**GME Question bank**

**IC Engines**

1. State the difference between 2 & 4 stroke engines?
2. Draw a sketch of a two stroke engine and name the parts?
3. Draw a Jacket Cooling water pipe line diagram of Main Engine?
4. State the different types of Piston cooling system and draw any one of them?
5. Draw a ME lubrication system?
6. State and draw the different types of Scavenging, in the IC engine?
7. State the indications, causes and how to extinguish an uncontrollable scavenge fire in an IC engine?
8. Draw the timing diagrams of 2 & 4 stroke engines?
9. State the ME cylinder head mountings and sketch any one of them?
10. Draw a crank case relief door and name the parts?
11. State the cause of crank case explosions and state how it occurs?
12. State the cylinder lubrication system and sketch the lubricator?
13. State, how to take crank shaft deflection and the initial checks, to be done?
14. Write down a detailed procedure of ME unit overhaul?
15. State the procedure for overhauling a fuel injector of an IC engine?
16. State, what are the checks carried out, in a crank case inspection?
17. State the safety measures taken before dismantling any parts of ME?
18. State the checks and clearances made in a ME piston rings?
19. State, how to check main bearing clearances and name the tools used?
20. State, the purpose of crank shaft deflection, tabulation and interpretation of the results?
21. State the Main Engine maintenance routine schedules?
22. State the procedure to adjust the ME fuel pump timings?
23. State the procedure followed for checking the foundation bolts of the ME?
24. State the procedure for pre-tensioning and checking of ME Tie Rods?
25. State, how to check the bearing clearances of ME at various places?
26. Name, some of the special tools and measuring equipments used for ME?
27. State, how to check the piston ring condition, without dismantling?
28. Draw the ME starting line and name the parts?
29. State the safety cutouts fitted in the IC engine?
30. State the different types of fuel oil pumps of IC engine and draw any one of them?
31. Draw the ME thrust bearing and name the parts?
32. State, how the clearances of a Thrust Bearing are checked onboard?
33. Sketch & describe, Muff Coupling, in the ME shafting system?
34. Describe any Stern Tube Lube Oil system?
35. Write short notes on Air Guard for stern Tube sealing system?
36. Sketch and describe stern tube aft simplex seal system?
37. State the procedure for mounting and dismantling the fixed pitch propeller?
38. Write short notes on taking Propeller drop and Rudder Drop?
39. Write down a defect list carried out for Dry Dock?
40. Sketch and describe an Oil mist detector fitted onboard?
41. Sketch ME fuel oil system, from DB tank to the Fuel Injector?
42. Write down the various parameters of alarms and trips of ME?
43. What are the causes of ME auto slow down?
44. Describe a Propeller curve, with operating limits?
45. What are the purpose of taking Indicator diagrams of ME?
46. Draw the Power card and Draw card of IC engine?
47. Explain the purpose of Pre-heating in the IC engine?
48. State the properties of ME cylinder lube oil?
49. State, how to check the ME liner wear down?
50. What are the reasons of excessive liner wear?

**Turbocharger**

1. Describe the function of the Turbocharger in the IC engine system?
2. Sketch and describe lubricating system of Turbocharger?
3. Describe the function of the labyrinth seal in the Turbocharger?
4. Describe the phenomena of surging in the Turbocharger?
5. Describe the procedure for water washing on turbine and blower side of the turbocharger during the operation?

**Steering Gear**

1. Sketch and describe Telemotor system?
2. State the purpose of bye pass valve in the steering system?
3. Describe variable delivery hydraulic pump, used in steering system?
4. Explain the function of Hunting gear in the steering system/
5. State the properties of steering gear lube oil?
6. Sketch and describe four ram steering system?
7. Sketch and describe Vane type, steering system/
8. What is the Solas requirement in the function of steering system?
9. Describe safematic system in the steering system?
10. Sketch and describe all electric Wardlenard steering system?

**Fresh Water Generator**

1. Draw a Fresh Water Generator and name the parts?
2. State the procedure of starting the FWG?
3. Draw a Shell & Tube type Heat Exchanger, showing how the thermal expansion is taken care?
4. State the advantages of Plate type, over the Shell & Tube type Heat Exchanger?
5. Draw the pipe line diagram from FWG to Storage Tank?

**Pumps**

1. Show by a sketch, an Automatic Priming System, in a Centrifugal Pump?
2. State what is Cavitations, the cause and its effects?
3. State the reasons for a Centrifugal Pump, not taking suction?
4. State the reasons for the following at the Pressure Gauges of:
   * 1. Suction Pressure Gauge: a) Pressure is zero? b) Pressure is 76mm Hg.
     2. Discharge Pressure Gauge: a) Shows very high? b) Pointer fluctuating?
     3. Discharge Pressure Gauge: a) Shows very high? B) Pointer fluctuating?
5. Draw a Gear Pump and name the parts?
6. State the advantages of a Screw Pump over the Gear Pump?
7. State the reasons, for a Centrifugal Pump, not taking suction?
8. State, when do we use Weldon Pump in the ship and draw a sketch of it?
9. What are the advantages of a central priming system?
10. Name few parts of a reciprocating pump?
11. Draw a simple sketch of a reciprocating pump and name the parts?
12. What is the use of an air vessel in a reciprocating pump system?
13. What is the slip of a pump?
14. State few parts of a gear pump and state which part requires, renewal?
15. What are the advantages of a screw pump?
16. Name some different types of pumps?
17. Write down the starting procedure of a centrifugal pump?

**Steam Turbine & Gas Turbine**

**1**. Draw a Marine Steam Turbine, used for Propulsion and name the parts?

**2.** Draw the P-V diagram of an Impulse & Reaction Turbines and state their differences?

**3.** What is the objective of warming up through turbine?

**4.** What are the functions of lubrication in marine turbine plants?

**5.** What is the necessity of having a drain system for a turbine?

**6**. Draw a P-V diagram of a Gas Turbine, along with a simple sketch of a Gas Turbine?

**7.** State the advantages & disadvantages of a Gas Turbine and the uses of Gas Turbine?

8. State the uses of Gas turbine and the reasons for it?

**Heat Exchanger**

**1.** Draw a Shell & Tube type Heat Exchanger, showing how the thermal expansion is taken care?

**2.** State the advantages of Plate type, over the Shell & Tube type Heat Exchanger?

**3.** State the materials used in the Shell & Tube type & Plate type heat exchangers?

**4.** Draw a Plate type heat exchanger and name the parts?

**5.** State, how to detect, a leak in a tube of the Shell type heat exchanger?

**Marine Boilers**

**1 .** State, how many types of Boilers onboard and name three of each?

**2.** State the advantages of a Water Tube Boiler?

**3.** State the different types of Stays and draw any one of them?

**4.** State the advantages of a corrugated furnace?

**5.** Draw a complete closed system of an Aux. Boiler Plant?

**6.** State the Internal and External Mountings, in a Water Tube Boiler?

**7.** State the Procedure for blowing through a Gauge Glass, in a Boiler?

**8.** Name the various Boiler Water Tests carried out onboard the ship?

**9.** State the objective of Water Treatment, onboard the ship?

**10.** State the Firing sequence for the boiler burner operation?

**11.**  State the different types of Burners and draw any one of them?

**12.** How do you prepare a water tube boiler & raise steam from cold?

**Watch Keeping in Engine Room**

**1.** State the watch keeping hours of the engineers and deck officers, at sea? Also the same for Electrical Officer?

1. State, what actions you will take, if vessel is going to experience Bad Weather?
2. State the reasons for not handing over the watch to the incoming Engineer
3. What actions taken during the watch, if the vessel is grounded?
4. Draw the Pipe Line diagram of FO system, from DB Tank to the Injector?
5. Draw a SDNR valve and name the parts? (Pg.38)

**7.** State the color codes of the following Pipe Lines: (Pg.38)

i) Bilge, ii) MDO, iii) HFO, iv) Steam, v) Sea Water.

**8.** State the gasket used in the following pipe line flanges:

i) Steam, ii) Sea Water, iii) F,O,

**9.** State how you will select a packing, in a stuffing box of a pump or valve?

**Air Compressor**

**1.** Draw a two stage Air Compressor and show the temperatures & Pressures at

various stages?

**2.** Draw an Air Receiver and name the parts?

**3**. Also state what are the safeties fitted on the Air Compressor?

4. State what is the purpose of clearance volume in the Air compressor?

5. Draw a multi compression P-V diagram of an Air Compressor?

6. State the comparison of centrifugal, Axial & Reciprocating Air Compressors?

**Purifier & Clarifier**

**1.** Draw a simple Purifier and name the parts?

**2.** State, how to change over a Purifier into Clarifier, for operation?  
 **3.** Name the Deck machineries onboard a bulk carrier?

**4.** Show, how a gravity disc is chosen in the Purifier?

**5.** Draw a ship’s pipe line diagram, from the settling tank, Purifier and then to Service tank?

**6.** State the reason for water coming along the discharge oil side?

**7.** State the difference between the Purifier & Clarifier?

**Deck Machinery**

1. Name the Deck machineries onboard a bulk carrier?
2. Draw a simple windlass sketch and name the parts?
3. State the uses of ship’s Gantry Crane?
4. What is the purpose of the Chain Stopper and show the location by a sketch?
5. State the use of Pilot Hoist and how it is operated?
6. State what is Strand in a wire rope?
7. State the various operations of Deck Hydraulic Crane?

**E.R. & Deck, Pipe Lines**

1. Draw a pipe line diagram of a Tanker ship, cargo oil pumping system?
2. Draw a modern ship, Oily Water Separator and name the parts?
3. Draw a pipe line diagram of, Ballast Water pumping system?
4. Draw a simple Fire Line diagram of, a general cargo ship?
5. State the capacity of the Emergency Fire Pump, & how it is tested?
6. Draw a ship’s Bilge Pipe Line diagram?
7. Draw an Inert Gas system, Piping diagram on board a Tanker ship?
8. State with a sketch, how to pump out, E.R. bilges in case of Emergency?

**Prevention of Pollution of the Marine Environment**

1. State the Marpol 73/78, all the annexes and their revised dates of entry into force?
2. State the control of discharge of the following, into sea?
   1. Oil, outside special area, **b) D**ischarge ofSewage effluent,and **c)** Garbage
3. State the Emission control of Sulphur, in the Exhaust Gas of the Main Engine, in the Emission Control Area?

**4.** Explain the actions to be taken in Port, to prevent discharge of oily bilges overboard?

**5.** Draw a Biological Sewage Treatment Plant and describe the function of it?

**6.** Draw the pipe line diagram to the Incinerator, the tanks and name the parts?

**7.** State the checks carried out, before starting Bunkers?

**8.** State, on what occasions. You will stop the Bunkers, which is in progress?

**Refrigeration & Air Conditioning**

1. Draw the Vapor Compression Cycle and name the Parts?
2. Indicate the Pressures, Temperatures and the state of the Refrigerant, at various points in the refrigeration cycle?

**3.** State the Refrigerant used and the reasons, and state the Properties of the Refrigerant?

**4**. Draw a Thermostatic Expansion Valve and briefly explain the function of it?

**5**. State the procedure for charging the Refrigerant in the system?

**6**. State the various methods of Defrosting and explain any one method?

**7.** Describe a method of removing Air from the system and name the drying agents used in the Drier of the Plant?

**8.** Draw a simple sketch of ship’s Air Conditioning system and state, under what circumstances, it is put on recirculation mode?

**9.** State the principles of Refrigeration cycle by a ‘p-h’ diagram and show the details?

**10**. Sketch an oil separator used in Refrigeration system?

**11**.Name two drying agents used in the drier unit?

**12**.Show the circuit for, various cooled rooms for storage, name the parts and state the temperatures maintained for the Meat, Fish and Vegetable rooms?

**13**.Explain, how the temperatures of the storage rooms, are maintained?

**14**. State, when ship’s Air Conditioning system, run on recirculation mode?

**Advance Workshop Practice**

**1**. Write short notes on low, medium & high, carbon steels?

**2.** State the procedure for Heat Treatment of carbon steel?

**3.** State what is vibration, and explain different types of vibrations with reference to main engine?

**4.**What is an adhesive bonding and state its advantages and disadvantages?

**5.** State and describe, the personal protective equipments (PPE) used in the ship?

**6.** Name different types of gland packing used and the properties required of a gland packing?

**7.** Describe, how to cut a gasket to the flange of, four bolt holes, welded to a pipe?

**Thermodynamics & Heat Transmission, Mechanics & Hydro Mechanics**

1. Define the following?

a) Specific heat, b) Thermal efficiency, c) Mechanical efficiency

1. Describe the following? a)Bow’s notation, & b)Flywheels
2. Define Bernoulli’s equation?
3. Write the equation of simple harmonic motion?
4. Write down the effect of Fouled Hull in the performance of the sea going Vessel?
5. Explain the Heat balance of Marine Diesel Engine?
6. Explain any one system’s fault, its effect and the remedial action in the refrigeration system?
7. Explain the Enclosed drip sampling method during Fuel Oil Bunkering operation. Mention the purpose of taking four sample bottles?
8. Describe the Impact and Bend tests?

**Legislation**

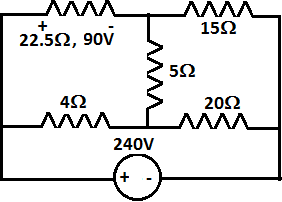
1. State the operations that are recorded in the ER Oil Record Book?
2. State the conditions to obtain IOPP Certificate, onboard?
3. State the law for throwing the Garbage, at sea?
4. Write short notes on Solas regarding ship’s steering Gear?
5. State five safety requirements, as per Solas?
6. State, who invented the Plimsoll mark and the year?
7. State the rest periods and the conditions as per STCW Convention?
8. State the requirements, while vessel is transmitting through poor visibility?
9. What is the objective of ISM Code?
10. What is the Master’s responsibility?
11. Describe emergency preparedness?
12. What are the safety management system?
13. what are the periodical and non periodical survey of ship?
14. What is the Role of DG Shipping, in the Indian shipping industry?
15. State what is RPSL No. and is it necessary for the Indian ship owners?
16. What is the recruitment and placements rules of seafarers in 2005?
17. What is the articles of agreement in (Foreign flag ship)?

**ISPS (INTERNATIONAL SHIP AND PORT FACILITY SECURITY CODE)**

|  |
| --- |
| 1. State the possible Threats that may be encountered? 2. State the Security equipments, to be kept onboard the ship? 3. State the Restricted areas in the ship? 4. Who is CSO? And state their responsibilities? 5. State the duties of SSO?   **FFA ( Fire Fighting Appliances)**  **1**. What are the portable fire fighting extinguishers?  **2**. Define flammable limits?  **3**. What are the fire detecting equipments?  **4**. Operation check in breathing apparatus?  **5.** Define mechanical foam extinguishers?  **6**. State the actions to be taken in the event of fire in a machinery space, which is uncontrollable?  **7**. How to avoid Fire on board ship  **8.** State the checks made on the Fire Extinguisher?  **9**. Explain Class of Fire, Equipment and the Type of Fire extinguishers used?  **10**. State, how a metal fire is extinguished?  **11**. Draw a ship’s Fire line, showing the isolating valve and the fire monitors?  **12**. State, how Fire hoses are maintained after use and the material of the Hose?  **13**. Draw a ER CO2 flooding system and name the parts?  **14**. Draw a Fire detection system in a ship for the Cargo Holds?    **Alarms and Signals**   1. Write down the alarms and signals incorporated on board ship? 2. State the functions of a ‘Walkie–Talkie’ and where its used onboard   the ship?   1. i) State, where VHF Radio is used? ii) What is the range of VHF in MHz?   iii) What is the distress channel no.? iv) State, how far, the transmission can be heard?   1. State the Sound Powered Telephone, circuit stations in the ship? 2. Write short notes on ‘Engineers Call alarm? 3. State the different types of Signals used in the Wheel House? 4. State the colour of Hand Flares, when it is lit and the durations? 5. State, the types of Alarms given, when man fallen overboard? 6. State the different types of Life Boats used, so far in the ship? 7. State the signals required for poor visibility due to fog? 8. State the items stored inside a Life Raft? |
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**MARINE ELECTRICAL TECHNOLOGY**

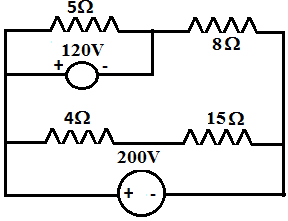
1. Define a) On-OFF control, B) sequential control, C) PID control, D) Program Control
2. Explain automatic motor with start/stop for on/off control,
3. Explain about the start/stop for generator and sequential control,
4. Explain the principle of i) Pressure switch, ii) Temperature switch, iii) Resistance bulb, iv) Electric pneumatic converter,
5. Explain the principle of i)Electromechanical transducer, ii)valve positioned, iii)control valve, iv) Relay
6. Explain the composition of atom and briefly write about proton, electron and neutron.
7. Describe the effect of applying energy to an atom.
8. Describe with a sketch what is congenital flow and electron flow of current.
9. Explain what is conductor and insulator. Given two example for each.
10. Define, E.M.F and P.D state the symbols and unit.
11. Define (a) Direct current (b) Alternating Current.
12. Define Ohm’s law: Solve the given problem: find the resistance of the circuit shown.



1. Determine the current flow, resistance value and voltage in (a) series circuit (b) Parallel circuit.
2. Solve the given problem: three resistors of 4, 12 and 6 ohms are joined in parallel.

If the total current taken is 12 amperes, find the current through each.

1. Write the low of resistance and explain the effect of temperature on it .
2. What is internal resistance? What is the effect on supply source?
3. Problem on grouping of cells. Ten cells, each of e.m.f 1.5 volt and the internal resistance 0.2 ohms are connected in series. What current will they send through an external resistance of 4ohms?
4. Define Kirchhoff’s lows. Resistance of 4, 15, 5 and 8 ohms are connected up to two batteries (of negligible resistance) as shown in Fig. Find the current through each resistor.



1. Explain the principle of wheat stone bridge with the simple diagram and mention their application.
2. Explain the arrangement of connecting voltmeter and ammeter with the simple diagram.
3. Explain the arrangement of changing the ranges of voltmeter and ammeter. Also explain arrangement of reading 440kv and 4000amps.
4. a. Derive the formula to calculate power in electrical circuit.

b. An electric iron marked 200 volts 350 watts, what current does it take and what is its hot resistance. What is the monthly cost of using it 30minutes per day at Rs 3 per unit?

1. Define efficiency and explain basic ratio and symbol.
2. Explain the magnetic circuit and compare with electrical circuit
3. Derive the formula for total capacitance of (a) 3 capacitors in series (b) 4 capacitors in parallel.
4. Draw a neat diagram and explain hysteresis loop
5. Explain Faraday’s laws of electromagnetic induction
6. Explain Flemings Right hand and Left hand rules.
7. a) Briefly explain how alternating current is produced

b) What is the speed of a 4 pole alternator which gives an output of 440 V 60 c p s

1. Explain what is RMS value, Average value and Form factor
2. a.What is Impedance in an AC circuit?

b. Find the current which will flow through a coil of negligible resistance and inductance 0.8 Henry, when connected to a 200V 50 c/s supply. What will be current if the frequency is doubled?

1. A coil of resistance 10 ohm and inductance 0.04 H is connected in series 100 micro Farad capacitor 200 V 50 c/s supply. Find the current taken and angle of phase Difference. Find also the voltage across the coil and the voltage across the capacitor?
2. Define power factor, apparent power, real power, voltage resonance and resonance frequency?
3. A non inductive resistance takes 8 amperes at 100 Volts. Calculate the inductance of a choke coil of negligible resistance to be connected in series in order that load may be supplied from 220 V 50 c/s .What will be the phase angle between supply Voltage and current?
4. Derive the equation for induced EMF of DC Generator
5. Draw a sectional view of DC generator showing all parts and explain briefly
6. Explain the operation with diagrams of the different types DC Generators
7. Explain the power stages, loses and efficiency of DC Generator
8. Explain the working principle and construction of Alternator and advantages of rotating field system
9. a) Explain the different types of rotors and their application

b) Derive the EMF equation for the Alternator

1. Explain the different types of 3 phase power distribution and their application
2. Explain the working principle of single phase and three phase transformers
3. Draw a typical power distribution of cargo ship and explain the operation of Bus Coupler
4. Three single phase *ideal* transformers, each of rating 5kVA, 200V/400V, 50 Hz are available.
5. The LV sides are connected in star and HV sides are connected in delta. What line to line 3-phase voltage should be applied and what will be the corresponding HV side line to line voltage will be? Also calculate and show the line and phase current magnitudes in both LV & HV sides corresponding to rated condition.
6. The LV sides are connected in delta and HV sides are connected in delta. What line to line 3-phase voltage should be applied and what will be the corresponding HV side line to line voltage will be? Also calculate and show the line and phase current magnitudes in both LV & HV sides corresponding to rated condition.
7. Explain the operation of Brushless Alternator with a neat diagram
8. Explain the working of automatic voltage regulator
9. a. What is the importance of fuse? Name various types of fuses.

b Explain the operation of Bottle fuse

1. Draw a neat diagram of Air Circuit breaker for Alternator and explain the purpose arc chute
2. What are protections provided in the main switch board ?
3. What protection is provided on the doors of switch board cubicles?
4. Explain the operation of reverse power protection
5. Why under voltage protection is important for Generators and motors?
6. Why preferential trip is important for Generators which are the machineries effected?
7. Explain the operation of status indicator lamp.
8. Briefly explain the safety trips and interlocks in circuit breakers of switch boards of a cargo ship
9. Draw a neat diagram of ordinary filament lamp (General lighting service lamp) and name the parts
10. Where are Tungsten-Halogen lamps used and what precautions to be taken while handling them.
11. Draw a neat diagram of the switch start circuit of tube light and explain the purpose of choke
12. Draw a neat diagram of Navigational lights (Circuit energised) and explain brief
13. Explain the arrangements of Emergency lighting on board and testing procedure
14. Explain briefly the current rating and voltage drop of a cable?
15. Describe the conditions to be fulfilled and method of paralleling by synchro cope method
16. When and why shaft generator is preferred to use? Explain the procedure to transfer load from No 1 Generator to the shaft generator
17. Draw neat diagram to show the consumers supplied from Emergency switch board and explain briefly.
18. What are the regulations for Emergency generator? Briefly explain the starting arrangements of Emergency generator.
19. What are the common types of motors used on board ships and their applications?
20. What are the information displayed on motor and generator name plates?
21. What are the part of a DC motor and their purpose?
22. What is the importance of back emf in DC motor? Explain briefly
23. Explain the operation of Ward Leonard system
24. Explain different types of DC motors briefly
25. How is the starting current controlled by 3 point starter for DC Motor?
26. Explain the working principle of three phase Induction motor .
27. Explain the effect of varying excitation of a synchronous motor with neat diagram
28. Draw neat diagrams of star / delta starter and explain the function of timer contacts
29. Explain briefly the torque-slip characteristics of an induction motor
30. Explain why starting current is high for a motor and requirement of starter
31. Explain briefly the effect of single phasing in a three phase motor
32. What is the purpose of megger and how will you use it?
33. Describe the standard tests carried out on a rewound motor both AC and DC
34. What is high voltage? Explain the advantages of using high voltage by referring power equation
35. What is short circuit? Explain the types of short circuits and their effects
36. What are the major risk factors in HV system? What are the hazards of an arc flash?
37. Draw a neat diagram of power distribution of a HV ship with Electrical propulsion and explain briefly the speed control of propulsion motors
38. What are the different types of circuit breakers used in HV system? Draw a neat diagram of VCB and name all the parts
39. Explain the operation of Vacuum Circuit Breaker with a net diagram
40. Why HV is used on board ships and what are the standard voltages?
41. What are the major differences between HV supply and LV supply on board ships?
42. What is the importance of earthling HV system and how is it done?
43. What are the precautions to be taken while doing maintenance on HV system?
44. What is close loop system? Explain briefly. Give an example in marine application
45. Explain the operation of a open loop control system
46. Define the various terminologies in control system
47. Explain the sequential operation of boiler
48. Explain the sequential operation of Refrigeration plant
49. Which is a semi conductor and how many types of them are there? Define each of them
50. Draw neat simple diagrams to show the testing procedure of diode and transistor
51. Draw neat simple diagrams to show the operating principle of an amplifier and state their applications
52. What are the various sensors used in control system? Mention one applications of each of them
53. Draw a flow chart for routine testing of Emergency Generator
54. Why automation is required in ships?
55. Which are the different types of analogue sensor?
56. Briefly explain Logic/sequential control system
57. Briefly explain the operation of follow up mode of Electro hydraulic system?
58. What are the electrical controls of Main Engine?
59. Compare the operation of Oily water separator and oil discharge monitor system.
60. Explain the principle of operation of a pressure switch with a neat diagram
61. Explain the principle of operation of an accumulator with a neat diagram
62. Draw a block diagram of PID Controller and explain briefly.
63. Draw a neat diagram of Boiler control panel and name all the indication lights
64. Draw a line diagram to show the interlocks for manual and automatic operation of Auxiliary boiler and explain briefly
65. Referring the control loop define are the terms PV, MV.SP and e?
66. What is the difference between ON /off and continues control? Give examples for temperature, level and pressure controls
67. Briefly explain the remote control of cargo valves in a tanker.

**QUESTION BANK FOR COMPETENCE 7 OF GME**

* 1. Why copper is opted for conductor for marine cables?
  2. What are Do’s and Don’ts when working on electrical equipments?
  3. What are the protections you will take while working on batteries?
  4. What safety tips to remember while working on electric al equipments?
  5. What are the Physiological effects of Electric shock currents?
  6. What isthe procedure to save a casualty of electric shock?
  7. What is static electricity? Explain briefly
  8. What is the danger in the vicinity of bus bars?
  9. What is the purpose of interlocks fitted to circuit breakers?
  10. What are the parameters to be recorded of an alternator on load?

1. What is the importance of checking air gap in an alternator and how is it done?
   1. What routine checks are done on batteries?
   2. What will you do if ACB is tripped on reverse power?
   3. What is the importance of checking insulation? What is the minimum?
2. value required?
   1. What types of tools are used for electrical work?
   2. How will you use different types of Megers?
   3. What is use of hydro meter? How will you know the charge of lead acid
3. battery?
   1. Explain how earthling on a circuit can be detected and rectified
   2. With a neat diagram explain the operation of earth fault lamps
   3. Draw a simple Engine alarm system and explain briefly
   4. Draw a neat diagram of extension alarm and name the parts
   5. Ref the Generator control circuit and explain the operation of low lub
   6. oil pr trip
   7. How will you check the IG high temperature alarms and trips?
   8. How will you check the L o Pressure alarms and trips?
   9. How will you check the Generator over load alarms and trips?
   10. How will you check the Low lub oil pressure in Main engine alarms and
   11. trips?
4. 27 How will you check the High temperature in meat room alarms ?
   1. Draw 20 symbols of electrical/electronic diagrams and name them
   2. Ref sheet No 24 of the Generator control circuit and explain the purpose
   3. of middle section
   4. Explain the basic difference between following electrical drawings with
   5. simple diagrams A) Block, b) circuit,
   6. Describe the safety procedure to be followed while working aloft
   7. Describe the safety procedure to be followed while working Alternator
   8. Describe the safety procedure to be followed while working Main switch
   9. board
   10. Describe the safety procedure to be followed while working on main sea
5. water pump motor
   1. Describe the safety procedure to be followed while connecting shore
   2. power
6. 38 What is the effect of excessive heat on a PLC?
7. 39 What are the advantages of PLC over hard wired circuit?
8. 40 What are the protective clothes and tools required to work on batteries?
9. 41 Explain the procedure to give first aid to a victim with electrical shock
10. 42 Explain the dangers associated spaces in the vicinity of bus bars
11. 43 What is electro static charge and their effects?
12. 44 What is the purpose of interlocks fitted with circuit breakers?
13. 45 Explain the requirement of Emergency batteries and maintenance of it
14. 46 What are the routine checks done on AC and DC motors?
15. 47 What are the routine checks done on starters?
16. 48 What is the Importance and of checking Insulation of electrical
    1. equipment. What is minimum Insulation reading acceptable?
17. 49 Explain the Methods of bring up Insulation reading of a motor
18. 50 Describe how to fit cable through gland into a terminal box

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| --- |
| 1. Emergency batteries requirement and maintenance |
| 1. Describe the maintenance routine of circuit breakers. |
| 1. Routine checks and maintenance carried out on 2. a)AC/DC Motors d)Alternators 3. b)Starters e) Switchboards 4. c)Transformers f) Batteries |
| 1. State safety and Isolation precautions necessary before commencing work. 2. Importance and of checking Insulation of electrical equipment. What is minimum Insulation reading acceptable. Methods of bring up Insulation reading. Maintenance of cables |

**Subject: Ship Construction (TAR Book Competence No.11)**

**Topic 1: Types of Vessel, Dimensions and Tonnage of Vessel**

1. List out the principle types of Merchant Vessels.
2. Draw the cross section of an Oil Tanker.
3. Draw the Longitudinal Section of a LNG Carrier.
4. What is Colliers?
5. Define Length Overall (L.O.A)
6. Define Forward Perpendicular, Aft Perpendicular and Length between Perpendicular.
7. Define Breadth Extreme and Breadth Moulded.
8. Define Depth Extreme and Depth Moulded.
9. Define Draught Extreme and Draught Moulded.
10. Define Freeboard.
11. Define Camber, Sheer, Rise of Floor and Tumble Home
12. What are the different types of Tonnages?
13. What is the difference between Gross Tonnage and Net Tonnage?
14. Explain the importance of Dead Weight Tonnage?
15. Draw the Load line diagram with Dimensions.
16. What is Suez Canal and Panama Canal Tonnage?
17. Define Archimedes principle.
18. Define Law of Floatation.
19. Define Centre of Gravity
20. Define Centre of Buoyancy

**Topic 2: Stress on a Vessel**

1. Define Stress and Strain.
2. Define Elastic limit.
3. Define Shear stress.
4. Explain the forces to which a ship is subjected?
5. Draw and explain buoyancy curve.
6. Draw and explain hogging and sagging.
7. What is still water bending?
8. Explain in detail panting and pounding.
9. Explain transverse bending.
10. Explain Racking.

**Topic 3: Structural Framing System, Connections and arrangements and layouts**

1. Define Scantling and intercoastal.
2. What are different grades of steel used in the construction of a Vessel?
3. What are the different steel Sections used in the construction of a Vessel?
4. Draw and Explain Butt joint, Lap joint and T joint.
5. Draw and explain the connection of Aluminium Section to Steel Section
6. What is the difference between Structural member and strengthening member?
7. List out the types of Rivet Heads.
8. List out the Method of Riveting and explain any one in detail.
9. What are the important components of Electric Arc Welding?
10. Explain the different types of weld?
11. Explain the process of welding of Aluminium?
12. List out the important certificates to be carried onboard.
13. Sketch and describe the Transverse, Longitudinal and Combined Framing System.
14. What is the difference between Flat Plate Keel and Duct Keel?
15. Draw and Explain Transversely Framed Double Bottom.
16. Draw and explain the arrangements in the Bilge.
17. List out the types of Frames and Explain Web frame in detail.
18. What is the required number of Bulkhead to be fitted for different length of Vessel?
19. Explain the importance of Corrugated Bulkhead
20. Explain the different types of Pillars?
21. Draw and explain the process of fitting of Pillar.
22. Draw and Explain in detail Hold Drainage System.
23. Draw and explain the construction of Hatchways.
24. How water tightness is achieved between hatch cover and hatch coaming?
25. Explain the process of Welded Deck Plating.
26. Explain the process of joggled Deck Plating.
27. Explain the importance of Tween decks at the Ship’s side.
28. What is the purpose of Bilge Keel?
29. Draw and Explain the Panting arrangements at the fore end of Ship.
30. Describe the fitting of air pipe and sounding pipe to tanks on a ship?
31. Explain the importance of Bulkhead.
32. What is the construction difference between balanced and unbalanced Rudder?
33. List out the important components of a Rudder.
34. Draw the Stern frame for a twin screw ship.
35. Draw the cross section diagram of Stern tube and propeller.
36. Define Superstructure.
37. Draw the general arrangement of an Engine room.
38. Draw the Bottom Floor arrangement of an Engine room.

**Topic 4: Resistance Propulsion and Powering of Ship**

1. Explain how Ship’s performance is measured based on Speed, Fuel Consumption and displacement.
2. Define Propeller Slip.
3. Describe Ship’s resistance experienced at sea
4. What is the difference between frictional resistance and residuary resistance?
5. Define Froude’s number and Reynold’s number.
6. Explain in detail Froude’s law of similarity.
7. How to determine the frictional and residuary resistance of a ship?
8. Define effective horsepower.
9. Draw the geometry of a screw propeller.
10. Define thrust deduction and wake fraction.
11. Derive the Law of similitude of propeller.
12. List out the special types of propeller.
13. Draw and explain controllable pitch propeller.
14. What is the advantage of voith Schneider propeller?
15. Difference between fuel consumption and specific fuel consumption.
16. How to predict the area of rudder, steering torque and Stock diameter?
17. How to calculate the power required for steering?
18. Draw the heeling of the ship while turning indicating necessary angles.
19. Define Turning circle.
20. How to calculate the power required for towing and Bollard Pull.
21. What is the power required for the operation of windlass and mooring winch?
22. How to determine the size of Anchor, Cables and Ropes?

**Ship stability**

1. Define the following principal terms in Naval Architecture.

(a) Length Between Perpendiculars

(b) Displacement

2. A vessel of 10000 tonne displacement has a second moment of area of water plane about the center line of 6 × 10³ m⁴. The centre of buoyancy is 2.75 m above the keel. The following are the disposition of the masses on board the ship.

4000 tonne 6.30 m above the keel.   
2000 tonne 7.50 m above the keel.  
4000 tonne 9.15 m above the keel.

Calculate the Meta centric height.

3. Define the following terms:-

(a) Water plane area coefficient

(b) Laws of flotation

4. How is the density of fluid measured?

5. A Ship of 8500 tonne displacement is composed of masses of 2000, 3000, 1000, 2000 and 500 tonne at positions 2, 5, 8, 10 and 14 m above the keel. Determine the height of the centre of gravity of the ship above the keel.

6. A Ship of 10000 tonne displacement has a mass of 60 tonne lying on the deck. A derrick, whose head is 7.5 m above the centre of gravity of the mass, is used to place the mass on the tank top 10.5 m below the deck. Calculate the shift in the vessel’s centre of gravity when the mass is:

(a) Just clear of the deck.

(b) At the derrick head.

(c) In its final position.

7. What is a lines plan & Table of offset?

8. A Ship 180m long has half widths of water plane of 1, 7.5, 12, 13.5, 14, 14, 14, 13.5, 12, 7 and 0 m respectively. Calculate:

(a) Water plane area

(b) TPC

(c) Water plane area coefficient

9. Explain Righting moment with relevant sketch.

10. Explain the Inclining experiment conducted on ships in detail.

11. Explain Stable & Unstable equilibrium with relevant sketch.

12. Explain Hogging & Sagging with relevant sketch.

13. A ship 150m long has draughts of 7.70 m forward and 8.25 m aft, MCTI cm 250 tonne m, TPC 26 and LCF 1.8 m forward of midships. Calculate the new draughts after the following masses have been added:

50 tonne, 70 m aft of midships

170 tonne, 36 m aft of midships

100 tonne, 5 m aft of midships

130 tonne, 4 m forward of midships

40 tonne, 63 m forward of midships

14. What is a deadweight scale? How it is used?

15. Define Angle of loll & Trim.

16. What is a weight curve? Draw and explain.

17. A vessel has the following righting levers at a particular draught, based on an assumed KG of 7.2 m

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ѳ | 0˚ | 15˚ | 30˚ | 45˚ | 60˚ | 75˚ | 90˚ |
| GZ | 0 | 0.43 | 0.93 | 1.21 | 1.15 | 0.85 | 0.42 m |

The vessel is loaded to this draught but the actual KG is found to be 7.8 m and the GM 1.0 m. Draw the amended statical stability curve.

18. Explain Righting moment with relevant sketch.

19. Explain the Inclining experiment conducted on ships in detail.

20. Explain Stable & Unstable equilibrium with relevant sketch.

21. Explain Hogging & Sagging with relevant sketch.

22. A ship 150m long has draughts of 7.70 m forward and 8.25 m aft, MCTI cm 250 tonne m, TPC 26 and LCF 1.8 m forward of midships. Calculate the new draughts after the following masses have been added:

50 tonne, 70 m aft of midships

170 tonne, 36 m aft of midships

100 tonne, 5 m aft of midships

130 tonne, 4 m forward of midships

40 tonne, 63 m forward of midships

23. What is a deadweight scale? How it is used?

24. Define Angle of loll & Trim.

25. What is a weight curve? Draw and explain.

26. A vessel has the following righting levers at a particular draught, based on an assumed KG of 7.2 m

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ѳ | 0˚ | 15˚ | 30˚ | 45˚ | 60˚ | 75˚ | 90˚ |
| GZ | 0 | 0.43 | 0.93 | 1.21 | 1.15 | 0.85 | 0.42 m |

The vessel is loaded to this draught but the actual KG is found to be 7.8 m and the GM 1.0 m. Draw the amended statical stability curve.

1. In the light condition a box shaped vessel is 45 m in length, 8 m in breadth and floats at a draught of 3.0 m in fresh water. The vessel has three holds each 15 m in length. 90 tonnes of bulk cargo is loaded into number 2 hold and is trimmed level. For the loaded condition construct the Shear forces and Bending moment diagram.

1. What is a section module? How do you calculate .
2. Define Hogging and Sagging?
3. A fore peak bulkhead is 4.8 m deep and 5.5 m wide at the deck. At regular intervals of 1.2 m below the deck, the horizontal widths are 5.0, 4.0, 2.5 and 0.5 m respectively. The bulkhead is flooded to the top edge with sea water on one side only. Calculate the load on bulkhead.
4. Define Permeability & margin line.
5. Define freeboard & Reserve buoyancy.
6. How do you calculate the floodable length?
7. List the reasons for damage stability
8. List the requirements of damage stability for passenger vessels.
9. What is Loadline & why it is required?
10. What is type A & Type(B-60) vessel & Fresh water allowance.
11. Define the following principal terms in Naval Architecture.

(a) Buoyancy (b) Displacement

(c) Water plane area coefficient (d) Deadweight

39. (i) How is the density of fluid measured?

(ii) What is a lines plan & Table of offset?

40. A Ship of 8500 tonne displacement is composed of masses of 2000, 3000, 1000, 2000 and 500 tonne at positions 2, 5, 8, 10 and 14 m above the keel. Determine the height of the centre of gravity of the ship above the keel.

41. A Ship of 10000 tonne displacement has a mass of 60 tonne lying on the deck. A derrick, whose head is 7.5 m above the centre of gravity of the mass, is used to place the mass on the tank top 10.5 m below the deck. Calculate the shift in the vessel’s centre of gravity when the mass is:

(a) Just clear of the deck.

(b) At the derrick head.

(c) In its final position.

42. A ship 135m long, 18m beam and 7.6m draught has a displacement of 14000 tonnes.The area of the load water plane is 1925 m2 and the area of immersed midship section is 130 m2.

Calculate : a) Cw b) Cm c) Cb d) Cp

43. (a) Explain Righting moment with relevant sketch.

(b) What is a weight curve? Draw and explain.

44. Explain the Inclining experiment conducted on ships in detail.

45. (a) Explain Stable & Unstable equilibrium with relevant sketch.

(b) Explain Hogging & Sagging with relevant sketch.

46. A ship 150m long has draughts of 7.70 m forward and 8.25 m aft, MCTI cm 250 tonne m, TPC 26 and LCF 1.8 m forward of midships. Calculate the new draughts after the following masses have been added:

50 tonne, 70 m aft of midships

170 tonne, 36 m aft of midships

100 tonne, 5 m aft of midships

130 tonne, 4 m forward of midships

40 tonne, 63 m forward of midships

47. A vessel has the following righting levers at a particular draught, based on an assumed KG of 7.2 m

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ѳ | 0˚ | 15˚ | 30˚ | 45˚ | 60˚ | 75˚ | 90˚ |
| GZ | 0 | 0.43 | 0.93 | 1.21 | 1.15 | 0.85 | 0.42 m |

The vessel is loaded to this draught but the actual KG is found to be 7.8 m and the GM 1.0 m. Draw the amended statical stability curve.

48.Write short notes on the following :-

(a) Deadweight scale (b) Angle of Loll (c) Free Surface Effect

(d) Dynamical Stability (e) Trim (f) TPC

49. The ½ ordinates of a water plane 120 m long are as follow:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Section | AP | ½ | 1 | 1 ½ | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8½ | 9 | 9½ | FP |
| ½ ord | 1.2 | 3.5 | 5.3 | 6.8 | 8 | 8.3 | 8.5 | 8.5 | 8.5 | 8.4 | 8.2 | 7.9 | 6.2 | 3.5 | 0 m |

Calculate

1. Water plane area (b) Distance of centroid from midships.

50. A box shaped vessel has length 80 m and breadth 10 m and is floating in the light condition at draught of 3.0 m in water RD 1.010. It is divided into four holds of equal length. Cargo is loaded as follows :-

No. 1 120 tonnes,

No.2 120 tonnes,

No.3 empty,

No.4 160 tonnes. Construct the curves of shear force and bending moment diagram.

1. Explain with neat sketch the Weight curve and Buoyancy curve.

1. What is a section module? How do you calculate.
2. Define Hogging and Sagging?
3. A fore peak bulkhead is 4.8 m deep and 5.5 m wide at the deck. At regular intervals of 1.2 m below the deck, the horizontal widths are 5.0, 4.0, 2.5 and 0.5 m respectively. The bulkhead is flooded to the top edge with sea water on one side only. Calculate the load on bulkhead

55. Define the following principal terms in Naval Architecture.

(a) Deadweight. (b) Displacement

(c) Water plane area coefficient (d) Laws of flotation

56.(a) What is the Use of Hydrometer.

(b) State Archimedes’s principle

(c) Define Centre of Buoyancy

57.A vessel of 10000 tonne displacement has a second moment of area of water plane about the center line of 6 × 10³ m⁴. The centre of buoyancy is 2.75 m above the keel. The following are the disposition of the masses on board the ship.

4000 tonne 6.30 m above the keel.   
2000 tonne 7.50 m above the keel.  
4000 tonne 9.15 m above the keel.

Calculate the Meta centric height.

58. A ship 150 m long and 20.5 m beam floats at a draught of 8 m and displaces 19500 tonne. The TPC is 26.5 and midship section area coefficient 0.94. Calculate the block, prismatic and water plane area coefficients.

59.A Ship 180m long has half widths of water plane of 1, 7.5, 12, 13.5, 14, 14, 14, 13.5, 12, 7 and 0 m respectively. Calculate:

(a) Water plane area

(b) TPC

(c) Water plane area coefficient

60. What are the needs of water tight subdivision in a ship?

61.Draw & show how water tightness is achieved when a pipe line passing through the WT Bulkhead?

62.Define Permeability & Reserve buoyancy?

63. List some of the stability data that changes due to flooding?

64. A box barge 30m long and 8m beam floats at a level keel draught of 3 m and has a mid-length compartment 6 m long. Calculate the new draught if this compartment is bilged:

(a) With µ = 100%

(b) With µ = 75%

65. How do you calculate the floodable length?

66. What is type A & Type (B-60) vessel?

67. List the reasons for damage stability.

68. List the requirements of damage stability for passenger vessels.

69.. What is the purpose of Load line?

70.Explain the Fresh water allowance?