Q1 (16 marks)

Describe the procedure to be undertaken when, upon a routine schedule for changing Exhaust Valve on a main engine, it is found that the exhaust valve body is seized inside the cylinder head and cannot be removed by conventional means and the internal threads in the exhaust valve body connecting to the exhaust bellows are damaged (16).

Cylinder head

Q2 (16 marks)

It is found that the tie rods are persistently becoming slack:

(a) State, with reasons, the possible causes (6).

(b) State, with reasons, the likely effects on the engine if it is allowed to operate with slack tie (5).

(c) Explain how this problem can be minimized (5)?

Engine construction & working

Q3 (16 marks)

(a) Briefly explain the term metal fatigue and further explain how fatigue failure occurs (4).

(b) State the difference between high stress/low cycle and low stress/high cycle fatigue giving an example of each (4).

(c) State how defects in the metal can influence the expected safe life of a component (4).

(d) State how fuel injection timing and cylinder power balance can influence the possibility of fatigue cracks developing in the bedplate (4).

Q4 (16 marks)

With reference to air receivers and bottles explain with reasons:

(a) Why regular systematic internal inspection is advisable (4)

(b) Which internal areas of large receivers should receive particularly close examination (4)

(c) How bottles are inspected internally and what parts should be closely examined (4)

(d) How the condition of a bottle or receiver that cannot be inspected internally is checked (4)

Q5 (16 marks)

List the maintenance routines you plan to carry out on the deck hydraulic cranes, winches, and mooring machineries before arrival port after a long voyage, considering the fact that cargo operation is solely dependent on the proper functioning of the cranes and winches (16).

Q6 (16 marks)

With reference to the crankshaft deflection of main engine crank shaft.

(a) State the ideal condition required before taking deflections (6).

(b) How is the accuracy of the reading taken are ensured? (6)

(c) What is the purpose of taking deflection and how is the readings taken interpreted? (4)

Crankshaft

Q7 (16 marks)

Describe the procedure for overhauling a boiler safety valve and explain using sketches where necessary those parts, which require close attention. Also describe the procedure setting of boiler safety valves (16).

Valves

Q8 (16 marks)

Severe engine vibration has recently become evident when the main engine for which you are responsible operates within a certain speed range.

(a) State, with reasons, the possible causes of such vibration (6).

(b) State the consequences of operating the engine under such vibratory conditions (5).

(c) Describe the procedure you, as Second Engineer, would implement in order to investigate and rectify the problem (5).

Q9 (16 marks)

With reference to the auxiliary engine big end bearing.

(a) State the various inspections done on the bearing shells, crank pin, serrations on the con-rod and bolts (6).

(b) How is the bearing assembled after inspection (4)?

(c) Describe the various checks carried out after assembling the bearing (6).

Bearings