

# Вопросы по основам судовой механики

## Part 1

### Theoretical Knowledge

- What is the purpose of a Safety Management System?
  - Explain the purpose of a Planned Maintenance System (PMS) system?
  - What are the major pieces of shipping legislation and what are their purposes?
  - How to calculate specific lube oil consumption in g/BHP?
  - If vessel speed is doubled, the propeller thrust has to be increased 4 times. How much M/E power increase is required?
  - What is the industry standard for Under Keel Clearance?
  - What is the industry standard for UMS operational policy?
  - What is the standard navigational charts policy for the port entry?
  - What are the benefits (if any) of building an effective Bridge/Deck/ER team?
  - Explain briefly the Work & Rest Hours process?
  - Explain how fuel cut-off to a unit?
  - ME Aux. blower out of order – at maneuvering mode how to react?
  - Explain any reasons for exhaust temperature deviations?
  - Reason of scavenge fires and how to react?
  - Your ideas about generator tappet clearances?
  - Could you explain why low lub oil pressures might occur on AEs?
  - Lub oil cooler leakage – how to address ?
  - Cylinder oil TBN for low sulphur fuel oil?
  - OWS 15 ppm sensor failure –your actions?
  - Critical Operations Check Lists
  - Chief Engineer Standing Orders
  - Fuel test – Si; Al high level – what affect, how to reduce?
  - MAN B&W MC-C experience?
  - SECA area?
  - Aux. boiler adjustment
  - China – Australia – AMSA requirements?
  - Cranes rocking test?
  - Basis for overhauling time?
  - CCAI of fuel oil– what affect?
  - Incinerator flame detector failure – your actions?
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- Reasons for High exhaust gas temperature in all ME cylinders.
  - Reason for turbocharger surging.
  - Safety trips of main engine.
  - ME reversing ahead /astern (purpose of reversing cylinders).
  - VIT-purpose, adjustment and troubleshooting.
  - ME performance (indicator cards- Pz, Pmax, SFOC and SLOC and power calculation).
  - ME exhaust valve sulphuric acid corrosion due to low temperature of cooling water.
  - ME slow steaming (cold corrosion, turbocharger cut/out –if installed, Fuel v/v slide type, affect to exhaust gas economizer) – required actions to mitigate associated risks.
  - ME lubricators adjustment (increasing/decreasing- why and what we are trying to achieve) for HSFO and LSMGO.

Can we start and run ME/AE without governor? – How, why yes or why not (we should get feedback and clear understanding of engineering knowledge and skills).

AE air circuit breaker on MSBD - how many common trips do applicant know (short circuit-overcurrent, reverse power).

Fluctuating of frequency of two AEs running in parallel – reason and point to check FO/LO bunkering procedure and required points to be discussed/checked (high level alarms, overflow alarm, FO/LO valves free movement on deck and so on) during pre-bunkering meeting.

Permit to work system (Hot work permit, Enclosed Space permit, Working aloft) – required RAs, permits and point to check (Oxygen content, LEL and so on).

## **Practical Skills (experience on ship/engine type including Rank(s))**

What is the standard Procedure for changing a ME cylinder liner?

From which parameters can you see that ME load is higher than normal?

How will sulphur content in fuel affect the feed rate of Cylinder oil?

What problems will a too high feed rate cause?

What can cause an increased exhaust temperature?

If attended a BTM/ERM course, what key skills did you learn?

What is the reason for keeping an Oil record book?

in case ODME is not working. Are you allowed to discharge slops?

You have a broken 15 ppm sensor and the amount bilge water is accumulating on-board. There is a very big commercial pressure on you to rectify this. The alternative is to deviate the vessel at a very high cost. What do you do?

How far from the coast do you have to be to be allowed to discharge with a working 15ppm sensor? What are the basic regulations for handing garbage onboard?

What are the risks of using ECDIS as the primary means of navigation?

What are the VGP requirements?

When do you use MSDS information and why?

Explain the Permit-to-Work System (Hotwork, Enclosed Space Entry, Work Aloft, Pumproom Entry, etc.)

What are the basic lifeboat inspection checks that need to be made?

What is the basic FFS inspection requirement?

What checks need to be made of lifting equipment?

Check mooring winch BHC testing knowledge.

Check knowledge of TLV limits for H<sub>2</sub>S and Benzene.

How do you prepare a vessel for a Vetting?

Have you ever been involved in a serious ME failure/Nav close-quarter situation. If so what caused it and how as it solved?

Have you ever been involved in an emergency situation? What caused it and what lessons were learnt?

Have you ever sailed in High Risk/ War Risk area before?

What kind of precautions do you take during sailing in High risk area?

What would be your immediate action if you saw a skiff boat / if you were attacked/ if you saw pirates onboard?

What are your actions if you find stowaways onboard?

## Commercial Awareness

What is the consequence of a poor vetting result?

You have urgent spares waiting for you in Singapore and want to have it delivered when passing Singapore. You discuss with master and you instruct agent to go ahead and deliver. Vessel is loaded. What has to be cleared first?

Why do vessels have Vetting inspections?

Why do vessels tender NOR?

Check knowledge of NOR tendering?

How do you know when to tender NOR?

Why would the vessel use weather routing?

## Management or Supervisory Skills

Discuss one time when you felt you did good when supervising another person.

What are important factors for successful guidance of other persons?

Your team are overhauling a pump and when you have a round in ER you discover that they don't know what they are doing. What do you do?

You have a young junior officer onboard. He is smart but not experienced. How do you deal with this?

How do you manage seafarers from different nationalities?

What factors do you think are necessary for good team performance?

## Training and Coaching Skills (Officers only)

In command, how do you see your responsibility for training?

What do you think some of the challenges in training younger / older seafarers might be? How would you deal with these?

How would you motivate trainees?

What do you think makes a good trainer?

## Leadership Skills (Officers only)

Explain one time you felt that you provided good training of another seafarer.

What are important factors for successful leadership?

Describe your leadership style.

Under what leadership style a subordinate develops best?

Give an example of a situation when a quick decision is preferable instead of discussing 'how to do it' before deciding.

Check if participated in special training programs like CRM, for example.

Can you explain the difference between accountability and responsibility?

What behaviours should a successful leader display?

What do you think is the difference between leadership and management?

What is the difference between a group of people and a team?

Is assertiveness important? In leaders? In team members? Why?

What do you think are the biggest challenges to successful leadership on board?

What are the consequences of a lack of good leadership?

## Personal Qualities

What are you good at?  
What are your strengths?  
What are your weaknesses?  
What do you enjoy most while at work?

## Reason(s) for seafarer interest in V.Ships

Is this your first contract for VSN/V.Ships?  
If yes, who recommended you to work for VSN/V.Ships?  
What made you decide to join us?  
What do you think about V.Ships benefits?  
Do you prefer to work with same nationality crew?

## For all recruits to and promotions to Master and Chief Engineer:

### Safe prosecution of a voyage related to Job Description and specific responsibilities

Pls mention at least two factors to take into consideration when planning a voyage.  
(charts and UKC)  
What is safe speed?  
What is max allowed XTE?  
What is min allowed distance to the nav danger?  
What are the requirements for position fixing frequency?

### Delegation and management of crew

Who is in charge during a ship to ship operation?  
What is the chain of command during a STS transfer operation?  
Describe how to effectively delegate a task.  
What is the difference between 'Master in Charge' and 'Master on the Bridge'?  
Describe the onboard disciplinary process.  
Describe the D&A Policy on your last vessel.  
What are the benefits of delegation?  
What are the risks of delegation?  
What is the purpose of completing Appraisals of your officers?  
What are the main difficulties when carrying out effective Performance Appraisals of your officers?

### Reporting as per VMS and charterer requirements including defect and repair planning

Describe the basic structure of the VMS?  
What is the Noon Position reporting requirement in ShipSure?  
Check knowledge of special Charterers reporting requirements (Shell, Exxon, etc.)

## **Managing and monitoring attending inspectors and surveyors**

How would you prepare for a vetting inspection?

Would you leave a Vetting Inspector to inspect the vessel alone? What is the reason?

Who should accompany a Vetting Inspector?

What are the powers of Port State Control inspectors?.

## **Maintaining housekeeping standards, effective routine inspection and repair routines**

Please give an example for good housekeeping.

Why is a good inventory important and why?

Why is it important to undertake Master's and CE's weekly inspections and record keeping?

What is the importance of the Minimum Spare Part List requirements?

## **Maintaining and managing crew discipline and overall crew welfare**

Is it important for you to be popular among the Crew?

Please mention two examples for activities/equipment that will improve the welfare of crew on-board.

Explain the VMS Disciplinary Procedures.

## **Accounting and procurement systems**

What is a normal interval for supply of stores and provision?

Do you know how Shipsure purchasing works? Please describe the process from issuing of request till ordered item is delivered onboard.

How shall stores be ordered?

## **Commercial and cargo related responsibilities**

What approvals are needed if you need to bunker during a loaded voyage?

What are the requirements for the bunkering if it is to be carried out after discharging alongside the berth?

What is Max Allowable Working Pressure for cargo lines?

## **Lines of reporting and support between vessel and managers**

How would you report in case of an emergency?

Who does the master report to in regards of technical matters?

If owner request some info from you, what do you do?

Check knowledge of reporting priority streamline in case of emergency.

## Part 2

1. Теоретические основы судовой механики. Уравнение Бернулли. Законы термодинамики. Что такое абсолютное давление? Что такое коэффициент избытка воздуха? Что такое коэффициент наполнения и от чего он зависит? Что такое ламинарный поток? Закон Джоуля-Ленца: формулировка и смысл. Что такое крутящий момент? Что такое термический, механический КПД?
2. Обязанности вахтенного механика.
3. Классификация дизелей, устройство, типы продувки, смесеобразования.
4. Термодинамические процессы, протекающие в тепловых машинах. Цикл Карно, Отто, Дизеля, Тринклера.
5. Основные показатели работы ДВС: мощность, степень нарастания давления, степень сжатия, среднее индикаторное давление, КПД.
6. Причины возгорания в подпоршневом пространстве ГД. Действия обслуживающего персонала при возгорании и методы минимизации возможных последствий от длительного горения.
7. Виды индикаторных диаграмм ДВС. Основные показатели, способы получения диаграмм. Расчет мощности ДВС. Доступные отклонения  $P_z$ ,  $P_c$ ,  $P_i$ ,  $T_g$  согласно ПТЭ ДВС.
8. Винтовые характеристики ГД. Понятия о «легком» и «тяжелом» винте. Изменение режимов ГД в связи с изменением характеристик винта от условий эксплуатации.
9. Расчет расхода цилиндрического масла ГД в граммах на 1 л.с./час. Разновидность систем подачи цилиндрического масла в цилиндр двухтактного дизеля.
10. Типы наддува двухтактных дизелей. Преимущество и недостатки.
11. Описать процесс впрыска топлива в цилиндр ДВС. Взаимосвязь топливоподачи и рабочего процесса дизеля. Основные фазы сгорания и характеристики динамичности рабочего процесса. Понятие «Угол опережения подачи топлива», «Нулевая подача топлива»: определение, проверка, регулировка, назначение.
12. Основные мероприятия, проводимые вахтенной службой для подготовки ГД к пуску.
13. Типы ТНВД по регулировке подачи топлива.
14. Типы регуляторов оборотов дизелей. Законы регулирования и регуляторные характеристики.
15. Основные характеристики и сорта топлив применяемых в ДВС. Влияние свойств топлив на работу двигателей. Как подбирается  $T$  подогрева топлива при различных величинах вязкости. Определение понятия  $T$  вспышки и  $T$  воспламенения.
16. Механизмы, оборудование, устройство топливной системы. Основные паспортные данные топлива. Стандарты и классификация.
17. Система сжатого воздуха на судне. Сколько последовательных пусков и реверсов главного двигателя должна обеспечивать система?
18. Процедура подготовки пуска ДГ, взятие под нагрузку, остановка. Включение судовых генераторов в параллельную работу.
19. Круговая диаграмма четырехтактных ДВС.
20. Судовые паровые котлы. Их классификация и типы. Основные принципы ввода, вывода котла из эксплуатации. Признаки упуска воды согласно ПТЭ.
21. Элементы АСУ вспомогательных котельных установок: питания, горения, сигнализации, защиты. Принцип работы.

22. Водоподготовка и анализ котельной воды. Производство анализа котельной воды на хлориды, общую жесткость, щелочность. Мониторинг состояния котельной установки и систем посредством анализа котельной воды.
23. Основные типы и принцип действия судовых насосов.
24. Принципиальная схема насоса переменной производительности радиального и аксиального типа. Область применения.
25. Типы сальников, принцип работы. Конструкция механических сальников насосов.
26. Типы и классификация рефрижераторных установок. Перечень основных составляющих рефрижераторной системы. Физический смысл получения холода ХСУ. Состояние хладагента в различных точках системы. Цикл холодильной установки в диаграмме Тl.
27. Гидравлические системы. Основные компоненты и отображение их на гидравлической схеме. Эксплуатация гидравлических систем в период низких температур.
28. Принцип действия топливных, масляных центробежных сепараторов. Схема барабана самоочищающегося центробежного сепаратора. Режимы сепарации топлива.
29. Типы и принцип действия компрессоров пускового воздуха. Правила пуска и остановки. Требования, предъявляемые к смазочным маслам компрессоров пускового воздуха.
30. ГТН применяемые на ДВС. Принцип действия, устройство.
31. Принцип действия Сепаратора льяльных вод и требование МАРПОЛ. Журнал нефтяных операций, правила его заполнения.
32. Основные элементы и принцип действия электрогидравлической рулевой машины. Требования SOLAS к углу поворота и времени перекладки с борта на борт и к тестированию рулевой машины. Переход на управление рулевой машины в аварийном режиме.
33. Управление в режиме безвахтенного обслуживания Машинного отделения. Основные причины, запрещающие использование безвахтенного обслуживания МО.
34. Морская техническая терминология на английском языке согласно должностным обязанностям и заведованию. Понимание VMS на английском языке.
35. Понятие Night Order Book, Standing Orders. Цель использования.
36. Основные характеристики, классификация смазочных масел. Механизмы, оборудование, устройство масляной системы.
37. Принцип действия судовых инсинераторов и их защита.
38. Устройство установки биологической очистки сточных вод.
39. Системы управления аварийными дизель-генераторами (АДГ), их техническое использование и обслуживание.
40. Процедура подготовки судна к бункеровке топливом, отбор проб, перекачка топлива.