INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination December 2017

Programme: B.Tech (Marine Engineering) **Semester:** V

Subject Name: Marine Internal Combustion Engine-I **Subject Code:** UG11T2503/1503

Date: 08.12.2017 **Maximum Marks:** 100

Time: 3 Hours **Pass Marks:** 50

PART – A **(10 X 3=30 Marks)**

(All questions are compulsory)

Q.1. a. Draw labelled timing diagrams of a two stroke and a four stroke marine diesel engine.

b. Why are scavenging ports bored obliquely and how is the same effect achieved in four stroke engines.

c. State the need of an auxiliary blower for constant pressure turbocharged engine.

d. Draw a labelled PØ (pressure vs crank angle) diagram of a two stroke marine diesel engine clearly highlighting the compression phase, ignition delay period, uncontrolled combustion phase, controlled combustion phase, afterburning period and expansion. Assume the start of injection at 14 degrees before TDC and end of injection at 14 degrees after TDC.

e. State mathematically the benefit of using a charge air cooler between the turbocharger and scavenge manifold.

f. State the advantages of oil cooling over, water cooling in large two stroke piston cooling system

g. State the reason for using fitted bolts to bolt the entablature, A frames and Bedplate together.

h. State the parameters which govern the atomisation and penetration to achieve effective combustion.

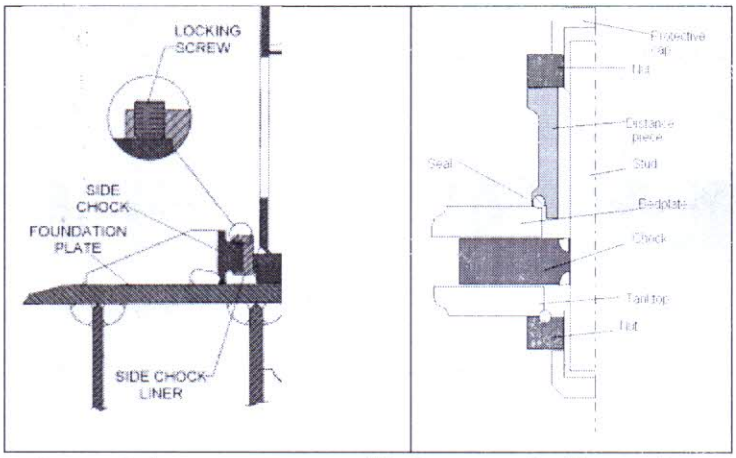
i. Justify the advantage of long stroke marine engine.

j. Justify the statement "Turbochargers are matched to the engine".

PART – B **(5 X 14=70 Marks)**

Answer any 5 of the following seven questions

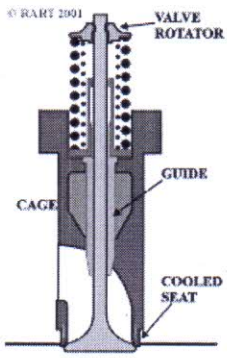
Q.2. With respect to the diagrams shown below, answer the related questions.



a. What do the two pictures represent? Answer in three lines. [2]
b. What is the material of the chock and stud? [2]
c. Justify and state reasons for introducing a distant piece as shown in the diagram. [4]
d. State the purpose of chock. [2]
e. Why are side chocks fitted and what are end chocks for? [2]
f. Justify the use of side stays for an engine. [2]

Q.3.a. What are the measurements carried out on a piston of large two stroke engine during O'haul? [2]

b. Wrt to the diagram shown below answer the following questions:



i. State benefit of having a valve rotator. [1.5]
ii. State the purpose of using two co-axial springs and the how are the springs oriented and why? [3]
iii. What are the advantages of a cooled seat? [1.5]
iv. What is the material of exhaust valves and their seats? [1.5]
v. What is tappet clearance and state the reason for clearance. [1.5]
vi. What is the advantage of a hydraulically operated exhaust valve over rocker arm operated ones. [1.5]
vii. State the purpose of valve guide. [1.5]

4. a. With respect to a starting airline explosion explain the following?
i) How it can occur? [3]
ii) How its occurrence can be minimized? [3]

b. Sketch any fire smothering system is arrangement for extinguishing scavenge fire? [4]

c. Explain the action to be taken in case an oil mist detector alarm is sounded? [4]

5. a. State the advantages of turbo charging an engine. [3.5]

b. With the help of suitable simple schematic sketches elaborate the function of each of the following parts of a turbocharger? [7 X 1.5]

i. Air filter unit of compressor

ii. Nozzle Ring

iii. Diffuser blades

iv. Volute casing

v. Labyrinth seal

vi. Inducer

vii. Turbine Blades with its attachment to the rotor.

6. With respect to the cooling systems employed in diesel engines answer the following questions:

a. Why is fresh water used for cooling the engine parts, even though sea water is abundantly available? [3]

b. Draw simplified labelled line diagram of a fresh water jacket cooling system of an engine. [6]

c. State the reasons for additives periodically introduced into the cooling system. [2]

d. State the reason for using tangential bore cooling system in liners of diesel engines. [3]

7. a. Draw a labelled Sankey diagram for typical Marine two stroke diesel engine clearly indicating in percentage the power developed, lost and available. [5]

b. Define the following terms with respect to a marine propulsion engine:

i. Maximum continuous rating [3]

ii. Mean piston speed [3]

iii. Overload rating [3]

8. Write short notes on the following:

i. Choice of marine diesel engines for propulsion. [4]

ii. Constant and Pulse type of Turbo-charging system [5]

iii. NOx and SOx controlling measures in diesel engines [5]

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