

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2023
Programme Name: B Tech (ME)
Semester: V
Subject Code: UG11T3503
Subject Name: MARINE INTERNAL COMBUSTION ENGINES I

Date: 15.06.2023

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.
- (iii) Tables (Steam/Log/Nautical Almanac etc) that can be used.
- (iv) Chart Work Booklets to be used.
- (v) Any other tables/charts to be used.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

Q1. Which of the following event would reduce volumetric efficiency of a vertical compression ignition engine

- A) Inlet valve closing after bottom dead centre
- B) Inlet valve closing before bottom dead centre
- C) Inlet valve opening before top dead centre
- D) Exhaust valve closing after top dead centre

Q2. The main function of tie rods in the construction of large, low speed diesel engines is to

- A) stiffen the bedplate in way of the main bearings to increase the engine's longitudinal strength
- B) accept most of the tensile loading that results from the firing forces developed during operation
- C) mount the engine frame securely to the hull to prevent shaft coupling misalignment
- D) connect the crosshead solidly to the piston rod

Q3. Crank web deflection readings will give a positive indication of

- A) worn main bearing journals
- B). torsional stress deformation
- C). slack thrust bearings
- D). bearing shells shim dimensions

Q4. Which of the following statements is true, about slow speed engines?

- A) A scavenge fire can lead to a crankcase explosion
- B) A scavenge fire can lead to deformation of diaphragm plate
- C) A scavenge fire can lead to damage to tie rods.
- D) All of the above.

Q5. The purpose of an air cooler in a supercharging system is to

- A) Reduce temperature of supercharged air in order to condense and remove maximum possible moisture from the air prior entry to the engine
- B) Reduce the temperature of the supercharged air in order to increase the density & also to cool down below dew point to remove moisture from air prior entry to the engine
- C) Cool supercharged air to increase its density such that the dew point is not reached to avoid entry of moisture into the engine
- D) Cool supercharged air to increase its density and also to keep the peak temperature and exhaust gas temperature within limits

Q6. Some 4-stroke engines are fitted with a rotocap on the cylinder head valves. For what reason?

- A. Rotate the inlet valve during operation.
- B. Distribute the exhaust gas or the air inlet better to improve combustion.
- C. Improve the scaling surface function, increase the service time of the exhaust valve in the engine
- D. To prevent the valve spindle from sticking

Q7. Modern marine turbochargers use a _____ type of compressor

- A) Radial flow
- B) Axial flow
- C) Mixed flow
- D) Turbulent flow

Q8. What do you mean by surge limit of a turbocharger?

- A. Characteristic curve of a turbocharger
- B. Portion of compressor characteristic curve which lies on the left side of the point of maximum pressure
- C. A line joining all the points of maximum pressure on compressor characteristic curves, drawn at various speeds of operation
- D. Maximum rpm limit of T/C above which surging will start

Q9. Cylinder lubrication oil for low speed main propulsion diesel engines is admitted to each cylinder during

- A) the power stroke
- B) the compression stroke
- C) low load operation only
- D) periods of standby

Q10. Even if there is an oil mist concentration inside a crankcase, and there is also a hot spot, crankcase explosion will only take place when

- A) The hot spot provides the ignition temperature for the oil mist concentration
- B) When the oil mist - air mixture is in the flammable range
- C) Both A and B
- D) None of the above

Section B

Five Questions of 02 Marks each

Q11. Draw the valve timing diagram of 4 stroke diesel engine and mention the typical crank angles for various process during the cycle.

Q12. What is the purpose of transverse girders in the construction of main engine bed plate?

Q13. Describe the role of scavenging period & exhaust blow down period in removal of exhaust gases in diesel engine operation

Q14. What do you understand by "tangential bore cooling "

Q15. What are the stroke-to-bore ratios of short-stroke, long-stroke, super-long-stroke, ultra super-long-stroke engines?

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

Q16.a) Make a comparison between low, medium and high speed Marine diesel engines **5M**

b) Discuss various power ratings used as standards for measurement of power **5M**

Q17. a) Discuss the constructional details of a cross head as fitted to a Marine Diesel engine with neat sketch **6M**

b) Discuss the following piston rings **4M**

- i) Oil scraper ring
- ii) Compression ring

Q18. Explain connecting rod for 4 stroke diesel engine with neat diagram

10M

Q19.a) Explain about under piston assisted scavenge system with neat diagram

6M

b) What are the merits of reverse flow scavenge system

4M

Q20.a) What is 2 stage turbo charging explain with neat diagram

6M

b) Explain the phenomenon turbocharger surging

4M

Q21.a) How bunker fuel oil is prepared on board for efficient combustion

6M

b) What treatment is carried out chemically on the main engine cooling water system?

4M

Q22.a) What are the causes of crankcase explosion?

3M

b) Explain in detail how these could be avoided.

3M

c) What inspections are to be carried out after a scavenge fire?

4M
