

JP

## CERTIFICATE OF COMPETENCY EXAMINATION

EXAMINATIONS ADMINISTERED BY THE  
SCOTTISH QUALIFICATIONS AUTHORITY  
ON BEHALF OF  
MARITIME AND COASTGUARD AGENCY

SMALL VESSEL CHIEF ENGINEER <3000 GT, UNLIMITED  
SMALL VESSEL CHIEF ENGINEER <500 GT, UNLIMITED

059-02 - AUXILIARY EQUIPMENT PART II

FRIDAY, 01 March 2024

1400-1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.
2. Non-programmable calculators may be used
3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres:

Candidate's examination workbook

## AUXILIARY EQUIPMENT PART II

Attempt ALL questions

Marks for each part question are shown in brackets

1. Describe, with the aid of sketches, how an axial piston pump can vary the volume of liquid it displaces. ✓ (10)
2. Describe, with the aid of a sketch, a constant pressure hydraulic power system for a vessel's Anchor Windlass, showing safety features and labelling ALL components of the system. ✓ (10)
3. With reference to speed control of ac induction motors, explain the function of Pulse Width Modulation (PWM). ✓ (10)
4. With reference to induction motor starters:
  - (a) state when a STAR/DELTA starter may be required; ✓ (2)
  - (b) describe the operation of a STAR/DELTA starter; ✓ (5)
  - (c) explain why the motor configuration is changed from STAR to DELTA. ✓ (3)
5. Sketch an indirect expansion, chilled water air conditioning plant, labelling the MAIN components. ✓ (10)
6. With reference to air conditioning systems, state the meaning of EACH of the following terms:
  - (a) heating load; ✓ (1)
  - (b) cooling load; ✓ (1)
  - (c) sensible heat; ✓ (2)
  - (d) latent heat; ✓ (2)
  - (e) absolute humidity; ✓ (2)
  - (f) specific humidity. ✓ (2)

7. (a) Describe TWO possible sources of contamination of compressed air used for breathing. ✓ (4)
- (b) State THREE contaminants that may be found in compressed air, outlining the effect of the contaminant on the user when the compressed air is used for diving (SCUBA) purposes. ✓ (6)
8. With reference to the Code of Safe Working Practices for Merchant Seamen and maintenance of lifting equipment:
- (a) state the interval between testing and who should carry out the testing; ✓ (2)
- (b) state the name of the document where details of the vessel's lifting gear is kept; ✓ (1)
- (c) state the meaning of SWL; ✓ (1)
- (d) state the possible reasons for needing to take a piece of lifting equipment out of service, explaining the measures to be taken before it can be returned to service. (6)
9. Describe the procedure that should be followed if an outboard motor has been submerged in sea water. ✓ (10)
10. With reference to the International Convention for the Safe and Environmentally Sound Recycling of Ships:
- (a) state the operational requirements for compliance; ✓ (4)
- (b) list FOUR prohibited hazardous materials; ✓ (4)
- (c) list TWO hazardous materials whose use should be restricted. ✓ (2)