

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

**B.Tech. (Marine Engineering) - Semester – V**  
**December 2015 - End Semester Examinations**

**Marine Internal Combustion Engine - I**  
**Subject Code: UG11T1503/UG11T2503**

Time: 3 Hours  
Date: 14.12.2015

Max Marks: 100  
Pass Marks: 50

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**Part-A (3x10=30 Marks)**

**Compulsory Questions**

- 1) (a) Define mean piston speed and list down the constraints for increasing the mean piston speed.  
(b) Explain compression ratio, pressure ratio and cutoff ratio for the dual cycle engines.  
(c) Compare tie rods and holding down bolts for Marine IC engines  
(d) Describe the various power ratings of the engine  
(e) Explain the relationship between heat balance and thermal efficiency of the engine  
(f) Explain how supercharging helps to improve the combustion efficiency and reducing specific fuel oil consumption  
(g) What is CCAI in relationship with ignition quality of fuel  
(h) Describe the reasons why jacket cooling water to be treated onboard  
(i) Compare briefly electronically controlled engines with conventional marine diesel Engines  
(j) Write down the measures to control NOX and SOX.

**Part-B ( 5x14 = 70Marks)**

**Answer any five of the followings.**

- 2) a) Explain the 4-stroke engine valve timing diagram with the help of crank angle diagram. (5 Marks)  
b) State the objectives of valve timing. (3 Marks)  
c) What is meant by scavenge efficiency? (3 Marks)  
d) Discuss the effect of the shape of the ports and choking with carbon deposits on scavenge efficiency. (3 Marks)
- 3) (a) Describe, with the aid of a sketch, the operation of main engine exhaust valve which is hydraulically operated. (10 marks)  
(b) In a diesel engine late injection is indicated by black or grey exhaust smoke with low exhaust temperature, justify your answer (4 marks)
- 4) (a) Sketch and describe a large turbocharger for the Marine Diesel Engines. (7 Marks)  
(b) Give reasons for the relative positions of the various components shown. (7 Marks)

- 5) (a) Sketch and describe a fuel oil system of a large diesel engine, from a settling tank to main engine fuel injectors. (8 Marks)
- (b) Comment on the importance of:
- (i) Heating arrangement with temperature control. (2 Marks)
  - (ii) Prevention of air lock in the system. (2 Marks)
  - (iii) Purification of fuel. (2 Marks)
- 6) With reference to large slow-speed diesel engines discuss with reasons, the following
- (a) The increasing use of long-stroke crosshead engines. (7 Marks)
  - (b) The introduction of two-stage turbocharging. (7 Marks)
- 7) a) Draw a neat sketch of cylinder liner of large marine 2 stroke diesel engine of any reputed manufacturer where bore cooling method is used. (8 Marks)
- b) Label the sketch and briefly describe the special features of Liner. (6 Marks)
- 8) a) Describe how a crankcase explosion may occur and state the possible causes. (3 Marks)
- b) What safeguards may be used to reduce the risk of this occurring or of reducing subsequent damage? (8 Marks)
- c) List the procedures, which should be taken if such conditions occur. (3 marks)

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