Government of the People's Republic of Bangladesh

Department of Shipping

Sample Written Question Bank

Marine Engineer Officer Class 3

Motor Engineering Knowledge

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1.0 FUEL INJECTION SYSTEM

1.Draw onboard Fuel Oil system using mixing column of a large Two Stroke Engine indicating all parts clearly. (10)

2.For perfect combustion in the engine, describe the importance of (2.5 X 4)

(a) Viscosity,

(b) Atomization

(c) Penetration and

(d) Turbulence.

3.Define Ignition Delay? Describe the effect of Ignition Delay on combustion.

4.What is Diesel Knock? How is it caused?

5.(a)What is NOx? (2)

(b) How NOx impact of Nox the environment? (3)

(c) Briefly describe the principles of reducing NOx from engine emission (5)

6.(a)What is SOx?(2)

(b) How it impact environment? (3)

(c) Briefly describe the principle of reducing SOx from engine emission.(3)

7.Sketch and describe exhaust gas scrubber system.(10)

8.(a) Why VIT is incorporated in large diesel engine fuel pump? (3)

(b) At what load VIT comes in operation and why it is not used in low load (2)

(c) Explain with a indicator diagram how VIT improve fuel efficiency at higher load(5) When it is operated?

9.Describe the causes and effects on engine operation of the following Fuel Injector faults: (2.5 X 4)

(a) Incorrect spring pressure setting,

(b) Nozzle leakage,

(c) Worn nozzle holes,

(d) Slack needle.

10.Describe the operating principle of a large fuel injection pump describing how quantity adjusted and VIT works with engine load.(10)

11.(a)What is the function of delivery valve with respect to Fuel injection pump? (5)
(b) What do you understand by termination of injection of a fuel pump?(5)

12. (a)What are the dangers of allowing small bore pipes carrying fuel oil or lubricating oil to vibrate excessively?(5)
(b) What are the measures adopted to avoid these dangers? (5)

13.Describe the operating principle of a viscometer with the aid of a sketch.(10)

14.(a)What is Fuel Impingement and When does it occur?(3)

(b)What are the likely consequences of carry over of Catalytic Cracking fines from the separator in to the fuel oil system. (3)
(c) Describe the measures to be adopted to minimize the damages. (4)

15.(a)Draw a diagram of ships fuel transfer system and discuss the problems associated in each stage of fuel handling from bunker tank to fuel injector in case of Heavy Fuel Oil.(6)
(b)Explain why residual fuel oil needs to be purified?(4)

16.Explain with reasons how the use of poor quality residual fuel can effect the following, (Any 4, 2.5 X4)
(a)Engine Power
(b)Turbo Charger
(c) Exhaust Values
(d)Fuel pump and injector
(e) Cylinder liner
(f) Piston and Piston Rings

17.(a) If sulfur content is low in fuel, what are the likely consequences in engine operation? (5)

(b)How the consequences can be reduced.(5)

18.(a)Describe procedure for performance measurement of medium speed engine engaged in electrical power generation.
(b) How the parameter can be interpreted.

19. With reference to high viscosity fuel oil:
a.Explain how it is treated between storage tank and main engine (7)
b.State the purpose for the treatment explained in Q1(a). (3)

20. Describe the procedure to change the fuel supply of the main propulsion engine from high viscosity fuel to low sulpher low viscosity fuel such as diesel oil (10)

21.a.Describe the tests which are carried out on a fuel injector after overhaul.
b. Sketch a section through the nozzle of a fuel injector.

22. a. Draw a cross section of an injector used in Medium speed engine(4)
b. Describe the testing of a fuel oil injector after overhaul and before it is refitted to the engine(6)

23.With reference to the operation of main propulsion engines, outline the importance of EACH of the following:
a. Maintaining the temperature of the scavenge air above the dewpoint (5)
b. Maintaining the fuel at the correct viscosity for injection (5)

24. Referring to diesel Engine , explain following
(a)High temperature Corrosion. 2.5
(b)Water content in fuel and liner lubrication. 2.5
(c) Double helix plunger and ignition time control. 5

25. Referring to ME engines explain how fuel injection occurs ? Discuss how efficient combustion is achieved without cam. 10

2.0 ENGINE PARTS

2.1 ENGINE SEATING: BEDPLATE AND CHOCKS

1. (a)Draw a cross section of a large slow speed engine showing various components.(5)

(b) State the purpose of Tie Bolts.(3)

(c) What is the effect of running engine with loose Tie Bolts? (2)

2.(a)What is the purpose of the resilient mountings fitted in medium speed engine.(3)

(b)Draw and state the purpose of holding down bolts (5)

3.(a)State the advantage of chocks and holding down bolts rather than resting the engine directly on ship's structure.

(b) Describe the advantages of non-metallic chocking arrangement over conventional design.

4.a.Draw a cross section of Large two stroke engine;(4)

b. Describe the function of EACH of the following diesel engine components:

i. Tie rods;(3)

ii. Holding down bolts;(3)

5.a.Draw a cross section of a Four stroke engine;(4)

b. Describe the function of EACH of the following diesel engine components:

i. Bedplate;(3)

ii. Crankshaft.(3)

2.2 CONNECTING ROD, CROSS-HEAD AND BEARINGS

1. (a)Explain why bottom end bolts, particularly in medium speed engines are prone to failure. (3)

(b) Describe how this tendency can be minimized by proper maintenance. (4)

(c) Describe the design features of bottom end bolts, contributing to increase fatigue strength.(3)

2.(a) Explain why lubrication of crosshead bearings is critical. (3)
(b) Describe few improvements of cross head bearing design to facilitate lubrication.(3)
(c)State the advantages of thin shell bearing. (4)

3.Describe the procedure for replacing Main bearing of a Medium speed engine.(10)

4. Elaborate the procedure & precaution of Conrod bolt renewal & tightening of medium speed engine . (10)

2.3 LINER

1. (a)Draw a bore cooling cylinder liner with illustrating it's major parts.(4)
(b) What are the causes of abnormal Cylinder Liner wear? (3)
(c)What are the Ideal Operational and Maintenance practice to be followed to keep Liner wear normal?(3)

2.With respect to medium speed engine liners ;
(a)What are the functions of cylinder lubrication? (3)
(b) How liners are lubricated and what is the effect of incorrect Cylinder Lubrication?(4)
(c) How correct lubrication is verified.(3)

3.(a)Sketch a Large diesel engine cylinder lubricator (5)
(b) Describe alpha lubrication system (5)

4.With reference to Jacket Cooling Water treatment of a diesel engine:
a. State the chemical tests carried out;(4)
b. State the frequency of testing;(2)
c. explain why it is necessary to keep the test results certain limits;(5)

5.With reference to Jacket Cooling Water treatment of a diesel engine:
a. State the chemical tests carried out;(4)
b. Explain why it is necessary to keep the test result its certain limits;(3)

c. State the action to be taken to rectify an abnormal test result.(3)

4.(a) Draw a simple diagram of a modern large Diesel Engine liner and provide a brief
Description.(8)
(b) Why is Cylinder Lub Oil is Alkaline.(2)

5.(a) What is running in and why it is necessary? (5)
(b) State with reason, your action as a Watch Keeper, on cylinder lub oil feed when, New liner and piston is rings fitted.(5)

6.Explain with reasons the contribution made by the following to cylinder liner wear. (4 X 2.5)
(a)High sulfur content in fuel
(b)Low cooling water temperature
(c) Excess lubricant
(d) Low sulpher content

7.(a)State with reasons, two indications of excessive liner wear.(5)
(b)State why modern engines have adopted two rows of lubricating oil quills (5)

8.(a)Describe the procedure of replacing a liner of a four Stroke Engine.(8)
(b)Describe how the liner should be run- in to prolong working life (2)

9.(a)Describe how liner wear rate should be measured and recorded.(8)
(b) Describe with the aid of a sketch the sealing arrangement of a medium speed engine liner.(2)

10.(a) Explain why liner wear rate is maximum at the top.(5)
(b) Sketch and Define the term “Clover Leafing” and How is it minimized.(5)

11. With reference to a main engine jacket water cooling system:

a. Explain, with the aid of sketches, how the jacket water temperature is maintained at its optimum value;
b. State the possible effects on the engine if the jacket water temperatures are maintained outside the desired value.

12. Referring to marine diesel Engine
(a)Why Jacket temperature to be maintained at a level in engine stopped condition ? (5)
(b)What is Liner calibration and How to assess the liner status ? (5)

2.4 PISTON, PISTON RINGS & STUFFING BOX:

1. (a) Describe with an aid of a sketch how piston rings seal the combustion chamber.(3)
(b)State with reasons the clearances to be maintained for piston rings (4)
(c) State the procedure to measure the clearances.(3)

2.(a)Discuss the validity of the following statement: 'Skirts are fitted to pistons of both two and four stroke engines, but for different reasons'. (6)
(b) State the properties required of piston ring material.(4)

3.(a) State why piston cooling is necessary? (2)
(b) Describe the advantages and disadvantage between Fresh Water and Lubricating Oil as piston cooling medium.(4)
(c) sketch a cross section of a medium speed engine piston.(4)

4. (a) Sketch a diagram of the lubricating oil system of a Large Two Stroke Diesel Engine. (5)

(b) State the functional purposes of scraper and seal rings in stuffing box. (2)
(c) Sketch a stuffing box showing its different parts.(3)

5.With reference to medium speed diesel engine sketch and label a typical arrangement for the piston and connecting rod.(10)

6.With reference to medium speed diesel engine sketch and label a typical arrangement for the piston and connecting rod.(10)

7. State the procedure of assessing stuffing box condition from stuffing box drain . (10)

2.5 EXHAUST VALVES

1.(a)Draw and describe the working principle of hydraulic operated exhaust valves.(7)
(b) State the advantages of hydraulically operated exhaust valves over conventional push rod operated exhaust v/v (3)

2.With reference to exhaust valves explain the advantage of the following modifications:
(a)Roto cap or spinners for valves.
(b)Bore cooling for valve seats.
(c) Hydraulic operation of valve.

3.(a) Outline the indications of leaky exhaust valves in a large main propulsion engine. (5)
(b) Discuss the likely results of permitting a leaky exhaust valve to remain in this condition for an extended period of time. (2)
(c) Identify the factors leading to leakage of Exhaust valve. (3)

4.(a)State why Tappet clearances are important. (3)
(b)Explain the effect of excessive and insufficient tappet clearance on valve and engine operation. (2)
(c) State with sketch the procedure for tappet clearance adjustment.(5)

5. With reference to auxiliary diesel engines, state FOUR causes for EACH of the following faults:
a. Lubricating oil pressure low (4)
b. Exhaust temperature high single unit(3)
c. Exhaust temp high in all unit (3)

6.With reference to the operation of main propulsion engines, outline the importance of EACH of the following:
a. Regular on board testing of the lubricating oil (5)
b. Ensuring rotation of exhaust valves (5)

7. (a)With reference of ME Engine describe how exhaust valves operate with Hydraulic power and spring air . (5)

(b) What is the major change in Exhaust valve design brought by modern ME Engines? (5)

2.6 CRANKSHAFT

1. (a) Describe the types of crank shaft and give example of their use. (5)
(b) Describe crankshaft defects and their causes.(5)

2. With respect to crank shafts explain importance of the following:
(a)Balance weights,(2)
(b)Construction of oil holes and fillets.(2)

3.Describe the full procedure of taking crankshaft deflection and how the result can be interpreted.(10)

4.(a)Describe the safety procedure of Crankcase inspection of a Trunk type diesel engine.(6)

(b) What are the defects likely to be found during the inspection.(4)

5. (a) Describe the events leading to crank case explosion.(4)

(b) Describe the action to be taken in case of High Oil Mist alarm.(6)

6. a. State the name of the equipment and its function used to give a warning of the presence of conditions that could lead to an explosion in the crankcase of a diesel engine.(6)

b. Sketch the device used to relieve any excess pressure that might develop as a result of a crankcase explosion in a diesel engine (4)

7.As engineer officer of the watch explain the procedure to be followed in the event of a crankcase oil mist alarm on a bridge controlled, constant speed, main propulsion engine fitted with a controllable pitch propeller.

3.0 SCAVENGING & SUPERCHARGING

1.(a)State the indications of scavenge fire.(2)

(b) Describe the causes of scavenge trunk fire.(2)

(c) Describe the actions to be taken in case of a scavenge fire.(6)

2.(a) Describe the advantage of Turbo charging.(2)

(b) With reference to Turbo-charger describe the advantages and disadvantages of

(i) Pulse Turbo-charging

(ii) Constant Pressure Turbo-charging

3. (a) Name the types of scavenging used for large two stroke engines.(2)

(b) Describe the advantages of Uniflow scavenging.(2)

(c) How scavenge fire can be avoided?(4)
(d) What are the safety devices incorporated in an engine for scavenge fire?(2)

4. With reference to scavenge fires in large slow speed diesel engines,
State FOUR actions to be taken by the Engineer Officer of the Watch on discovering EACH of the following: (5 x 2)
a. One engine unit only affected;
b. Several engine units affected at the same time.

5. a. State main FOUR possible factors leading to a scavenge fire.(4)
b. State FOUR indications of a scavenge fire.(4)
c. What regular maintenance is necessary to avoid scavange fire.(2)

6.State the immediate action to be taken in the event of EACH of the following circumstances occurring with a large main propulsion diesel engine, giving a reason for EACH action:
a. Turbocharger surging during heavy weather; (5)
b. Excessive vibration from turbocharger at full sea speed;(5)

7. Describe, with the aid of a sketch, the operational principles of a main engine exhaust gas turbo-charger (10)

8. With regard to marine Diesel Engine , explain
(a) Blow Past (2.5)
(b) Blowback (2.5)
(c)Surging of turbocharger. (5)

9.(a) Is there any extinguishing system incorporated in case of Scavenge fire, discuss. (5)
(b) Explain impact of proper scavenging in engine performance. (5)

10.With reference to diesel electric propulsion

a. Why are medium speed engines preferred on some ships ? 3

b. Describe diesel electric propulsion 3

c. Discuss types of ships where above propulsion plant is suitable . 4

4.0 STARTING & REVERSING.

1.(a)Sketch and describe a Medium speed Diesel Engine starting air system.(6)

(b) Describe the safely features used in starting air system.(4)

2.(a) Describe the events leading to starting line explosion (5)

(b) How the possibility of starting air line explosion can be minimized.(5)

3.(a) Describe the indications of a leaky cylinder starting air valve.(2)

(b) Explain the consequences of running an engine with a leaky starting air valve.(2)

(c) State the action to be taken in the case of a starting air valve leaking. (6)

4.(a) With respect to control air of a pneumatic starting and reversing system, state the importance of an air drier. (2)

(b) As a watch keeper state with reason what checks you perform: (4 X 2)

(a)On an air drier,

(b)Prior to maneuvering- on starting air bottle

(c)Prior to maneuvering- on starting air line

(d)On control airline.

5. List, in a logical sequence, the checks to be carried out if an auxiliary diesel engine fails to start (10)

6. With reference to a small diesel engine that requires the use of a starting handle:

a. State the procedure for starting;

b. State EIGHT reasons that would cause difficulty in starting.

7.With reference to a main engine air starting system:
(a) state how a leaking air start valve may be detected when the engine is running (5)
(b)explain the dangers of allowing a leaking air start valve to persist (5)

8. With reference to a main engine air starting system:
(a) Draw air starting system(5)
(b) State FIVE important safety features fitted to the system and reason for incorporating(5)

9. With reference to an auxiliary diesel engine:
a. Explain the procedure for preparing for starting (5)
b. Outline those checks made on the machine once it is running on load (5)

10. State the immediate action to be taken in the event of EACH of the following circumstances occurring with a large main propulsion diesel engine, giving a reason for EACH action:
a. Overheating of air starting branch pipe to one cylinder during maneuvering;(5)
b. High main bearing temperature (5)

11.(a) State the reason for turning the engine with the turning gear prior to starting (5)
(b)State the reason for leaving the indicator cocks on main engine cylinders open when the engine is turned initially with the turning gear (5)

12.(a) State the reason for leaving the lubricating oil circulating after "Finish with Engines"(5)
(b)State why diesel alternator cooling water may be circulated through the main engine after shutdown (5)

13. Referring to Marine diesel Engine , explain the following
(a) How to identify leaky starting air valves. (5)

(b) Why is a regular draining of an air bottle necessary? (5)

14. Draw and describe Main starting air valve of marine diesel engines . (10)

15. (a) What is overlapping in the pneumatic starting sequence of the diesel Engine ? (5)
(b) Is it possible to reverse a 2 stroke medium speed Engine from full ahead ? if yes, what are the possible precautions to take in this process ? (5)

5.0 CYCLES AND TIMINGS

1.(a)Describe with the aid of indicator diagrams: indication of the followings.
(i) Late ignition, (ii) Chocked injector, (iii) Leaky injector, (iv) Early ignition, (v) after burning (5)
(b) How these can be avoided. (5)

2.Describe with the aid of sketch purpose of the following: (4 X 2.5)
(a) Power card,
(b) Draw card,
(c) Compression card,
(d) Light spring card.

3. (a) With the aid of sketch describe the operating cycle of a Four Stroke Diesel Engine. (4)
(b) With the aid of sketch describe the operating cycle of a Two Stroke Diesel Engine (4)
(c) Draw an Ideal Draw card indicating salient points. (2)

4. (a) Describe the effects of running engine with excessive peak pressure.(3)

(b) Describe the advantage and disadvantage between medium speed and slow speed engines.(4)

(c) what are the preparation to be taken prior taking power card and draw card in large diesel engine.(3)

5.(a) What is power balancing? (2)
(b) What are the effects of running an engine without balancing for prolonged period.(3)
(c) Is exhaust temperature the sole criteria to balance an engine?
Justify your answer. (5)

6.Explain the constructional differences between 2-stroke Slow Speed and 4-stroke Medium Speed diesel engines (10)

7. Describe, with the aid of sketches, the combustion process of the two stroke compression ignition engine. (10)

8. a. Sketch a typical power indicator card & Draw card for a slow speed marine diesel
engine.(4)
b. Explain how the Power card may be used to assess the power developed in the cylinder.(6)

6.0 AIR COMPRESSOR AND RECEIVER

1.(a) How many types of compressors are there? Why reciprocating type is most commonly used.(5)

(b) Sketch a cross-section through the delivery valve of an air compressor, labeling the principal components.(5)

2. (a) With respect to reciprocating air compressors define Bumping clearance.(2)
(b)State the effect of incorrect Bumping Clearance using PV diagram on compressor efficiency. (4)

(c) How the bumping clearance can be adjusted?(4)

3.(a) Define volumetric efficiency of a reciprocating air compressor. (2)
(b) Show in PV diagram how various factors contribute to the deterioration of volumetric efficiency and how to avoid them.(8)

4.(a) Briefly describe the necessity to keep the air compressor valves in good condition.(4)
(b) With respect to cylinder lubrication, describe the effect of the following in case of a reciprocating air compressors:
(i) Insufficient lubrication,(3)
(ii) Excess lubrication.(3)

5. Describe the effects of the following using PV diagram:
(a) First stage delivery valve leaking.(5)
(b) Second stage delivery valve leaking.(5)

6. (a) Why Inter Stage cooler and multistage compression is required?(2)

(b) What are the safety devices incorporated in a reciprocating air compressor?(3)
(c) State how performance of air compressors can be checked and optimum performance is maintained.(5)

7.(a) What are the safety devices incorporated on an air bottle?(2)
(b) Describe the effects of the following faults in multi-stage reciprocating air compressors: (4 X 2)
(i) inter-stage cooler starved of cooling water,
(ii) worn crank shaft bearings,
(iii) Dirty air filter
(iv) Excess cylinder lubrication.

8. (a) Explain why air receiver draining is critical? (4)
(b) With reference to reciprocating air compressors state why: (3 X 2)

(i) Suction and discharge valves are of plate type,
(ii) Restriction of air intake is dangerous,
(iii) What are the safety devices in starting air line.

9. With reference to two stage water cooled reciprocating main engine starting air compressors:
(a) Sketch, a protective device fitted to the water side of the intercooler or aftercooler; (4)
(b) explain why the device described in Q(a) is fitted; (4)
(c) describe the possible consequences should the device described in Q4(a) fail to operate. (2)

10.With reference to main start air compressors;
a. State FOUR causes for deterioration in efficiency (4)
b. state how a deterioration in the efficiency would be detected(6)

11.With reference to main start air compressors;
a. State what is bumping clearance and explain with an sketch how it effects compressor efficiency.(6)
b. Describe a test for establishing performance (4)

12. Sketch a cross section through a two stage main starting air compressor, labelling the main components.

13. (a) State the regulations related to air bottles . (5)
(b) Why emergency air bottle and air compressor is critical , explain (5)

14. Describe procedure of starting main engine from Dead ship condition. (10)

15. With referrence to Main air receiver
(a) Why regular inspections are necessary ? (3)
(b) Explain with reasons the areas require special attention . (3)
(c) Distingush specific functions of relief valves and fusible plug (4)

7.0 AUXILIARY STEAM PLANT

1.With reference to auxiliary boilers:
(a)Explain the difference between fire tube and water tube boiler.(4)
(b)What are the advantages of water tube boiler over smoke tube boiler.(3)
(c)Sketch a vertical auxiliary boiler and name all the major parts.(3)

2.(a) Sketch a vertical auxiliary boiler and indicate all the important mountings.(4)
(b) Explain the role of any six mountings fitted to the boiler.(6)

3. (a) Describe with sketch the procedure of blowing through of a boiler gauge glass assembly with all the necessary safety precautions.(4)

(b) Explain why water testing is essential in boiler water management.(3)

(c) Describe with reasons the tests carried out on feed water of a low-pressure auxiliary boiler.(3)

4.(a) Describe the reasons of feed water treatment.(3)
(b) Describe with aid of a sketch the correct procedure of blowing down boiler water.(4)
(c) Explain the significance of regular blowing down of boiler, even though the chemical parameters are within limits.(3)

5. Describe the safety procedure followed to raise steam from a cold boiler.(10)
6. Describe the safety procedure how to blow down an auxiliary boiler to empty for inspection, survey and cleaning (10)

7.(a)Draw a water level indicators mounted on a boiler and describe the blow down procedure (6)
(b)State why at least two of the items stated in Q5(a)are fitted (2)
(c) List FIVE boiler mountings which are subject to survey, other than those

stated in Q1(a).(2)

8. With reference to an auxiliary boiler, state for EACH of the following circumstances the action to be taken, giving a reason for EACH action; (5X2)
a. No water level visible in gauge glass;
b. Safety valve lifting;

9. With reference to an auxiliary boiler, state for EACH of the following circumstances the action to be taken, giving a reason for EACH action; (5X2)
a. Excessive smoking during firing;
b. Excessively high chloride content of boiler water.

10.With reference to large water tube boilers:
a. Explain the causes and hazards of uptake fires (4)
b. State how uptake fires are detected and the remedial action to be taken by the Engineer Officer of the Watch (6)

11.With reference to auxiliary boilers:
a. Explain how scale forms on the heating surfaces;(3)
b. State TWO reasons why scale is undesirable;(2)
c. State how scale build up is prevented from forming in steam boilers.(5)

12. Making reference to all safety procedures and checks that should be carried out prior to starting, describe the procedure for preparing the auxiliary turbine from cold to stand-by assuming that the main boilers are at operating pressure.(10)

13.Describe, with the aid of sketches, the procedure for testing a boiler gauge glass.(10)

14. With reference to main boiler soot blowers, describe the procedures to be carried out before and during operation of the system (10)

15. a. Explain why it is essential to regularly test the water condition in a main water tube boiler (5)

b. State the possible effects on the boiler if the chemical condition of the boiler water is allowed to deteriorate (5)

16. Draw a line diagram of a boiler fuel oil system showing the path of fuel oil from the settling tank to the burners (10)

17. State FOUR tests which are required for boiler water, giving a reason for EACH test. (2.5 X4).

18. State FOUR circumstances under which the fuel supply to the burners of an auxiliary boiler would be automatically cut off; giving a reason why EACH circumstance requires the fuel to be cut off. (10)

19. In Case you received a frequent boiler trip due to low fuel pressure , what would be your course of action ? Explain and investigate . (10)

8.0 LUBRICATION

1. (a)State the reasons behind deterioration of lubricating oil.
(b) State the functions of lubricating oil in a diesel engine.
(c) State how conrod bearings being lubricated in medium speed engine.

2.(a)Describe the procedure of LO sampling on board for lub oil analysis.(4)
(b) Name three on board test conducted on board and how this tests are being done on board. (6)

3.(a) Describe the four mode of lubrication. State example of each mode. (5)
(b) Describe the strength and weaknesses of synthetic lubricating oil.(5)

4.(a) Explain Microbial Degradation with respect to lubricating oil and What are the indications. (5)
(b) Describe the remedy and prevention of Microbial Degradation of lubricating oil (5)

5.With reference to lubricating oil discuss the cause, effect and corrective measures for problem relating to: (2.5 X 4)

(a) Change in viscosity,

(b) Drop in alkalinity,

(c) Increase in insoluble

(d) Fresh water or saltwater contamination.

6. (a)What are the main properties of main engine system oil ? (5)

(b)Distinguish between the major characteristics of Two stroke and four stroke diesel engines system oil . (5)

7. (a) Discuss how a 4 stroke diesel engine is lubricated ? (5)

(b)Draw a diagram showing the flow of Lube oil in a 4 stroke auxiliary engine . (5)

8. Discuss how lube oil resists liner corrosion. Also briefly discuss the impact of excessive lubrication . (10)