**AUXILIARY EQUIPMENT PART I**

Attempt ALL questions

Marks for each part question are shown in brackets

1.  (a)  State, with reasons, the type of valve that should be fitted to EACH of the following:

    (i)   main engine lubricating oil pump delivery;                                    (2)

    (ii)  fuel service tank outlet;                                                      (2)

    (iii) Ballast tank.                                                                  (2)

    (b)  State the information required to correctly order a replacement valve.          (4)

2.  Describe, with the aid of a sketch, the operation of a double acting, piston type positive displacement pump.                                                                  (10)

3.  With reference to air compressors:

    (a)  state TWO advantages of rotary air compressors;                                 (2)

    (b)  state ONE advantage of reciprocating air compressors;                           (1)

    (c)  explain why multistage air compressors are used for starting air purposes.      (7)

4.  With reference to an air supply for pneumatic control systems:

    (a)  state THREE contaminants that may be present;                                   (3)

    (b)  explain why the contaminants stated in part (a) are undesirable.                (7)

5.  With reference to a hydraulic steering gear, explain the purpose of EACH of the following:

    (a)  shock valve;                                                                    (3)

    (b)  by-pass valve;                                                                  (3)

    (c)  pump isolating valve.                                                           (4)

6.  Explain, with the aid of a sketch, the securing of a controllable pitch propeller to the tailshaft.                                                                            (10)

7.  (a)   Explain, with the aid of sketches, how a new motor is aligned with an existing pump.  (7)

    (b)   State THREE checks which should be made before using the pump after the motor has been aligned.  (3)

8.   Describe the construction of a three phase induction motor of the caged rotor type.  (10)

9.   With reference to electrical generation and distribution systems, explain EACH of the following:

    (a)   why an insulated neutral is preferred to an earthed neutral;  (4)

    (b)   how essential circuits are protected should main switchboard overload occur.  (6)

10.  Sketch an open loop constant pressure hydraulic system incorporating EACH of the following components:

    fixed capacity pump
    pressure control valve
    flow control valve
    change over valve
    reversible motor  (10)