Second Mates Orals Examination Questions and Answers As Supplied By Australian Maritime College Students in 2001

[compiled by Inderjit Singh]

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2ND MATES

ORAL PREPARATION

Compiled by
INDERJIT SINGH
INDIA
GROUP A 2001
STABILITY

LENGTH OVERALL: measured in the fore and aft line between the extremities of the vessel; i.e. the vessel's maximum length.

LENGTH BETWEEN PERPENDICULARS: measured in the fore and aft line between the fixed reference points for design purposes; i.e. forward perpendicular and after perpendicular.

FORWARD PERPENDICULAR: A line perpendicular to the load water plane which passes through the intersection of the load waterline and the stem contour.

AFTER PERPENDICULAR: A line perpendicular to the load water plane which passes through the intersection of the waterline and the rudder post contour.

DRAFT: Measured in a vertical line from the extremity of the bottom plating to the waterline.

FREEBOARD: Measured in a vertical line from the waterline to the underside of the deck.

i.e. depth = draft + freeboard (at load line)

LIGHT DISPLACEMENT (LIGHT SHIP): Mass in tonnes, of the vessel in the light condition, i.e. it is the displacement with in the ship is complete in the sea going condition but without cargo, fuel, crew, passengers, stores, baggage or water in tanks. It does, however, include water in the boilers and lube oil in machinery.

LOAD DISPLACEMENT: The total mass, in tonnes of the ship at a particular draught. It is the sum of light displacement and dead weight and is normally referred to simply as the displacement.
RESERVE BUOYANCY: volume of enclose space above waterline.

\[ RB = \text{Total volume} - \text{Underwater volume} \]

BUOYANCY: It is a upward thrust caused by the pressure of water on vessels hull. For a vessel to float the upthrust of buoyancy must equal the down thrust of the vessels weight. The centre of buoyancy is the geometrical centre of the underwater volume and the point through which the total force due to buoyancy may be considered to act vertically upwards.

In a box shape \( VSB = 0.5 \text{ of draft} \)
In a triangular shape \( VSB = \frac{2}{3} \text{ of draft} \)
In a ship shape \( VSB = 55\% \text{ of draft} \)

WHY THE LUMBER SUMMERDRAFT IS HIGHER THAT SUMMER LOAD LINE?
Because we can load more timber up to lumber summer draft because timber gives us more reserve buoyancy. But the WNA & LWNA is always at the same line.

STUDENT MUST KNOW THE LOADLINE MARKS SHOWING ALL DIMENSIONS.

TROPICAL LOADLINE: a line \(\frac{1}{48}\text{th} \) of the summer draft of the vessel above the summer load line

WINTER LOADLINE a line \(\frac{1}{48}\text{th} \) of the summer draft below the summer loadline.

SUMMERFRESH WATER LOADLINE a line drawn a distance equal to the fresh water allowance above the summer loadline.

TROPICAL FRESH WATER LOADLINE a line drawn a distance equal to the fresh water allowance above the tropical load line
FRESH WATER ALLOWANCE (FWA):
The FWA is the amount which the vessel will change her draft when moving from salt water to fresh water and vice versa.

FWA = DISPLACEMENT / 4 x TPC

TPC at loaded draft and answer is in mm.

DOCK WATER ALLOWANCE
Is the amount by which the vessel will change draft when moving from salt water to a water density in between that of salt and fresh water.
(i.e. any density between 1.025 to 1.000)

DWA = FWA x (1.025 - DW density) / 0.025

LOADLINE ZONES: details is given in the OCEAN PASSAGE OF WORLD AND LOADLINE CHART NO. D 6083.

BLOCK COEFFICIENT: is the ratio of the actual volume of underwater form and the volume L x B x draft.

Cb = V / L x B x draft

WATERPLANE AREA COEFFICIENT also known as the coefficient of fineness of the water plane, which is the ratio of the area enclosed by any particular water plane (Aw) to the area of the circumscribing rectangle.

Cw = Aw / L x B

DENSITY mass per unit volume
RELATIVE DENSITY  mass per unit volume relative to mass of fresh water. Also known as specific gravity.

TPC (Tonnes per Centimetre Immersion)
We can say that the extra weight added to sink the vessel by one centimetre is equal to the water plane area multiplied one centimetre multiplied by the density of water.

i.e.  \[ \text{TPC} = \text{WPA} \times 0.01 \times \text{density} \]

TPC is always given for the salt water values only. For calculating for the other density we had to divide the TPC with the 1.025 and multiplied with the density of water required.

KNOWLEDGE OF TRANSVERSE STABILITY

There are two forces involved in keeping a ship stable. First the downward force of gravity, working through the centre of the ship's mass. Secondly the upward thrust of buoyancy, working through the centre of the ships underwater form. These forces are equal and work in the opposite direction and when the ship is lying quietly in still water are directly opposed to each other. In most instances, but not always, the force of gravity is above the force of buoyancy.

In transverse stability the height of these two points are measured from the keel (K), hence the position of the ships centre of gravity is distance KG, and the position of the centre of buoyancy is distance KB.

If the ship heels due to external forces acting on the hull the centre of the underwater form, through which the upthrust of buoyancy acts moves outside the down thrust of gravity causing a lever, which is called the righting lever (GZ). The two opposing forces now cause the ship to return to upright, as shown in diagram.
The point at which upthrust of buoyancy crosses the original centre line is called the metacentre (M). Provided this metacentre falls above the ship's centre of gravity then the ship remains in a stable condition. Should the metacentre fall below the centre of gravity the ship is termed unstable and is in great risk of capsizing.

The ship's centre of gravity (G) is determined by the placement of weights, cargo, fuel, ballast, and other items with in the ship. The position of the centre of buoyancy (B) is determined by the ship's draft.

The amount of movement of the centre of buoyancy, as the ship heels is determined by the shape of the ship's hull underwater. The actual height of BM is found by the formula $BM = \frac{I}{V}$. Where (I) is the moment of inertia of the ship's water plane about the centre line and (V) is the volume of the underwater form.

Obviously, a wider ship will have a water plane with a larger moment of inertia that a narrow ship hence will have greater stability. However, the further a ship sinks into the water the larger will become the vessel's underwater volume and hence the smaller the value or BM.

The distance between the centre of gravity and the metacentre is known as the ship’s GM and this in turn dictates the length of the ship’s righting lever (GZ). As the position of (M) is determined by the vessel's draft and hull shape this leaves the position of the ship’s centre of gravity as the critical factor in determining a ship’s stability and must be accurately calculated by ship’s officer.

Once the ship’s centre of gravity is known the length of the righting lever (GZ) is determined by the two factors, the angle of heel and the value (BM). The position of the metacentre (M) will change as the ship heels because the width of the waterline changes hence the distance of (BM) will change.

The height of the metacentre (M) is directly related to the transverse shift of (B), hence the (BM) of the light draft ship is far greater than the (BM) of the deeper draft ship. Therefore, provided the centre of gravity does not moves, the increase of ship’s draft causes a decrease in stability.
CAUSES OF ANGLE OF LOLL

1. too much free surface
2. loss of bottom weight
3. too much water on timber deck cargo
4. ice on deck.

HOUGING
Straining of the ship that tends to make the forward and aft end lower than the middle portion.

SAGGING
Straining of the ship that tends to make the middle portion lower than forward and aft ends.

PANTING
The pulsation, in and out, of the bow and stern plating as the ship alternatively rises and plunges deep into the water. Causes of panting is the opposing of the waves and the waves put pressure in and out and in and out.

POUNDING
Slamming of the vessel onto the seawater after rising due to dynamic effect of wave and ship's own motion.

STEEL CASTING
Molten steel is poured into a mould and allowed to solidify to the shape required. After removal from the mould a heat treatment is give to reduce the brittleness. i.e. stem frames, rudder frames and other structural components.

FORGINGS
Forging is a simple method of shaping a metal by heating it to a temperature where it becomes more of less plastic and then hammering or squeezing it to the required form. i.e. rudder stock, propeller shaft.

STRESS
It is defined as the force applied per unit area of cross section of the material under test. Units are Newton/mm square.
STRAIN
Is defined as the deformation per unit length or volume which a body undergoes when subjected to a force or load.

TYPES OF WELDING
1. Electric arc welding
2. Gas welding (e.g. Oxy-Acetylene)
3. Resistance welding
4. Thermit welding

NON DESTRUCTIVE TEST (NDT)
It is used to assess the soundness of welds during construction and repair. In this type of test, none of the structural members are subjected to any type of destruction or distortions by way of hammering, tampering, drilling etc.

TYPES OF NDT
1. Visual examination
2. Dye penetration inspection
3. Magnetic particle inspection
4. Radiographic inspection
5. Ultrasonic inspection.

What is PLD?
PLD is permissible load density. Unit of load density is tonnes per square meter.
ANGLE OF LOLL

The vertical distance between G and M is said to be metacentric height and if the G is above M it is said to be unstable equilibrium at small angle of heel.

As per diagram a unstable equilibrium as we increase the angle of heel the metacentric height will reduce and at one angle of heel the GM is equal to zero that is KM=KG and at that angle of heel it become the neutral equilibrium and that angle is said to be ANGLE OF LOLL.

HOW TO CORRECT THE ANGLE OF LOLL

First find out the causes that whether its a heel, list or angle of loll. The causes of angle of loll is too much free surface, loss of bottom weight, too much water on timber deck or ice on deck. If it is a angle of loll first add the weight on the lower side of the vessel so that its G shifted downward below M and make it a list and then ballast the higher sides to make it upright. And reduce its free surface.
STATE THE MINIMUM NO OF TRANSVERSE WATERTIGHT BULKHEADS REQUIRED ON A SHIP AS PER IMO REQUIREMENTS?

A) a collision bulkhead forward
B) an after peak bulkhead containing the vessel’s stem tube and watertight glands around the propeller shaft.
C) A bulkhead both forward and aft of the vessel’s machinery space.

NOTE:
The aft machinery bulkheads and the after peak bulkheads may be one of the same in vessels with machinery placed aft.

All remaining bulkheads must be so placed, that the vessel in a loaded condition can flood any one compartment and still remain afloat with positive stability.

WHAT IS FLOOR?
Vertical plates fitted transversely in double bottom tank between outer bottom and inner bottom.

WHY FORWARD AND AFT WATERTIGHT BULKHEADS ARE CALLED COLLISION BULKHEADS?

As it is a fact that the bow of the at least one out of two ships involved in a collision will be damaged. For this reason is of heavier and stronger construction that the other bulkheads. It should not be located so far forward as to be damaged on impact. It also should not be too far aft so that the compartment forward of it if flooded will not cause excessive trim by the bow. As a rule this bulkhead is fitted at the minimum permitted distance from forward in order to gain maximum length (space) for cargo stowage.
HOW MUCH TIME TO FLOOD A ENGINE ROOM BY CO2 IN CASE OF FIRE?
CO2 flooding needs 85% to be discharged with in 2 minutes.

DIFFERENT TYPES OF BULKHEADS?
Water tight bulkhead
Non watertight bulkhead
Oil tight bulkheads

WHAT IS THE HEIGHT OF WATERTIGHT COLLISION BULKHEADS ON SHIPS??
The collision bulkhead should extend to the uppermost continuous deck. All the other bulkheads to the freeboard deck. The after peak bulkhead should extend at least to the first deck above the load water line provided it is made water tight at the stern.

WHAT ARE THE DIFFERENT TYPES OF FRAMING ARE THERE IN THE SHIP CONSTRUCTION?
Transverse system
Longitudinal system
Combination system

DIFFERENT TYPES OF KEEL PLATES ARE THERE?
Flat plate keel and duct keel.

SCALLOPING
A rod notch cut in frame in way of seam or in stiffeners in way of butts.

WHAT IS BUTTS AND SEAMS?
The shell plating is composed of many strakes or plates arranged in a fore and aft direction and welded together. The horizontal welds are termed SEAMS and vertical welds are termed BUTTS.

SHEER STRAKE
Upper strake of plating adjacent to the strength deck is referred to as the SHEER SSTRAKE.
GUNWALE
The region where the sheer strake meets the deck plating is known as the GUNWALE.

SOFT NOSE STEM
It is a readily collapsible region in the event of a collision. Stem is the terminating point of forward shell plating. It is made up of a solid round stem bar from the keel to load water line and a stiffened plated structure up to the forecastle deck. This form is referred to as a SOFT NOSE STEM, which in the event of a collision will buckle under load, keeping the impact damage to a minimum.

RUDDERS
The rudder is used to steer the ship. The turning action is largely dependent on the area of the rudder. Rudders are described by the arrangement about their turning axis.

*Unbalanced rudder:*
A rudder with all its area aft of the turning axis.

*Semi-balanced rudder:*
A rudder with a small part of its area forward of the turning axis.

*Balanced rudder:*
When more than 25% of the rudder area is forward of the turning axis. There is no torque on the rudder stock at certain rudder angles.
PERCENT OF GASES IN THE ATMOSPHERE.

<table>
<thead>
<tr>
<th>GASES</th>
<th>PERCENTAGE BY VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N2)</td>
<td>78.09</td>
</tr>
<tr>
<td>Oxygen (O2)</td>
<td>20.95</td>
</tr>
<tr>
<td>Argon (Ar)</td>
<td>0.93</td>
</tr>
<tr>
<td>Carbon dioxide (CO2)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

AIR PRESSURE
Air pressure may be defined as the force exerted on unit area of a surface. The term atmospheric pressure therefore refers to the force which a column of air exerts on unit area of the earth’s surface.
The unit of measurement of atmospheric pressure is the hectopascal (hPa), this unit being equivalent to and replacing the millibar.

INSTRUMENT USED FOR MEASURING PRESSURE IS CALLED BAROMETER. There are 4 types:
Mercury type
Aneroid dry
Precision aneroid barometer
Barograph

DIURNAL VARIATION OF PRESSURE
Due to the heating and cooling of the earth a diurnal variation of pressure occurs. The variation greater at low latitudes with a range approximately 3 hPa and gradually decreasing with latitude. The information on diurnal variation can be found in the sailing directions or in the mariners hand book.
MARKINGS ON ANCHOR AND ANCHOR CABLE
A circle is to be marked on the any conspicuous position on the anchor, with in the circle, two items of information are appeared:
First represent the serial no of the test certificate.
Second represent the letters of the certificating authority. Must not exceed by 3 initials or one number. Chain is also marked same manner, the markings are to appear on every shackle at each end of cable. The cable is also marked by crew or dockyard staff to show the number of the shackle. The number is start from the anchor towards the chain locker.
For example to indicate the third joining shackle, which will be 82.5 mt from the anchor shackle is painted white and stud is bound by seizing wire.

ANCHORING TERMS:

ANCHOR AWEIGH: the anchor has just cleared the seabed when being heaved up. Ship is now technically under way.

ANCHOR IN SIGHT: when anchor becoming visible while heaving up, may be below or close to sea surface. This gives the bridge how much longer the process may take place during early manoeuvring procedure ahead or astern.

ANCHOR HOME: when the anchor is hove into its stowed position at the ship’s side.

SCOPE: the whole length of chain paid out whilst at anchor and measured from anchor to the gypsy.

BROUGHT UP: there is little or no weight/tension on the chain. The vessel is calmly riding to her anchor and chain after the required length of chain has been run out.

DRAGGING ANCHOR: the ship is dragging her anchor, and changing her position, as a result of strong wind and or tide, heavy weather or insufficient anchor chain let go.

CLEARING ANCHORS: preparing anchors for letting go. Includes the removal of all stoppers, lashings and access to spurring and hawse pipes.

WALK BACK OR WALK OUT ANCHOR: To lower the anchor under power of the windlass either to a desired length of chain or until the anchor is clear of and hanging vertically below the hawse pipe.

WINDRODE OR TIDERODE: when the ship is at anchor she will point or head into which ever of the elements, wind or tide is the stronger.

RANGE CABLE: to lay out anchor cable on deck or on a wharf in dry dock, for inspection, disconnection of anchor etc.
NORMALLY FROM HOW MUCH DEPTH ONWARD WE CAN WALK BACK ANCHOR UNDER POWER ALL THE WAY?
If the water is over 20mts deep, then the anchor must be walked back close to the seabed or walked back under power all the way.

DURING ANCHOR WATCH HOW WILL YOU CHECK ANCHOR IS NOT DRAGGING?

During anchor watches, check regularly that the anchor is not dragging. This can be done by:
- Taking cross visual bearings.
- Watching objects in transit abeam.
- Observing GPS/DGPS derived positions.
- Observing positions derived by electronic aids such as Radar and Decca.
- By inspecting the cable at regular intervals. If the cable slackens and tightens alternately and/or vibrations are felt in the anchor cable, this is usually a sign of anchor dragging.
- By dropping a lead line and checking to see if its leads forward.
LIFE SAVING APPLIANCES

LIFEJACKET: one life jacket is carried for each person on board a ship and in addition
Sufficient children’s life jackets for all children on board or 10% of the number of passengers on board a vessel.
Sufficient life jackets to be carried for all persons on watch.
Sufficient life jackets for use at remotely located survival craft locations.

Each life jacket must be fitted with a whistle, retro reflective tape and a light powered by a water activate battery. Must have sufficient energy to operate for 8 hours.
Life jackets located at remote survival craft locations must be kept in a box. Hydrostatic release must be used on the securing strap. This will allow the life jacket box to float free in the event of the ship sinking.

LIFEBUOYS: Life buoys are designed to provide a fast way to get a flotation device to a person who falls overboard. Total numbers of life buoys carried by a ship depend on its length. They will be usually between 8 to 14 life buoys carried on a ship.
Commonly stowed at:
1 on the foc’sl
2 adjacent to gangways
3 at the stern
4 each bridge wing.

Life buoy light required to last or at least 2 hours and to be visible for a distance of 2 miles on a clear night. At least half of the life buoys must be fitted with the self-igniting lights and there is at least one each side fitted with the buoyant line not less than 30 meters in length. Life buoy lights must be powered by:
Sea water activated cells
Conventional batteries
Lithium cells
IMMERSION SUITS
An immersion suit is a protective suit which helps in maintaining body temperature of a person by wearing it in a cold water and saves the person from the thermal shock on entering in a cold water.
Ships fitted with a open type lifeboats must carry at least 3 in numbers per boat. And a rescue boat one for each operator and for ships regularly operating in cold climates must carry for each person.
After a jump into the water from a height of 4.5m, and a 6 hours in water as cold as 0 degree C., the wearer’s body core temperature should not fall by more than 2 degree C. The suit must also allow the wearer to pick up a pencil and wrote after spending 1 hour on water of 5 degree C.

THERMAL PROTECTIVE AIDS
TPA’s are device that are worn in survival craft to reduce heat loss due to normal convection, wind chill and the evaporation of water from wet clothing.
TPA’s are required to be carried as follows
Liferafts, enclose lifeboats 10% capacity or 2 which ever is the greater number.
Open lifeboats 1 TPA for each person except the three people who will have an immersion suit.

WHAT ALL INFORMATIONS ARE PROVIDED IN THE MUSTER LIST?
1 Emergency alarm signal
2 Abandon ship signal
3 Action to be taken on hearing a emergency signal
4 Duties assigned to crew members
5 Persons responsible for providing emergency equipment
6 Substitute for key persons
7 Duties with respect to passengers.
**MOB smoke floats**
Two lifebuoys on a ship must be fitted to a self-igniting smoke/light floats. These must be capable of being quickly activated from the bridge. They are commonly held in place by a pin. Once the pin is removed, the lifebuoy rolls out of its ramp and falls. Once lifebuoy reaches the end of the connecting line, the MOB smoke float/light is activated and pulled out of its bracket in one action. This device will then emit orange smoke for at least 15 minutes and provide light for 2 hours.

**LINE THROWING APPLIANCE**
A line throwing device is a device that is used to throw a light line a distance of at least 230 metres in calm conditions. A ship must carry equipment that allows at least 4 lines to be deployed.

**NON ELECTRONIC DETECTION DEVICES**
Visual detection devices will be
- Heliograph
- Pyrotechnics
- Radar reflectors

**PYROTECHNICS**
- Rocket parachute flare
- Red hand flare
- Orange smoke float
Ships must carry at least 12 rocket parachute flares on board in addition to those required in survival craft. They are usually located in the ship’s pyrotechnic locker along with the rocket line throwing apparatus
Other pyrotechnics are located in each survival craft. Each survival craft is required to carry

- Red hand held flares 6
- Rocket parachute flare 4
- Orange smoke float 2

All pyrotechnics have a shelf life of 3 years.
RADAR REFLECTOR
Radar reflector is a passive device that is used to reflect the radar signal from a searching ship or aircraft. Each survival craft will be supplied with a radar reflector as a part of its normal equipment. Radar reflectors are normally detectable at a range of approximately 4 nautical miles, but the signal can be weak and easily lost in sea clutter in rough day. For best result a radar reflector should be mounted as high as is possible on the survival craft.

ELECTRONIC DETECTION DEVICES

EPIRBs (emergency position indicating radio beacon)

Transmitting time - at least 48 hours
Operation – may be manual or automatic float free depending on type
Once activated it is vital that the EPIRB is placed in the water and secured to your survival craft using the line provided.
There are three different type of EPIRB
406/121.5 Mhz
‘L’ band (inmarsat E)
121.5/243 Mhz

Generally a transmitting 406/121.5 Mhz EPIRB will be detected anywhere in the world on the alerting frequency of 406 Mhz with in about 1.5 hours of activation (maximum). Positions have an accuracy of 3 to 5 km.

This EPIRB type also transmits an identification code which allows the search authorities to identify the vessel's name. 121.5 Mhz frequency transmitted by this type of EPIRB is a homing frequency. This allows search aircraft to home to the exact position of the EPIRB once they are within VHF range of the EPIRB.

L band EPIRB is detected by the INMARSAT communication satellite system. This EPIRB is fitted with a SART (search and rescue transponder) instead of a 121.5 Mhz homing frequency. This EPIRB transmits at about 1.6 Ghz. It is immediately detected as this EPIRB carries an on board GPS receiver and transmits regular GPS derived positions provided the EPIRB is between 70 degree north or south of equator.

121.5/243 Mhz is totally manual in its mode of activation. Once activated these units can be detected by the military aircraft on 243 Mhz and civil aircraft on 121.5 Mhz. It can be detected only if it is with in 1600 nautical miles of a ground station known as local user terminal (LUT). Position accuracy is about 20 km. This type is unable to transmit an identification code.

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SEARCH AND RESCUE RADAR TRANSPONDER (SART)

Transmission time is at least 8 hours in ‘response’ mode.
At least 96 hours in “standby” (listening) mode.
Operation manually operated. Switch to on position.
Once activated it should be mounted at a height of 1 meter above water level.
As per SOLAS requirement:
Cargo and passenger ships over 500 gross tonnes are required to carry 2 SARTs. One
on each side.
Vessels between 300 and 500 gross tonnes are only required to carry one SART.

SART assist in detection and location of a survival craft. When activated the SART will
listen for 9 Ghz radar signals (3cm wavelength also known as X band). The SART will
give a sound and visual signal to the survival craft occupants when it begins to transmit.
Normal detection range is 5 nautical miles.

TWO WAY RADIO TELEPHONE APPRATUS
As per SOLAS that ships over 500 gross tonnes must carry at least 3 portable VHF
radios for use in survival craft. Ships between 300 and 500 gross tonnes are require to
carry 2 portable VHF radios.
The main use of these radios is
Inter survival craft communications
Survival craft to rescue ship communications and
Survival craft to search aircraft communications.

LIFE BOATS

Open type of life boats: this type of life boats are found on the vessels constructed
before July 1986.
Propulsion systems for open type of life boats may consist of a diesel engine, hand
crank gear, oars, or sails.

Partially enclosed lifeboats: are normally found on passenger vessels. They have rigid
canopy extending for 20% of the boat’s length from the bow and stern and a roll down
cover for the remainder of the vessel’s length.

Totally enclosed lifeboats: these type of life boats are mandatory for cargo vessels of
over 500 gross tonnes. This type of boat is to be self righting, provided all hatches are
secure and all occupants are strapped in their seat belts. Propulsion is provided from a
diesel engine. This type of boat must be set to allow boarding at the stowed position.
CARRIAGE REQUIREMENT FOR LIFE BOATS

CARGO VESSELS
Must carry at least one totally enclosed boat on each side of the vessel. Each boat must have room for 100% of the vessel’s compliment. Vessel must carry life raft sufficient for 50% of the vessel’s compliment on each side.

OR
At least one free fall boat launched over the stern. In this case the vessel must also carry sufficient life rafts sufficient for 100% of the vessel’s compliment on each side of the vessel. There must also be a launching appliance fitted to at least one side of the vessel for life raft.

PASSENGER VESSELS
Passenger ships on international voyages are required to carry a combination of partially enclosed lifeboats and life rafts. There must be sufficient lifeboats on each side of the vessel to hold between 37.5% and 50% of the vessel’s compliment. If there is less than 50% capacity of lifeboats on each side life rafts must make up the difference. In addition to this requirement, the vessel must also carry extra life rafts capable of holding 25% of the vessel’s compliment.

LIFEBOAT MARKINGS
Lifeboats are required to be marked as follows:

Dimensions of the boat
Number of persons it is permitted to carry
Name and port of registry of the parent ship
Means of identifying the lifeboats parent ship must be displayed so that it is visible from above.

LIFEBOAT EQUIPMENT

1. Buoyant oars sufficient to make headway in calm seas
2. Crutches sufficient for oars
3. Boat hooks- 2
4. Buoyant bailer- 1
5. Buckets- 2
6. Survival manual- 1
7. Compass & binnacle- 1
8. Sea anchor, hawser & tripping line
9. Painter secured to a quick release device 15mt long or twice the distance from the stowed position of the boat to water

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10 Painter firmly secured at or near the bow of the boat
11 Hatchets-2 one at each end of boat
12 Fresh water- 3lt per person
13 Rust proof dipper & lanyard- 1
14 Rustproof graduated drinking vessel-1
15 Carbohydrate based food ration- 10000 kj per person
16 Rocket parachute flare- 4
17 Red hand flare- 6
18 Buoyant orange smoke float- 2
19 Water proof torch, spare batteries and bulb- 1
20 Daylight signalling device- 1
21 Life saving signalling card- 1
22 Whistle-1
23 First aid kit in a water proof case- 1
24 Anti-seasickness medicine – 6 doses per person
25 Seasickness bag- 1 per person
26 Jack knife & lanyard- 1
27 Tin openers- 3
28 Buoyant rescue quoits attached to 30mt of line- 2
29 Manual pump-1
30 Fishing tackle-1 set, spare hooks & lure
31 Tools for minor engine adjustments – 1 set
32 Portable fire extinguishment equipment for oil fires
33 Search light-1
34 Radar reflector- 1 unless SART is carried on boat
35 Thermal protective aids- 2 or 10% of the boats capacity

LIFERAFTS

Rigid life rafts
Inflatable life rafts
Davit launched life rafts

Life raft carriage requirements

Cargo vessels are required to carry life rafts as follows:

Each side of the vessel must have sufficient life rafts for 50% of the vessel’s complement.
Where the design of the vessel is such that life rafts cannot be easily moved from one side of the vessel to the other, the vessel must carry sufficient life rafts for 100% of the crew on each side.

Where the vessel is fitted with a free fall lifeboat, the vessel must carry sufficient life rafts or 100% of it’s complement on each side of the vessel.
If the bow or stern of a vessel is more than 100mt from the normal survival craft embarkation area an additional life raft usually of 6 person capacity must be located at either the bow or stern.

LIFE RAFT MARKINGS

The following markings are required to be exhibited on a life raft container:

- Makers name or trade mark
- Serial number
- Month and year of manufacture
- Name of the approving authority
- Name and place of the servicing station where the life raft was last serviced
- Number of persons that the life raft is permitted to accommodate

LIFE RAFT EQUIPMENT

- Buoyant rescue quoit and 30mt buoyant line - 1
- Knife fitted with buoyant handle and lanyard – 1 for up to 12 person capacity, 2 for 13 or greater capacity
- Buoyant bailer - 1 for 12 person capacity, 2 for 13 or greater capacity
- Sponges – 2
- Sea anchors and shock resistant hawser – 2 one fitted and one spare
- Buoyant paddles – 2
- Tin openers – 3
- First aid kit in a waterproof case capable of being closed tightly after use – 1
- Whistle – 1
- Rocket parachute flares – 4
- Red hand held flares – 6
- Buoyant smoke signals – 2
- Water proof torch – 1
- Radar reflector or transponder – 1
- Daylight signalling mirror with instructions – 1
- Life saving signal cards – 1
- Fishing tackle set – 1
- Food ration - 10000kJ per person
- Water ration - 1.5lt per person
- Rustproof graduated drinking vessel – 1
- Anti-seasickness medication – 6 doses per person
- Seasickness bags – 1 per person
- Survival instructions – 1 set
- Immediate action instructions – 1 set
- Thermal protective aids – 2 or 10% of the life raft capacity

Inderjit Singh
FLOAT FREE LAUNCH
This method of launching is intended for a situation where a ship sinks too quickly for normal launching of survival craft. It allows life rafts to be:

Released automatically from the stowed position
Inflated
Detached from the sinking ship via a weak link in the painter attachment system
This launching system requires the use of a device known as a ‘hydro-static release’ mechanism. This is incorporated as a part of the lashing system and must allow for quick manual release as well as automatic float free operation. This unit require to operate at a depth range of between 1.5 and 4 metres.
It has a 2 year in use life after which it is replaced with a new unit.

What is a ASRK?
It means Air Sea Rescue Kit. This consist of a drop of two liferafts connected by a buoyant line, with 2 or 3 equipment containers known as marine supply containers in between them. The distance between each unit is about 110mt. The entire ASRK is between 440 and 550 meters long. Before the kit is dropped the aircraft will drop a datum reference white smoke marker as well as a series of either white or orange timing smoke markers.

What is SONOBUOY?
A sonobuoy is a cylindrical container that is fitted with an antenna and an underwater microphone called a ‘hydrophone’. If a sonobuoy is dropped near your survival raft, it is important that you are aware that you can use the hydrophone that will be hanging beneath it to communicate by voice with the aircraft to do this leave the sonobuoy in the water and refer to the instructions that will be attached to it. Pull the cable until you have the hydrophone. Then speak slowly and clearly with your mouth about 7-8 cm from the base of the hydrophone. The aircraft crew will be able to hear you but they cannot reply by voice.

Message received but not understood: making a complete right hand circle or making red flashes with a single lamp.
Message received and understood: rocking wings from side to side or making green flashes with a single lamp.
WINCHING SIGNALS
The following hand signals are used during helicopter winching operations:
1  thumbs/palms up using only one hand is used to signal: winch slowly
2  thumbs/palms up both hands is used to signal: winch faster (i am clear of obstructions)
3  thumbs/palms down is used to signal do not winch (i am not ready yet)

ON LOAD RELEASE GEAR MECHANISM

Lifeboats constructed before July 1st 1986 are provided with an off load release mechanism. Releasing a lifeboat from the falls required that there be no weight on the falls. In many boats the release was effected by a person physically removing the lifting rings from the hooks. In rough conditions a non simultaneous release of falls could result in:

• injury to crew member's hands and fingers.
• The boat being up ended with disastrous results for all on board.

On load release equipment overcomes these problems by providing:

• simultaneous fall release.
• Fall release with up to 1.1 times the boat weight on the falls.

On load release mechanism can be used if there is a weight on the falls also so its not required to go out and physically remove the hook.

HOW TO CORRECT CHARTS?

For correction of charts always refer to the admiralty notices to mariner which is the main source of document. By reading ADM and looking at the chart. Always insert the information before you delete any information which is very important.

The following procedure will help you avoid making mistakes
1  using the information in the ANM apply correction to the chart.
2  Check what you have done
3  When you are satisfied that you have correctly done the correction then write down the ANM number in the bottom left hand corner of the chart as a record of the completed correction. It is dangerous to apply correction before making correction in the chart.
You should always insert the missing NM’s on to the chart before correcting the chart for the latest ANM.

Use pens for permanent corrections specially violet colour.
Use HB pencils for temporary and preliminary corrections.

WHAT ALL INFORMATIONS ARE GIVEN IN THE ADMIRALITY NOTICES TOMARINER?

ANM consist of 6 sections:

Section I  Explanatory notes & Index to section II
Section II  correction to charts
Section III  navigational warnings
Section IV  correction to admiralty sailing directions
Section V  correction to admiralty list of lights and fog signals
Section VI  correction to admiralty list of radio signals.
CARGO OPERATION

DUTIES OF OFFICER OF WATCH IN PORT CARGO OPERATIONS?

A watch keeper in charge of a cargo watch, has the following responsibilities towards the carg operations in port-

- observe the operations by physical presence and personal vigilance.
- Ensure safe and proper methods to minimise/avoid damage to cargo, ship, and injury to personnel
- Ensure correct port rotation for loading/discharging
- Note damages inform, log down, prepare damage reports
- Closely observe weather conditions – should be prepared for adverse weather.
- Comply with master’s/chief officer’s standing/port/night orders or instructions
- Note or log all the relevant facts- good practice to have a handy note book and correctly synchronised clock
- Provide a thorough and clear hand over to the relief
- If no cargo being worked ensure duty seaman aware of OOW’s whereabouts at all time.

STCW '95 Convention:
The very important part of the duties of the watch keeper in port and an officer being relieved should not hand over to the relief if:

- The relieving officer is apparently not capable of carrying out watch keeping duties due to being drunk, injured or physically incapacitated
- At that instance an important operation is being performed.

WHAT THE RELIEVING OFFICER SHOULD KNOW:

STCW 95 states that the relieving officer should be informed of the following by the officer being relieved:
- The depth of water at the berth, draught, tides, condition of moorings, anchor and scope of chain, readiness of engines etc.
- Information related to cargo operations – how, where being worked, cargo plan, any damages noticed, reported etc.
- Tank soundings, ballast operations if being reported etc.
• Lights and signals.
• Number of crew on board and presence of other personnel
• State of FFA/LSA
• Any special port regulations
• Master’s chief officer’s standing and special orders
• Lines and means of communications with the stevedores, foremen etc
• Aspects of safety of ship, crew and environment.
• Notification procedure for spills or such other damages resulting in environmental pollution

WHAT THE RELIEVING OFFICER SHOULD DO:

Officer shall verify that
• Anchors, mooring adequately secured
• Appropriate signals and lights displayed
• Fire safety measure adequate
• he/she is aware of the dangers hazardous related to the cargo operations and actions in case of emergency
• any other conditions that may cause alarm or cause damage to the ship, cargo or personnel.

SATURATION
Air nearly always contains appreciable amounts of water vapour an these amounts are greater in air which lies over, or which originates over warm oceans.
A mass of air at a certain temperature can contain a definite maximum amount of water vapour. When this maximum amount is reached the mass of air is said to be saturated.

RELATIVE HUMIDITY
The air in a particular space contains rather less water vapour than is needed for saturation.

DEWPOINT
If air is saturated only a very small fall in temperature is needed for condensation to occur. Remember that if we decrease temperature we decrease the amount of water vapour that the air can contain. If the air is already saturated before the temperature fall occurs then obviously some of the water vapour must be got rid of i.e. dew will be deposited.
The temperature to which air must be cooled in order for condensation to occur is called the DEWPOINT TEMPERATURE.
SAFETY CHECKS

The following are the safety checks that should be employed prior to commencement of cargo work.

GANGWAY

- Rigged correctly and rigidly.
- Safety nets, lights, manropes provided. Safety net should never be made fast to the quay.
- Clean – no obstruction, steps free of oil/grease etc.
- Lifebuoy, heaving line, SI light is close by and working properly
- Maximum number of persons that can board at one time is displayed prominently
- Clear of the shore moving gears
- Adequate and relevant notices are prominently displayed. Such as for unauthorised personnel, dangerous cargoes, smoking hazards etc
- Similar and appropriate means to be employed for shore gangway.

ACCESS TO CARGO COMPARTMENTS

- Clearly marked, pointed to be arrows etc.
- Unobstructed by cargo, dunnage, equipment etc.
- Trap doors secured properly
- Cleaned of oil grease previous cargoes
- Railings erected, manropes rigged, safety lines rigged, safety harnesses kept ready to hand
- Well ventilated, atmosphere checked for toxicity and or lack of oxygen
- Adequate lighting provided at all time

CARGO GEARS

- Controls tried out, clearly marked for speed and direction of operation.
- Safety overrides working properly
- Wire ropes inspected for visible damages.
- SWL marked clearly and not obscured.
- If ship’s lifting gear not being used - same secured well out of the way, controls locked/switched off as required.
- Change of gears to be carried out under the supervision of a qualified ship’s person only.
- All relevant cargo gear visibly checked for damage and inadequacy.
DESIGN AND CONSTRUCTION OF PILOT LADDER

The following is a summery of Marine Orders part 23

Length a pilot ladder shall:

- consist of a single length without joins
- be capable of extending to the water line from the point of access to the ship under any condition of loading and trim, to an adverse list of 15 degrees.

Steps the steps of the pilot ladder shall be:

- made of hardwood or any other material of equivalent properties, except that the four lowest steps may be made of rubber or any other material of equivalent properties.
- Made in one piece and in the case of wooden steps be free of knots.
- Provided with an efficient non-slip surface.
- Not less than 480 mm in length, 115 mm in width and 25 mm in depth, excluding any non-slip surface.
- Equally spaced not less that 300 mm and not more than 380 mm apart secured in such a manner that each step will remain horizontal.

RIGGING OF PILOT LADDERS

REPLACEMENT STEPS a pilot ladder shall

- have not more than 2 replacement steps which shall be relaced as soon as reasonably practicable by a step secured by the method used in the original construction.
- Where a replacement step is secured to side ropes of the pilot ladder by means of grooves in the sides of the step, the grooves so used shall be in the longer sides of the step.

SIDE ROPESSide rope shall consist of

Two uncovered manilla ropes, each not less than 20 mm in diameter, continuous and without joins below the top step.
RIGGING OF PILOT LADDERS:

- The vertical climb is neither more than 9mt nor less than 1.5mt.
- The ladder is clear of discharges and the fine lines of the ship, so that each step rests against the ship’s side.
- The launch can manoeuvre clear of the propeller and the poor lee at bow and stern.
- The pilot can always be seen during the climb.
- Manropes are rigged for use if required by pilot.
- By night the pilot boarding area and ladder is fully illuminated.
- A lifebuoy with self-igniting light, safety line usually attached to buoy but not secured to ship and a heaving line used to recover the pilot’s bag from the launch should be at hand.
- Safe access exist from the ladder to the deck.
- The pilot should be met by a responsible officer in communication with the bridge.

COMBINED PILOT AND ACCOMMODATION LADDER

- Where the vertical distance from the water to the point of access is more than 9 metres, access to/from the pilot ladder shall be possible via an accommodation ladder.

In such a case the accommodation ladder must:

- be leading aft to avoid fouling the launch’s rigging and to give a clear view for the launch master.
- Rest firmly against the ship’s side at its lower end
- Be clear of all ship side discharges.
- Rest at a slope angle not more than 55 degrees.
- The pilot ladder must be positioned adjacent to the lower platform, allowing safe and convenient access between the two in some cases access would be via a trap door through the lower platform of the ladder.

LIFE BUOYS REQUIRED ON BOARD

CARGO SHIPS
Length less than 100 mts 8
Length between 100mt and 150mt 10
Length between 150mt and 200mt 12
Length 200mt and more 14
PASSENGER SHIPS
Ships with length under 60 mt  8
Length between 60mt and 120mt  12
Length between 120mt and 180mt  18
Length between 181mt and 240mt  24
Length 240 and more  30

Marine Orders part 25

Stowage of survival craft
Survival craft other than a life raft intended for throwover board launching in such a position that the embarkation position is not less than 2mt above water line in fully loaded condition under unfavourable condition of trim and listed up to 20 degree either way or the angle at which ship's weather deck edge becomes submerges.

Lifeboat on cargo ships length between 80m and 120m must be so stowed that after end of the lifeboat is not less than the length of the lifeboat forward of the propeller. On cargo ships 120m and more and passenger ships 80m and more each lifeboat be so stowed that after end of lifeboat is not less than 1.5 times the length of the lifeboat forward of the propeller.

WEEKLY INSPECTION
- All survival craft, rescue boats and launching appliances must be visually inspected to ensure that they are ready to use.
- Every lifeboat and rescue boat engine must be run for a total period of not less than 3 minutes. During this period of time it should be demonstrated that gear box and gear box train are engaged satisfactorily.
- Rescue boats fitted with outboard motor would not allow to be run other than with its propeller submerged for a period of 3 minutes.

MONTHLY INSPECTION
Inspection of appliances, including lifeboat equipment, must be carried out monthly and ensure that they are completed and in good order. A report of the inspection must be entered in the official log book.
• Document of authorisation for the carriage of grains
• Cargo securing manual
• Safety management certificate are valid for 5 years
• De-rating certificate is valid for six months and may be extended on a once only basis for a period of one month to get to a port where an inspection could be carried out.
• International oil pollution prevention certificate (IOPP) valid for 5 years
• Garbage disposal record book (MARPOL 73/78)
• Material handling equipment register (chain register) with test certificate of gear (marine order part 32)
• Test certificate of following: life saving appliances; fire fighting appliances; anchor and cables; navigation lights.
• Oil record book
• Compass certificate, table of deviation and compass error book.
• Compass error register book

WHAT ALL PREPERATIONS ARE REQUIRED TO CARRY CARGO SHIP SAFETY SURVEY?

1. Inspect the entire lifeboat stores and equipment. Overhaul and renew as necessary.
2. Inspect the lifeboat, pay particular attention to buoyancy material and check that bottom boards and thwarts are not cracked. Repaint the ship’s name, port of registry, and the lifeboat numbers, and ensure that the lifeboat particulars on the bow have been obliterated.
3. Thoroughly overhaul davits, winches and blocks, and grease all moving parts. Renew or ‘end for end’ the falls. Inspect lifeboat embarkation arrangement and launching arrangements and lower the boats into the water.
4. When the boats are in the water run the lifeboat engines both ahead and astern.
5. Check that the inflatable life raft have been serviced with in the previous 12 months. Inspect the stowage, release, launching and embarkation arrangement of the life rafts and if necessary renew the launching instructions.
6. Inspect the survival craft portable radio equipment.
7. Overhaul the lifebuoys, specially the self-igniting lights and self-activating smoke signals, and ensure that the lifebuoys are correctly located throughout the ship.
8. Examine the life jackets and check that they are correctly distributed throughout the vessel.
9. Ensure that all pyrotechnics, including the line throwing appliance rockets, are not out of date. Inspect the line throwing appliance.
10. Test the emergency lighting whenever the general alarm system is tested.
11. Check the fire control plans and posted and clearly legible.
12. Test, where possible, the fire and/or smoke detection system.
13 Run each fire pump, including the emergency fire pump, to check that each pump can supply via the fire main the required two jets of water simultaneously from separate hydrants.

14 Check that the fire hoses, nozzles and applicators are in good condition and correctly located.

15 Test and overhaul the fixed fire-fighting system.

16 Overhaul portable and non-portable extinguishers are correctly located and that spare charges are available.

17 Where possible, confirm that all remote controls are operable.

18 Overhaul any applicable closing arrangements for ventilators, skylights, doorways, funnel spaces, and tunnel.

19 Overhaul the fireman’s outfits and recharge, when possible, the compressed air cylinders.

20 Inspect the pilot ladders, pilot hoist if carried, and all ancillary equipment.

Includes all bridge equipment including meteorological instruments and instruction manuals; charts, publications and chart correction log and equipment; logbooks and compass error book; signals flags and signalling equipment; emergency lighting and batteries; medicine and medical locker; muster list; lifebuoys; gangways and nets; etc into the above list.

PREPARATION FOR A LOAD LINE SURVEY

1 Check that all access openings at ends of enclosed structures are in good condition. All dogs, clamps, and hinges should be free and well greased.

2 All gaskets and watertight seals should be crack free.

3 Ensure that door opens from both sides.

4 Check all cargo hatches and access to holds for weather-tightness, especially battening devices such as cleats and wedges.

5 Check the efficiency and securing of portable beams.

6 Inspect all machinery space opening on exposed deck.

7 Check that any manholes and flush scuttles are capable of being made watertight.

8 Check that all ventilator openings are provided with efficient weather tight closing appliances and repair any defects.

9 All air pips must be provided with permanently attached satisfactory means for closing openings.
10 Inspect any cargo ports below the freeboard deck and ensure that all of them are watertight.
11 Ensure that the non-return valves overboard discharges are operating in satisfactory manner.
12 Side scuttles below the freeboard deck or to spaces within enclosed superstructure must have efficient internal watertight deadlight. Inspect the deadlight 'rubber'.
13 Check that all freeing ports are in a satisfactory condition, e.g. shutters are not jammed, hinges are free, and that pins are of non-corroding material. Check that any securing appliances, if fitted, working properly.
14 All guard rails and bulwarks should be in a satisfactory condition, e.g. all fractured rails should be re-welded.
15 If lifelines are required to be fitted in certain areas, rig the line and overhaul as necessary.
16 De-rust and paint the deck line. Load line marks, load line, and the draught marks.

**DECK LINE**
This is a horizontal line 300mm long and 25 mm wide with which is marked amidships in the shell plating on each side of the ship to indicate the position of the freeboard deck.

**FREEBOARD DECK**
This is the uppermost continuous deck below which watertight integrity can be maintained, i.e. it is that deck which all openings have permanent weather tight closing arrangements and below which all openings in the shell also have permanent watertight closing arrangement.

**FREEBOARD**
This is the distance from the waterline to the upper edge of the deck line measured vertically, or with regard to the rules. ‘the deck distance measured vertically downward amidships from the upper edge of the deck line to the position at which the upper edge of the load line appropriate to the freeboard is the freeboard is to be marked.'
Type A & Type B ships

Type A: A ship that is designed to carry liquid cargoes in bulk whose cargo tanks have only small access opening closed by gasket covers of steel or equivalent material. Inherent features of such ships would be (a) high integrity of exposed decks (b) high degree of safety against flooding, resulting from the low permeability of loaded cargo spaces and the degree of subdivision usually provided.

Type B: all other ships. Ships over 100 m can be assigned a freeboard that is less than that obtained from Table B. However, the value of Table B shall not be reduced by more than 60% of the difference between B and A tabular value for the same length. As a result there are ship types B-100, B-60 and B 0 to 60.
LIFE SAVING APPLIANCES

LIFEJACKET
LIFEBUOYS
LIFEBOAT WATER AND RATION
LIFEBOAT FALLS
LIFEBOAT ON LOAD RELEASE GEAR
HYDROSTATIC RELEASE UNIT
H2O AND STEEL TYPE
PYROTECHNICS
RADAR REFLECTORS
SART
EPIRB
TWO WAY RADIO TELEPHONE APPRATUS
LIFElEJACKET LIGHTS
IMMERSION SUITS
THERMAL PROTECTIVE AIDS
MOB SMOKE FLOAT
SIZE OF LIFE BOAT FALLS
LINE THROWING APPRATUS

ROPES ARE MADE FROM THREE BASIC MATERIAL

Natural fibre
Synthetic fibres
Steel wire

NATURAL FIBRE

Manila rope
Sisal
Hemp
Jute
Flax
Cotton

SYNTHETIC FIBRE

Polyamide common known as nylon
Polyester common known as terylene or dacron
Polypropylene
Polyethylene
FIBRE ROPE STRENGTH
Breaking strain
The safe working load sometimes also called working load limit SWL-WLL

BREAKING STRAIN: the breaking strain of a rope “the ultimate strain on rope at failure” and is measured in kilogram.

SAFE WORKING LOAD (SWL)
The safe working load of a rope is “the maximum load that should be applied to a rope”.

The Safe Working Load is one sixth that of the Breaking Strain

The factors that will cause a rope to lose strength:

One or more knots will reduce the strength of rope by as much as 50%
One or more splices will reduce the strength of rope by as much as 10%

SAFE WORKING LOAD OF A WIRE ROPE
The safe working load of steel wire rope is one fifth that of the breaking strain.

MARINE ORDER REQUIREMENTS M.O. PART 32 gives the requirements for wire ropes used with materials handling equipment.
Wire ropes used with lifting gear are not to be used for loading or unloading unless:

1. it has been tested, thoroughly examined by certificated, in accordance with this part
2. the current record of examination in the appropriate register of materials handling equipment indicates that the equipment is fit for use; and
3. it appears in all respects, to be fit for such use.

The provision does not apply provided:
1. responsible person has issued a certificate in respect of the rope in accordance with marine order
2. a responsible person has thoroughly examined the rope with in the period of 6 months immediately preceding the proposed use and found that the rope is not worn, corroded or otherwise defective to a degree that renders it unfit for the proposed use and recorded the examination in the appropriate register of materials handling equipment.
3 where a wire in the rope is broken:

a) the rope has been examined by a responsible person in that condition with in the period of one month immediately preceding the proposed use, and the examination is recorded in the materials handling register, and
b) the total number of broken wires visible in a length of the rope equal to 10 times its diameter, does not exceed 5% of the wires constituting the rope;

4 the rope is free from knots and kinks;
5 the rope complies with the structural requirements

KNOTS BENDS HITCHES

Figure of eight knot
Reef knot
Sheet bend
Double sheet bend
Bowline
Bowline in a bight
Round turn and two half hitches
Carrick bend
Sheep sink
Clove hitch
Rolling hitch

WHIPPINGS
3 different types

- common
- west country
- sailmaker's

MATERIALS USED FOR LASHING

A) WIRE ROPE
B) CHAINS
C) STEEL STRAPPING
D) WEBBING
E) FIBRE ROPE
F) COMPOSITE ROPE
G) NETS
HOW TO DETERMINE STRENGTH OF LASHINGS?

RULE OF THUMB

Below deck cargo:
The sum of the minimum breaking loads of all the lashing should not be less than twice the static weight of the item of cargo to be secured.

On deck cargo
The sum of the minimum breaking loads of all the lashings should not be less than three times the static weight of the items of cargo to be secured.

For example a cargo weight 10 tons
Lashing holding cargo vertically down will be 3 times weight
Eg for 10t cargo, B.S. = 30T

WHAT INFORMATION SHOULD BE THERE IN CAROG SECURING MANUAL?
The cargo securing manual should contain the following information:

1. Details of fixed cargo securing arrangements and their locations.
2. Location and stowage of portable cargo securing gear.
3. Details of portable securing gear including an inventory of items provided and their strength.
4. Correct application of portable securing gear on various cargo units, vehicles and other entities carried on board the ship.
5. Indication of the magnitude of forces expected to act on cargo units in various positions on board the ship.

WHAT IS MARPOL 73/78?

International convention for the prevention of pollution from ships, 1973 as modified by the protocol 1978.

There are Five Annexes that contain regulations for the prevention of various forms of pollution are:

Annex I  Prevention of pollution by oil

Annex II  Control of pollution by noxious liquid substances
It details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk.
Annex III  Prevention of pollution by harmful substances carried in packaged form, or in freight containers or portable tanks or road and rail tank wagons.

Annex IV  Prevention of pollution by sewage

Annex V  Prevention of pollution by garbage

Annex VI  Prevention of Air pollution from ships

Annex VII  Ballast management

International Oil Pollution Prevention Certificate (IOPP)

Under MARPOL 73/78 the requirement for the ships to carry a valid IOPP certificate came into force in 1983

A record of construction and equipment that outlines supplements the certificate;
1  Particular of the ship
2  Equipment for the control of oil discharge from machinery spaces, bilges and oil fuel tanks
3  Tanks for oil residue (sludge)
4  Standard discharge connections

The survey and subsequent certification is similar to other certificates and is valid for 5 years subject to annual and intermediate survey.

OIL RECORD BOOK

Every ship of 400 grt and over and every oil tanker of 150 grt should be provided with and oil record book.
Entries with regard to cleaning and ballasting of oil fuel tanks, disposal of residues, pumping out machinery space bilges, loading/transfer/discharging of oil cargo, cleaning of cargo tanks, ballasting of cargo tanks etc. are made into the Oil Record Book.
Each entry is signed by the officer in charge and each completed page by the master. It shall be preserved for a period of 3 years after the last entry has been made.

Inderjit Singh
CUMULATIVE LIST OF ADMIRALTY NOTICES TO MARINER
This publication records the data of issues of the current edition of each navigational chart includes AUS and NZ charts. Subsequent relevant notices to mariners issued since weekly edition first dated 1st January.

Cumulative lists published 6 monthly in January and July. If it is published in January then it gives the details of last 2 years and if it is published in July then it gives the details of last 2 and half year.

The publication also includes the latest details of current hydrographic publications.

1. Current edition of sailing direction and their supplements
2. Admiralty list of lights and fog signals
3. Admiralty list of radio signals
4. Tidal publications such as

- admiralty tide tables
- admiralty tidal stream atlases
- co-tidal charts
- admiralty tidal prediction software

LIFTING TACKLES

TYPES
- Single whip
- Double whip
- Gun tackle
- Luff tackle
- Double luff or two fold purchase
- Three fold purchase

SWL formula

Natural fibre \(D^2\)
Polypropylene \(1.8D^2\)
Steel wire rope \(8D^2\)
Example
You have a load of 500 kgs to lift in a direct pull. What is the minimum diameter polyethylene that you require to make it a safe lift?

Load that is to lift safely is 500 kg
Safe working load of polyethylene is $1.2D^2$
We need to find the diameter ‘D’
$500=1.2D^2$

$D^2 = 500/1.2$
$D^2 = 416.6$
$D = 20.4$

Minimum diameter for polyethylene to use = 20.4 mm
Ropes are not supplied in 20.4 mm diameter so we find the next size up ie 22 mm

HOW TO CALCULATE THE DIAMETER OF THE SHEAVES?
The diameter of sheaves used for fibre rope should be
When hand operated at least six times the diameter of the rope in mm
When power operated 12 times the rope diameter.

WHAT INFORMATION WE CAN FIND IN THE SHEAVE?

| SERIAL NUMBER: |
| SAFE WORKING LOAD: |
| LAST TEST DATE: |
TYPES OF SHACKLES

D SHACKLES
BOW SHACKLES

MOUSING A HOOK OR SHACKLE PIN

The purpose of mousing a hook is to prevent the object being lifted or the hook from breaking adrift. Small stuff, for example spun yarn, is seized about the back of the hook and around the bill, effectively closing off the clear.
The objective of mousing the bolt or pin of the shackle is to prevent the shackle working itself free when in normal regular employ. Seizing wire is used, because of its robust character. It is passed inside the clear and through the end of the bolt in a figure eight so preventing withdrawal of the pin.

WHAT DO U MEAN BY THE TACKLE ROVE TO DISADVANTAGE?
A tackle is rove to disadvantage when the hauling part comes from the fixed block.

AND ADVANTAGE?
When a hauling part is come from the moving block.

MECHANICAL ADVANTAGE OF TACKLES

Where the tackle is rigged to disadvantage the mechanical advantage is the number of sheaves in the tackle therefore when rigged to advantage the mechanical advantage is the number of the sheaves in the tackle plus one

EXAMPLE
You are about to lift a weight of 1.5 tonnes using a two fold purchase rove to disadvantage. The tackle includes a polyester rope of 18mm diameter.
Will this be a safe lift?

First we had to find out the stress required
Stress = (weight + friction)/mechanical advantage

Friction is no of sheaves * 10% of weight
DIFFERENT TYPES OF LIMIT SWITCHES IN THE CRANES

The most common limit switches are
- Maximum hook height limit
- Maximum jib elevation limit
- Minimum jib elevation limit
- Ship out of trim limit
- Dancing roller arrangement

INSPECTIONS OF WIRE ROPEs

An inspection of wire ropes must be made by a competent person at intervals not exceeding:
For a wire rope which does not pass over a sheave or a winding drum 12 months
For a wire rope which passes over a sheave or a winding drum 6 months

PROOF LOAD

Where a crane or derrick is tested, the proof load must not be less than the applicable load as stated in marine order part 32
Safe working load of derrick gear or crane

proof load

Not more than 20 tonnes
SWL*1.25
More than 20 but less than 50 tons
SWL+5tonnes
More than 50 tonnes
SWL*1.1

NOTE VERY IMPORTANT

When a single sheave block is rigged as a double whip or gun tackle, so that the load is suspended from its head fitting, the load which may be lifted is twice the SWL marked on the block.
SECURING RUNNERS IN DERRICKS OR CRANES

The method used to secure a runner to a winch should be by shackle or clamp type socket or similar, any of which should provide a strength equivalent to 50% of that of the runner. The number of complete turns remaining on the drum of the winch when the compete working length of rope has been paid out should not be less than:

In the case of an un grooved drum three and
In the case of a grooved drum two.

ANGLE BETWEEN RUNNERS OF UNION PURCHASE RIG

When loading or unloading by derricks in union purchase rig, the angle included by the ends of runners at the hook assembly measured in the plane of the runners must not be permitted to exceed 120 degree or such lesser angle as is specified.

CONFINED SPACE ENTRY

FLAMMABLE RANGE: the range of flammable gas or vapour (%by volume in air) in which an explosion can occur upon ignition. Expressed by lower explosive limit and upper explosive limit.

SAFE OXYGEN LEVEL: a minimum oxygen content in air of 19.5 percent by volume under normal atmospheric pressure and a maximum oxygen content in air of 23.5 percent by volume under normal atmospheric pressure.

COMPETENT PERSON: a person who has, through a combination of training, education and experience acquired knowledge and skills enabling that person to perform correctly a specified task.

WHAT SHOULD BE THERE IN THE ENTRY PERMIT?

However they should include the following information
1. location and description of the work to be done
2. hazards that maybe encountered
3. isolation checklist
4. atmospheric test readings
5. continuing review of ventilation and atmospheric conditions
WHAT INFORMATION SHOULD WE GET IN THE HOT WORK PERMIT
This permit may include the following information
1 competent person
2 location and date
3 work to be done
4 hazards present
5 isolation
6 ventilation
7 area clear of combustibles
8 work to be done by
9 appropriate fire fighting equipment present
10 fire watch organised
11 appropriate PPE available
12 suitable access and exit present
13 appropriate personnel/authorities notified
WHAT IS IMO?

International maritime organisation. A specialised agency of the united nations concerned solely with maritime affairs was first proposed the main concern was to develop an international system to improve safety at sea.
The total no of members in IMO is 158

Structure of IMO
IMO consist of
• Assembly
• Council
• Five main committees
• Nine sub committees

CONVENTIONS AND PROTOCOLS

They are agreements or treaties set of standards for the construction, equipment and operation of ship. These are the binding legal instruments. In a convention there are 2 parts
First part is the articles which gives and state the fundamental principles of the conventions and gives regulations
Second part is the Annexes which gives the technical details and standards.

Where as protocol is nothing but a major amendment to a convention especially an amendment in the article of the convention. It itself becomes another convention or agreement. It is a major change to at convention specially if the changes are affecting the fundamental principles stated in the article.

Conventions and protocols falls under 4 groups
• Maritime safety
• Prevention of marine pollution
• Liability and compensation
• Other matters

CODES AND RECOMMENDATIONS

The non-treaty instruments such as codes and recommendations deals with wide range of subjects
These are not legally bindings on the governments unless mandatory effects is given through a convention. They provide a guidance in framing national regulations and requirements. There are more than 500 codes and recommendations.
These codes and recommendations falls under 7 categories.
* Cargo (grain, IMDG, timber deck cargo, etc)
* Marine technology (alarms and indicators, construction of chemical and LPG carrier)
* Marine environment (crude oil washing)
* Navigator (international code of signals, standard maritime navigational vocabulary)
* Life saving and search and rescue (MERSAR)
* Radio communications (EPIRB recommendations)
* Training and certifications (ISM, STCW)

NAVIGATION ACT - It is the premier piece of legislation in the marine field in Australia. It is similar to merchant shipping act of UK. The act does not applies in relation to
* Trading ships proceeding on voyages other than overseas voyages or inter state voyages
* Australian fishing vessels proceeding on voyages other than overseas voyages
* Inland water crafts
* Pleasure crafts
* Naval crafts

Act consist of 11 parts and further broken into divisions and has 427 sections. There are 7 schedules to the act which are as follows:
1 SOLAS
2 1978 protocol to SOLAS
3 Collision regulations
4 Loadline convention
5 convention for safe containers (CSC)
6 CSC amendments
7 Convention of tonnage measurements

REGULATIONS AND MARINE ORDERS
Regulations are drafted by the professional legal draftsmen and signed by the Governor general. There are still some old regulations such as Navigational compass regulation. Regulations proves to be inefficient in giving effects to technical standards and particular standards in international conventions, therefore they made ‘orders’. Which were made by the ministers introduced in 1979. Then comes AMSA the Australian maritime safety authority in 1990 and all powers to make orders are transferred to AMSA from ministers. The marine orders are disallowable instrument and they have to be presented in the parliament and they had a right to disallow them.
LIST THE DOCUMENTS MANDATORY BY THE SOLAS CONVENTION OTHER THAN SAFETY CERTIFICATES
1. Intact stability booklet
2. Minimum safe manning document
3. Document of compliance with the special requirement of carriage of dangerous cargo.
4. Dangerous goods manifest and stowage plan
5. Cargo securing manual
6. Documents for authorisation for carriage of goods
7. ISM code safety management manual
8. LSA code
9. International grain code
10. International gas carrier code
11. International bulk carrier code

WHAT ARE THE USES OF TONNAGE MEASUREMENTS
As a basis for the calculation of various charges as shown:-
- Harbour dues
- Light dues
- Pilotage dues
- Canal dues
- Miscellaneous fees such as Agency fees, towage charges, dry docking charges

Collection of fee such as P & I clubs, registration of ships and statutory fees
Limits of application in the major international conventions such as SOLAS, MARPOL73/78, ILO convention.
As a comparison of fleet sizes between countries and the shipping traffics of individual ports.

WHAT IS TONNAGE? GROSS AND NET?
Gross and net tonnages both of which are calculated independently. The gross tonnage is a function of the moulded volume of the all enclosed space of the ship.
The net tonnage is given by the formula which is a function of the moulded volume of all cargo spaces of the ship with correction for draft less than 75% of the depth of the ship and for the number of un berth passenger. Net tonnage must not be less than 30% of the gross tonnage.
WHAT IS ISM WHAT DO YOU KNOW ABOUT THE ISM?
ISM stand for the international safety management code.
ISM code is to provide an international standard for the safe management operation of
the ships and pollution prevention. It is required under SOLAS. The objective of the
code is to ensure

- safety at sea
- prevention of human injury or loss of life
- avoidance of damage to the marine environment and property

Its objectives are to provide safe practices and a safe working environment in ship
operations, establish safe guards against all identified risk., continuously improve safety
management skill of personnel ashore and on board ships, including preparing for
related emergencies.

When is the ISM enforce?
1st July 1998 passenger ship, oil/chemical, gas carriers & high speed crafts.
1st July 2002 all cargo ships & mobile offshore drilling units
mandatory to all commercial ships above 500 grt.

What is bridge resource management (BRM)?
Bridge resource management is the effective use of all personnel and equipment to
ensure the safe navigation of the vessel.
- consist of sufficient number of qualified individuals on watch to ensure duties
  performed efficiently and effectively
- qualified individuals fit to perform their duties
- duties are clearly and unambiguously assigned
- task performed according to priority
- not assigned different duties
- instruments and equipment are readily available and function properly.
- Essential information, calculated, processed and made conveniently available

Bridge team consist of those personnel responsible for the safe navigation of the vessel.
May includes both licensed and non licensed personnel both on and off watch
BRIDGE EQUIPMENT

SEXTANT: "the sixth part" so called because its graduated arc is about one sixth of a circle. However angles up to 135° can be measured which is due to the principle of optics on which the instrument is based.

PRINCIPLE OF OPERATION
The optical principle on which the sextant is constructed is as follows
"if a ray of light is reflected from two mirrors in succession, the angle between the first and last directions of the rays is twice the angle between the two mirrors.

USES OF SEXTANT
Sextant is used for measuring the
Vertical sextant angles
Horizontal sextant angles
Vertical angles (altitudes) of celestial bodies

Reading of sextant is made in three stages
1 degrees are ready by noting the position of the arrow on the index arm in relation to the arc.
2 Minutes are read by noting the position of the zero on the vernier in relation to the graduations on the micrometer drum.
3 Fraction of the minute (seconds) is read by noting which mark in the vernier most nearly coincides with one of the graduations on the micrometer drum.

WHAT DO YOU MEAN BY ADJUSTABLE ERRORS OF SEXTANT?
Adjustable errors which can be detected and eliminated by the observer by making adjustments. These must be check by the observer and eliminated prior to taking readings.
There are 4 adjustable errors:
1 error of perpendicularity
2 side error
3 parallelism error also called index error.
4 collimation error.

ERROR OF PERPENDICULARITY
This error is caused by index mirror not being perpendicular to plane of sextant. By using the first adjustment screw, which behind the index mirror.
SIDE ERROR
Side error is caused by horizon mirror not being perpendicular to the plane of sextant. Remove by turning the second adjustment screw on the back of the horizon mirror. Turn the screw until such time as the horizon appears in alignment when the sextant is rotate(by day) or until the reflected image of the star passes exactly over the direct image when the index bar is moved across the scale zero by night.

PARALLELISM ERROR (INDEX ERROR) 3RD ADJUSTMENT ERROR
This error is caused by two mirror not being parallel when index bar is set exactly at zero. This error is the principle cause of the index error, which is the total error remain after the four adjustments have been made.

Remove by first ensuring that the index bar is still clamped exactly at zero and then turn the screw on the back of the horizon mirror which is nearest to the plane of the instrument, the third adjustment screw, until such time as the two images of the star are exactly in line or until the two parts of the horizon are in exact alignment.

COLLIMATION ERROR
Error caused by axis of telescope not being parallel to plane of sextant. Its effect is to cause the measured angle to be always greater than the true angle.

NON-ADJUSTABLE ERRORS
1 Centring error
2 Prismatic error
3 Shade error
4 Graduation error

RESIDUAL ERROR
This error is different than the Index Error residual. All new sextants are optically and mechanically tested after manufacture and a certificate is issued with the sextant to this effect. Any residual errors found during testing are tabulated on the certificate which is generally attached to the inside cover of the box.

INDEX ERROR
Index error is the error remaining in a sextant after making the first, second, third (and fourth if required) adjustments.
HOW TO DETERMINE INDEX ERROR

Index error is determined in one of the three different ways

1. By observation of the sun:- set the index approximately at zero and then use the
tangent screw or micrometer drum as appropriate, to bring the true and reflected
images of the sun just into contact, one above the other. The reading should be noted
and then the relative positions of the true and reflected images of the sun should be
reversed. Again the reading should be noted. These two readings are, of course,
measurements of the sun’s diameter on the arc and off the arc. The index error is

- half of the difference between these two readings
- positive if the greater reading was off the arc
- negative if the greater reading was on the arc

![Reflection Diagram]

reflected sun off the arc • • true sun •
true sun • reflected sun on the arc •

reading

00°35’30” off

00°30’42” on

calculations

readings ON the arc 00° 30’ 42”
reading OFF the arc 00° 35’ 30”

difference 04’ 48”

Index error is half the difference that is 00° 02’ 24” OFF
If it's ON - take it off (-)
If it's OFF - take it on (+)

One of the greater advantage of using sun for the index error is as we can find the
semidiameter of the sun easily. In each of the observations the angle measured is that
subtended by the sun’s diameter since the upper limb of one image is made to touch the
lower limb of the other. A check can therefore be made o the accuracy of the
observations by adding the readings “on” and “off” the arc and dividing this sum by 4.
The result will be the semidiameter of the sun.
MAGNETIC VARIATIONS
The magnetic longitudes (meridian) runs between the Magnetic North and South poles, and form an angle with the geographic meridian. This angle between the geographic meridian and the magnetic meridians is called VARIATION. It is this variation that causes the magnetic needle, in a compass, to be deflected by an angle away from the geographical north pole by an amount equal to the variation for that location.

DEVIATION
Deviation can be defined as the angle between the magnetic meridian, and the direction that the compass needle actually points. Deviation is the sum total of the effects of the ships permanent and induced magnetic field on the vessels magnetic compass. Deviation changes with the change in vessel's headings.

COMPASS ERROR
One of the main effects of the vessel's own magnetism in the compass is to cause the compass to point away from magnetic north to a point called compass north is a combination of the sum total effect of variation and deviation, which is called the compass error. Error is for a given heading only and changes with the change in heading.

CORRECTORS OF COMPASS
- Fore and aft permanent magnets
- Athwartships permanent magnets
- Soft iron quadrantal sphere
- Soft iron vertical bar (flinders bar)
- Vertical corrector magnets (the heeling error bucket)

ERROR OF AZIMUTH MIRROR
A celestial body with low. Altitude should be observed both with the arrow up and with the arrow down, ie looking both over the top of the prism and looking down the sight tube. If the two bearings so obtained are identical then no error exist. If however, the two bearings are not the same then an error is present. The value of the error is half the difference between the two readings and this amount should be applied to all subsequent bearings observed. If the smaller reading obtained by the arrow down then the error should be added to all subsequent bearings taken with the arrow down.
**PRINCIPLE OPERATION OF AUTOPILOT**
In its simplest form an autopilot compares the course to steer data as set by the helmsman, with the actual course data, as received from the gyro heading or magnetic compass heading and applies a corrective rudder if a difference is detected between the two input of data.

There are 3 main control functions which act on one or more of the data inputs as listed above:
- Proportional control
- Derivative control
- Integral control

**MANUAL OPERATOR CONTROL**
1. RUDDER
2. COUNTER RUDDER
3. PERMANENT HELM
4. RUDDER LIMIT
5. WEATHER

*After seeing the red distress flare, how do you know the distance from your vessel?*
The vertical height of the rocket parachute/flare is about 300mt and I will take into consideration my height of eye when interpolating the range from the geographical range table, which can be found in the front pages of list of light and signal tables. The light intensity of the flare is about 30000 candelas.

*Who is a “competent person”?*
A competent person means a person having practical and theoretical knowledge and relevant experience, sufficient to enable that person to detect and evaluate any defects and any weaknesses that may affect the intended performance of the equipment.

*Who is “responsible person”?*
A responsible person means a person who, in relation to materials handling equipment, is competent and qualified and is responsible to
- The manufacturer of that equipment
- A classification society surveyor
- A competent testing establishment
For carrying out any testing and thorough examination and issuing certificates of test in respect of that equipment.
Is responsible to the owner or master of the ship, where that equipment is the ship’s equipment. For carrying out thorough examinations, other than those associated with the testing of that equipment.
Fire fighting apparatus (M.O part 15 & SOLAS)

FIRE PUMPS
Each of the required fire pumps shall have a capacity not less than 80% of the total required capacity divided by the minimum of required pumps but in any case not less than 25 tonnes per hour & each pump capable of delivery at least 2 required jets of water.

ARRANGEMENT OF FIRE PUMPS AND OF FIRE MAINS
Passenger ships of 4000 GRT and more shall have at least 3 fire pumps.
Passenger ship of less than 4000 GRT and cargo ships of 1000 GRT and upwards shall have at least 2 fire pumps.
Cargo ships of less than 1000 GRT must have as per Administration.

EMERGENCY FIRE PUMP
Capacity of emergency fire pump shall not be less than 40% of the total capacity of the fire pump required by the regulation and in any case not less than the 25 tonnes per hour.

Relief valves shall be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes hydrants and hoses.

Number and position of hydrants
The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and any part of any cargo space when empty, any ro-ro cargo space or any special category space in which latter case the two jets shall reach any part of such space, each from a single length of hose.

Nozzles
Standard nozzle sizes shall be 12mm, 16mm and 19mm or as near there to as possible.

Isolating valves
Isolating valves to separate the section of the fire main with in the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space.

Fire hoses
In cargo ships of 1000 GRT and upwards the number of fire hoses to be provided shall be one for each 30m length of the ship and one spare but in no case less than 5 in all. This number does not include any hose required in any engine or boiler room.
Fireman’s outfit
A fireman outfit shall consist of
Personal equipment comprising:
➢ protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water resistance.
➢ Boots and gloves of rubber or other electrically non conducting material.
➢ A rigid helmet providing effective protection against impact.
➢ An electric safety lamp of an approved type with a minimum burning period of 3 hours.
➢ An axe to the satisfaction of the administration.

All ships shall carry at least two fireman’s outfits complying with the requirements.

INTERNATIONAL SHORE CONNECTION
Ships of 500 grt and upwards shall be provided with at least one international shore connection, complying with the provision
Facilities shall be available enabling such a connection to be used on either side of the ship. Standard dimension of flanges for the international shore connection shall be in accordance with the following table:

➢ Outside diameter 178mm
➢ Inside diameter 64 mm
➢ Bolt circle diameter 132 mm
➢ Slots of flange four holes of 19mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery.
➢ Flange thickness 14.5mm
➢ Bolts and nuts four each of 16mm dia, 50mm in length.

The connection shall be of steel or other suitable material and shall be designed for 1.0N/mm square service. The flange shall have a flat face on one side and on the other side shall be permanently attached to a coupling that will fit the ship’s hydrant and hose. The connection shall be a kept aboard the ship together with a gasket of any material suitable for 1.0N/mm square services, together with four 16mm bolts, 50mm in length, and eight washers.

FIXED HIGH EXPANSION FOAM
Expansion ratio shall not exceed 1000:1
Sufficient to fill the greatest space to be protected at a rate of at least 1m in depth per minute.
Quantity of foam forming liquid available shall be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected.
**FIXED LOW EXPANSION FOAM**
Expansion ratio shall not exceed 12:1

*What type of portable fire extinguisher do you have on board?*
Foam type, dry powder, and CO2.

*What type of fire extinguisher you have in engine room?*
CO2, dry powder, foam, semi-portable foam at least 45 litres capacity

*What is the purpose of the self contained air support system?*
- For the survivors to breathe.
- To maintain positive pressure inside the boat so that the flammable gases does not enter the boat. Pressure must not exceed 20 milibars.
- For the diesel engine
- As per SOLAS, capable of air supply not less than 10 minutes.

*How will you ascertain risk of collision?*
Risk of collision exist if the compass bearing of an approaching vessel does not appreciably change. And risk of collision also exist when there is change in compass bearing particularly when approaching a very large vessel or a tow or when approaching a vessel at a close range.

*Australia which buoyage system?*
IALA buoyage system region – A.

*What is emergency signal?*
Seven or more short blast followed by one prolong blast on the ship’s whistle or siren and electrically operated bell or klaxon system.

*What is an abandon ship signal?*
Ready for abandon ship – One short blast followed by one prolong blast repeated three times. The final order to abandon ship is usually a verbal order by the master.
How will you check a low lever alarm for breathing apparatus?
First of all make it sure that bottle is full. Then turn then main valve on and close the lung demand valve and then as the air is in the hose check for leaks. Then close the main valve and check on the gauge that the pressure does not fall more than 10 bar per minute. And then at last hold the lung demand valve press against the palm of your hand and activate the by pass valve and release the air slowly and at the same time check the gauge as the pressure decreases and the low level alarm must be sound at 50 bar ± 5 bar.

You are about to go the enclosed space what are you going to check?
- Inform bridge and engine room.
- There should be a proper permit before entering.
- Confined space should be gas free.
- There should be a proper ventilation.
- Check the level of oxygen in that area.
- If there is any pipe lines going in that enclosed space then it should be isolated from the engine room.
- The proper tag should be there on the valves with the date, time and signature.
- Always one responsible person should be stand by out side when one person is inside the entry.
- Provide SCBA set with the spare cylinder, safety harness, lifeline.
- Communication with bridge or engine room and the person going inside.

When will you call master?
- If restricted visibility is encountered or expected.
- Any movements of other vessel causing concern.
- Difficulty in maintaining course.
- Failure to sight land or navigational mark or obtain soundings at expected time.
- If unexpected land or navigation marks are sighted.
- Breakdown on main engine or steering failure.
- Radio equipment malfunction.
- Heavy weather
- If ship meets any hazard to navigation.
- In any other emergency or if in doubt.

What are the distress signals?
When a vessel is in distress and requires assistance she shall use or exhibit the signals described in Annex IV of the collision regulations.
The following signals, used or exhibited either together or separately, indicate distress and need of assistance:
• a gun or other explosive signal fired at intervals of about a minute;
• a continuous sounding of any fog signalling apparatus;
• rockets or shells, throwing red stars fired at a time at short intervals;
• signal made by radiotelegraphy or by any other signalling method consisting the group (SOS) in the Morse Code;
• signal send by radiotelephony consisting of spoken word ‘mayday’;
• the international code of signal of distress indicated by N.C.;
• a signal consisting of a square flag having above or below it a ball or anything resembling a ball;
• flames on the vessel as from a burning tar barrel, oil barrel etc;
• a rocket parachute flare or a hand flare showing a red light;
• a smoke signal showing a orange coloured smoke;
• slowly and repeatedly raising and lowering arms outstretched to each side;
• the radiotelegraphy alarm signal;
• the radiotelephony alarm signal;
• signals transmitted by emergency position indicating radio beacon (EPIRB);
• signal transmitted by search and rescue radar transponder (SART).

You are duty officer on watch – fire in accommodation what action you shall take?
• Sound fire alarm.
• Call master if not already on bridge & inform engine room.
• Muster crew and find out how many persons are missing.
• Assign duties to the persons such at make ready attack party, prepare stand by party.
• Normally accommodation fires are or A class fires
• Disconnect all the electrical connections
• Make communication with the scene leader and find out what is going on

Can you use sextant while at anchor? How?
Yes we can use sextant at anchor. By using horizontal sextant angle and vertical sextant angle.

Where will you find HRU on ship?
• on the life raft
• on the EPIRB fastened to the cradle.
• on the life jacket float free box near embarkation spot.

what are the errors of sextant?
Sextant have two types of errors
• adjustable errors
• non adjustable errors.
Adjustable errors
1. Error of perpendicularity
2. Side error
3. Parallelism error (index error)
4. Collimation error

Non adjustable errors
1. Centring error
2. Prismatic error
3. Shade error
4. Graduation error.

How will you correct index error?
The cause of index error is two mirrors not being parallel when index bar is set exactly at zero. It should be corrected by first ensuring that the index is still clamped exactly at zero and then turn the screw on the back of the horizon mirror which is nearest to the plane or the instrument, the third adjustment screw until such time as the two images of the star are exactly in line or until the two parts or the horizon are in exact alignment.

After correcting index error will you check for any other errors?
Yes, we can check for collimation error. But now days the collimation error doesn’t exist.

You are 2nd mate on board ship and at night 2’o clock in the mid Atlantic ocean. What will you do? If you seen a white light. Tell me everything what will you do?
1. I will note the characteristic of the light
2. Take the bearing of the light
3. Inform the master.
4. Check on the chart for any details and/or for the light.
5. Plot the position on the chart
6. Inform the engine room for any manoeuving if required.

What (LSA) life saving appliances you have on your vessel.
- life jackets
- life buoys
- life boats
- life raft
- life buoys
- breathing apparatus
- thermal protective aids
- immersion suits
- line throwing apparatus
- rocket parachutes
- hand flares
- emergency position indicating radio beacon
- search and radar transponder

Fireman's outfit requirement? At least 2
All ship carry at least two fireman's outfits complying with the requirement.
Personal equipment comprising:
- protective clothing of material to protect the skin from heat radiation from the fire
  and from the burns and scalding by steam
- outer surface must be of water resistant.
- Boots and gloves of rubber of other electrically non conducting material.
- A rigid helmet providing effective protection against impact.
- An electric safety lamp.
- An axe.

At anchor how will you get anchor position?
By vertical sextant angle
By horizontal sextant angle.

How do you know the ship is dragging her anchor? And what action you will take?
Anchor is said to be dragging when it is not held to the sea bed.
Anchor cable comes to long stay, then slacking, then coming to long stay again and so on, indicates that the ship is dragging her anchor.
By cross bearing or beam transit bearing.
She is out of initial anchor position.

Action:
1 inform master immediately
2 make sure engine stand by
3 stand by anchor party
4 pay out extra cable
5 if not holding let go the other anchor at the extremity of yaw and veer both cables so that the ship rides comparatively quietly to her two anchors.
6 And the plot the position.
7 2nd method is that we can steam up the first anchor, sheer away and let go the second anchor. The first cable is hove in while approaching its anchor. Both cables are then veered so that the vessel rides quietly with an anchor fine on each bow.
How many shackles do you have in each side in a anchor cable?
One side 9 and other side 10

How will you prepare anchor for sea?
1. Make sure that anchor is home in its stowed position.
2. Then put the compressor bar and then put the Devil’s claw and tightened the screw thread.
3. In some of the devil’s claw there is a bottle screw that should be tightened.
4. Then cover the hawse pipe cover by slide or hinged plates.
5. Then cover the spurling pipe to make the water tight integrity, so this opening must be closed and effectively sealed off normally done by cement. Such a seal is know as “A pudding”
6. Or we can use a lace up canvas cover which enclose the spurling pipe and steel plates and also wraps around the chain before being lashed in position.

Why do we keep anchors on breaks?
Anchors are kept on breaks because in case of emergency we can just immediately open the breaks and use the anchor. And also in case of power failure we can use the anchor.

There is a fire in crew cabin, you observed your action?
As soon as we can observe fire in crew cabin:
1. Raise alarm shout fire fire fire.
2. Inform on the bridge.
3. Immediately close the door and all vents and close the air condition.
4. Isolate the electric supply.
5. If it is a small fire use the fire extinguishers to extinguish the fire.

How many TPA’s & immersion suit do you have?
As in my last ship there are enclosed life boats therefore the TPA required are 2 or the 10% of the total complement.
Immersion suit are for all persons in the rescue boat.
Where as in open type life boats the TPA for all persons except the 3 who have a immersion suit.

SART what is it used for range 5 miles?
SART is a search and rescue radar transponder.
Its nominal detection range is 5 nautical miles. It gives a sound and visual signal to the survival craft occupants when it begins to transmit.
Transmission time at least 8 hours on response mode.
And at least 96 hours in standby mode.
When activated the SART will listen for 9 Ghz radar signals which is detected on a 3 cm wavelength radar.
**Gyro failure what action?**
- Immediately put the wheel on hand steering.
- Inform master.
- Apply the compass error on the true course and start to steer on the compass course.
- Inform engine room.
- Stand by the engine for immediate manoeuvre.

**How you know that the target vessel moving or not?**
By plotting we can find the relative and true vector.
True vector tells us the speed of the other vessel, if the true vector is zero that means vessel is not moving.

**Look out report one white light on 4 points on the starboard side. Action?**
I will find out what kind of light is it. Check it characteristic.
Power driven Vessel seen from astern
Vessel less than 50 m seen out side the range of side lights
Vessel less then 7 m, speed less than 7 knots
Life boat light
Life jacket light
Vessel at anchor
Vessel pushing ahead
Vessel under oars
Sailing vessel less than 7 m.

**Lower procedure of enclosed lifeboat?**
1. First painter is rigged.
2. Harbour/davit locking pin removed.
3. Drain plug is in place.
4. Crew embarked in the boat, seated and safety belts are secured.
5. Grips are released by the launch crew.
6. Engine is started.
7. Remote control brake is used to lower the boat to the water.
8. As the boat is water borne on load release gear is activated.
9. Boat clears the ship and painter will be released.
Taking over a cargo watch at night?
1. First of all always be fit for duty.
2. Come 5 – 10 mins early on the watch.
3. As soon as you come on deck first check the gangway and moorings.
4. Make sure that rat guard are in position.
5. Check that deck lights are on.
6. Check master and chief officers standing and night orders.
7. Special instructions relating cargo must be taken if any.
8. Check that crew on watch should be there.
9. Check any fresh water is taken by the ship, check its readings.
10. If dangerous cargo is loading put the red light.
11. Then check how is cargo is going on.
12. Check loading or discharging plan.
13. Check that they are stowing the cargo properly.

GZ curve what does it depend upon?
GZ curve depend upon the angle of heel. And BM

What information can you obtain from the GZ curve?
Following information can be obtained from the GZ curve:
1. The range of stability.
2. The angle of vanishing stability.
3. The maximum righting lever.
4. The angle of maximum righting lever.
5. The point of contra flexion (the angle at which the deck edge immerses for a loaded vessel.

\[ GZ = KN - KG \sin \theta \]
What are the warning signals of the submarine?

The presence of submarine is indicated by:

1. **Visual signals**: ships flying international code group “NE2” to denote that the submarine which may be submerged, are in the vicinity.

2. **Pyrotechnics and smoke candles**:
   - The following signals are used by submerged submarines.
     - **White smoke candles**
     - **Yellow smoke candles**
     - **Green flares** launched approx. 60 – 90 metres into the air and burning for 5 sec.
       - It indicates the position in response to request from the ship or aircraft as required.
     - **Red flares (grenades)** characteristic same as green flares
       - Mean submarine carrying out emergency surfacing procedure. Keep clear. Do not stop propeller and clear the area immediately.

Two white or yellow smoke candles released single about 3 minutes apart.
Means keep clear. I am preparing to surface do not stop propellers, clear the area immediately.
If the red flare signal is sighted and the submarine does not surface within 5 minutes, it should be assumed that the submarine is in distress and has sunk.
An immediate attempt should be made to fix the position in which the signal was sighted.

Navigational lights of the submarine?

The masthead and side lights of submarines are placed well forward and very low over the water. And the stern lights are placed very low indeed and may at times be partially obscured by spray and wash.

While at anchor or at buoy by night submarines display an all round white light amidships in addition to the normal anchor lights. The after anchor light of nuclear submarines may be mounted on the upper rudder which is some distance astern of the hull’s surface water line.

All submarines are fitted with the yellow (amber) quick flashing light situated about 1 to 2 metres above or below the after masthead light. Its rate of lash is between 90 and 105 flashes per minutes and it should not be confused with a similar light currently used by hovercraft with a rate 120 flashes per minute.

What are the distress signals shown by the sunken submarines?

A bottomed submarines which is unable to surface will try to indicate her position by the following methods:

1. Release an indicator buoy (which carries a vertical whip aerial)
2. On the approach of the surface vessels and at regular intervals by firing candles giving off a white flame and white smoke or just yellow smoke.
3. Pumping out oil fuel or lubricating oil
4. Blowing out air.
Description of submarine indicator buoy.
The buoy is made of expanded plastic foam covered with a 3 mm thick GRP skin for physical protection. It is semi-spherical in shape of 76 cm in diameter and 90 cm deep. The buoy floats end up with a freeboard of about 15 cm in slack water. For identification purpose the three digit serial number which is displayed on each side under the words “forward” or “aft”. It is also written around the top of the buoy that the FINDER INFORM NAVY, COASTGUARD, OR POLICE. DO NOT SECURE OR TOUCH.

A light which flashes approximately every 2 seconds, over a period of about 72 hours, is mounted in the centre of the top surface. In darkness and during good weather, the unassisted visibility of the light is 5 nautical miles.

What stability criteria would you use for your vessel? (IMO)
A ship’s minimum stability criteria is as follows:
1. The area under the GZ curve from 0° to 30° must not be less than 0.055 metre – radians.
2. The area under the GZ curve from 0 degree to 40 degree or the angle of down flooding, whichever is the least, must not be less than 0.09 metre – radians.
3. The area between 30 degree and 40 degree must not be less than 0.03 metre – radians.
4. At 30 degree of heel the righting lever (GZ) is to be equal to or greater than 0.20 metres.
5. The maximum righting lever is to occur at an angle of heel preferably exceeding 30 degree, but not less than 25 degree of heel.
6. The initial metacentric height (GM) is not to be less than 0.15 metres.

What is a flashpoint?
The lowest temperature of a liquid at which its vapour forms an ignitable mixture with air.

What is a flammable liquid?
A liquid that gives off a flammable vapours at or below 61 degree C.

What is a grain capacity?
It is a total volume for a space based on the fact that grain flows like a fluid and will be able to completely fill all space from the tank top to the underside of the hatch covers and in between the vertical hull frames too.

What is a bale capacity?
This is the capacity of the space. It is measured from between the insides of cargo battens, between the tank top ceiling and the underside of deck beams and between bulkheads stiffeners.
What is a stowage factor?
Stowage factor is the amount of the space occupied in cubic metres by one tonne of cargo. That is cargo stowage factor is expressed in cubic metres per tonnes.

What is a load density?
It is defined as the unit weight per square metre expressed in tonnes.

Broken stowage?
Broken stowage is defined as lost space around and with in stowed cargo.

What all is written on the CSC SAFETY APPROVAL PLATE?
1. Country of Approval & Ref No
2. Date of manufacture
3. Box number (4 letters and 7 numbers)
4. Maximum gross operating weight
5. Allowable stacking weight
6. Racking test load value
7. End wall strength (if < of > than 0.4P)
8. Side wall strength (if < or > than 0.6 P)
9. Examination date (month and year)

What is IMDG?
The international maritime dangerous goods code, is a complete guide published by the international maritime organisation for the purpose of safe handling of the dangerous goods all around the world. It contains the uniform information for everyone everywhere.

The old IMDG consists of four volumes and a supplement and was well known as the five blue books in the ships office.
On 1st January 2001 the IMDG code 2000 edition was launched, while the old code continued in service. On 31st December 2001 the old edition ceased to be current. On 1st January 2004 the IMDG code 2000 is mandatory for all ships.

New IMDG code 2000 consist of three books, two volumes and one supplement. Marine order 41 deals with DANGEROUS CARGOES.

CLASSIFICATION OF DANGEROUS CARGOES
Class 1 Explosives
Class 2 Gases
Class 2.1 Flammable gases
Class 2.2 Non flammable gases
Class 2.3 Toxic gases
Class 3  Flammable liquids
Class 4  Flammable solids
Class 4.1 Flammable solids
Class 4.2 Liable to spontaneous combustion
Class 4.3 Flammable gases emitted when wet
Class 5  Oxidising agents and Peroxides
Class 5.1 Oxidising agents
Class 5.2 Organic peroxides
Class 6  Toxic and Infectious substances
Class 6.1 Toxic substances
Class 6.2 Infectious substances
Class 7  Radioactive
Class 8  Corrosives
Class 9  Other hazardous cargo.

What is dewpoint temperature?
The temperature to which air must be cooled in order for condensation to occur is called the Dewpoint temperature.

Preparation for entering enclosed space?
1 Make sure that the space where you are going to enter must be properly ventilated.
2 Check that the space should be gas free.
3 Check the oxygen contents in the enclosed space.
4 Then you must have a proper enclose space entry permit.
5 Make sure that all the line going to the enclosed space must be isolated and tag should be put on the valve giving the time and date and signature of the person.
6 Proper lifesaving equipment should be ready to use.
7 Proper protective clothes should be used.
8 Breathing apparatus must be ready with a life line.
9 There should be a responsible person stand by out side the entry.
10 There should be a proper communication between the bridge the responsible person staying outside the entry and the person in side the enclose space.
11 Stretcher should be ready out side the entry.
Preparing vessel for load line survey.
1. all doors to the enclosed structure must be in good condition.
2. All dogs clamps and hinges should be free and well greased.
3. All gaskets and watertight packing should be crack free.
4. Doors must be open from both ends
5. All cargo hatches and entry to the holds must be weather tight. Check specially the battenning devices such as cleats and wedges.
6. Machinery space opening should be weather tight on exposed deck.
7. All manholes and flush scuttles are capable of being made watertight.
8. All ventilators must be in good condition.
9. All openings below freeboard deck must be watertight.
10. Ensure that the non return valve overboard discharges are operating in satisfactory condition.
11. De — rust and paint the deck line. Load line marks, load line, and the draught marks.
12. All guard rails and bulwarks should be in satisfactory condition.
13. Check that all freeing ports are in satisfactory condition for example, shutters are not jammed, hinges are free, and that pins are of non corroding material.

What fire fighting equipment are there on your last ship?
1. fixed fire fighting equipment CO2
2. in engine room there was a 45 lts foam extinguisher
3. in bridge, galley, in engine control room, there was CO2 portable fire extinguisher of 9lt.
4. In accommodation there was foam type and water type portable fire extinguisher and in some places there was dry powder extinguishers are there.

Change in draft in different densities?
As ship goes from one density to other density of water the draft of the ship changes. As ships goes to lesser density from 1.025 and draft of the ship increases.

What is SOLAS?
It is the international convention for the safety of life at sea, 1974. The main objective of the SOLAS convention is to specify minimum standards for the construction, equipment and operation of ships. SOLAS entered into force in May 1980 and SOLAS protocol 1978 in May 1981.
It consist of 12 chapters and 3 annexes
Give the detail information regarding construction,
fire protection, fire detection,
life saving appliances,
radio communication,
safety of navigation,
carriage of cargo and dangerous goods,
nuclear ships,

Inderjit Singh
safe operation of ships where as the annexes gives the details of harmonised system of survey and certification, certificates and documents required to be carried on board ships and list of resolutions adopted by the SOLAS conferences.

**Name IMO codes, how many?**
IMO codes fall under 7 categories as follows
1. Cargo (grain, IMDG, timber deck cargoes etc)
2. Marine technology (alarms and indicators, construction of chemical and LPG carriers)
3. Marine environment (crude oil washing system)
4. Navigation (international code of signals, standard marine navigation vocabulary)
5. Life saving, search and rescue (IAMSAR)
6. Radio communications (EPIRB recommendations)
7. Training and certification (ISM, STCW)

**What is these codes?**
These are non treaty instruments which deals with wide range on subjects. These are not legally binding on the governments unless mandatory effect is given through a convention such as ISM code which is mandatory through the SOLAS convention.

**What is marine notices?**
These are the normal notices of any information related to the marine industry is issued as a marine notice by the Australian maritime safety authority. Such notices issued as change in fees, change of IMDG etc.

**Vessels mean draft forward and aft is 7.89 m, midship draft is 7 m. what cause this condition, and what is it called.?**
This happen when weights are not loaded proportionally. In forward and aft more weight is loaded as compare to mid part. This condition is called HOGGING.

**What do you understand by AB?**
AB means Able Body seaman.
What are the duties of AB?
1. look out
2. daily deck work and maintenance.
3. In port check moorings
4. Cargo watches
5. Doing steering
6. Mooring stations

How do you ascertain risk of collision?
Risk of collision exist if the compass bearing of an approaching vessel does not appreciably change and risk of collision also exist if there is a change in bearing but we are approaching a large vessel or a tow or approaching a vessel at close range.

What do you understand by systematic radar observation?
Systematic radar observation mean that proper tracking of the approaching vessel is made.
Doing a proper 3 or 6 minute plot. And find out the CPA, TCPA, course and speed of the approaching vessel, range of the vessel, aspect of the vessel, bearing of the vessel. Or by using ARPA acquiring the target and find out full details of the vessel.

For collision avoidance how your radar should be stabilised?
For collision avoidance the radar should be always sea stabilised.
And for navigation purpose radar should be ground stabilised.

Why do you take 3 or 6 minute time intervals for your plotting?
Its more easy to calculate as 6 min is one tenth of the hour.

Which one is more accurate?
The accurate one is 6 minute plot.

What O.A. vector indicate?
O.A. vector represent the relative movement of the target vessel.

What W.A. vector indicate?
W.A. vector represent the speed and course of the target vessel.
How you come to know whether target is moving or not?
From the W.A. vector, if the W.A. is zero then the target is not moving.

When you are coming to Australian port how do you check your L.S.A. and F.F.A.?
While coming to Australian ports make sure that all LSA and FFA are up to date and in good condition and are surveyed. And check marine order part 15 for FFA and marine order part 25 for LSA.

What are the stages of passage planning?
There are 4 stages of passage planning
Appraisal
Planning
Execution
Monitoring
And further 2 more stages are
Updating and
Archiving

Define flashing, isophase, occulting?
Flashing – total duration of light is less than darkness
Isophase – light and darkness of equal interval
Occulting – duration of light is greater than darkness.

What is safe speed and how will you determine safe speed?
A speed which allows time to take effective action to avoid collision. It should be determined by the state of visibility, traffic density, manoeuvring ability of own ship,

What do you mean by competent person?
Means a person having practical and theoretical knowledge and relevant experience, sufficient to enable that person to detect and evaluate any defects and any weaknesses that may affect the intended performance of the equipment. (chief officers, chief engineer officers and second engineer officers are considered to be competent persons.)
What is marine orders and where do you find them?
Marine order are legislation or regulations which are made by the Australian
Maritime Safety Authority. Marine orders are disallowable instruments and they
have to be laid before parliament and can be disallowed. Marine orders are found
in Australia.

What are notice to mariners? Contents and who issue it?
Admiralty notice to mariners, weekly editions, contains information which enables
the mariner to keep his charts and books published by the UK hydrographic office
up to date for the latest reports received. This also includes NZ and AUS chart
correcting notices and selected temporary and preliminary ones.
The notice are published in weekly edition and are issued by the hydrographic
office on a daily basis to certain chart agents.

Contents of weekly edition
Section I  Explanatory notes, indexes to section II
Section II  Admiralty notice to mariner correction to charts
Section III Reprints of radio navigational warnings
Section IV Correction to admiralty sailing direction
Section V  Correction to list of lights and fog signals
Section IV correction to admiralty list of radio signals

What you find in Annual Summary of Admiralty notice to mariners?
The first few notices of each year are not published in weekly edition no.1, but in
Annual Summary of Admiralty Notice to Mariners which is published as soon as
possible in the year.
Summary are reprints of all admiralty temporary and preliminary notices which are
in force on 1st January. It also contains reprints of all corrections to admiralty
sailing directions which have been published in section IV and re in force on the
same date.

You join a vessel as a 2nd officer, how will you find that your charts
are corrected?
I will check the chart correction log, check last 3 notice to mariners and check
cumulative list to notice to mariners.

What is cumulative list?
The dates of the current edition of each admiralty chart and each Australian and
New Zealand chart republished in admiralty series, and the serial numbers of
permanent notices affecting them issued in the pervious 2 years, are published in
this list.
What is the SWL for union purchase?
One third of the single derrick.

What is the maximum angle between the runners?
Should not exceed 120°.

What would be the effects on the SWL every ten degrees of increase in angle and what would be the stresses in relation to the SWL?
Safe working load decreases with the increase in angle where as the stress increases with the increase in the angle between the runners.

How would you rig a pilot ladder at night?
1. First of all make sure that pilot ladder is in good conditions.
2. There should not be any broken or oily steps.
3. Make sure that it should be clear of discharges and scuppers.
4. Must be of one lengths.
5. There should not be any joints or splicing in between.
6. Lower 4 steps must be of rubber.
7. And 5th step must be spreader.
8. There must be a tripping line attached to the pilot ladder.
9. All steps must be firmly rest toward the ship side.
10. Proper light should be there on the ladder and it should not interfere the driver of the pilot boat.
11. Heaving line should be ready to use to lift the pilots baggage if any.
12. Life buoy with self igniting light should be there.
13. A responsible person must be stand by on the pilot ladder to receive him.
14. There must be a proper communication in between the responsible person and the bridge.

If gyro reads 3 degree high would you apply this error to the gyro bearings you take for collision avoidance?
No.

Gyro failure action? Do you apply compass error to your bearings.
1. First immediately put the wheel on hand steering
2. And start to steer on the compass course.
3. Inform master.
4. Inform engine room.

No, I will not apply compass error to the bearings.
How would you take the bearings on magnetic compass in such a situation?
I will use azimuth mirror.

Pilot ladder specification?
Side rope 22mm
Manrope 28mm
Step (480x115x25) mm
Spreader (1800x115x25) mm
Lower four steps should be of rubber or equivalent material.

How would you takeover the navigational watch?
1 always be fit for duty
2 always be early to adjust with the night vision and for situation awareness.
3 Read masters night orders and special instructions such as call me points, ETA.
4 Check next look out person is fit for duty
5 Check the position, course, speed and draught of the vessel.
6 Check the next chart, way point and course lines
7 Check prevailing and predicting tides, currents, weather, visibility.
8 Check operational condition of the navigational equipment and safety equipment used or going to be used.
9 Check for gyro and magnetic errors.
10 Traffic density and what action is taken to avoid collision.
11 Then only say I'm on watch.

How would ascertain the position of your vessel at anchor?
By vertical sextant angle and horizontal sextant angle.

How would you ascertain vessel dragging anchor?
When the beam bearing of the vessel changes, and when the range of the vessel from a prominent land marks right ahead changes that means anchor is dragging.

Length of one shackle and how many shackles on last ship?
One shackle is 27.5 meters and on my last ship there are 9 shackles on one side and 10 shackles on the other side.

How will you mark the 4th shackle?
Normally the kentre link painted red and the 4 chain links are painted white and the 4th link marked with a number of turns of seizing wire around the stud corresponding to the number of the joining shackle.
What is a fathom and how much is one fathom?
A unit of measurement used for soundings. Equal to 6 feet or 1.8288m.

What type of valves are fitted in bilges, and what are their functions?
Screw down non return valve are fitted in bilge systems. If the sea water suction is open then the non return valves stop the water to flow back in the bilges.

How would you determine your vessel is dragging her anchor in restricted visibility?
You can go forward and visually observe and hear the sound of the chain. As it will slag and then taut and again slag and then again taut.

Where did you have your emergency fire pump? And why is it separated from the machinery space?
Emergency fire pump must be located away from the engine room in the shaft tunnel, steering gear space, a deck enclosure or in the forward part of the ship. It is separated because in case of fire in the engine room we can operate the emergency fire pump from out side of the engine room.

How many fire pumps did you have in engine room?
Two dedicated fire pumps.

How will you plan a passage?
1. chart catalogue
2. select all charts ocean, costal, pilots and load line charts.
3. Select all publications including sailing directions, list of light, radio signals, guide to port entry, tide tables, tidal stream atlases.
4. Make sure that all publications and charts are corrected up to date including all new charts and publications.
5. Check NTM for local area warnings.
6. Check vessels arrival and departure draught.
7. Check reporting systems, traffic services, routeing schemes.
8. Consider weather routeing for passage.
10. Port entry preparation
11. Guide to port entry must be studied for local regulations etc.

Will you plan your passage from pilotage to pilotage?
NO, it should be from berth to berth.
How will you come to know that your radar is operation properly?
By checking performance monitor.

If performance monitor is not working properly, how will you know that its working good?
I will take one target at the edge of the range (any range) and then increase the sea clutter and then with use of gain and tuning I will tune the radar and make the target echo strong. If it shows good means the radar is working good.

Emergency steering and location of emergency steering?
All steering systems are fitted with an emergency steering system in the event that the main steering fails the emergency steering can be used. In an emergency, the steering can be operated from the steering flat.

How will you cross and join a traffic separation scheme, on what angle?
Shall cross on a heading as nearly as practicable at right angle to the general direction of traffic flow. And when joining or leaving from either side shall do so at as small an angle to the general direction of traffic flow.

ISM code in detail?
ISM stand for international safety management code. Provides safe management of ship’s operation and pollution prevention.
Objectives
Safe operation on ships
Safety at sea
Prevention of human injury or loss of life
Avoidance of damage to marine environment and property.
Safe working practices on ships
Improving safety management skill among the personnel on board ships and ashore.
Safe guard against all identified risks.

Enforce from 1st July 1998
for all passenger ships, oil/chemical, gas carriers & high speed crafts.
From 1st July 2002
All cargo ships and mobile offshore drilling units
Mandatory to all commercial ships above 500 GRT

DOC  document of compliance is issued by the flag state to the company which complies with the requirement of ISM code and one copy of DOC is kept on board ship.
SMC safety management certificate shall be issued to every ship that is operated by a company that meets with the code’s requirement.

**Manoeuvring light what is its range and where it is placed?**
Light used for giving manoeuvring signals and its range is 5 nautical miles.
It shall be placed in the fore and aft vertical plane as the masthead light or lights and, where practicable, at a minimum height of 2 metres vertically above the forward masthead light, provided that it shall be carried not less than 2 metres vertically above or below the after masthead light.

**What is transverse thrust?**
Transverse thrust is the force that tends to move the stern 90 degree to the axial thrust.

**Advantages of William son turn?**
Its very reliable turn.
Well known manoeuvre - details can be easily found on manoeuvring data sheet or manoeuvring diagrams.
It doesn’t matter when the manoeuvre take place.

**Describe William son turn?**
William son turn is to bring back the vessel to the initial track on a reciprocal heading.
After person overboard wheel hard over to the person overboard side. Wait until the heading changes about 60 degree to the initial heading and then put wheel hard over to the other side and when its about to reach 30 degree to reciprocal course wheel midship and steady the vessel on the reciprocal course. Make sure vessels speed should be on search speed of about 4 knots.

**Specification of side lights and what height it should be placed?**
A green light on starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degree abaft the beam on its respective side.
The side light of a power driven vessel shall be placed at a height above the hull not greater than three quarters of that of the forward masthead light. And they shall not be so low as to be interfered with the deck lights.
What do you mean by all available means?
Means by the use of all look out means such as
By sight
By hearing
By radar
By using navigational equipment

What do you mean by compass bearing and relative bearing?
The compass bearing is a bearing which is taken from a standard compass.
And relative bearing is a target vessel’s bearing relative to own ships head. If
we add relative bearing to ship’s head then it is true bearing.

Pilot boarding suddenly falls overboard. Action?
1. throw the lifebuoy with self igniting light.
2. Inform bridge immediately.
3. If on bridge make sure u inform master.
4. Make wheel hard over to the pilot overboard side.

Difference between TPA and immersion suit.
TPA is thermal protective aid are device that are worn in survival craft to reduce
heat loss due to normal convection, wind chill and the evaporation of water
from wet clothing. Where as immersion suit is a protective suit which helps in
maintaining body temperature of a person by wearing it in cold water and save
the person from the thermal shock on entering in a cold water.

What has the aspect of the vessel got to do with risk of collision?
Aspect means the angle between the bearing of own ship from the target ship
and the course of the target ship is called aspect. If the aspect remain constant
the risk of collision exist.

What is look out?
Every vessel shall maintain proper lookout by sight and hearing as well as by all
available means appropriate in the prevailing circumstances and conditions so
as to make a full appraisal of the situation and of the risk of collision.

How will you secure deck for heavy seas?
1. make sure that hatches are close
2. batten down properly put cleats and wedges
3. make sure that all lose objects are lashed properly
4. all mast house doors are weather tight and closed properly
5. derricks/cranes are in stowed position
6 proper lashing of derrick and cranes
7 inside stores all lose objects secured
8 paint store all paint drums must be secured and lashed.
9 Put guard rails all over

What are the information contain in ANNUAL SUMMARY TO NOTICES TO MARINER?
1 Gives all the 'T' and 'P' NTM which are in force for the year.
2 Correction to sailing direction.
3 Tide table corrections
4 Traffic separation schemes shown on the admiralty charts
5 Distress and rescue at sea by ships and aircraft
6 Fire practice areas and exercise areas
7 World wide navigational warning services
8 Availability of notice to marines
9 Ship reporting systems that is automatic identity reporting system

Sound signal is always supplemented by a light signals which one?
Only manoeuvring signals are supplemented by light signals.

What is the fog signal for vessel at anchor other than the bell signal?
That is three blast in succession one short one prolong one short on a whistle.

Why she will sound such a signal? And when?
It will sound such a signal when she is giving a warning of her position and of the possibility of collision to an approaching vessel

How often you do an abandon ship drill?
Once in month or with in a 24 hours after leaving port if 25% or more crew is changed.

Can you use relative bearing as collision avoidance?
No

What will be the SWL (U) of two 7T derrick?
Safe working load of a union purchase derrick is one third of the single derrick.

How you know the above?
We can find it from the Marine order Part 32 that is Cargo Handling Equipment.
How Hydro static Release Unit work or activated?
When it make fast to ship if the ship sinks it will activate between 1.5 to 4 metre depth of water a razor is released from its stowed position under pressure and cut the rope and clear the life raft from lashing.

What is pelorus and how you will use on board?
The pelorus is a device used for obtaining bearings from positions in which it is not practical or economic to provide a compass and azimuth mirror. Pelorus is taken to the desired position and the lubber line on the outer casing is then aligned with the fore and aft line of the vessel. Then the graduated plate is rotated so that the vessel’s course is aligned with the lubber line. The plate is then clamped in the position. True bearing is taken by releasing the locking nut in the centre of the plate and using the sighting vanes.

Will you still use pelorus while the ship is yawing?
No as it change the true bearings.

How will you come to know if the other vessel is making way or not making way?
By the true vector on the radar plot.

What is transit bearing?
Two objects are described to be in transit when they can be seen in a direct line with each other. We can align the ruler on the chart between the objects a line can be drawn on a chart. Thus we can effectively use this line of transit as a position line.

What is the anti pollution equipment? List them?
All equipment kept in the SOPEP locker (shipboard oil pollution emergency plan) used in case of oil pollution.
List of equipment
1. saw dust
2. rags
3. brooms
4. shovels
5. scupper plugs
6. drip tray plugs
7. oil dispersant chemicals
8. manual pumps
9. scoops
10 sponges
11 buckets
12 empty drum

*When do you use the oil dispersant?*
In case of oil spill and oil is gone in the water but we had to take permission from the local authorities.

*What are the requirements of the ISM code for the drills in board, and how often?*
- Fire drill: monthly or within 24hr of leaving port if 25% of the crew changed.
- Abandonment: monthly or within 24hr of leaving port if 25% of the crew changed.
- Rescue boat: monthly – 3 monthly
- Davit launched liferaft: 4 monthly
- Emergency lighting: monthly.

*What is nominal range?*
Nominal range is the range at which a light may be seen under the metrological visibility of 10 nautical miles.

*Luminous range?*
The luminous range is the range at which a light is expected to be visible for a given meteorological visibility.

*Geographical range?*
It is also known as extreme range. It is the limiting maximum range the light can be seen due to height of eye and the elevation of the light, as dictated by the curvature of the earth.

*How will you launch a life raft manually from a stored position?*
1. First of all make sure that the painter is secured to the deck.
2. Then check down that should be clear.
3. Then lower the embarkation ladder.
4. Manually release the life raft lashing.
5. Lift the life raft and throw it in the water.
6. Then pull the painter.
7. And inflate the life raft.
8. Then one person go down in the life raft and check for any leaks or damages.
9. Then all persons go down in the life raft one by one.
4 If centrifugal pump is fitted in a high places like steering flat, a priming pump is fitted.

**How do you operate CO2 system?**
The actuating handle opens the pilot cylinders of CO2 and the gas from these pushes the piston in the servo-cylinder down, to operate the gang release for the other bottles. The other handle is operated to open the master valve, to allow the CO2 to enter the machinery space.

**How CO2 alarm works?**
The CO2 alarm should be incorporated in the system. When the control box is opened to actuate the handles, the CO2 alarm should be automatically sound. This alarm is a requirement to warn personnel to evacuate the machinery space if the CO2 is accidentally released.

**Who decides when to discharge CO2?**
The master is kept informed of the fire situation by the chief engineer. Under the chief engineers recommendations master gives the final order to release the CO2 total flooding system.

**What steps are to be taken before total CO2 flooding?**
1. evacuate all personnel from the machinery space
2. take a head count to confirm all personnel are accounted for.
3. Baton down and seal off the machinery space by taking the following steps
   close all doors to the space
   shut down all skylights
   shut ventilation fans and
   close dampers on vents.
4. Shut fuel tanks by operating the collapsible or quick closing remote valves.
5. Open the door of control box for operating the CO2. This will operate the audio visual alarm in the engine room.
6. Continue with boundary cooling, if appropriate, even after total CO2 flooding.
10 Last person can take off the painter end and take along with him in the life raft.
11 Then using paddles and sea anchor move away from the ship.

What are the different type of detectors? How often they should be tested?
1 thermal detector
2 smoke detector
3 ionisation or combustion products detector
4 flame detectors

Fire detectors should be tested regularly. These tests are usually carried out during the weekly emergency gear tests. It is recommended that all detectors are tested at least once a month.

What are the requirement for fire detector system?
1 there must be two source of power supply.
2 Detectors and calling points must be grouped into sections.
3 Calling point must indicate visual and audible fire signal at the control panel and indicating units in case of activation of detector.
4 If the signals have not received attention with in 2 minutes and audible alarm must be automatically sounded through out the accommodation service spaces. This alarm sounder system need not be an integral part of the detection system.

Fire alarm activated. Action?
1 muster at your muster station.
2 find out which zone is activated
3 find out which detector is activated
4 if false alarm is there rectify the problem and resume normal duties
5 find out as must as possible about fire, the vicinity, type, surroundings, etc and inform
6 restrict the fire as much as possible, by closing doors, removing fuel, shutting remote fuel valves, shutting blowers etc.
7 extinguish with portable extinguishers if possible.
8 Together with the relevant parties fight the fire.

Emergency fire pump?
1 the emergency fire pump is located away from the engine room in the shaft tunnel, steering gear space, a deck enclosure of in the forward part of the ship.
2 Should be independent driven such as a diesel engine or an electric motor powered from the emergency supply.
3 Suction lift of pump is limited there fore restricted to being at a maximum of 6m from the water lever at light draft condition.
If centrifugal pump is fitted in a high places like steering flat, a priming pump is fitted.

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