) What is the purpose of the 'buffer tank' (ie mixing tank)?
  - b) What impurities are generally found in the fine filters?
- (10+2+2 Marks)
6. What are the primary (preventive) means of reducing NO<sub>x</sub> discharge from Marine Diesel Engines?
- a) Why do slow speed engines discharge more NO<sub>x</sub> than MSE & HSE ?
  - b) What damages are caused by NO<sub>x</sub> pollution to life and environment? (8+3+3 Marks)
7. What causes Scavenge Fires in diesel engines? Explain the process.
- a) What are the indications of a potential fire occurrence, the actions to be taken?
  - b) What are the preventive measures that can be taken ? ( 8+3+3 Marks)
8. Compare the relative advantages and disadvantages of using fresh cooling water, and lubricating oil as a coolant for piston cooling.
- a) What is 'bore cooling' in engine components?
  - b) Why is conditioning and treatment of cooling water necessary? ( 8+3+3 Marks)

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