

1. (a) Sketch a globe type screw lift valve suitable for sea water service. (7)
- (b) State, with reasons, the materials used for the valve sketched in part (a). (3)

2. With reference to positive displacement pumps:

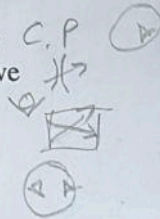
- (a) describe, with the aid of a sketch, the operation of a pulsation damper; (6)
- (b) explain why some positive displacement pump types do not require pulsation dampers. (4)

3. With reference to air compressors, explain EACH of the following:

- (a) why an air filter is important; (4)
- (b) why the compressor should not be allowed to run with a dirty air filter. (6)

4. 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)

5. Describe, with the aid of a block diagram, the control of an automatic steering system, including auto-pilot and valve operated steering gear. (10)

6. With reference to controllable pitch propellers:
- (a) explain why they should maintain a small amount of pitch when in the neutral position; (3)
 - (b) state, with reasons, the failsafe position; (4)
 - (c) explain how pitch may be restored should hydraulic system failure occur. (3)
7. With reference to stern bearings, state the advantages and disadvantages of using EACH of the following:
- (a) white metal; *cheap, low load* (5)
 - (b) polymer or composite. *expensive, load* (5)
8. With reference to main distribution switchboards being fitted with preference trips:
- (a) state why the preference trip is fitted; (1)
 - (b) explain the operation of a two-stage preference trip; (6)
 - (c) state THREE circuits that can not be connected to the preference trip. (3)

9. The figure shows the main generation layout of a fully automatic switchboard, No 1 generator is running, No 2 is on stand-by.

Describe the automatic sequence that occurs to restore power should No 1 generator suffer a sudden failure.

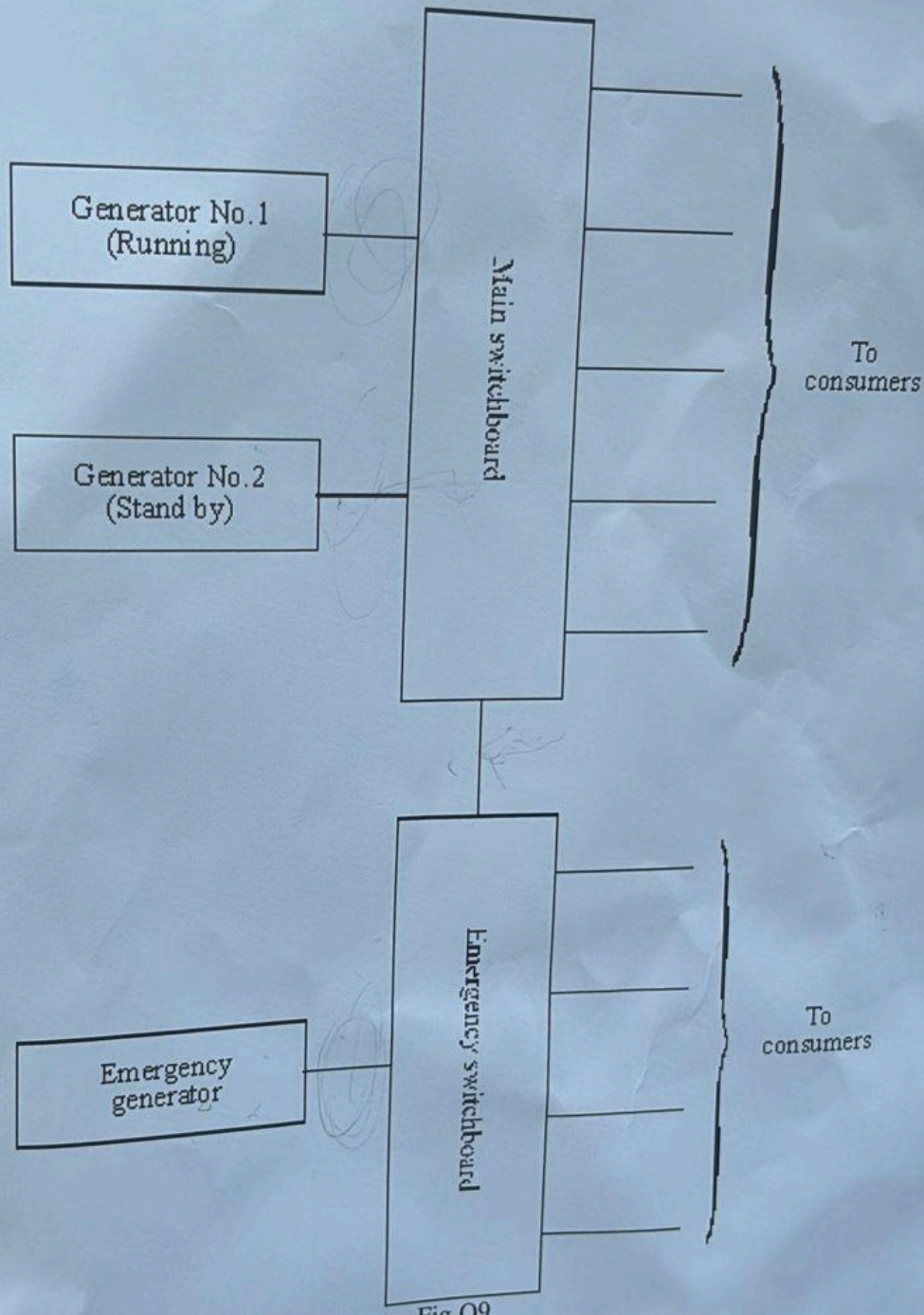


Fig Q9

10. 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)