NOV 2007

APPLIED MARINE ENGINEERING

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) Describe TWO methods that could be used to reduce the rate of corrosion inside the steel sea water piping system of a vessel to be laid up for a period of time. (4)

   (b) Describe the procedure for recommissioning a sea water system which has been out of use for a long period of time. (6)

2. (a) State the TWO steps occurring in the fracture process of a material. (2)

   (b) Explain EACH of the following fracture failures:

   (i) highly ductile fracture; (2)

   (ii) moderately ductile fracture; (2)

   (iii) brittle fracture. (2)

   (c) Explain the process of *fatigue failure* and its significance in engineering design. (2)

3. List FIVE additives that may be included in a lubricating oil, describing why EACH additive may be necessary. (10)

4. (a) Describe the procedure for the collection of bunker fuel samples during bunkering operations. (6)

   (b) Explain why the taking of bunker samples is considered good practice. (4)

5. (a) Explain, with the aid of a diagram, the operation of a solenoid operated, battery powered electric starting system for an internal combustion engine. (6)

   (b) Explain the operation of the solenoid fitted to an electric starter motor circuit. (4)

6. List the routine maintenance checks that should be carried out on a vented type lead acid battery. (10)

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7. Describe the advantages and disadvantages of EACH of the following electrical protection devices when used for three phase motor protection:

(a) thermistor; (2)

(b) electromagnetic overload; (2)

(c) thermal overload; (2)

(d) single phase protection; (2)

(e) high rupture capacity fuse. (2)

8. With reference to paralleling and load sharing of generators, explain EACH of the following:

(a) the possible causes of no voltage indication on start up of a stand-by generator; (2)

(b) the purpose of the check synchroniser; (2)

(c) the reason for the incoming machine to be running slightly faster than the busbar frequency at the instant of closing the incoming breaker; (2)

(d) how equal kW load sharing is maintained; (2)

(e) why the currents may be different when the kW loads are equal. (2)

9. Describe, with the aid of a block diagram, how analogue plant process signals can be supplied to a central computer control system and output signals from the processor can be used for analogue control equipment. (10)

10. Describe a method of measuring and remotely indicating EACH of the following:

(a) temperature; (5)

(b) rate of flow. (5)