

## MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. Describe the combustion process of EACH of the following:
  - (a) petrol engine; (5)
  - (b) diesel engine. (5)
  
2. With reference to engine timing belts or chains:
  - (a) state the cause of loss of timing drive tension; (2)
  - (b) state how this will affect the engine; (6)
  - (c) explain how slight loss of tension can be corrected. (2)
  
3.
  - (a) Describe the events leading to a crankcase explosion. (4)
  - (b) State the methods of detecting the events of part (a) (2)
  - (c) State how the severity of a crankcase explosion may be limited. (4)
  
4. With reference to fuel injector needle valves siezing in their bodies during engine operation:
  - (a) explain the effects if the needle has jammed partially open; (3)
  - (b) state the possible causes; (2)
  - (c) state, with reasons, how to minimise this problem. (5)
  
5. With reference to the properties of fuel oils, explain EACH of the following terms, stating their significance to engine/shipboard operations:
  - (a) specific energy: ~~kJ/kg~~  $\text{KJ/Kg}$  (2)
  - (b) cetane number; (2)
  - (c) residual carbon; (2)
  - (d) sulphur content; (2)
  - (e) relative density (specific gravity). (2)

6. (a) Describe, with the aid of a sketch, a central cooling water system. (8)
- (b) State the advantage of the system described in part (a). (2)
7. Describe, with the aid of a sketch, the operation of a pre-engage diesel engine electric starting system, labelling the main components. (10)
8. With reference to turbochargers:
- (a) explain the term *surging*; (5)
- (b) describe the indications of *surging*; (2)
- (c) describe the causes of *surging*. (3)
9. With reference to an engine connected to a gearbox via a friction clutch, explain EACH of the following:
- (a) why vibration from the engine should be damped; (7)
- (b) how vibration damping is achieved. (3)
10. With reference to a gearbox:
- (a) explain why large quantities of lubricating oil are used; (2)
- (b) state FOUR possible causes of excessive lubricating oil temperature when at normal operating speeds; (4)
- (c) state how EACH cause stated in part (b) may be remedied. (4)