

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

**May/June 2015 End Semester Examinations**

**SEMESTER – VI, B.TECH ( MARINE ENGINEERING)**

**ADVANCED MARINE HEAT ENGINES (E 1602)**

**Date: 24.06.2015**  
**Time: -3 Hrs**

**Max. Marks: 100**  
**Pass Marks: 50**

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**PART – A**  
**(Compulsory Questions)**

**(3 x 10 = 30 Marks)**

1. a) What are the limitations of diesel engines ?
- b) What is the function of a heat exchanger ?
- c) What is flame stabilization and why is it required ?
- d) What is the function of a compressor ?
- e) What is the requirement of premixing of gaseous fuel for combustion ?
- f) What are the main components of a Steam turbine plant ?
- g) Define atomization and combustion chamber.
- h) What is the purpose of Gas and Oil heaters ?
- i) Why does stalling of compressor occur ?
- j) Why and where are air pre-heaters used ?

**PART – B**  
**(Answer any five of the following)**

**(5 x 14 = 70 Marks)**

2. a) What are the different types of heat exchangers ?
- b) How the overall heat transfer coefficient and fouling factor can be determined ?  
**(7+7)**

3. a) Write the differences between a reciprocating and rotary air compressor work?
- 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 /m<sup>2</sup> and 20<sup>0</sup> C respectively. The isentropic efficiency of the compressor is 0.85. Determine
- the final pressure and temperature
  - the energy, in kilowatts, required to drive the compressor.
- Take  $\gamma = 1.4$  and  $C_p = 1.005$  kJ/kK.
- (6+8)**
4. a) How does a cascade refrigeration plant work ?
- b) Sketch and describe such a plant.
- (6+8)**
5. a) What will be the power output for a combined gas turbine and steam turbine plant ?
- b) A combined gas and steam plant develops 10 MW at the gas turbine shaft with an efficiency of 20 percent. A steam turbine power plant (  $\eta_{st} = 32\%$  ) is operated through the WHRB which receives the turbine exhaust. Calculate
- the output of the steam turbine plant.
  - thermal efficiency of the combined cycle plant and
  - the overall heat rate.
- (6+8)**
6. a) Sketch and describe operation of a free piston gas generator.
- b) What is the thermal efficiency of such a generator ?
- (10 + 4)**
7. a) What are the ideal conditions for efficient burning of fuel in a diesel engine ?
- b) How does the shape of combustion space affect combustion
- (8+6)**
8. a) Discuss about the mechanism of fuel oil combustion.
- b) How can the spray of fuel be performed ?
- c) Explain the methods of fuel atomization
- (5+4+5)**

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