MEO CL-1

WRITTEN

QUESTION & ANSWER

-Simple

-Accurate

-Pointwise

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Question 1.

Maritime industries have taken several initiatives to explore new digital technologies and Big Data is one of such initiatives .

With brief introduction on the principles of Big Data explain the following

a) The Challenges and Opportunities of Big Data Analytics for Upcoming Regulations and Future Transformation of the Shipping industry .

b) How usage of big data analytics helps in chartering, operations, vetting and designing of the vessel.

ANSWER 1.

Big Data refers to the massive amounts of structured and unstructured data that businesses collect and analyze to uncover insights, patterns, and trends that can help drive decision-making. The volume, velocity, and variety of data generated today have made it increasingly challenging for businesses to manage and analyze this data without advanced technologies and tools. Big Data is not just about the size of the data, but also about the insights and value that can be derived from it through analytics and machine learning.

a) Challenges and Opportunities of Big Data Analytics for Upcoming Regulations and Future Transformation of the Shipping Industry:

The shipping industry deals with massive amounts of data generated from various sources such as vessels, ports, customers, and IoT devices. Big Data analytics can be used to derive insights on fuel consumption, route optimization, weather patterns, cargo tracking, and maintenance of vessels, among others. However, the usage of Big Data analytics in the shipping industry presents some challenges, such as data quality, data privacy, cybersecurity, and lack of analytical talent.

On the other hand, the opportunities that Big Data Analytics offers the shipping industry are numerous. For instance, it can improve the efficiency of vessel operations, reduce fuel consumption and emissions, enhance safety and security, and promote overall cost savings. In addition, Big Data analytics can help shipping companies comply with upcoming regulations, such as the IMO 2020 sulfur cap, greenhouse gas emissions reduction targets, and safety and security standards, among others.

b) How usage of Big Data Analytics helps in chartering, operations, vetting, and designing of the vessel:

Big Data analytics can be used in various areas of the shipping industry, including chartering, operations, vetting, and designing of vessels, among others. For instance, in chartering, Big Data analytics can provide insights on vessel availability, cargo demand, market trends, and pricing. In operations, Big Data analytics can help monitor vessel performance, optimize routes, manage fuel consumption, and ensure safety and compliance. In vetting, Big Data analytics can be used to assess the quality and safety of vessels and crew, manage port state control inspections, and ensure compliance with regulations. In designing vessels, Big Data analytics can help enhance vessel efficiency, reduce fuel consumption and emissions, improve safety and avoid damage collisions.

Overall, Big Data analytics is a critical initiative in the maritime industry that presents both challenges and opportunities for upcoming regulations and future transformation. Its usage in chartering,

operations, vetting, and designing of vessels can improve efficiency, reduce costs and emissions, and promote safety and compliance in the shipping industry.

Question 2.

Referring to The IMQ Instruments Implementation Code.

a) Briefly Discuss the objective of the code and strategy recommended to flag state to achieve the objective. Which all IMO instruments covered in the code.

b) What are the key performance indicators for evaluation of Flag state performance as per the code.

c) Briefly discuss the Flag state coast state, and Port state responsibilities.

ANSWER 2.

a) The objective of the IMO Instruments Implementation Code is to provide guidelines and recommendations to flag states to ensure effective implementation and enforcement of IMO instruments onboard ships. The code recommends a strategy for flag states to achieve this objective, which includes developing and implementing policies and procedures, conducting regular inspections, and providing training and support to ship operators.

The IMO Instruments Implementation Code covers various IMO instruments, including the International Convention for the Prevention of Pollution from Ships (MARPOL), the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), the International Convention for the Safety of Life at Sea (SOLAS), and the Ballast Water Management Convention, among others.

b) The key performance indicators for the evaluation of flag state performance as per the IMO Instruments Implementation Code include the number of inspections conducted per year, the percentage of inspections resulting in deficiencies, the number of deficiencies corrected within a specified time frame, and the rate of compliance with IMO instruments.

c) The responsibilities of flag state, coastal state, and port state as per the IMQ Instruments Implementation Code are as follows:

- Flag state: The flag state is responsible for ensuring that ships flying its flag comply with all applicable IMO instruments, including ensuring that ships are properly registered, certified, and equipped with appropriate safety and environmental protection equipment. The flag state is also responsible for conducting inspections and investigations, and taking enforcement actions in case of non-compliance.

- Coastal state: The coastal state is responsible for ensuring that ships operating in its waters comply with all applicable IMO instruments, including regulating access and traffic to its ports and offshore installations, carrying out inspections, and exercising control over pollution and other hazards.

- Port state: The port state is responsible for ensuring that ships calling at its ports comply with all applicable IMO instruments, including carrying out inspections, monitoring ship activities, and taking enforcement actions in case of non-compliance. The port state can also deny entry or take other

measures to prevent a ship from leaving its port if it poses a serious threat to safety, security, or the environment.

Question 3:

a) IMO has introduced the EEXl requirements under MARPOL Annex VI Chapter IV for existing vessels from 2023 as a measure towards reduction of C02 emissions from shipping

Explain the various design features adopted in the existing vessels to comply with the present EEXI framework under Phase 2 (of 20% -30% reduction).

b) Explain the concept of CII rating and critically discuss the role of measuring metrics of AER and EEOI. What are the measures required to be taken by the vessel to improve its CII ratings.

ANSWER 3:

a) The EEXI requirements under MARPOL Annex VI Chapter IV are aimed at reducing CO2 emissions from existing vessels. To comply with the present EEXI framework under Phase 2 (of a 20%-30% reduction), existing vessels can adopt various design features, including:

- Improved propeller design: Optimizing the propeller design can result in significant fuel savings by reducing the resistance of the ship in the water and increasing the propulsion efficiency.

- Hull modifications: By optimizing the hull form, reducing the weight of the structure, and using energy-saving devices such as air lubrication systems, existing vessels can reduce drag and improve fuel efficiency.

- Engine modifications: By retrofitting the existing engine with energy-saving technologies such as waste heat recovery systems, exhaust gas cleaning equipment, and variable speed drives, vessels can improve the engine's efficiency and reduce fuel consumption.

- Fuel switching: By switching to low-carbon fuels such as LNG or biofuels, vessels can significantly reduce their CO2 emissions.

b) The concept of CII (Carbon Intensity Indicator) rating is a measure of a ship's carbon emissions per unit of transport work. It is calculated as the ratio of a vessel's CO2 emissions per distance sailed, multiplied by the cargo-carrying capacity. The CII rating provides a standardized way of comparing the carbon emissions of different ships and can be used as a basis for incentivizing emission reductions.

Two metrics used to measure a vessel's energy efficiency and carbon emissions are AER (Annual Efficiency Ratio) and EEOI (Energy Efficiency Operational Indicator). AER measures the energy efficiency of a vessel over a year, taking into account factors such as the weather, chartering terms, and vessel speed. EEOI, on the other hand, measures the energy efficiency of a single voyage, taking into account factors such as the load, distance, and speed of the vessel.

To improve the vessel's CII rating, various measures can be taken, such as:

- Optimizing the speed and route of the vessel to reduce fuel consumption and emissions.

- Improving the maintenance and management of the vessel to ensure the efficient operation of the engine and equipment.
- Installing energy-saving technologies such as waste heat recovery systems and air lubrication systems.
- Retrofitting the vessel with emission reduction equipment such as scrubbers and selective catalytic reduction systems.
- Switching to low-carbon fuels such as LNG or biofuels.

Question 4:
State the difference between Maritime salvage and contractual salvage. Give simple examples. Who is responsible for payment of award to the salvor, for salvage of maritime property, as per the salvage convention? Which form is popularly used in case of contractual salvage? How Is the amount of award calculated as per this form?

ANSWER 4:
Maritime salvage refers to the act of rescuing a vessel or maritime property from peril at sea, without a pre-existing contract. Contractual salvage, on the other hand, refers to the salvage of maritime property under a pre-existing salvage contract.

An example of maritime salvage would be if a ship is in distress and a passing vessel rescues the crew and cargo. An example of contractual salvage would be if a company contracts with a salvor to recover cargo from a sunken ship.

As per the salvage convention, the owner of the salvaged property is responsible for payment of the salvage award to the salvor.

The Lloyd's Open Form (LOF) is popularly used in case of contractual salvage. The amount of award is calculated based on a percentage of the value of the property as well as the level of risk and effort involved in the salvage operation. The percentage of the award can range from 1% to 100% of the property's value.

Question 5:
Question 5
Explain "Effective communication" as mentioned in the ISM Code.
How can principles of Engine Resource Management be used to improve communication on board and with outsiders.
Give two examples of near misses or accidents which were mainly due to incorrect, faulty, or unclear communication and how this could have been avoided through assessment or monitoring?

ANSWER 5:

Effective communication is an essential aspect of the International Safety Management (ISM) Code, which is a set of guidelines aimed at promoting the safety of ships and preventing pollution. Effective communication means that information is exchanged clearly, accurately, and timely between people and departments on board the vessel and with the shore. It includes the ability to receive, understand, process, and transmit information in a manner that ensures that those receiving the message fully comprehend it.

The principles of Engine Resource Management (ERM), a management system that prioritizes the effective use of personnel and mechanical resources, can help improve communication on board and with outsiders. The principles of ERM such as clear communication, mutual support, and problem-solving can be applied to all aspects of ship operations, including communication. By encouraging a culture of open and honest communication, crew members can more easily identify and mitigate potential risks before they turn into accidents. Utilization of standard phraseology and the use of checklists can help to minimize miscommunication and misunderstandings during routine or emergency situations.

Some examples of near misses or accidents which were mainly attributed to incorrect, faulty or unclear communication include:

1) Collision of two vessels due to miscommunication over VHF radio regarding the passage through a narrow waterway. Proper assessment of the weather, sea-conditions, vessel speed and the implementation of a bridge resource management (BRM) plan could have mitigated this risk.

2) Grounding of a vessel as a result of miscommunication between the bridge team and ship's captain over the permissible draft of the vessel for the navigation channel. Pre-voyage planning and implementing a clear communication plan with the vessel's captain could have avoided this situation.

In conclusion, communication is critical to the safe operation of a vessel, and effective communication is essential in reducing the risks associated with seafaring. ERM principles can be used to improve communication on board and with outsiders, and monitoring or assessments of communication procedures can help prevent a range of accidents and incidents that can occur due to miscommunication or lack thereof.

Question 6:

Question 6.
(a) Discuss, in detail, the main functions of a Bill of Lading and explain the reasons for a Bill of Lading being made out 'to order' instead of to named consignee
(b) A Bill of Lading is said to be evidence of the contract of carriage of goods Discuss any circumstances when a Bill of Lading may become the actual contract of carriage.

ANSWER 6:

(a) The main functions of a Bill of Lading are as follows:

Document of Title: A Bill of Lading serves as a document of title, which means it is proof of ownership of the goods being transported. It is also a negotiable instrument, which means it can be transferred to another party for payment, loan or other purposes.

Receipt of Goods: It serves as a receipt for the goods shipped, confirming that the carrier has received the goods listed on the document.
Contract of Carriage: It is a contract between the carrier and the shipper, detailing the terms of carriage, including the type, quantity, and condition of the goods being transported, the agreed-upon rate, the delivery location, and any special instructions.
Delivery Instructions: It serves as instructions for the carrier on where and how to deliver the goods.

A Bill of Lading is made out 'to order' instead of a named consignee for various reasons, such as:

Flexibility: Making it out 'to order' makes it transferable, which increases the flexibility of the document, allowing the shipper to transfer ownership of the goods without needing to change the Bill of Lading.
Security: It allows the shipper to maintain control over the goods and to ensure that they are only delivered to the intended recipient.
Financing: It enables the shipper to use the Bill of Lading as collateral for financing, such as a letter of credit.

(b) A Bill of Lading is said to be evidence of the contract of carriage of goods. However, there are circumstances when a Bill of Lading may become the actual contract of carriage. This can happen when:

It is the only document: If the Bill of Lading is the only document between the shipper and carrier, then it becomes the actual contract of carriage.
It is incorporated by reference: When a Bill of Lading is referred to in another contract, such as a sales contract or charter party, it may become the actual contract of carriage.
Custom and practice: The shipping industry has certain customs and practices that may result in a Bill of Lading being treated as the actual contract of carriage even if it was not intended to be so. For example, in some countries, Bills of Lading are used as a legal requirement for transportation of goods.

In these circumstances, the Bill of Lading would be treated as the contract of carriage, and any terms and conditions listed on the document would be legally binding on both parties. It is essential for carriers and shippers to ensure that the terms of the Bill of Lading accurately reflect the agreed-upon terms to avoid any disputes or legal issues.

Question 7:
Improving efficiency of propellers is recognized as a growing means to improve energy efficiency of ships.

Discuss the following high-efficiency propellers with its merits and demerits: -

a) Ducted Propellers

b) Keppel Propellers

c) Contra rotating Propellers.

d) Azimuth Propulsion

ANSWER 7:
Ans7.

a) Ducted Propellers:
Merits:
- Ducted propellers increase the thrust efficiency by capturing some of the slipstream and reducing swirl.
- They provide a better flow distribution of the water around the propeller, leading to better inflow angles and reduced cavitation.
- Ducted propellers can provide a higher efficiency at lower speeds, resulting in better maneuverability in restricted waters.
Demerits:
- They require a larger diameter, which can increase the drag of the vessel.
- Manufacturing and maintenance costs are higher than conventional open propellers.
- The ducting can be damaged by debris, leading to reduced efficiency.

b) Keppel Propellers:
Merits:
- Keppel propellers have a unique blade design that reduces the cavitation and energy loss around the blades.
- They provide a high degree of vibration damping, leading to a smoother and quieter ride.
- Keppel propellers have a higher efficiency at low speeds, making them ideal for maneuvering in restricted waters.
Demerits:
- Keppel propellers require unique design and manufacturing processes, which can increase their cost.
- The unique blade profile may not be suitable for all vessel types and operating conditions.

c) Contra rotating Propellers:
Merits:
- Contra rotating propellers capture the slipstream more efficiently, leading to higher thrust efficiency.
- They provide a more uniform and stable thrust distribution, resulting in reduced vibration and noise levels.
- Contra rotating propellers can achieve higher efficiencies at lower speeds, which is critical for ships with frequent low-speed operations.
Demerits:
- They require a more complex power transmission system.
- The design and manufacturing process is more complicated, resulting in higher production costs.
- The contra rotating propellers are more susceptible to damage from debris and corrosion.

d) Azimuth Propulsion:
Merits:
- Azimuth propulsion enables better maneuverability in restricted waters, making it ideal for vessels operating in port areas.
- They provide a higher degree of thrust control and efficiency, leading to better overall efficiency.

- Azimuth propellers can be positioned to provide optimal propulsion direction, reducing drag and improving fuel efficiency.

Demerits:

- Azimuth propulsion requires a larger space allocation in the vessel, making it less suitable for use in smaller ships.
- They have a higher initial cost than conventional propulsion systems.
- Azimuth propulsion requires specialized maintenance and training for operation, increasing the running costs.

Question 8:

Referring to MLC 2006. Discuss

Flag state and port state responsibilities

On board and shore complaint procedures.

Detainable deficiencies

Grievance redressal mechanism for Indian seafarers.

ANSWER 8:

The Maritime Labor Convention (MLC) 2006 is a comprehensive international labor standard that provides rights and protection to seafarers working on ships. It establishes minimum requirements for seafarers to work on a vessel, including their working conditions, hours of work and rest, accommodation, and welfare.

Flag State and Port State Responsibilities:

The Flag State has the primary responsibility for ensuring compliance with the MLC, and it is required to issue a Maritime Labor Certificate (MLC) and Declaration of Maritime Labor Compliance (DMLC) Part I and II. Port State Control (PSC) also plays a crucial role in enforcing the MLC by conducting inspections to ensure that ships calling at ports comply with the MLC requirements.

On-board and Shore Complaint Procedures:

The MLC sets out specific procedures for handling complaints or grievances on board a vessel and on shore. The procedures must be easily accessible, in writing, and posted in a prominent place on the vessel. The master is responsible for ensuring that seafarers have access to complaint procedures, and their complaint is handled impartially and efficiently.

Detainable Deficiencies:

If a vessel is found to be non-compliant with the MLC requirements, it can be detained in port. The most serious MLC deficiencies are detainable, including the unavailability of medical care, the non-payment of wages, or the incompatibility of the vessel's equipment with the requirements of the MLC.

Grievance Redressal Mechanism for Indian Seafarers:

The government of India has established the Indian National Shipowners' Association (INSA) to provide grievance redressal mechanisms for Indian seafarers. INSA represents the interests of Indian seafarers and aims to promote and protect their rights. It has implemented a mechanism to provide

legal aid and support services to Indian seafarers who find themselves in difficult situations while working on ships.

In conclusion, the MLC 2006 lays down detailed requirements for seafarers' rights and working conditions, and it sets out obligations for Flag States and Port States to ensure compliance. It also establishes procedures for handling complaints and grievances on board vessels and onshore, and provides legal mechanisms for redressing grievances for seafarers.

Question 9:
Compare and Discuss the features CLC92 and BUNKER CONV 2001 with specific reference to the type of ships oil & nature of pollution damages covered limits of liability and geographical coverage.

ANSWER 9:
Ans 9.
The Civil Liability Convention of 1992 (CLC92) and the Bunker Convention of 2001 are both international conventions aimed at providing compensation for oil pollution damage caused by ships. While both conventions share some similarities, they differ in several aspects, including the type of ships and pollution covered, the limits of liability, and geographical coverage.

Type of ships and pollution damages covered:
CLC92 covers the liability of the shipowner for pollution damage from crude oil, heavy and secondary oil, bunker oil, and other substances carried in bulk. The Convention applies to vessels carrying more than 2,000 tonnes of oil in a single tank as cargo or in multiple tanks as cargo. The Bunker Convention of 2001, on the other hand, specifically deals with pollution damage caused by oil from ships' bunkers, fuel oil used for the propulsion or operation of a ship, and covers all types of ships, including non-tankers.

Limits of liability:
CLC92 sets out a maximum limit of liability for pollution damage, which is based on the weight of the ship. The maximum limit of liability has been revised over time, with the current limit set at 89.77 million Special Drawing Rights (SDR), or approximately USD 138 million. The Bunker Convention has a lower liability limit and provides compensation for pollution damage up to a maximum of 1 billion SDR (approx. USD 1.5 billion).

Geographical coverage:
CLC92 applies to pollution damage suffered in the territory, including the territorial sea, of a State party to the Convention or in an area beyond the territorial sea to which the Convention applies. The Bunker Convention covers pollution damage that occurs in the Exclusive Economic Zone (EEZ) of a State Party, or if there is no EEZ, in the territorial sea of that State.

In conclusion, both CLC92 and Bunker Convention of 2001 serve as important frameworks for providing compensation for pollution damages caused by ships. However, they have several differences, such as the type of ships and pollution covered, limits of liability, and geographical coverage. Therefore, it is important for shipowners and operators to understand the provisions of both conventions to ensure compliance and adequate protection in case of emergencies.