

INDIAN MARITIME UNIVERSITY
(Central University, Government of India)

May/June 2016 End Semester Examinations
B.Tech. (Marine Engineering)

Sixth Semester
Advanced Marine Heat Engines (Co-Cycles) (UG11 E1602/E 2602)

Date : 21.06.2016

Max Marks: 100

Time: 3 Hrs

Pass Marks: 50

Part-A
Compulsory Question

(3 x 10 = 30 Marks)

- 1) a) What are the limitations of diesel engines ?
- b) Why Steam Propulsion is preferred on LNG Ship?
- c) What are various power losses in a shafting system.
- d) How the same turbocharger is matched with diesel engines of different makes (with in a specified power range).
- e) What is stalling of compressor in turbo charger?
- f) Define atomization, penetration of fuel & combustion chamber.
- g) What is the purpose of air pre-heaters and where do you find them?
- h) In marine applications, Rankine cycle is combined either with Brayton cycle or Diesel cycle. Compare them.
- i) Find an expression for the overall efficiency of a combined power cycle in series.
- j) Define combustion. What is dew point temperature of combustion products?

Part - B
Answer any five of the followings

(5 x 14 = 70 Marks)

- 2) a) What are the different types of heat exchangers ?
- b) How can the overall heat transfer coefficient and fouling factor be determined? (7+7)
- 3) a) How does a rotary air compressor work ? (6)
- b) A rotary compressor has a pressure compression ratio of 5:1. It compresses air at the rate of 10 kg/sec. The initial pressure and temperature are 100 kN /m² and 20⁰ C respectively. The isentropic efficiency of the compressor is 0.85. Determine
 - i) the final pressure and temperature
 - ii) the energy, in kilowatts, required to drive the compressor. Take $\gamma = 1.4$ and $C_p = 1.005$ kJ/KgK. (8)
- 4) Find an expression for thermal efficiency of Brayton cycle with perfect regeneration. Plot the cycle on P-v and T-s plane. (14)
- 5) a) What is cascade refrigeration plant ? (4)
- b) Sketch and describe a plant stated above for air conditioning a passenger ship. (10)
- 6) a) With a suitable sketch describe how efficiently waste heat is recovered from a marine diesel engine plant. (10)
- b) How LNG boil off gas is cooled? (4)
- 7) a) Sketch and describe a rotary cup burner used in boiler. (8)
- b) Define flame stabilization and how is it achieved. (6)
- 8) Define fin efficiency and fin effectiveness. Derive an expression for overall efficiency of a fin array. (14)
