AUXILIARY EQUIPMENT PART I

Attempt ALL questions
Marks for each part question are shown in brackets

1. Sketch a cross-section through a valve suitable for use as an isolating valve in a fire main, labelling ALL parts and stating a suitable material for EACH part. (10) 5

2. With reference to positive displacement pumps:

   (a) explain the need for a relief valve, stating where it would be fitted; (5) 4

   (b) explain when a pulsation damper may be fitted to the delivery line, stating how it works. (5) 3

3. With reference to compressed air systems used for starting air and control purposes:

   (a) state the pressure used for starting air; (1) 1

   (b) explain why the pressure stated in part (a) is necessary; (3) 2

   (c) state the pressure used for control air; (1) 1

   (d) explain why the pressure stated in part (c) is different to that stated in part (a); (3) 1

   (e) explain why the pressure stated in part (c) is greater than that necessary to operate the control equipment. (2) 1

4. Sketch a hydraulic circuit using standard symbols showing a unidirectional, constant pressure pump driving a bidirectional motor that is reversed by means of a manually operated direction valve. The motor should have pilot non-return valves as isolating valves. (10) 8

5. With reference to steering gears, explain the meaning of EACH of the following:

   (a) 100% redundancy; (5) 2

   (b) single failure criteria. (5) 2

6. Describe the advantages of using water jets instead of conventional propellers for vessel propulsion. (10) 8

7. (a) Sketch a flexible coupling that could be used for a main propulsion drive. (7) 4

(b) State THREE reasons for using a flexible coupling in propulsion drives. (3) 2

8. (a) Explain how propeller thrust is transmitted to a vessel's hull. (3) 1

(b) Describe the mounting arrangements of a thrust block to the hull. (4) 2

(c) Explain why the clearance between the thrust block pads and collar is critical. (3) 1

9. Sketch a Direct-On-Line starter for a small, three phase, a.c. motor, labelling all components. (10) 5

10. (a) State the requirements for connnecting a 3-phase generator to live busbars. (3) 2

(b) Sketch a connection diagram for synchronising lamps, stating when synchronisation should occur. (5) 5

(c) State what occurs if synchronising is incorrect when connecting to the busbars. (1) 1

(d) State the possible consequence of incorrect synchronising. (1) 1