AUXILIARY EQUIPMENT PART II

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

1. Describe, with the aid of sketches, the operating principle of an axial variable delivery hydraulic pump. (10)

2. Describe, with the aid of a sketch, a hydraulic rack and pinion starting system, labelling the MAIN components. (10)

3. With reference to variable speed control of a 3 phase ac induction motors:

   (a) explain why EACH of the following is not preferred:

   (i) variable voltage, constant frequency; (3)

   (ii) variable frequency, constant voltage. (3)

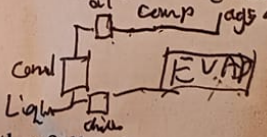
   (b) explain why voltage and frequency should both be varied. (4)

4. With reference to two identical generators operating in parallel supplying a switchboard that automatically shares load equally, explain EACH of the following:

   (a) the effect of the excitation of <u>one</u> generator reducing while the load remains constant; (5)

   (b) the possible effects of closing the main circuit breaker when frequency and voltage are equal but phases are out of phase. (5)

5. Describe, with the aid of a sketch, the procedure for *Liquid Charging* a refrigeration plant, stating all safety procedures and checks to be carried out. (10)



6. With reference to blended refrigerants, explain EACH of the following terms, stating the refrigerant state required for charging:

   (a) azeotrope; (3)

   (b) zeotrope; (4)

   (c) near-azeotrope. (3)

7. (a) Sketch a Chemical Filter tower supplying air suitable for breathing and diving, labelling ALL elements. (6)

(b) Explain the purpose of TWO of the filter elements sketched in part(a). (4)

8. (a) State the maximum time periods between EACH of the following lifting equipment requirements:

(i) inspection; (1)

(ii) testing. (1)

(b) Describe the inspection routine for lifting gear. (6)

(c) State the procedure for recording the results of the inspection and tests. (2)

9. State the safety requirements for small lockers on open deck storing petrol and other highly inflammable liquids in hand portable containers. (10)

10. With reference to a vessel's motion control:

(a) outline the SIX degrees of freedom; (3)

(b) explain the term *damping;* (4)

(c) state THREE considerations to be made, before the installation of a motion reduction system. (3)