UK MARINE TRAINING CENTRE (UMTC)
SAI POOJA BUILDING, SHOP NO. 4, PLOT NO. 36, SECTOR - 34. KAMOTHE, NAVI MUMBAI - 410 209 MAHARASHTRA, INDIA.
EMAIL : umtcindia1234@gmail.com | PH : +91 9673855053, +91 7021406134

March 2016

Attempt TEN questions only as follows

SIX questions from each section A

TWO questions from section B

TWO questions from section C

Marks for each part question are shown in brackets.

SECTION A

Q1. State the inspections, instructions and maintenance that should be carried out on main sea water pipelines, strainers and ship's side valves to minimise the risks of engine room flooding. (10)

2013/DEC	2016/March	2018/March				

Q2. (a) With reference to a vapor compression refrigeration plant, explain why EACH of the following conditions are desirable:

(i) superheating at the compressor suction; (3)

(ii) undercooling at the condenser outlet. (3)

(b) Describe, with the aid of a Pressure-Enthalpy diagram, how the evaporator cooling load is affected by the conditions stated in Q2(a). (4)

2016/March	2018/OCT				

Q3. With reference to centrifugal pumps:

(a) state the operating principle of a centrifugal pump and why it is unnecessary to fit a relief valve to it; (2)

(b) state TWO impeller types, explaining which type of application EACH would be best suited for; (4)

(c) explain why cavitation occurs, and how it is reduced by design (4)

2015/Mar	2016/Mar	2017/Dec	2018/OCT			

Q4. With reference to stern tube bearings:

(a) explain why white metal lined bearings are susceptible to failure; (5)

(b) outline the merits of non-metallic bearings. (5)

2016/March						

Q5. Sketch a hydraulic circuit for a FOUR ram steering gear that allows FIVE different ram combinations to be used, identifying EACH ram and valve combination. (10)

2013/DEC	2016/Mar					

Q6. (a) Explain EACH of the following control terms:

(i) cascade; (2)

(ii) split range. (2)

(b) Describe, with the aid of a sketch, a control system that may be enhanced by the inclusion of cascade control. (6)

2013/DEC	2016/March					

Q7. As Chief Engineer Officer on board a vessel which has lost 500 litres of lubricating oil from the stern tube system overnight, write a report to superintendent outlining the actions taken to rectify the leakage and any other further recommendations. (10)

2016/March						

Q8. The company, with which you are employed, requests that all Chief Engineer Officers prepare standing orders regarding the prevention and detection of fires in the machinery spaces. Compile such a list of recommendations to be submitted to central office. (10)

2015/MAR	2016/MAR	2016/DEC	2017/July					

SECTION – B

Attempt TWO questions only from this section

Q9. With reference to electrical short-circuits:

(a) state, with reasons, THREE factors that will influence the severity of a short circuit; (6)

(b) explain the role of reactance when selecting protective devices. (4)

2015/March	2016/March	2016/OCT	2019/OCT					

Q10. With reference to a THREE phase electrical distribution system:

(a) discuss the advantages and disadvantages of an insulated neutral system; (8)

(b) state how an earthed neutral system is earthed and the measures taken to limit the maximum earth fault current. (2)

2013/OCT	2016/ March	2017/JULY					

Q11. (a) State the reasons why direct on line starting for large induction motors such as those for bow and stern thruster units may not be viable. (2)

(b) Describe, with the aid of a sketch, a starting system that may be used for such motors. (8)

2016/March							

SECTION – C

Attempt TWO questions only from this section

Q.12. Sketch FIVE methods used to prevent the distortion of ships' plates and frames during major welded hull repairs in dry dock. (10)

2013/ July	2016/March					

Q.13. During sea trials, extensive noise measurements are taken in accordance with the Code of Practice for Noise Levels in Ships.

(a) State and explain the unit of sound measurement. (2)

(b) State the noise level above which personnel are required to wear ear protection. (1)

(c) Explain how a ship's crew may be made aware of the hazards posed by exposure to excessive noise. (2)

(d) Explain how the noise levels can be reduced in the design of EACH of the following:

(i) diesel generators; (3)

(ii) ventilation fans and trunkings. (2)

2015/DEC	2016/March	2016/DEC				

Q.14. With reference to the classification of ships, explain EACH of the following: (a) why ships are built to classification society rules;

(b) the meaning of the notation +:100A1;

(c) how a ship remains in class throughout the life of the vessel.

2014/July	2016/March					

UK MARINE TRAINING CENTRE (UMTC)
SAI POOJA BUILDING, SHOP NO. 4, PLOT NO. 36, SECTOR - 34. KAMOTHE, NAVI MUMBAI - 410 209 MAHARASHTRA, INDIA.
EMAIL : umtcindia1234@gmail.com | PH : +91 9673855053, +91 7021406134

July 2016

Attempt TEN questions only as follows

SIX questions from each section A

TWO questions from section B

TWO questions from section C

Marks for each part question are shown in brackets.

SECTION A

Q1. Discuss the factors that lead to the selection of materials for use in a sea water cooled, multi- tubular heat exchanger. (10)

2014/March	2016/July					

Q2. With reference to machinery parts under cyclic loading, describe, with the aid of sketches, how the propagation of even the smallest of cracks can lead to total component failure. (10)

2013/Oct	2016/July	2016/March					

Q3. With reference to main thrust block arrangements:

(a) explain how the tilting pads assist in the formation of an oil wedge; (2)

(b) describe the actions that may be taken if upon inspection the pads are found to be:

(i) lightly scored; (2)

(ii) wiped; (2)

(c) explain how the thrust clearance may be measured, stating a typical value; (2)

(d) state the possible effects if the thrust clearance is incorrect. (2)

2015/DEC	2016/JULY						

Q4. Describe, with the aid of a sketch, the operation of a static Oily Water Separator which conforms to current MARPOL regulations and utilises a pump on the discharge side of the separator. (10)

2015/July	2016/July	2017/ DEC				

Q5. With reference to tunnel type bow thrusters:
(a) explain why some vessels are fitted with more than one bow thruster; (2)
(b) discuss the options available in terms of prime mover and transmission systems. (8)

2013/JULY	2016/July					

Q6. (a) Sketch a diagrammatic arrangement of a fully automatic direct expansion domestic refrigeration system which supplies a number of cold rooms. (5)
(b) State, with reasons, FIVE desirable thermodynamic properties of a refrigerant. (5)

2016/July	2018/Mar				

Q7. Following a serious machinery space fire, the engine room was abandoned and an inert gas smothering agent used to extinguish the fire.
Write a report to the Superintendent Engineer detailing the sequence of events which led to this course of action and the subsequent actions taken to enable the vessel to proceed on passage. Include conclusions and recommendations in the report. (10)

2016/JULY						

Q8. With reference to automatic control:
(a) sketch a pneumatic proportional plus integral controller; (6)
(b) explain the term integral saturation; (2)
(c) explain the action to be taken by the operator m the event of integral saturation occurring. (2)

2014/DEC	2015/Mar	2016/July						

SECTION – B

Q9. With reference to insulated and earthed electrical systems operating at High Voltage:

(a) state the regulations pertaining to tankers; (4)

(b) describe, with the aid of a sketch, a method to detect earth leakage in EACH of the following

systems:

(i) earthed; (3)

(ii) insulated. (3)

2013/July	2016/July					

Q10. Explain the meaning of EACH of the following types of electrical equipment:

(i) intrinsically safe; (2)

(ii) flameproof; (2)

(iii) increased safety; (2)

(iv) pressurised enclosure. (2)

(b) State TWO types of lighting equipment that may be installed in the pump room areas of a crude petroleum carrier. (2)

2013/July	2016/July	2017/Dec					

Q11. Describe, with the aid of a block diagram, how automatic starting, load sharing and stopping of generators in response to load changes is effected. (10)

2014/Dec	2016/July					

SECTION –C

Q12. Describe, with the aid of a sketch, how a hydraulically operated folding hatch cover opens and closes. (7)

(b) Explain how the water tightness and security of the hatch cover sketched in part (a) can be ascertained before proceeding to sea. (3)

2013/DEC	2016/Jul					

Q13. (a) State, with reasons, the potential hazards that may be present in EACH of the following spaces:

(i) an oily bilge tank; (2)

(ii) a ballast tank; (2)

(iii) a refrigerated space. (2)

(b) State the procedures to be undertaken prior to entering enclosed spaces. (4)

2016/July	2017/July					

Q14. With reference to roll reduction systems, explain the principles of operation of EACH of the following, stating the advantages and disadvantages of EACH:

(i) Bilge keels (5)

(ii) Passive Uncontrolled Tanks (5)

2014/July	2015/Dec	2016/July	2018/Mar				

UK MARINE TRAINING CENTRE (UMTC)
SAI POOJA BUILDING, SHOP NO. 4, PLOT NO. 36, SECTOR - 34. KAMOTHE, NAVI MUMBAI - 410 209 MAHARASHTRA, INDIA.
EMAIL : umtcindia1234@gmail.com | PH : +91 9673855053, +91 7021406134

October 2016

Attempt TEN questions only as follows

SIX questions from each section A

TWO questions from section B

TWO questions from section C

Marks for each part question are shown in brackets.

SECTION A

Q1. Describe, with the aid of a graph, EACH of the following types of ferrous material failure, stating ONE practical example of EACH:

1. creep; (5)

2. fatigue. (5)

2014/July	2016/Oct	2017/ Dec					

Q 2. The steering gear operation of a vessel that recently experienced a heavy storm is found to be abnormally sluggish.

(a) State FIVE reasons for possible malfunction of the gear. (5)

(b) State the corrective actions that may be carried out at sea, that will allow the vessel to continue to the nearest port. (5)

2014/OCT	2016/Oct	2019/Dec					

Q 3. With reference to refrigeration systems:
(a) explain why undercooling of the refrigerant at the condenser outlet is desirable; (3)
(b) describe, with the aid of a sketch, how a heat exchanger could be incorporated in the circuit to enhance undercooling; (5)
(c) explain the possible consequences of the refrigerant having a dryness fraction at the compressor suction. (2)

2014/April	2014/July	2016/Oct	2018/March				

Q4. Discuss the advantages and disadvantages of electrical remote monitoring and control systems compared to pneumatic systems. (10)

2016/Oct	2017/ July					

Q5. (a) Describe the principle of operation of a biological sewage treatment plant. (4)

(b) Explain how anaerobic conditions can occur within a sewage treatment plant, stating hazards that may be encountered. (4)

(c) Explain the meaning and significance of the term biological oxygen demand. (2)

2014/July	2016/Oct					

Q6. As a prerequisite to its promotion programme, the head office of your company requests prospective Chief Engineer Officers to submit a report, detailing the responsibilities of a Chief Engineer Officer. As an aspiring Chief Engineer Officer compile such a report. (10)

2016/Oct						

Q7. (a) Sketch a muff type propeller shaft coupling. (5)

(b) Describe the actions to be taken if the coupling sketched in part (a) does not readily disconnect during routine tail shaft inspection in drydock. (5)

2016/Oct						

Q8. (a) Discuss the merits of a condition monitoring system compared to other maintenance regimes. (5)

(b) Describe how the data is gathered, stored and evaluated on a computer-based vibration analysis system. (5)

2016/Oct	2017/July					

SECTION – B

Q9. With reference to electrical short-circuits:
(a) state, with reasons, THREE factors that will influence the severity of a short circuit; (6)
(b) explain the role of reactance when selecting protective devices. (4)

2015/March	2016/Mar	2016/Oct	2019/ Oct			

Q10. With reference to star delta starters used for three phase induction motors:
(a) explain in detail why this type of starter is employed; (4)
(b) explain, with the aid of a circuit diagram, the sequence of operation of a star delta starter. (6)

2014/OCT	2016/Mar				

Q11. Describe, with the aid of a diagram, a shaft generator that uses a frequency converter. (10)

2013/Oct	2016/OCT	2018/OCT				

SECTION –C

Q12. (a) State FOUR reasons for transverse watertight bulkheads in ship construction. (4)
(b) State the minimum number of transverse watertight bulkheads and their location. (4)
(c) Describe how watertight bulkheads are tested. (2)

2013/Mar	2016/Oct					

Q13. Explain why fatigue cracks occur in a ship's hull, stating the locations where they may be found. (3)

(b) Describe the hull inspection that should be carried out m drydock to ascertain the maintenance and repairs that may need to be carried out. (7)

2013/OCT	2016/Oct						

Q14. As Chief Engineer officer, write a dry dock specification for the repair of the following damage that has occurred, stating what factors have to be considered when costing the repairs. Damage to water ballast tank number 1 port wing. The shell plating 15 mm thick for approx 2 metres square has to be removed and replaced along with the relevant damaged stiffeners. (10)

2013/Mar	2014/OCT	2016/OCT						

UK MARINE TRAINING CENTRE (UMTC)
SAI POOJA BUILDING, SHOP NO. 4, PLOT NO. 36, SECTOR - 34. KAMOTHE, NAVI MUMBAI - 410 209 MAHARASHTRA, INDIA.
EMAIL : umtcindia1234@gmail.com | PH : +91 9673855053, +91 7021406134

December 2016

Attempt TEN questions only as follows

SIX questions from each section A

TWO questions from section B

TWO questions from section C

Marks for each part question are shown in brackets.

Q1. With reference to fuel oil viscosity:

(a) explain why correct fuel oil viscosity is necessary; (2)

(b) describe TWO methods for the measurement of viscosity that are suitable for the inclusion into a pneumatic or electronic control system; (6)

(c) state, with reasons, a control action for a viscosity controller. (2)

2013/July	2016/Dec					

Q2. (a) Sketch a muff type propeller shaft coupling. (5)

(b) Describe the actions to be taken if the coupling sketched in part (a) does not readily disconnect during routine tail shaft inspection in drydock. (5)

2014/Dec	2016/Oct	2016/Dec				

Q3. With reference to pump selection, state TWO types of pump for EACH of the following applications, stating why they are suitable:

(a) bilge pumping; (2)

(b) cargo oil stripping; (2)

(c) sewage sludge; (2)

(d) lubricating oil circulating; (2)

(e) sea water circulating. (2)

2015/July	2016/July	2017/Dec				

Q4. As Chief Engineer Officer appointed to a newly acquired older vessel, compile a list of all the checks that would be required of the ship's steering gear and associated equipment, given that no hand over from the previous owners had taken place. (10)

2016/Dec						

Q5. With reference to a ship's air conditioning plant:

(a) define the term comfort zone; (2)

(b) state the objectives of maintaining the conditioned air within the comfort zone; (3)

(c) state, with reasons, FIVE areas from which the conditioned air must not be recirculated. (5)

2014/Oct	2015/March	2016/Dec				

Q6. With reference to bacteria harmful to humans in drinking and washing water:

(a) state the constraints placed on the installation and use of systems for shipboard production of fresh water; (3)

(b) state the maintenance and treatment recommended for fresh water tanks; (3)

(c) describe how the entire fresh water system can be made :free :from bacteria; (3)

(d) state an acceptable residual value in the fresh water tanks to ensure the correct concentration of treatment in the system. (1)

2013/July	2014/Mar	2015/July	2016/Dec	2017/Oct			

Q7. The company, with which you are employed, requests that all Chief Engineer Officers prepare standing orders regarding the prevention and detection of fires in the machinery spaces. Compile such a list of recommendations to be submitted to central office. (10)

2015/Mar	2016/Mar	2016/Dec	2017/July			

Q8. (a) Describe, with the aid of sketches, how the test pieces for a Class 1 pressure vessel are obtained. (6)

(b) List the tests which are carried out on the test pieces described in part (a). (4)

2014/DEC	2016/Dec	2019/July				

SECTION – B

Q9. With reference to voltage variation profiles caused by load changes imposed on alternating current generators when starting large motors on line:

(a) sketch a voltage dip, showing an acceptable recovery time; (2)

(b) state FOUR salient factors that cause the variation in part (a); (4)

(c) outline FOUR salient factors that assist recovery from the deviation shown in part (a). (4)

2013/Mar	2013/Oct	2013/July	2016/Dec	2019/July		

Q10. With reference to a.c switchboards:

(a) state, with reasons, the protective devices that are fitted; (5)

(b) state why a breaker may fail to open under prolonged low voltage conditions; (2)

(c) explain the actions to be taken should a main generator circuit breaker stay connected despite repeated efforts to trip it off the board. (3)

2016/DEC						

Q11. Describe, with the aid of a sketch, an electronic soft starting system that may be used for large a.c. induction motors. (10)

2014/March	2016/Dec	2018/March				

SECTION –C

Q12. Explain, with the aid of a mid-ship half sectional sketch of a container ship, how strength is built into this type of vessel whilst still allowing access to the cargo holds. (10)

2013/Dec	2016/Dec	2018/March				

Q13. As Chief Engineer Officer on a new vessel which is experiencing severe aft end vibration at full-service speed, write a report to the Engineer Superintendent suggesting reasons for the vibration and recommendations for further sister vessels presently under construction. (10)

2013/July	2016/Dec					

Q14. With reference to a bulk carrier, describe, as Chief Engineer Officer, the inspection that should be carried out on the upper topside areas. (10)

2015/July	2016/Dec					